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Water

EPA

Pretreatment

Guidance Manual for the Use of Production-Based Pretreatment Standards and the Combined Wastestream Formula

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

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OFFICE OF
WATER

MEMORANDUM

SUBJECT: Pretreatment Program Guidance

FROM: Rebecca W. Hanmer, Director
Office of Water Enforcement and Permits (EN-335)

James M. Conlon, Acting Director
Office of Water Regulations and Standards (WH-551)

TO: Users of the Guidance Manual for the Use of Production-Based Categorical Pretreatment Standards and the Combined Wastestream Formula

This guidance manual has been developed by EPA to explain how to implement two important elements of the national pretreatment program: categorical standards and the combined wastestream formula. The manual is divided into two sections. The first section explains how to apply production-based categorical standards in a permit, contract, or similar mechanism. The second part explains how to use the combined wastestream formula, providing definitions and examples.

The manual is one of a series of guidance documents intended to simplify and improve understanding of various aspects of the pretreatment program. Other documents in this series which have either been recently issued or will be issued in the near future will provide guidance on:

1) Removal Credits
2) Total Toxic Organics (TTO) Monitoring
3) RCRA Notification Requirements
4) Local Limits
5) POTW Interference

The need for guidance on the use of categorical standards and the combined wastestream formula was recognized by the Pretreatment Implementation Review Task Force (PIRT). PIRT was set up by the EPA Administrator to make recommendations concerning the problems faced by POTWs, states, and industry in implementing the national pretreatment program. This guidance manual is part of the Agency's response to the PIRT recommendations. It encourages active involvement of both the Control Authority and the industrial user in developing appropriate limits using categorical standards and the combined wastestream formula. Because the industrial users are generally the ones most familiar with their processes and production and flow rates, their participation is needed for proper development of limits.

There are a few items covered in this document which deserve special comment because they are related to Agency policy or anticipated changes in the federal regulations. These are discussed below.

Production-Based Standards

PIRT asked for guidance on, "the ways in which permits, contracts, or other enforceable mechanisms may be used legally to convert production-based standards to equivalent mass or concentration limits." PIRT asked whether the procedures that have been developed for direct dischargers under the NPDES* permit program also apply to indirect dischargers which are not required to be permitted under the federal regulations. The approach taken in this guidance manual is to provide a high degree of consistency between the NPDES program and the pretreatment program regarding application of production-based standards. The manual emphasizes the usefulness of converting a production-based standard to an equivalent mass per day limit, as is normally done when developing NPDES permits. The option of using equivalent concentration limits is also discussed. The discussion of how to determine an appropriate production rate is based on section 40 CFR 122.45(b) of the NPDES regulations.

The manual stresses the importance of applying the equivalent limits using a permit, contract, order, or other official document that is transmitted to the industrial user. As with NPDES permits, this document should clearly spell out 1) the equivalent limit, 2) the production and flow rates upon which the limit is based, and 3) the requirement to notify the Control Authority of changes in flow and/or production rates which would require the limit to be revised. Unless there is such a document, it may be difficult to determine compliance with production-based limits.

Equivalent limits provide a useful tool for determining compliance with applicable categorical standards. Under the current provisions of the Clean Water Act and the General Pretreatment Regulations, however, an industrial user's compliance with an equivalent limit does not relieve the legal requirement to be in compliance with the production-based standard itself. Equivalent limits are enforceable as local limits, but they do not take the place of the categorical standard.

* National Pollutant Discharge Elimination System

A permit containing an equivalent limit does not shield the industry from direct enforcement of the production-based standard. However, EPA will support the proper use of equivalent mass or concentration limits and will generally defer to the Control Authority's interpretation of how to apply them provided:

(1) the equivalent limits are correctly calculated using the guidance provided in this manual and the calculations are documented;

(2) each individual industrial user's limit is specified in a permit, contract, order or other official document that is issued by the Control Authority to the user; and

(3) the permit-type mechanism specifies the production and flow rates on which the equivalent limits were based and requires that the user notify the Control Authority if there is a change in the rates which would require the limit to be revised.

If EPA finds through its oversight activities that the three criteria listed above have not been met, we will generally inform the Control Authority and allow time to correct the problem before taking an enforcement action. However, the Agency may choose to take direct enforcement action in any given situation.

The Agency is planning to propose changes to the General Pretreatment Regulations to provide that equivalent mass per day or concentration limits contained in a permit, contract, order, or other official document shall be deemed Pretreatment Standards for purposes of section 307(d) of the Clean Water Act and shall be enforceable as such. If this regulation is promulgated, compliance with the equivalent limits would be deemed compliance with the production-based standard.

Combined Wastestream Formula

PIRT asked for clarification of the terms "regulated," "unregulated," and "dilution" used in the combined wastestream formula and recommended publication of corrections to Appendix D of the 1981 General Pretreatment Regulations. At present, Appendix D incorrectly labels certain wastestreams as dilution streams. Proposed revisions to Appendix D were published in the Federal Register on May 9, 1985. The reader should refer to this revised version of Appendix D instead of the 1981 list which has significant errors.

This guidance manual also clarifies how the combined wastestream formula should be applied when unregulated and dilution streams are combined with regulated wastestreams after treatment. The combined wastestream formula was developed to be used when wastestreams are combined before treatment. Control Authorities may also use the combined wastestream formula when these streams are combined after treatment but they are not required to do so. The manual provides guidance on how to proceed when Control Authorities do not use the combined wastestream formula when regulated and unregulated wastestreams are combined after treatment. It includes examples showing how a formula should be used to account for the streams added after treatment. If the streams added after treatment are all acting as dilution (as shown by actual analysis), the results may be the same as if the CWF were used. However, if unregulated streams are added after treatment, the results will depend on the mass of pollutants actually present in those streams and will probably differ from a combined wastestream formula calculation.

GUIDANCE MANUAL FOR THE USE OF PRODUCTION-BASED PRETREATMENT STANDARDS AND THE COMBINED WASTESTREAM FORMULA

Prepared by
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Office of Water Regulations and Standards
and
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1. INTRODUCTION

1.1 PURPOSE OF GUIDANCE MANUAL

The Environmental Protection Agency (EPA), given the responsibility of ensuring proper pretreatment program oversight and implementation, has begun developing a series of guidance manuals designed to assist Control Authorities in implementing and enforcing local, State, and Federal pretreatment requirements and standards. Industrial users will also find this guidance useful in meeting their compliance responsiblities with applicable pretreatment standards and requirements.

One of EPA's major areas of concern involves the proper application and enforcement of Federal categorical pretreatment standards by Control Authorities. The purpose of this manual will be to provide guidance on 1) the proper implementation of production-based categorical pretreatment standards, specifically on development and use of equivalent mass and concentration limits and interpretation of industrial user (IU) production and wastestream flow data; and 2) the application of the combined wastestream formula (CWF) including clarification of the definitions of terms used in the formula and clarification of methods for combining production- and concentration-based standards for regulated wastestreams.

Other manuals being developed by EPA will provide guidance on implementation of local limits, total toxic organics standards, and removal credits.

This chapter will provide a summary of background information regarding categorical standards. Other chapters contained in this guidance are organized as follows:

- Chapter 2 - USE OF PRODUCTION-BASED CATEGORICAL PRETREATMENT STANDARDS provides guidance on the proper implementation of production-based standards, including the use of equivalent concentration or mass limits and determination of production and flow rates. Examples demonstrating the use of equivalent limits are also provided.

- Chapter 3 - USE OF THE COMBINED WASTESTREAM FORMULA provides guidance on the purpose of the CWF, definitions of terms utilized, and proper application and implementation of the formula. Examples demonstrating the use of the CWF are also provided.

1.2 BACKGROUND

The purpose of this section is to provide a brief overview of the process by which categorical pretreatment standards are developed. This general overview provides an understanding of the basic process of categorical standards development and the role of categorical standards in the overall National Pretreatment Program. Categorical standards for specific industries are discussed in more detail in other sources, such as the technical development documents supporting each standard, and in the preambles to each standard which are published in the Federal Register.[1]

1.2.1 Purpose of Categorical Pretreatment Standards

Section 307(b) of the Clean Water Act of 1977 (the Act) requires EPA to establish:

> "pretreatment standards for introduction of pollutants into treatment works...which are publicly owned for those pollutants which are determined not to be susceptible to treatment by such treatment works or which would interfere with the operation of such treatment works."

EPA is implementing this mandate through two major regulatory components. One component is encompassed in the General Pretreatment Regulations (40 CFR Part 403), which contain general and specific discharge prohibitions and require that many of the nation's publicly owned treatment works (POTWs) develop local limits to protect their individual treatment systems and the local environment from pass through and interference. These prohibitions and local limits provide a mechanism for controlling conventional, nonconventional, and toxic pollutants.

The second major regulatory component of the pretreatment program is EPA's development of categorical pretreatment standards. Categorical pretreatment standards limit the pollutant discharges of all facilities within an industrial category which discharge into a POTW. (Appendix B of this guidance provides a list of the major industries subject to categorical pretreatment standards along with the effective and compliance dates for existing sources.) The primary focus of categorical standards is the control of toxic pollutants. Because categorical standards may differ from locally-developed limits, a categorical facility must comply with whichever limits are more stringent. Pursuant to 40 CFR Section 403.5(d), it is unlawful to violate either local or categorical standards.

1.2.2 Development of Categorical Pretreatment Standards

Categorical pretreatment standards for a given industry are based on the capability of a specific wastewater treatment technology or series of technologies to reduce pollutant discharges to the POTW collection system. Categorical pretreatment standards are therefore referred to as technology-based. There are two types of categorical pretreatment standards, Pretreatment Standards for Existing Sources (PSES) and Pretreatment Standards for New Sources (PSNS). Each type is based on a specific technology level identified for the industry category for the control of pollutants. The levels of technology correspond to similar technology levels applied to industry direct dischargers known as Best Available Technology Economically Achievable (BAT) for existing facilities and Best Available Demonstrated Technology (BADT) for new sources. In most cases, pretreatment standards for industries which discharge to POTWs (indirect

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[1] Copies of development documents can be obtained from the National Technical Information Services (NTIS), Springfield, VA 22161 (703) 487-4650. A listing of the development document reference numbers for the industrial categories discussed in this document is contained in Appendix A.

dischargers) are based on the regulations for direct dischargers. However, if POTW treatment plant processes can remove any specific industrial pollutant(s) as efficiently as the technology applied to direct dischargers, then pretreatment standards for those pollutants are generally not promulgated for that category.

Categorical standards do not necessarily require that industrial facilities install the specific treatment technology upon which they were based; however, the standards do require that industrial facilities achieve discharge limits that EPA determines are achievable using the model technology.

In some industries, particularly those with product rinse operations, the reduction of wastewater flow is one of the major technology options available to reduce pollutant discharge quantities. For these industries, EPA has identified process equipment or changes in operating practices that will reduce the wastewater flow and the mass of pollutants discharged. In those industries where flow reduction is a major part of the treatment technology defined as the basis for pretreatment standards, EPA issued production-based pretreatment standards since concentration-based limitations would not ensure an equal reduction in the mass of pollutants discharged. Table 1-1 provides the estimates EPA has made of the pollutant discharge rates achievable in ten industries that have production-based standards when flow reduction is included as part of the PSES treatment definition. This table also shows estimates of the expected pollutant discharge rates if flow reduction is not included in the technology basis.

For some categories, flow reduction may provide a certain amount of pollutant removal benefit but the difference is not significant. EPA issues both concentration-based and production-based pretreatment standards for these categories. Control Authorities can require industries in these categories to achieve either the concentration-based or the production-based standard. The choice may depend on whether dilution (as a substitute for treatment) is an expected problem. Dilution is an unacceptable way of achieving compliance with a standard and is prohibited by the General Pretreatment Regulations, 40 CFR Section 403.6(d). Application of a production-based standard makes the practice of diluting to achieve compliance more difficult because pollutant mass is limited.

Finally, for a third group of categorical industries, EPA established only concentration-based standards. This was done when it was not possible to establish a correlation between production and achievable pollutant discharge in order to develop a production-based standard.

TABLE 1-1

EPA ESTIMATES OF POLLUTANT DISCHARGE RATES ACHIEVABLE
WITH AND WITHOUT FLOW REDUCTION AS PART OF TREATMENT TECHNOLOGY

POLLUTANT DISCHARGE RATES (kg/yr)

CATEGORY	D*	I**	TOXIC METALS PSES W/O FR	TOXIC METALS PSES WITH FR	TOXIC METALS DIFF.	TOXIC METALS %	TOXIC ORGANICS PSES W/O FR	TOXIC ORGANICS PSES WITH FR	TOXIC ORGANICS DIFF.	TOXIC ORGANICS %	NONCONVENTIONALS PSES W/O FR	NONCONVENTIONALS PSES WITH FR	NONCONVENTIONALS DIFF.	NONCONVENTIONALS %
Aluminum Forming	59	72	14,542	3,201	11,341	78	710	208	502	71	21,659	8,885	12,774	59
Battery Mfg.	17	129	7,168	908	6,260	87	14	3	11	79	5,422	864	4,558	84
Coil Coating	29	39	2,821	1,001	1,820	65	307	100	207	67	20,007	6,525	12,482	62
Canmaking	3	80	9,241	5,366	3,875	42	3,506	382	3,124	89	299,942	99,729	200,213	67
Copper Forming	37	45	39,464	3,277	36,187	92	2,804	133	2,671	72	13,950	1,705	12,245	88
Metal Molding & Casting	300	508	50,909	7,273	43,636	86	29,273	3,727	25,546	87	NA	NA	NA	
Nonferrous Metals Forming	37	121	6,112	490	5,622	92	19	5	14	74	75,465	13,188	62,277	83
Nonferrous Metals Mfg. I	79	85	16,702	1,635	15,067	90	NA	NA	NA		33,845	8,219	25,626	76
Nonferrous Metals Mfg. II	34	39	228	124	104	46	NA	NA	NA		1,464	479	985	67
Subtotal	595	1118	147,187	22,295	123,912	84	36,633	4,558	32,075	88	471,754	139,594	332,160	70
Iron & Steel	733	162	192,272	33,691	158,581	82	1,401,909	532,454	869,455	62	NA	NA	NA	
Total	1328	1280	339,459	55,986	282,493	83	1,438,542	537,012	901,530	63	471,754	139,594	332,160	70

Notes: * Direct Dischargers
** Indirect Dischargers

PSES w/o FR estimated using raw waste flows
NA - Not Applicable

2. USE OF PRODUCTION-BASED CATEGORICAL PRETREATMENT STANDARDS

2.1 INTRODUCTION

EPA has issued categorical pretreatment standards that are: (1) concentration-based, (2) production-based, and (3) both. Table 2-1 shows which type of standards have been issued for each of the major industrial pretreatment categories. Eight categories have only production-based standards; seven have only concentration-based standards, and seven have both.

EPA has been asked to provide guidance for Control Authorities on how to use production-based pretreatment standards. Production-based standards are expressed in terms of allowable pollutant mass discharge rate per unit of production (e.g., mg/m^2 or lb/1000 lb). Production-based standards are administratively more difficult for the Control Authority to implement than concentration-based standards. To test for compliance with a concentration standard, the Control Authority need only take a wastewater sample, measure the concentration(s) of the regulated pollutant(s), and compare this result to the standard. For a production-based standard, however, the Control Authority must also measure the flow of the regulated wastestream and determine the corresponding production rate. The most difficult step in determining whether an industrial user is in compliance with a production-based standard is sometimes confirming this production rate.

Rather than measure the production rate each time that compliance monitoring is performed, Control Authorities may use equivalent mass or concentration limits as a tool for routine monitoring and enforcement purposes. Equivalent mass or concentration limits use an industrial facility's average production and flow rates to derive a limit that is essentially equivalent to the production-based standard but is expressed as mass per day or concentration (e.g., lb/day or mg/l). This approach is useful because, by using average production and flow rates, the Control Authority does not have to rely on day-to-day variations in the rates. This is the approach which has normally been used in the National Pollutant Discharge Elimination System (NPDES) program for direct dischargers for many years.

Equivalent mass or concentration limits are similar to limits derived using the combined wastestream formula (CWF) since they are usually based on average production and/or flow rates and are intended to remain constant over a reasonably long period of time. Sections 2.7 through 2.9 of this chapter provide guidance and examples which show how to determine appropriate production and flow rates for use in developing equivalent mass or concentration limits. The recommendations presented in those sections are applicable to limits developed using the CWF as well as to equivalent limits developed for a single wastestream. Examples involving the use of the CWF are presented in Chapter 3.

2.2 USE OF EQUIVALENT MASS LIMITS

A production-based standard is applied directly to an industrial user's manufacturing process unless an equivalent limit is established. Direct application would require the Control Authority or the IU to make direct measurements of the current production and flow rates each time that monitoring was performed. There are many instances in which this approach is impractical from the standpoints of cost and technical feasibility. As an alternative, the Control Authority is encouraged to use an average daily production value based on a reasonable measure of the actual production rate.

TABLE 2-1: COMPARISON OF TYPES OF PRETREATMENT STANDARDS FOR MAJOR CATEGORICAL INDUSTRIES

I. Production-based standards only:

- Aluminum Forming
- Battery Manufacturing
- Coil Coating
- Copper Forming
- Iron and Steel Manufacturing
- Metal Molding and Casting (Foundries)*
- Nonferrous Metals Forming
- Nonferrous Metals Manufacturing

II. Concentration-based standards only:

- Electrical & Electronic Components
- Leather Tanning & Finishing
- Metal Finishing
- Organic Chemicals, Plastics, & Synthetic Fibers*
- Pharmaceuticals
- Steam Electric
- Pesticides

III. Both production-based and concentration-based standards:

- Electroplating
- Inorganic Chemicals
- Petroleum Refining
- Porcelain Enameling
- Pulp, Paper, and Paperboard
- Builders Paper and Board Mills
- Timber Products

* Standards are not yet final.

The average daily production rate is used to develop an equivalent mass limit according to the relationship:

$$\frac{\text{standard x ave. production rate}}{\text{conversion factor}} = \text{equivalent mass limit.}$$

The same average daily production rate is multiplied by both the daily maximum and maximum monthly average standards. The resulting limits are a daily maximum mass per day and a maximum monthly average mass per day. (See Table 2-2.) A long-term average production value should be used -- usually a 12-month average. It is important to select a production level that will be representative during the life of the permit or other control mechanism. For example, for a five-year permit the Control Authority should evaluate enough production data to determine if it is possible to select an average production level that will be representative for the next five years. Section 2.8 discusses methods for establishing an appropriate production rate in more detail, including techniques to use when production is highly variable or historical data is unavailable.

The advantage of using equivalent mass limits, instead of applying the standards directly, is that it eliminates the need to routinely conduct exhaustive studies of plant production rates and wastewater detention times. For routine monitoring purposes, it is necessary for the Control Authority to measure only flow and concentrations of pollutants.

2.3 USE OF EQUIVALENT CONCENTRATION LIMITS

Direct measurement of flow on a routine basis by either the industrial user or the Control Authority is often more feasible from a cost and technical standpoint than is direct measurement of production. However, the Control Authority may decide, on the basis of cost, technical, or managerial considerations, to develop an equivalent concentration limit using an average daily flow rate based on a reasonable measure of the actual flow rate. Equivalent concentration limits eliminate the need to directly measure flow and production each time that monitoring is performed and permit the Control Authority to routinely measure only pollutant concentrations to assess compliance with production-based standards.

An equivalent concentration limit is developed using both an average production rate and an average flow rate. The average daily production rate is multiplied by the standard and this product is divided by the average daily flow rate, according to the relationship:

$$\frac{\text{standard x ave. production rate}}{\text{ave. flow rate x conversion factor}} = \text{equivalent concentration limit.}$$

It is proper to use the same production and flow values to derive both daily maximum and monthly average limits. (See Table 2-2.) Long-term average flow and production rates should be used and they should be based on the same time period. Section 2.8 discusses methods for establishing an appropriate flow rate in more detail. It is important to select average production and flow rates that will be representative during the life of the permit.

TABLE 2-2: APPLICATION OF PRODUCTION-BASED STANDARDS

Equivalent Mass Limits

Standards:

Daily Maximum.......	.004 kg Cu/ton of product
Maximum Monthly Average...........	.002 kg Cu/ton of product

Conditions:

Production..........	500 ton of product/day, 12-month average
Flow................	Not Applicable

Calculations:

.004 kg Cu/ton x 500 ton/day = 2 kg Cu/day

.002 kg Cu/ton x 500 ton/day = 1 kg Cu/day

Equivalent Limits:

Daily maximum.......	2 kg Cu/day
Maximum Monthly Average...........	1 kg Cu/day

Equivalent Concentration Limits

Standards:

Daily Maximum.......	.004 kg Cu/ton of product
Maximum Monthly Average...........	.002 kg Cu/ton of product

Conditions:

Production..........	500 ton of product/day, 12-month average
Flow................	.2 million gal/day, 12-month average

Calculations:

$$\frac{.004 \text{ kg Cu/ton} \times 500 \text{ ton/day}}{.2 \text{ mil gal/day} \times 3.78^*} = 2.6 \text{ mg/l}$$

$$\frac{.002 \text{ kg Cu/ton} \times 500 \text{ ton/day}}{.2 \text{ mil gal/day} \times 3.78^*} = 1.3 \text{ mg/l}$$

Equivalent Limits:

Daily Maximum.........	2.6 mg/l Cu
Maximum Monthly Average.............	1.3 mg/l Cu

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* This factor converts kg/mil gal to mg/l.

When using equivalent concentration limits, it is important to ensure that dilution will not be used to achieve the limits. For example, mixing the regulated wastewater with additional flow that has not been reported to the Control Authority would be a form of deliberate dilution. If dilution is an expected problem, it may be better to use mass per day limits and routinely measure the actual flow rate.

2.4 OBTAINING AND VERIFYING PRODUCTION AND FLOW INFORMATION

The Control Authority must maintain records on each industrial user to which equivalent mass or concentration limits have been issued that reveal how the production and flow levels were established and how the calculations were performed to derive the limits. These records will be reviewed by EPA or delegated State officials during their visits to the POTW for pretreatment program inspections and audits.

The General Pretreatment Regulations, in 40 CFR 403.12, describe the reporting requirements applicable to categorical IUs. Under the current regulations the IU must provide production and flow information to the Control Authority when it is necessary to determine compliance with a standard or if it is necessary to develop permit limits for the user. The information can be requested under Section 308 of the Clean Water Act or similar authority in a local program and as a requirement of the General Pretreatment Regulations. The information must be obtained in the form of a signed document such as a letter, report, or permit application.

Section 403.14 of the General Pretreatment Regulations discusses the confidentiality of industrial information submitted to the Control Authority. Information which is considered effluent data cannot be confidential under the Clean Water Act. In 40 CFR 2.302(a), effluent data is defined to include information on the manner or rate of operation of a regulated process, to the extent necessary to determine compliance with a standard. Therefore, industrial users must submit necessary production and flow rate data to the Control Authority or be liable for an enforcement action. Information which is determined to be effluent data is to be made available to the public in accordance with the procedures in 40 CFR Part 2.

IUs subject to production-based standards are required to submit production and flow rate information in the baseline monitoring report (BMR) which is to be submitted within 180 days after the effective date of a categorical pretreatment standard or 180 days after the final administrative decision on a category determination request under 40 CFR 403.6(a)(4), whichever is later. This information should be verified by the Control Authority soon after receipt of the BMR to determine whether it meets the criteria discussed in sections 2.7 and 2.8 of this manual for choosing appropriate production and flow rates. The participation of the IU is important at this stage in setting appropriate levels for use in developing equivalent limits. IUs will benefit from involvement because they will become cognizant of any mistakes in data or calculations prior to compliance deadlines. The Control Authority will also benefit from the active participation of the IU because the IUs are generally the ones most familiar with their processes and production and flow rates.

Similarly, discharge permit applications should ask for production and flow rate information from IUs subject to production-based standards. When the draft permit is developed, the IU should be given an opportunity to comment and to detect any mistakes in the data or calculations before the permit is issued.

After the compliance deadline, the IU is required, at a minimum, to continue to submit production and flow rate information in the 90-day compliance report which is submitted 90 days after the compliance date and in the periodic reports on continued compliance which are generally due in June and December each year, starting after the compliance date for the categorical standards.

When an IU permit or contract is issued with equivalent limits, the Control Authority should include a clause requiring the user to provide the current average production and flow rates in self-monitoring reports. There should also be a requirement that the IU notify the Control Authority immediately of a significant change in any of the values used in calculating the equivalent limit. The permit should advise the permittee that failure to provide the required information may subject the permittee to an enforcement action. The Control Authority should use this information to reevaluate equivalent mass or concentration limits and modify them, if necessary. Examples shown in sections 2.7 through 2.9 give the reader an idea of what significant changes could warrant modification of the permit limits. As a general rule, a change in the long-term average production or flow rate of greater than 20 percent is considered significant.

The Control Authority can and should inspect the facility's production and flow records and measuring techniques to confirm the accuracy of the reported values. If the Control Authority desires to verify the production rate first-hand or to determine the production rate on a particular monitoring day, then the industrial user may be required to perform actual measurements while a Control Authority representative is present. The proper installation, calibration, and maintenance of flow monitoring equipment should also be carefully checked.

2.5 PROHIBITION AGAINST DILUTION TO ACHIEVE COMPLIANCE

Categorical standards apply to the wastewater from the regulated process. For some categories, the regulated wastestream may include flows from process rinses, showers, handwashes, laboratories, wet air scrubbers, on-site laundries, respirator washes, truck washes, etc. To determine what flows are regulated, it is important to read the published standards, especially the Applicability section of each standard and the following sections of the preamble to the standard: Control Treatment Options and Technology Basis for Final Regulation and Public Participation and Response to Major Comments. It may also be necessary to read the Technical Development Document to determine which flows are regulated. Each categorical regulation published in the Federal Register includes an EPA contact and phone number for further information.

The above-mentioned sources may also provide information on normal flow rates for the regulated wastestreams. Some industrial users may attempt to increase water usage beyond normal, necessary levels in order to avoid use of treatment and control technologies. Such dilution is expressly prohibited by the General Pretreatment Regulations, Section 403.6(d). Control Authorities must implement this provision. If an IU is meeting applicable standards without having installed treatment or instituted other appropriate in-process controls, the Control Authority should investigate and ensure that unnecessary dilution is not being practiced.

When production-based standards are developed, a model flow rate per unit of production is assumed based on appropriate water consumption levels and flow reduction methods. If an IU's actual regulated process flow rate is significantly higher than the model rate, the effluent from the facility could contain concentrations of regulated pollutants below the analytical detection levels. An IU should not be considered to be in compliance with a production-based standard simply because of below detectable effluent concentrations. The Control Authority should ensure that compliance is achieved through appropriate treatment and in-process controls rather than through high water usage. Control Authorities should not normally develop equivalent mass per day or concentration limits which would require achieving below detectable effluent concentrations.

2.6 USE OF PRODUCTION-BASED STANDARDS WITH A PERMIT SYSTEM

It is strongly recommended that equivalent limits be applied using a permit, contract, order, or other official document that is transmitted to the industrial user. This document should clearly spell out 1) the equivalent limit, 2) the flow and/or production rates upon which the limit is based, and 3) the requirement to notify the Control Authority of changes in flow and/or production rates which would require the limit to be revised. Unless there is such a document, it may be difficult to determine compliance with production-based standards.

As an example of the type of production- and flow-related data that should be provided in a permit application, Appendix E contains a portion of the application form for an NPDES permit. It requests the following information:

I. Outfall Location (For an IU permit, this should be changed to "Sampling Point Location")

II. Flows, Sources of Pollution, and Treatment Technologies

   A. A flow diagram and a water balance for the entire facility.

   B. A description of the processes that generate wastewater and the average flow rates contributing to each sampling point.

   C. A description of treatment provided.

   D. Flow and frequency data for intermittent discharges.

III. Production Data

   A. Determine whether a categorical standard applies to the facility.

   B. Determine whether the applicable standard is production-based.

   C. If a production-based standard applies, give average daily production.

The permit itself should contain:

(1) Both the daily maximum and monthly average (or 4- or 30-day average) equivalent limits;

(2) Monitoring frequency;

(3) Type of monitoring or sampling;

(4) The flow and/or production values used as the basis for the equivalent limits;

(5) A "reopener clause" stating that the permit may be modified, revoked and reissued, or terminated if there is a material or significant change in any of the values used in the calculation to fix the equivalent limits.

(6) A requirement that the IU immediately report any material or significant change in any of the values used in the calculation to fix the equivalent limits.

(7) A requirement that periodic continued compliance reports which must be submitted at least semi-annually include the average production and flow rates that prevailed during the reporting period.

2.7 DETERMINING AN APPROPRIATE PRODUCTION RATE FOR USE IN DEVELOPING EQUIVALENT LIMITS

When a Control Authority chooses to use an equivalent mass or concentration limit to implement a production-based categorical standard, it is necessary to determine an appropriate production rate upon which to base the equivalent limit. Since the typical IU permit, contract, or other control mechanism is issued for a period of one to five years, Control Authorities will need to establish a limitation which will be applicable for that period. A potential problem, however, is that a plant production rate applicable to a multi-year period can be calculated in a number of ways, each resulting in a different limitation. This section provides guidance regarding reasonable and recommended procedures for determining a production rate upon which to base equivalent limits.

Production-based categorical standards are expressed in terms of various units of production depending on the nature of the regulated process. Table 2-3 gives a general comparison of the types of production quantities specified in the various standards. This table is greatly simplified; it is intended only to give an idea of the variety in the production bases for different standards.

The material presented in this section on determining an appropriate production rate is applicable to using the combined wastestream formula (CWF) to develop alternative mass limits. The CWF is used when one or more regulated wastestreams are combined with other process or non-process streams.

2.7.1 Background

The proper application of production-based categorical standards is related to the methodology that EPA uses to develop the standards. Categorical standards are developed in such a way that they are expected to be achievable in spite of normal variation in day-to-day production rates and the effect that routine variation has on effluent quality. When most standards are developed, a long-term average production value and its relationship to flow are determined for each industrial facility selected for in-depth study. Variability factors are developed using effluent concentration or mass data obtained by a field sampling program.

TABLE 2-3

COMPARISON OF PRODUCTION QUANTITIES SPECIFIED
IN PRODUCTION-BASED CATEGORICAL PRETREATMENT STANDARDS

CATEGORY	PRODUCTION QUANTITY
Aluminum Forming	mg/off-kg (Al or Al alloy removed from a forming or ancillary process)
Battery Manufacturing	mg/kg (processed material or product, varies w/subcat.)
Coil Coating	mg/m^2 (area processed), g/10^6 cans manfctd.
Copper Forming	mg/off-kg (Cu or Cu alloy removed from a forming or ancillary process)
Electroplating*	mg/m^2 (material plated)
Inorganic Chemicals Man. I*	kg/Kkg (product)
Inorganic Chemicals Man. II*	kg/Kkg (product)
Iron and Steel	kg/Kkg (product)
Metal Molding & Casting	kg/Kkg (metal poured, sand reclaimed, or air flow in scfm)
Nonferrous Metals Forming	mg/kg (product)
Nonferrous Metals Man. I	mg/kg (product)
Nonferrous Metals Man. II	mg/kg (product or raw material, varies w/subcat.)
Petroleum Refining*	kg/Mm^3 (feedstock)
Porcelain Enameling*	mg/m^2 (basis material coated or processed)
Pulp, Paper, & Paperboard*	kg/Kkg (product)
Timber Products*	gr/m^3 (production)

* Has both production-based and concentration-based standards

The variability analysis yields a determination of the achievable maximum daily, or maximum monthly average, concentration or mass per day. This is then combined with the long-term average production and flow rates to yield a production-based standard.

When using equivalent limits to implement production-based standards, the objective is to determine a production rate that approximates the long-term average rate that can reasonably be expected to occur during the term of the permit, contract, or other control mechanism. By long-term average, we mean an average based on the production over an extended period of time that captures a normal range of variation in production. Because of the way the standards are developed, using just the data for a short period of high production is likely to result in equivalent limits that are unnecessarily high, resulting in more pounds of pollutant being discharged than is allowed by the standards. Therefore, basing an eqivalent limit on the production rate for a high day, week, or month should be avoided.

2.7.2 Use of Historical Data

Equivalent limits should be based on an industrial user's actual production rate, not on designed production capacity. Historical information, if available, generally provides the best basis and should be given more weight than projections of future production, which are often unreliable. To determine a long-term average production rate, several years of production data should be examined, if possible. It is important to ask the industrial user to explain any trends or outstanding features of the historical data, especially what the causes were and if they are likely to be repeated in the future. If some of the data are not representative of normal operation and are due to specific events which are not expected to recur, the data should be disregarded.

The following example illustrates how a production level could be determined for use in conjunction with a five-year permit. In brief, the industrial user has five years of historical production data. After discarding the data for one of the years which was determined to be nonrepresentative, the daily average production rate for the highest of the other four years was selected as the basis for the alternative limit. Using the data for the highest year is meant to provide an allowance for large-scale variations affecting production, such as economic cycles, which may be repeated during the term of the permit. Such large-scale variations are not likely to have been taken into account when the standards were developed.

EXAMPLE 2.1 --

Industrial user A has recorded the following annual production figures for each of the past five years:

Year	Total Production (Tons/Yr)
1980	375,000
1981	284,000
1982	304,000
1983	292,000
1984	301,500

The Control Authority wishes to develop equivalent mass limits for the industrial user which will be applied in a five-year permit. Therefore, a reasonable measure of the expected production level for the next five years is needed. A reasonable measure might be based on the production for the highest of the five years, provided it was not an atypical year. In this example, the 1980 figure (375,000 tons/year) would be used, except that it appears to be substantially out of line with the other years, as shown by the calculation below.

$$\text{Average Annual Production} = \frac{1{,}556{,}500 \text{ tons}}{5 \text{ years}} = 311{,}300 \text{ tons/yr}$$

Year	Percent Difference from the Average
1980	+ 20.4 %
1981	- 8.8 %
1982	- 2.3 %
1983	- 6.2 %
1984	- 3.1 %

By checking with the industrial user it is found that between 1980 and 1981, the facility moved part of its manufacturing process to a new plant. Thus the 1980 data should be excluded from further consideration. Looking at the other four years, the production level for 1982, the highest year, would provide a reasonable basis for the equivalent limit.

The average daily production rate is computed using the 1982 production figure (304,000 tons/yr) and the number of production days per year. Since the industrial user has 255 production days per year, the average daily production rate is 1,192 tons per day. If pollutant X has a categorical standard of .001 lb/1000 lb for the monthly average and .0015 lb/1000 lb for the maximum daily average, the equivalent mass limits would be calculated as follows:

Monthly Average Limit (Pollutant X):

$$\frac{1{,}192 \text{ ton}}{\text{day}} \times \frac{2000 \text{ lb}}{\text{ton}} \times \frac{.001 \text{ lb}}{1000 \text{ lb}} = 2.38 \text{ lb/day}$$

Daily Maximum Limit (Pollutant X):

$$\frac{1{,}192 \text{ ton}}{\text{day}} \times \frac{2000 \text{ lb}}{\text{ton}} \times \frac{.0015 \text{ lb}}{1000 \text{ lb}} = 3.58 \text{ lb/day}$$

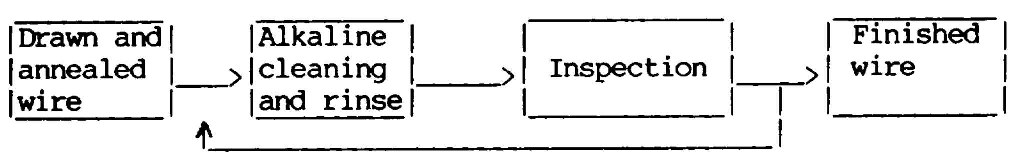
In this example, the average production rate was calculated using the number of production days per year. If the number of wastewater discharge days is different from the number of production days, then the average rate should be calculated using the number of discharge days, instead (See Example 2.4).

In some cases, historical data are available but the measured quantity differs from that specified in the standard. (See Table 2-3.) For example, the standards for some of the metal forming categories are expressed as milligrams per off-kilogram (mg/off-kg), where an off-kilogram is the mass of metal removed from one processing operation for transfer to another. Most facilities have not measured off-kilograms in the past. It may be possible, however, to relate the amount of final product, which is likely to have been measured in the past, to off-kg by developing a conversion factor. This will not always be possible, particularly at facilities where a number of alternate processing schemes are used depending on individual customer specifications and daily variations in product mix. Example 2.2 illustrates how the conversion could be made in a relatively simple situation. First, it is necessary for several corresponding measurements to be made of both the specified quantity (off-kg, in this case) and the quantity which was historically measured (amount of final product). After a few weeks of data have been collected and analyzed, a relationship between the two quantities may be found. It may be a simple multiplication factor that relates the two quantities. This factor is then applied to the historical data so that a reasonable long-term average production rate can be determined from the historical data.

Once a reasonable production basis has been selected and an equivalent limit has been established, the industry must continue to measure the production rate for the quantity specified in the standard. The equivalent limit should be reevaluated using the additional data. This should be done within six months.

EXAMPLE 2.2 ---

A nonferrous metal forming facility produces precious metal wire for several end uses. Wire is drawn and annealed, then cleaned. All wire products are produced in a similar manner, but wire destined for the jewelry industry may go through additional cleaning. Each batch of wire is inspected to determine whether or not it requires additional cleaning. The process diagram looks like this:



The facility must comply with production-based categorical pretreatment standards for the alkaline cleaning and rinse processes in mg/off-kg of metal cleaned. In the past, the facility has kept track only of the amount of finished wire. They have not measured off-kilograms from intermediate steps such as alkaline cleaning and rinse and do not know how much wire is normally returned for additional cleaning. They estimate that the amount returned is between 10 and 40 percent of the amount of finished wire.

The facility therefore assigns an individual to monitor the alkaline cleaning and rinse process and record the production rate in off-kilograms each day for a two-week period. This data is compared to the amount of final product below.

Day	Kg of Finished Wire	Off-kg of Metal Cleaned	Ratio of Metal Cleaned to Finished Wire
1	36,000	43,000	1.19
2	37,600	47,000	1.25
3	38,000	52,000	1.37
4	39,500	55,000	1.39
5	38,900	53,000	1.36
Week 1	190,000	250,000	1.32
6	43,500	56,100	1.29
7	39,500	52,500	1.33
8	38,000	54,000	1.42
9	36,000	43,200	1.20
10	40,000	49,600	1.24
Week 2	197,000	255,400	1.30

The data show that, on the average, the ratio of the mass of metal cleaned to the mass of finished wire is 1.31. Based on this, the Control Authority develops a relationship that converts kg of final product to off-kg of metal cleaned:

off-kg of metal cleaned = 1.31 x kg of finished wire.

The Control Authority then applies the conversion factor to the past several years of historical data to develop an appropriate average production rate expressed in off-kg of metal cleaned. The production rate is used in developing equivalent limits.

Once the equivalent limits are established, the industrial user should continue to monitor the production rate for the cleaning process, at least once every 6 months, by recording actual production for several days. This information should be included in the semi-annual continued compliance reports submitted to the Control Authority. The Control Authority should use the additional data to reevaluate the equivalent limits.

2.7.3 Determining a Production Basis without Historical Data

New industrial facilities or existing facilities that have changed to new processes will not have historical production information that can be used to develop equivalent limits. Furthermore, some facilities have historical data, but the quantity that was measured is not the same as the one specified in the standards and the two cannot be related by deriving a correlation. Without useable historical data, the Control Authority will have to rely on the industrial user's projections of what the actual production rate is expected to be in the future.

Projections are often unreliable indicators of actual future production regardless of the method used in making them and the earnestness of the effort to make reasonable assumptions. Therefore, although the Control Authority may issue an interim equivalent limit based on the estimated future production, the industrial user should be required to begin to measure the production rate of the quantity specified in the standards and supply the data to the Control Authority. The Authority will then be able to reevaluate the original production rate estimate and, if necessary, revise the equivalent limit. This should be done within six months.

2.8 DETERMINING AN APPROPRIATE FLOW RATE FOR USE IN DEVELOPING EQUIVALENT LIMITS

When a Control Authority chooses to use equivalent concentration limits to implement a production-based standard, it is necessary to determine an appropriate average flow rate on which to base the equivalent limits. The considerations for determining an appropriate flow rate are very similar to those described in Section 2.7 for determining a production rate. For instance, in both cases it is important to:

- Determine a reasonable estimate of the actual long-term average rate; for example, the normal daily average during a representative year.
- Use the actual rate rather than the design rate; emphasize historical data rather than future projections.
- Use the same average rate to calculate both daily maximum and maximum monthly average alternative limits.
- Establish a rate that is expected to be representative during the entire term of the permit or other control mechanism.
- Avoid the use of data for too short a time period. In particular, estimating the average rate based on data for a few high days, weeks, or months is not appropriate.
- Reevaluate equivalent limits every six months using additional monitoring data. If the actual average rate changes by more than 20 percent from the estimated rate used as the basis of the equivalent limits, then the limits should be revised.
- If an average flow rate is determined based on historical data, it should be based on the same time period as the production rate. In Example 2.1, for instance, the average flow rate would have been based on 1982 data.

As discussed previously in Section 1.2.2, production-based standards are developed using a model treatment technology that includes wastewater flow reduction as a major component. Control Authorities and industrial users should be aware of these model technologies. One source of information concerning model flow rates and process equipment to reduce water discharge rates is the technical development document for each of the industry categories (See Appendix A). Some specific problems and examples pertaining to determining an appropriate flow rate are discussed in the remainder of this section.

2.8.1 Flow Measurement and Flow Estimation

Because of the importance of accurate flow measurements to determining compliance with categorical standards and equivalent limits, the Control Authority should usually require categorical industrial users to install flow measurement equipment. Monitoring equipment can be permanently installed that will both (1) continuously record the instantaneous rate of flow of a fluid passing by a primary measuring device and (2) calculate and record the cumulative volume that passes during a 24-hour or longer period. If the equipment is properly installed, operated, and maintained, it is possible to obtain complete and accurate information on instantaneous flows, cumulative 24-hour flows, and cumulative or average flows for a longer period.

If such flow measuring data are available, the Control Authority should assess compliance using either the cumulative 24-hour flow for a particular monitoring day or the daily average flow based on the data for a longer period. The cumulative 24-hour flow corresponding to the day on which sampling is performed, when combined with concentration data from 24-hour flow-proportional composite sampling, often gives the best indication of the actual mass of pollutants discharged on a given day.

Thus, a permanent device that continuously records the flow rate is recommended. A device that allows only visual observation of instantaneous flows is usually inadequate for at least three reasons:

1) Production-based standards limit the amount of pollutants that can be discharged for any one day (daily maximum) or for the average of several days (maximum monthly average). Compliance with such standards should be determined based on the total flow during a sampling day, not on the flow at a single instant.

2) Flow records are needed to determine average flows for developing alternative concentration limits.

3) A complete flow record enables the Control Authority to determine if wastewater is discharged on weekends, evenings, or other unexpected times.

There may be cases where an IU can justify other methods of flow determination. Sections 403.12(b)(4) and (e) of the General Pretreatment Regulations state that, where justified by cost or feasibility considerations, the Control Authority may allow verifiable estimates of flow as opposed to actual measurements. Guidance on methods for accurately measuring and estimating flow rates can be found in the references listed in Appendix C.

At a minimum, it is always necessary to determine the average daily flow for the regulated process wastestreams. In addition, when the combined wastestream formula is used, not only are the flow rates for the regulated waste streams required, but the flow rates of unregulated and/or dilution streams are sometimes required as well. It is often necessary to conduct a water balance of the entire plant which accounts for all water entering and leaving. For example, incoming water may be determined from meter readings or water bills; measuring equipment may be installed at accessible points; flow volumes for batch processes may be estimated from a knowledge of tank sizes and number of batches; and so on. A water balance is useful to verify that flow rates have been accurately determined for using the CWF or to enable estimation of certain flows which are difficult to measure.

EXAMPLE 2.3 --

The Copper Forming categorical standards regulate the discharges from specific copper forming processes. The pretreatment standard for a given facility is determined by adding the allowable discharges for each copper forming process conducted at the facility using the CWF. For the purpose of this example, "drawing spent lubricant" is the only copper forming wastewater generated at the facility. Drawing is defined as:

> "a process in which wire or tubing is pulled through a die to reduce the cross-sectional area. Wire is drawn (pulled) cold through a series of tungsten carbide dies, decreasing the diameter in each draw. Diamond dies are used for fine wire. Temperature rise is important because of its relation to die life and lubrication. Water-based lubricants òr neat oils are used to control and to lubricate the copper as it is drawn through the die. The lubricant solution eventually becomes degraded and must be discharged and replaced."

The categorical pretreatment standards are:

Pollutant	Daily Maximum	Maximum Monthly Average
	(mg/off-kg of copper or copper alloy drawn)	
Chromium	0.037	0.015
Copper	0.161	0.085
Lead	0.012	0.011
Nickel	0.163	0.107
Zinc	0.124	0.051
TTO	0.055	0.028
Oil and Grease*	1.700	1.020

*Alternative "indicator pollutant" in lieu of TTO monitoring and compliance.

Compliance with the copper forming categorical standards is required by August 15, 1986.

Historical data for a copper forming facility shows that its production averages 25,000 off-kg/day and its wastewater discharges from the drawing spent lubricant process average 2,000 gallons per day. The facility does not meter wastewater flow from the drawing process. It meters the total wastewater discharge from the plant to the POTW collection system and the municipal water authority meters flow entering the plant. The estimated wastewater flow for the drawing process of 2,000 gallons per day was derived by balancing known water consumption and discharge and known or reliably estimated water requirements elsewhere in the plant. The estimated flow is considered relatively accurate. The Control Authority is considering equivalent concentration limits. Although compliance is not required until August 1986, the industrial user seeks establishment of equivalent concentration limits as soon as possible to determine the course of its compliance plan.

The daily maximum alternative concentration limit (C) for copper for this facility may be calculated as follows:

$$C = \frac{(0.161 \text{ mg/off-kilogram})\ (25{,}000 \text{ off-kilogram/day})}{(2{,}000 \text{ gpd})\ (3.78 \text{ l/gal})}$$

C = 0.53 mg/l

Similarly, the other equivalent concentration limits applicable to this copper forming facility are:

Pollutant	Daily Maximum mg/l	Maximum Monthly Average mg/l
Chromium	0.12	0.05
Copper	0.53	0.28
Lead	0.04	0.04
Nickel	0.54	0.35
Zinc	0.41	0.17
TTO	0.18	0.09
Oil and Grease*	5.63	3.38

*Alternative "indicator pollutant" in lieu of TTO monitoring and compliance.

These equivalent concentration limits are based on the estimated wastewater flow of 2,000 gallons per day. Although the estimate is considered a good estimate, it should be verified, both to determine the accuracy of the equivalent concentration limits and to ensure future compliance with the production-based requirements. Therefore, as a condition of establishing equivalent concentration standards, the Control Authority should require that flow monitoring equipment be installed and maintained to measure wastewater flow from the drawing spent lubricant discharge. As a part of the final compliance report from the IU, the Control Authority should require that a historical data base of actual flow measurements be submitted to permit verification that the established equivalent concentrations are accurate. If the actual flows differ significantly from the estimated value of 2,000 gallons per day, revised equivalent concentration limits should be calculated. The production basis should also be periodically reevaluted, based on more recent production data.

2.9 CHANGES IN PRODUCTION AND FLOW RATES

The use of long-term average flow and production rates eliminates the need for the Control Authority to rely on day-to-day variations in these rates. However, it is possible that the long-term average rate may change over time in response to large-scale factors. At a minimum, Control Authorities will have an opportunity to detect changes in the long-term average rate by reviewing the semi-annual compliance reports that must be submitted by categorical IUs every 6 months.

These reports should contain average production and flow rate data applicable to the 6 month reporting period. IUs are also required to notify the Control Authority immediately of significant changes in these rates. As a general rule, the average rate is considered to have changed significantly if the change is greater than 20 percent. EPA expects that significant changes will be rare unless due to a deliberate change in the normal method of operations on the part of the IU or to a substantial change in demand. When a significant change in the long-term average production rate has taken place or is expected, then the equivalent limits should be reevaluated. For purposes of determining compliance, until new limits are finalized, the old limits remain in force.

2.9.1 Changes in Production Rate

In rare cases, daily variations in production may be high enough to warrant consideration of direct implementation of the production-based standard. However, even if the day-to-day variability is large (exceeding 50 to 100 percent), in most cases it will still be appropriate to use an average production rate. The following example illustrates this point.

Example 2.4 ---

A battery reclaimer, covered by the secondary lead smelting subcategory of the nonferrous metals manufacturing category, must comply with production-based pretreatment standards which are expressed as milligrams per kilogram of lead scrap produced. The number of batteries cracked and the amount of lead scrap produced vary widely from day to day. One day 50 batteries may be cracked; 150 the next. The amount of lead scrap produced varies accordingly. The Control Authority would like to issue an equivalent mass or concentration limit to simplify implementation of the productionbased standard. At first glance, because of the large daily variation, it appears that an average production rate (based on more than a single day of production) might be inappropriate for establishing an alternative limit. But, after looking at the wastewater flow characteristics, the picture is altered.

Even though the production rate varies greatly from day to day, the wastewater discharge flow rate, as measured at the sampling point after pretreatment, is essentially constant. There is approximately a 16-hour wastewater detention time in the system, which exceeds the 8 to 10 hours per day that the facility produces lead. Furthermore, the wastewater is discharged seven days per week, although the number of production days per week is only five. Some of the treated wastewater is recycled back to the process or is used elsewhere in the plant. Occasionally, when the treated wastewater pollutant concentrations exceed the local concentration limits, the wastewater is pumped back through the treatment system.

The long detention time and the recycling practices have the effect of "averaging out" the wastewater pollutant concentrations and the flow rate over time. The sampling method used by the Control Authority, composite sampling, increases this effect. The result is that the measured pollutant concentrations and the flow rate on a particular monitoring day are not directly related to the production for that day. In this case, the Control Authority could elect to use the average production rate to develop an equivalent limit. If an equivalent concentration limit were desired, then the average flow rate for the same period would be used in the calculation.

When determining the average production rate in this example, the question arises whether to divide the total production rate by the number of production days or the number of flow days, since these two numbers differ. If an equivalent concentration limit is sought, then it does not matter which number is used, as long as both the average flow rate and average production rate are computed using the same divisor. Care should be taken to avoid mixing discharge days and production days in the calculations. If a mass limit is preferred, then the number of flow days should be the divisor. Because the number of production days is less than the number of flow days, dividing by the number of production days would overestimate the daily allowable mass discharge. For example, let us assume the battery reclaimer produced 50,000 Kkg of lead scrap during a 255-day production year. There are 5 production days per week but 7 discharge days. The following calculation would be performed:

$$\frac{\text{50,000 Kkg lead scrap}}{\text{255 production days}} \times \frac{\text{5 production days/wk}}{\text{7 discharge days/wk}}$$

$$= \frac{\text{196.1 Kkg lead scrap}}{\text{production day}} \times \frac{\text{.714 production days}}{\text{discharge day}}$$

$$= \frac{\text{140 Kkg lead scrap}}{\text{discharge day}} = \text{average production rate for use in developing equivalent mass limit.}$$

2.9.2 Changes in Flow Rate

In most cases, the use of equivalent concentration limits based on a long-term average flow rate is still appropriate even though day-to-day flow is highly variable. The flow from an individual regulated process may vary substantially from one day to the next, but the flow rate at the sampling point may be equalized because of the retention time in the system and mixing with other wastestreams. At facilities where the combined wastestream formula is used, flow variability seldom becomes an issue for this reason. In fact, the General Pretreatment Regulations specify that at least a 30-day average flow rate is to be used in the formula.

There are also many cases where both the flow rate and the production rate are highly variable, but the ratio of the two is relatively constant. An alternative concentration limit can then be calculated using the average value of the flow-to-production ratio using the relation:

$$\text{production-based standard} \div \text{average wastewater volume per unit of production} \times \text{conversion factor} = \text{equivalent concentration limit.}$$

2.9.3 Tiered Permits

In most cases, equivalent mass or concentration limits should be developed using a historical measure of the actual long-term average production rate. However, in some cases, the Control Authority may determine that historical production levels are not indicative of expected future production. When a significant change in average production is expected during the term of an IU's permit, the Control Authority may choose to issue a tiered permit.

A tiered permit is structured so that the IU is given one set of equivalent limits for the current average production rate and another set of equivalent limits is specified to take effect when there is a significant change in the average production rate. The alternate limits* would either become effective at a specific time or they would be triggered whenever production exceeded a threshold value. Definitive guidance is not available with regard to the threshold value which should trigger alternate limits. However, it is generally agreed that a 10 to 20 percent fluctuation is within the range of normal variability while changes higher than this could warrant consideration of alternate limits.

Tiered permits should be used only after careful consideration and only when a substantial change in the average rate of production is likely to occur. The IU should first be required to demonstrate that its actual average production rate is currently substantially below maximum production capability and that there is a reasonable potential for an increase above the actual rate during the term of the permit. A tiered permit may also be appropriate where a significant decrease in the average production rate is expected during the term of the permit. Since tiered permits generally require increased technical and administrative efforts on the part of the Control Authority to ensure that permit conditions are not violated, the number of tiers in the permit should not exceed the number necessary to address the reliably anticipated range of production.

A relatively simple type of tiered permit that has been used frequently in the NPDES program applies to cases where an IU is expanding its production facility to a significantly higher capacity. The permit might contain two alternate sets of limits labelled, for instance:

First Tier: From 9/01/85 until Expansion
Second Tier: From Expansion until 8/31/90.

Seasonal effluent limits have also been used successfully in NPDES permits. In most cases they are for fixed periods of time such as:

First Tier: November 1 to April 30
Second Tier: May 1 to October 31.

Another type of tiered permit contains alternate limits which become effective when actual average production exceeds a threshold value. This type is useful for industries, such as the automotive industry, in which demand is extremely volatile and the permit modification process might not be fast enough to respond to the need for higher or lower equivalent limits. A permit might be written with, for example, two or three tiers which apply to ranges of production. For example, a hypothetical automotive plant with a historical production rate of 50% of capacity might have a total capacity = 2000 ton/day and a production-based standard for pollutant X = 1 lb/million lb (daily maximum). If average production is expected to vary between 40 and 100% of capacity, alternate permit limits might be set as follows:

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* This usage of the term "alternate limits" should not be confused with the usage referring to limits derived using the combined wastestream formula (See Section 3).

First Tier: Basis of calculation = 50% of capacity, or 1000 ton/day

Limit for pollutant X = 2.0 lb/day

Applicable production range = 40% to 60% of capacity, or 800 to 1200 ton/day

Second Tier: Basis of calculation = 70% of capacity, or 1400 ton/day

Limit for pollutant X = 2.8 lb/day (daily maximum)

Applicable production range = 61% to 80% of capacity, or 1200+ to 1600 ton/day

Third Tier: Basis of calculation = 90% of capacity, or 1800 ton/day

Limit for pollutant X = 3.6 lb/day (daily maximum)

Applicable production range = 81% to 100% of capacity, or 1600+ to 2000 ton/day.

A graphical illustration of this approach is presented in Figure 2.1. The first tier has an applicable production range that covers plus or minus 20 percent of the basis of the calculation for that tier. This can be seen by noting that the basis of calculation for the first tier is 1000 ton/day and the threshold level that would trigger the next tier is set at 1200 ton/day, or 20 percent higher. Similarly, the second and third tiers have applicable production ranges of ± 14 percent and ± 11 percent, respectively. This is consistent with the general rule that a 10 to 20 percent change in average production rate is within the range of normal variability while a greater change could warrant alternate limits.

Tiered permits generally require increased technical and administrative supervision on the part of the Control Authority to verify compliance with permit limits. Special IU reporting requirements are usually necessary and should be detailed in the IU permit. The permit should specify one set of alternate limits as the primary limits. The primary limits would be based on the actual or recent historical level of production. For Control Authority monitoring, the Control Authority should evaluate compliance based on the primary limits unless notification was received in advance that the production rate had changed. IU continued compliance reports, which must be submitted every six months unless requested more often by the Control Authority, should contain measurements or estimates of the actual production rate which prevailed during the reporting period and the anticipated production rate for the next reporting period.

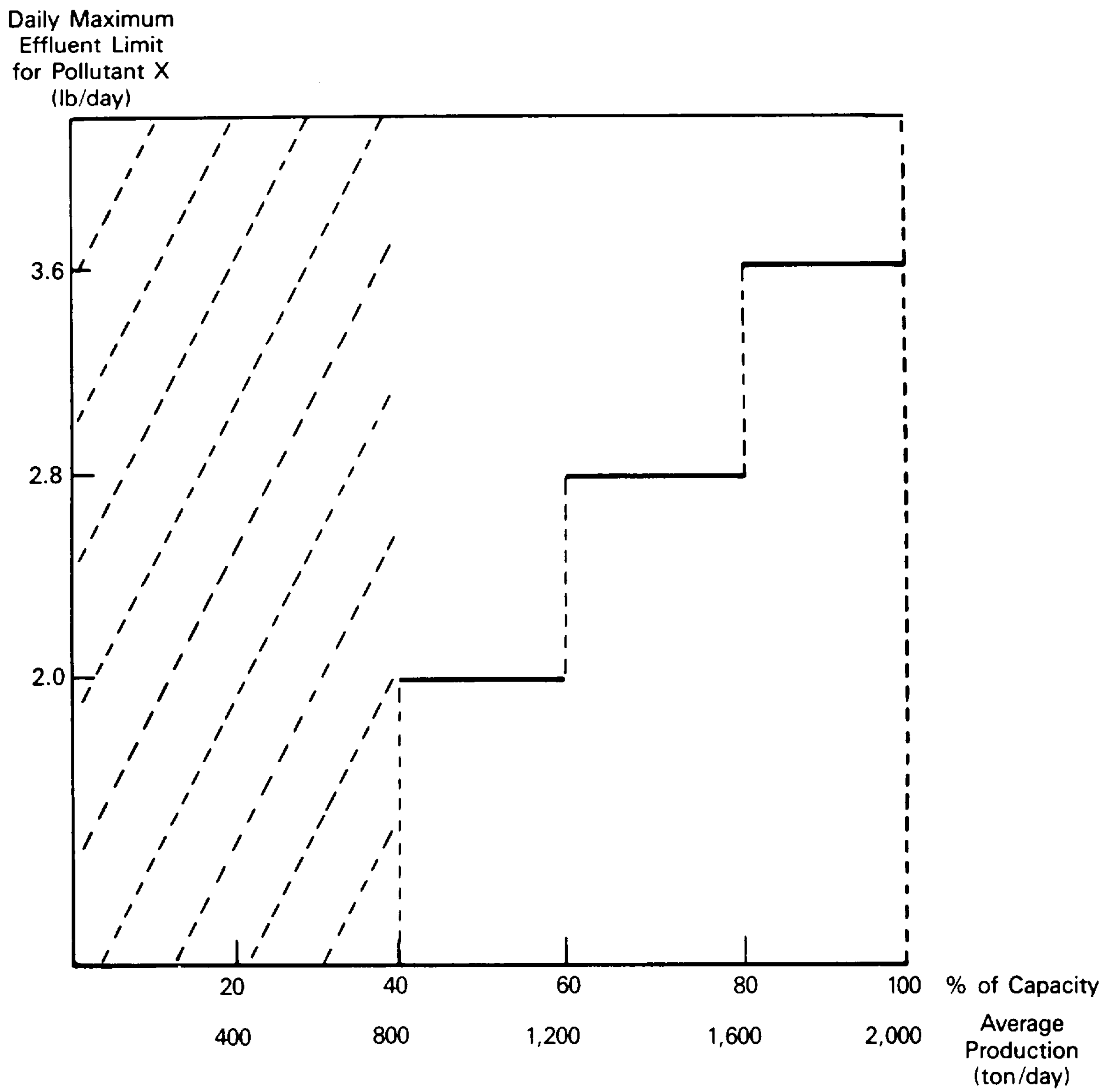


Figure 2.1
Tiered Approach to Using Equivalent Mass Limits

3. USE OF THE COMBINED WASTESTREAM FORMULA

3.1 PURPOSE OF THE COMBINED WASTESTREAM FORMULA

The purpose of this chapter will be to provide guidance to Control Authorities and industrial users (IUs) on proper application and utilization of the Combined Wastestream Formula (CWF).

Federal categorical pretreatment standards regulate the indirect discharge of certain pollutants from a particular industry or industrial process. An important consideration for Control Authorities as well as industrial users when applying or complying with categorical standards, is that the pollutant limitations specified in the standards apply to the discharge of wastewater from the regulated process only, prior to mixing with any other wastestreams.

The CWF (40 CFR 403.6 (e)) is a method for calculating alternative pollutant limits at industrial facilities where regulated process effluent is mixed with other wastewaters (either regulated or non-regulated) prior to treatment. As stated in the preamble to the 1981 amendments to the general pretreatment regulations (46 FR 9419), the formula is of primary importance to large, diversified industrial users with multiple processes.

These industrial users of POTWs frequently have a number of individual processes producing different wastestreams that are not regulated by the same categorical Pretreatment Standard or are not regulated by any categorical standard. Many of these integrated facilities have combined process sewers and a number have already constructed combined waste treatment plants. In these situations, the industrial user often prefers to install a pretreatment system on the combined stream rather than installing separate parallel systems on each individual stream. The CWF permits a facility to mix wastestreams prior to treatment by providing it with an alternative effluent limit for this combined discharge.

EPA wishes to minimize the need for separation of wastestreams and for treatment by parallel systems when comparable levels of treatment can be attained in combined treatment plants. Separate treatment of wastes at an integrated plant can be costly, wasteful of energy, inefficient and environmentally counterproductive. In addition, such an approach reduces the environmental gains resulting from the voluntary treatment of unregulated streams prior to the imposition of regulatory requirements. However, the Agency also recognizes that the countervailing concerns of avoiding the attainment of limits through dilution and ensuring that adequate treatment is provided may sometimes lead to the conclusion that segregation of streams is the only appropriate way to meet applicable pretreatment limits. The CWF attempts to strike a proper balance between these considerations. It is the industrial user's choice whether to combine or segregate its wastestreams. However, if the user decides to combine wastestreams prior to treatment, and at least one of these wastestreams is covered by a categorical pretreatment standard, then alternative limits for all regulated pollutants in the combined wastestream must be calculated using the CWF. If the calculated CWF limit is below the detectable level, then the alternative limit cannot be applied because it would not be possible to demonstrate compliance with such a limit. The Control Authority must require the regulated stream to be segregated from the other relatively dilute streams or appropriate flow reductions must be implemented to allow detection.

3.2 DEFINITION OF CWF TERMS

Prior to a discussion on the use of the CWF, it is important that Control Authority and industry personnel fully understand the terms for the three types of wastestreams that can exist at an industrial facility: regulated, unregulated and dilute. The terms are best understood by considering a particular pollutant, such as "pollutant X." A regulated wastestream is a wastestream from an industrial process that is regulated by a categorical standard for pollutant X. An unregulated wastestream is a wastestream that is not regulated by a categorical standard for pollutant X and not considered a dilute wastestream as defined below. A dilute wastestream is defined in 40 CFR Part 403 (as amended on May 17, 1984) to include:

- o Sanitary wastewater (considered dilute for all pollutants unless stated otherwise in the published categorical pretreatment standard)
- o Noncontact cooling water and boiler blowdown (considered dilute for all pollutants except in certain cases as described below)
- o Wastestreams listed in Appendix D to 40 CFR Part 403 (considered dilute for all pollutants).

In addition, a non-regulated wastestream is a general term which will be used in this guidance manual for any wastestream which is not regulated (it could be either unregulated or dilute).

A wastestream is considered regulated for purposes of calculating a CWF limit for pollutant X only if (1) the wastestream is produced by a categorical industrial process that has a standard for pollutant X, and (2) the compliance date for that standard has been reached. For example, since the aluminum forming industry has a categorical standard for zinc but not for copper, wastewater from aluminum forming would be considered regulated for zinc but unregulated for copper. Before October 24, 1986, the compliance date for the standards, the wastewater would be considered unregulated for all pollutants including both zinc and copper.

Unregulated wastestreams are those wastestreams that are not covered by categorical pretreatment standards and not classified as dilute wastestreams. An unregulated wastestream could be one for which a categorical standard has been promulgated but for which the compliance deadline has not been reached, one that currently is not subject to a categorical pretreatment standard (whether or not it will be in the future), or one that is not regulated for the pollutant in question although it is regulated for others.

Unregulated streams are presumed, for purposes of using the CWF, to contain pollutants of concern at a significant level. In effect, the CWF "gives credit" for pollutants which might be present in the unregulated wastestream. Rather than treating the unregulated flow as dilution, which would result in lowering the allowable concentration of a pollutant, the CWF allows the pollutant to be discharged in the unregulated wastestream at the same concentration as the standard for the regulated wastestream that is being discharged. This is based on the assumption that if pollutants are present in the unregulated wastestream, they will be treated to the same level as in the regulated wastestream. In some cases, unregulated wastestreams may not actually contain pollutants of concern at a significant level. Even if this is the case, they are still considered unregulated when applying the formula. However, if the Control Authority is concerned that an unregulated stream is actually acting as dilution, a local or state Control Authority can use its own legal authority to establish a limit more stringent than would be derived using the formula in the manner prescribed by the Federal Regulations.

The definition of a dilute wastestream was revised in the May 17, 1984, Federal Register. The current definition defines dilution flow (F_D) as:

> "F_D = the average daily flow (at least a 30-day average) from (a) boiler blowdown streams and noncontact cooling streams; provided, however, that where such streams contain a significant amount of a pollutant, and the combination of such streams, prior to treatment, with an Industrial Users regulated process wastestream(s) will result in a substantial reduction of that pollutant, the Control Authority, upon application of the Industrial User, may exercise its discretion to determine whether such stream(s) should be classified as diluted or unregulated. In its application to the Control Authority, the Industrial User must provide engineering, production, sampling and analysis and such other information so that the Control Authority can make its determination, or (b) sanitary wastestreams where such streams are not regulated by a categorical Pretreatment Standard, or (c) from any process wastestreams which were or could have been entirely exempted from categorical Pretreatment Standards pursuant to paragraph 8 of the NRDC v. Costle Consent Decree (12 ERC 1833) for one or more of the following reasons (see Appendix D):
>
> (1) the pollutants of concern are not detectable in the effluent from the Industrial User (paragraph (8)(a)(iii);
>
> (2) the pollutants of concern are present only in trace amounts and are neither causing nor likely to cause toxic effects (paragraph (8)(a)(iii);
>
> (3) the pollutants of concern are present in amounts too small to be effectively reduced by technologies known to the Administrator (paragraph (8)(a)(iii); or
>
> (4) the wastestream contains only pollutants which are compatible with the POTW (paragraph (8)(b)(i))."

The industry subcategories listed in Appendix D of 40 CFR Part 403 include several subcategories that fall under: Auto and Other Laundries, Electrical and Electronic Components, Foundries, Gum and Wood Chemicals, Inorganic Chemicals, Leather, Pulp and Paper, Rubber Manufacturing, Soap and Detergent, Textiles, and Timber Products. These subcategories are those which either EPA exempted from national categorical standards based upon a finding that they do not generally contain significant levels of pollutants of concern across the industry or EPA exempted them for another reason but could have exempted them for this reason.

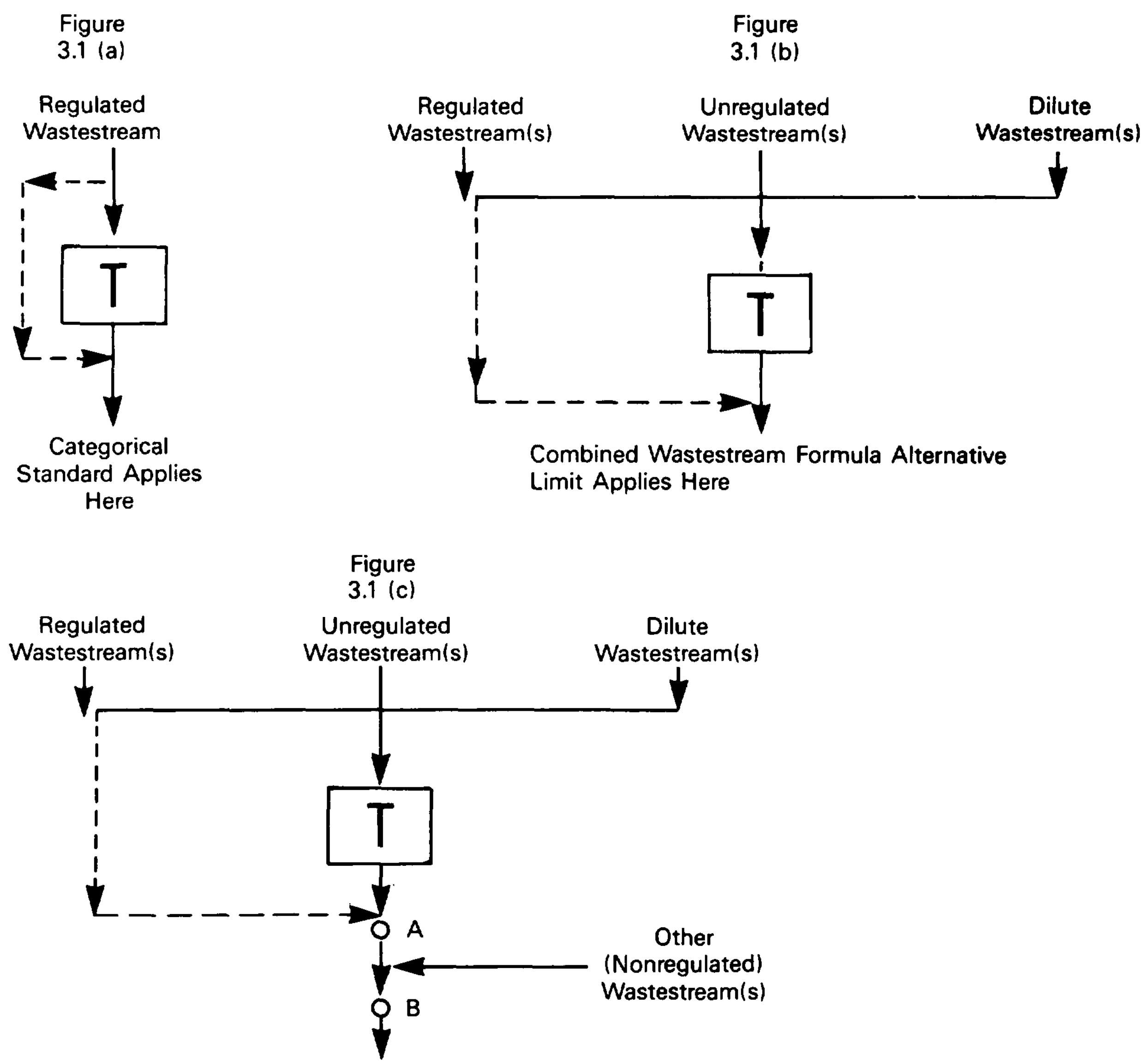
Wastestreams from the processes listed in Appendix D are always considered dilution for all pollutant parameters. Sanitary wastewater is almost always considered dilute, except in a very few categories for which the regulations state otherwise. Boiler blowdown and noncontact cooling water are also most always classified as dilute. However, if requested by the industrial user, the Control Authority may determine (supported by required analytical, engineering, and other data) that they should be considered unregulated process streams. The Control Authority should ensure that characterizing such wastestreams as unregulated and combining them with regulated wastestreams prior to treatment is not used by the industrial user as a partial or complete substitute for adequate treatment to achieve compliance with a categorical Pretreatment Standard. Dilution is prohibited in 403.6(d) as a substitute for treatment.

3.3 APPLICABILITY OF THE CWF

A categorical standard applies to the wastestream from a regulated process (See Figure 3.1(a)). The standard applies to the entire regulated flow, including the contributions from all operations defined as part of the regulated process. As indicated by the dashed line in Figures 3.1(a) and (b), an IU may choose not to treat the entire regulated flow, but the standard applies to the total flow.

When a regulated wastestream is combined prior to treatment with other wastestreams—either regulated or non-regulated — the CWF must be used to calculate an alternate discharge limit that applies to the combined stream (see Figure 3.1(b)). When non-regulated streams are added after treatment, however, the Control Authority may apply the CWF but it is not a requirement that it must be applied (See Figure 3.1(c).

In the situation illustrated in Figure 3.1(c), the CWF must apply when monitoring occurs at Point A, which is located before the treated flow is mixed with other non-regulated streams. The Control Authority may apply the CWF at Point B but the Control Authority is not required to do so. Rather, the Control Authority may require analytical, engineering and other data to determine the adjusted standard(s) to reflect the actual amount of a particular regulated pollutant in the non-regulated wastestream. The Control Authority should ensure that combining wastestreams after treatment is not used by the industrial user as a partial or complete substitute for adequate treatment to achieve compliance with a categorical pretreatment standard. The General Pretreatment Regulations, Section 403.6(d) prohibits dilution as a substitute for treatment. Therefore, if monitoring occurs at Point B and the Control Authority does not apply the CWF, then the non-regulated wastewaters added after treatment must be accounted for in determining compliance with the applicable categorical standard(s) by adjustment to reflect the actual amount of a particular regulated pollutant in the non-regulated wastestream. If the standard is expressed in terms of mass per day, the levels of the regulated pollutant in the individual wastestreams are simply added together to determine the applicability limit on that pollutant in the combined wastestream. For concentration-based standards, a flow-proportioning calculation must be performed in order to properly account for the level of the regulated pollutant in the non-regulated wastestream(s).



Point A: Combined Wastestream Formula Alternative Limit Applies

Point B: Control Authority May Apply the CWF, But If It Is Not Applied...Calculate Adjusted Limit as Follows:

1) Adjusted Mass Limit =

(CWF Mass Limit for Point A) + (Actual Mass of Pollutant in Nonregulated Wastestreams Added After Treatment)

2) Adjusted Concentration Limit =

$$\frac{(\text{CWF Concentration Limit for Point A}) \times (\text{Flow at Point A}) + (\text{Actual Mass of Pollutant in Nonregulated Wastestreams Added After Treatment})}{[(\text{Flow at Point B})]}$$

Note: T = Treatment Facility

Figure 3.1
Applicability of the Combined Wastestream Formula

The formulas that are used to calculate the adjusted mass or concentration limits in the example at Point B are given in Figure 3.1(c). These are simple mass summation and flow proportioning formulas. If the resulting adjusted standard is below the detectable limit, then a monitoring point must be located at Point A and limitations applied at that point

Whenever feasible, it is recommended that monitoring be performed at Point A. This will eliminate the possibility of errors which could occur in adjusting the limit to be applicable at Point B. Control Authorities may prefer to monitor at Point B, however, if that is where local limits apply. Section 3.4.5 of this Chapter presents an example of how to adjust categorical standards to compare them with local limits in a situation where non-regulated wastestreams are added after treatment. In this example, it is assumed the Control Authority is not applying the CWF but rather adjusting the standard(s) to reflect the actual amount of a particular regulated pollutant in the non-regulated wastestream.

3.4 IMPLEMENTATION OF THE CWF

This section will provide Control Authority and IU personnel with information that will be necessary to ensure the proper application and implementation of the CWF.

3.4.1 Combined Wastestream Formulas

Section 403.6(e) of the General Pretreatment Regulations provides two formulas to develop alternative categorical limits. One formula is used to develop an alternative concentration limit for standards that are concentration based. The other formula is used to develop an alternative mass limit for those categorical standards that are production based. Both alternative concentration and alternative mass limits will be developed in examples contained in this Chapter.

3.4.1.1 Alternative Concentration Limit Formula

$$C_T = \frac{\sum_{i=1}^{N} C_i F_i}{\sum_{i=1}^{N} F_i} \times \left(\frac{F_T - F_D}{F_T} \right)$$

C_T = Alternative concentration limit for the pollutant in the combined wastestream

C_i = Concentration-based categorical pretreatment standard for the pollutant in regulated stream i

F_i = Average daily flow (at least 30 day average) of regulated stream i

F_D = Average daily flow (at least 30 day average) of dilute wastestream(s) (see previous complete definition, page 3-2)

F_T = Average daily flow (at least 30 day average) through the combined treatment facility (including regulated, unregulated and dilute wastestreams)

N = Total number of regulated streams

The CWF develops an alternative concentration limit for each pollutant by multiplying the categorical standard for each regulated pollutant of each regulated stream (C_i) by the flow of that regulated stream (F_i) and then adding the resultant product for all the regulated wastestreams that are combined. This amount is then divided by the sum of the flows (F_i) of all the wastestreams in which that pollutant is regulated. If no dilution wastestreams are being combined, only the first part of the formula would be needed to compute an alternative concentration limit. If dilute wastestreams are combined with the regulated wastestreams, the number resulting from the first part of the formula is multiplied by a fraction. This fraction is derived by taking the total flow through the wastewater treatment system (F_T) minus the total flow from all dilute wastestreams (F_D) and dividing by the total flow (F_T).

It should be noted that when the formula is applied properly, it has the effect of allowing any unregulated streams combined with the regulated streams to be discharged at the same pollutant concentrations as allowed by the standards for the regulated streams.

3.4.1.2 Alternative Mass Limit Formula

$$M_T = \sum_{i=1}^{N} M_i \times \left(\frac{(F_T - F_D)}{\sum_{i=1}^{N} F_i} \right)$$

M_T = Alternative mass limit for the pollutant in the combined wastestream (mass per day)

M_i = Production-based categorical pretreatment standard for the pollutant in regulated stream i (or the standard multiplied by the appropriate measure of production if the standards being combined contain different units of measurement)

F_i = Average daily flow (at least 30 day average) of regulated stream i

F_D = Average daily flow (at least 30 day average) of dilute wastestream(s)

F_T = Average daily flow (at least 30 day average) through the combined treatment facility (including regulated, unregulated and dilute wastestreams)

N = Total number of regulated streams

Alternative mass limits are developed by adding together the calculated mass values from a production-based categorical standard for a pollutant (M_i) in each regulated process wastestream that is combined. If the production bases for the production-based standards being combined were different (see Table 2-3), then each of the production-based standards would have to be multiplied by the appropriate daily production basis for each regulated process, before the standards were added together. If only regulated wastestreams were combined, only this sum of the production-based categorical standards is needed to establish an alternative mass limit (M_T). In the case of the addition of dilute or unregulated wastewaters, the sum of production-based categorical standards mass values would need to be multiplied by a fraction. This fraction is calculated by taking the total flow through the wastewater treatment system (F_T) minus the total of dilute wastestreams (F_D) combined with the regulated process wastestreams and dividing by the total flow of regulated process wastestreams (F_i). (Note: This is equivalent to the regulated flow plus the unregulated flow divided by the regulated flow.)

As with the concentration limit formula, when applied properly the mass limit formula has the effect of allowing any unregulated streams combined with the regulated streams to be discharged at the same pollutant concentrations as allowed by the standards for the regulated streams.

3.4.1.3 Consistency When Combining Categorical Standards

When a Control Authority or IU utilizes the CWF to develop alternative limits for two different process wastestreams which are both regulated by a concentration-based categorical standard or a production-based standard, the CWF is simply applied as described in the previous sections. However, Control Authorities and IUs may be faced with the task of establishing an alternative limit when one process wastestream, regulated by concentration-based categorical standards, is combined with another process wastestream, regulated by production-based categorical standards. They also may face the situation where two different process wastestreams are combined but each is regulated by a production-based categorical standard based on different production units. (See Table 2.3 for a list of the type of standard by industry category.)

When a situation arises where a process wastestream, regulated by concentration-based standards (e.g., electronic components, metal finishing) is combined with another process wastestream regulated by production-based standards (e.g., copper forming, coil coating), then preliminary calculations are needed before the CWF can be applied. These preliminary calculations would involve either converting the production-based categorical standard to an equivalent concentration limit, or converting the concentration-based categorical standard to an equivalent mass limit.

To convert a production-based categorical standard to an equivalent concentration limit, the procedure outlined in the previous Chapter should be utilized. This would involve multiplying the production-based standard by the average production basis and dividing by the flow. Consider an industrial facility that combines wastewaters from a coil coating process (with discharge limit units of mg/m^2) and a metal finishing process (with discharge limit units of mg/l).

If the Control Authority desires to regulate using the concentration units of the metal finishing standards (mg/l), the Control Authority must first convert the coil coating standards to equivalent concentration limits. Assuming an average daily coil coating production rate of 30,000 square meters of area processed and an average process flow rate of 10,000 gallons per day, an equivalent concentration limit (daily maximum) for zinc is calculated as follows:

$$\frac{(1.56\ mg/m^2)\ (30{,}000\ m^2/day)}{(10{,}000\ gal/day)\ (3.78\ l/gal)} = 1.24\ mg/l$$

Where 1.56 mg/m^2 is the categorical standard daily maximum limitation for zinc and 3.78 l/gal is a unit conversion factor.

For this example, therefore, 1.24 mg/l would be used in conjunction with the daily maximum metal finishing zinc standard (2.61 mg/l) as C_i in the CWF to develop an alternative concentration limit for the combined wastestream.

If the Control Authority desires to regulate using equivalent mass limits, the concentration-based standard for metal finishing is multiplied by the average or other appropriate flow of that regulated wastestream. Assuming a metal finishing process wastewater average flow rate of 15,000 gallons per day, an equivalent mass limit (daily maximum) for zinc is calculated as follows:

$$(1.24\ mg/l)\ (15{,}000\ gal/day)\ (3.785\ l/gal) = 70{,}401\ mg/day$$

The coil coating standard (with units of mg/m^2) has to be converted to a mass per day limit so it can be combined in the CWF with the equivalent mass limit for the metal finishing standards (with units of mg/day). As described in Chapter 2, Section 2.2, a mass per day limit is derived by multiplying the production-based standard by the production basis. Thus assuming an average coil coating production rate of 30,000 square meters per day, the mass per day limit (daily maximum) for zinc would be calculated as follows:

$$(1.56\ mg/m^2)\ (30{,}000\ m^2/day) = 46{,}800\ mg/day$$

For this example, the 70,401 mg/day and 46,800 mg/day would be used as M_1 and M_2 in the CWF to develop an alternative mass limit (M_i) for the combined wastestreams of 117,201 mg/day.

Finally, a situation could occur where two process wastestreams, each regulated by different production-based categorical standards with different production units, are combined and the CWF is needed to establish alternative discharge limits. If this situation does occur, then the Control Authority or IU must convert each production-based standard to an equivalent mass per day limit prior to their use as values for M_i in the CWF for alternative mass limits. To assist Control Authorities and IUs evaluate the compatibility of production units for production-based categorical standards, Table 2.3 presents all of the major industrial categories and the production units associated with the standards.

3.4.2 Conditions For Using The CWF

To ensure proper application and implementation of the CWF, the following conditions (as described in Section 403.6(e) of, and the preamble to, the

General Pretreatment Regulations) must be followed by the Control Authority and IU:

- o Alternative discharge limits that are calculated in place of the promulgated categorical pretreatment standards must be enforced as categorical standards.

- o Calculations of alternative limits must be performed by the Control Authority or by the IU with review and approval by the Control Authority.

- o Alternative limits must be established for each regulated pollutant in each of the processes regulated by a categorical standard.

- o When both production- and concentration-based standards apply, the Control Authority may use mass-based limitations or concentration-based limitations.

- o Both daily maximum and long-term average (usually monthly) alternative limits must be calculated for each regulated pollutant, unless the categorical standards only include limits for the daily maximum.

- o A calculated alternative limit cannot be used if it is below the analytical detection limit for that pollutant. If a calculated limit is below the detection limit, the control authority must require the regulated process wastestream to be segregated or appropriate flow reductions to be implemented to allow detection.

- o A mixture of wastestreams where one of the streams is subject to a categorical standard requirement stating "zero discharge of process wastewater pollutants" (e.g., porcelain enameling) requires zero flow for the stream. The zero flow discharge requirement must be placed as a condition in the permit (or other control mechanism). If the standard says "no discharge allowance for process wastewater pollutants", (e.g., battery manufacturing), a discharge is allowed but any flow measured would be considered dilution when using the CWF.

Additionally, special considerations are needed if an industry combines an electroplating process wastewater with other wastewaters, and the CWF will need to be utilized to calculate an alternative discharge limit. Specifically, the Electroplating Point Source Category Pretreatment Standards have 4-day average limits. However, according to 40 CFR 413.04, as amended on January 28, 1981, if a nonelectroplating wastestream is regulated by a 30-day average standard, and it is combined with an electroplating wastestream, 30-day average standards rather than 4-day average standards are to be used in calculating an alternative limit with the CWF. Section 40 CFR 413.04 provides a table to convert a 4-day average standard to a 30-day average standard.

It is also important that Control Authority and IU personnel properly evaluate the applicability of each categorical standard as it relates to using the CWF when combining regulated process wastestreams. If there is any question of the proper category for which a facility is to be regulated, 40 CFR Part 403.6(a) gives procedures for a formal request for review and certification from EPA or the delegated State as to the proper category. There may also be instances when a categorical standard for one industry (e.g., Porcelain Enameling) regulates wastewater discharges from a process typically part of a more general industry category (e.g., Electroplating/ Metal Finishing). In these situations, the categorical standard for the more specific industry category may take precedence and apply to the process wastewater discharges. The Applicability Section of the regulation for each of the categorical standards should be checked carefully.

For example, refer to Figure 3.2 which provides a process flow diagram for a typical porcelain enameling on steel operation. Typically, alkaline cleaning, acid etching and nickel deposition operations would be regulated by the Electroplating/Metal Finishing Categorical Pretreatment Standards, and when wastewaters from these process operations are combined with certain other regulated process wastestreams, the CWF would need to be used. However, according to 40 CFR 433.10(b) (Metal Finishing Point Source Category) and 40 CFR Part 466 (Porcelain Enameling Point Source Category), these operations, when used immediately prior to a procelain enameling operation for surface preparation, are regulated by the porcelain enameling regulations and not the electroplating/metal finishing regulations.

Specifically, the Applicability Section of 40 CFR Part 466 states that the Porcelain Enameling categorical standards apply to any porcelain enameling facility which discharges into a POTW. Porcelain enameling is defined in 40 CFR 466.02(a) as follows:

> "Porcelain enameling means the entire process of applying a fused vitreous enamel coating to a metal basis material. Usually this includes metal preparation and coating operations."

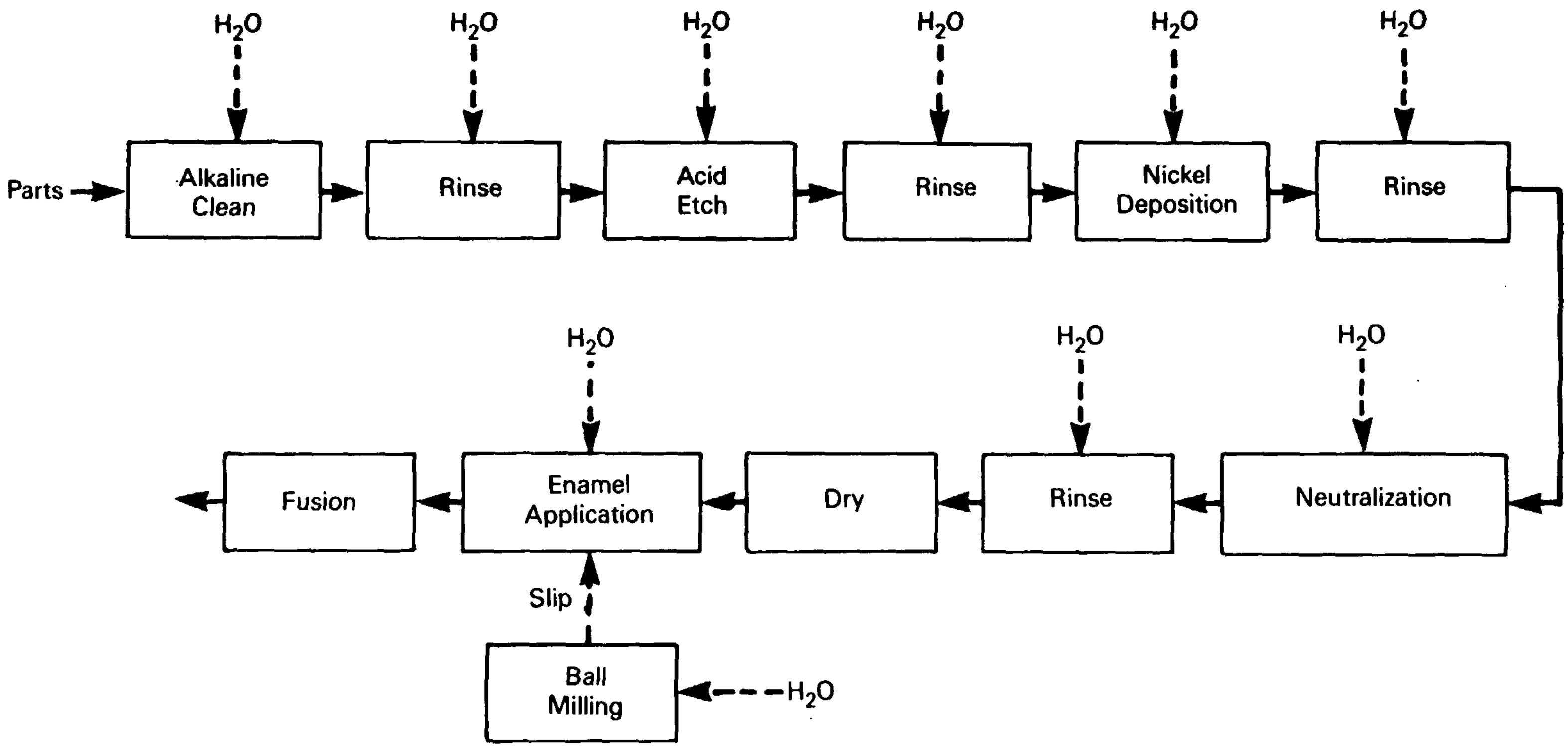
Further metal preparation is defined in 40 CFR 466.02(f) as follows:

> "Metal preparation means any and all of the metal processing steps preparatory to applying the enamel slip. Usually this includes cleaning, pickling and applying a nickel flash or chemical coating."

Therefore, the process wastewaters from all the operations shown in Figure 3.2 are regulated under the same category, Porcelain Enameling.

3.4.3 Implementation of the CWF

The previous sections of this chapter have provided guidance for Control Authorities and IUs on how to properly calculate or establish alternative categorical discharge limits when IU wastestreams are combined prior to treatment. However, it is equally important that IUs be aware of their responsibility to the Control Authority while being regulated by these alternative categorical discharge limits, and that Control Authorities provide proper oversight and ensure compliance with these alternative categorical discharge limits derived from the CWF.



From: Development Document for Effluent Limitations Guidelines and Standards for the Porcelain Enameling Point Source Category; EPA 440/1-82/072, Final, November 1982

Figure 3.2
Typical Porcelain Enameling on Steel Operation

3.4.3.1 IU Responsibilities

Section 403.6(e) of the General Pretreatment Regulations states in part:

> "The Industrial User shall comply with the alternative daily maximum and long-term average limits fixed by the Control Authority until the Control Authority modifies the limits or approves an Industrial User modification request. Modification is authorized whenever there is a material or significant change in the values used in the calculation to fix alternative limits for the regulated pollutant. An Industrial User must immediately report any such material or significant change to the Control Authority. Where appropriate, new alternative categorical limits shall be calculated with 30 days."

Therefore, the IU is responsible to notify the Control Authority immediately of any changes that would significantly affect the values used in the CWF to calculate their alternative categorical discharge limits. These types of changes could include, but are not limited to, the following:

- An increase or decrease in production or flow related to the use of production based standards to determine mass or equivalent concentration limits such that the mass (M_i) or equivalent concentrations (C_i) would change

- An increase or decrease in regulated process wastestream(s) flow such that the values F_T and F_i would change

- An increase or decrease in unregulated process and dilute wastestream(s) flow such that values F_T and F_D would change

- A change in the regulated process(es) such that it will be regulated by another categorical standard or subcategory thus changing C_i

- A change in manufacturing process such that dilute wastestreams become unregulated, or unregulated process wastestreams become dilute wastestreams (this would apply to boiler blowdown and noncontact cooling water discharges as the Control Authority determines the definition of each as described previously)

- The addition of other regulated, unregulated and/or dilute wastestreams which would affect all the CWF values.

It is the responsibility of the Control Authority to determine if new alternative categorical discharge limits should be calculated based on the changes submitted by the IU. Guidance on the use of production and flow information to calculate or modify alternative limits is presented in Chapter 2. If new alternative limits are warranted, then they must be calculated within 30 days.

Therefore, depending on the type of wastestreams combined, and the types of categorical standards applicable to the regulated wastestreams (i.e., concentration- or production-based), the following data may need to be included in IU baseline monitoring reports, 90-day compliance reports, and semi-annual self-monitoring reports:

- o Flow measurements from each regulated process wastewater stream
- o Flow measurements from each unregulated and dilute wastestream combined with any regulated process wastestreams before treatment of the combined wastestream. (The unregulated flow could be computed as the difference between total flow and dilution flow.)
- o Regulated pollutant concentrations in the effluent from the waste treatment system (both daily maximum and long-term average)
- o Production data for each regulated process (if production-based standards are used)
- o Regulated pollutant concentrations in boiler blowdown and noncontact cooling water wastestreams if the IU requests reclassification from dilute to unregulated

The Control Authority may request other data as necessary to evaluate the need for more stringent limits not associated with categorical standards.

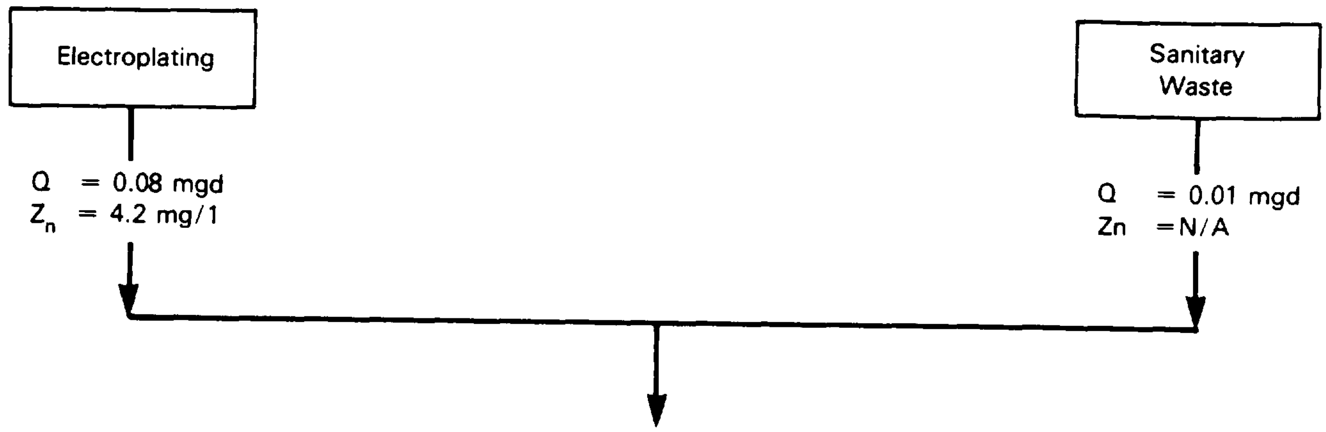
3.4.4. Example Use of the CWF

This section provides Control Authorities and IUs with several examples on how to properly utilize the CWF. These examples consider possible combination of categorical industrial processes, ranging from simple to more complex application of the CWF.

3.4.4.1 Example 1 - Simple Example of Combined Wastestream Formula Calculations with Concentration Limits

The following example provides the calculations for determining alternate discharge limits for zinc using the CWF. The example involving a job shop electroplater with >10,000 gpd process wastewater flow and a sanitary wastestream:

Industrial Category	Wastestream Type	Flow (mgd)	Daily Max. Zn Limit (mg/l)	Compliance Date
Electroplating	Regulated	0.08	4.2	April 27, 1984
Sanitary Waste	Dilution	0.01	N/A	N/A



$$Zn_{cwf} = \frac{4.2 \text{ mg/1 } (0.08 \text{ mgd})}{0.08 \text{ mgd}} \quad X \quad \frac{(0.08 \text{ mgd} + 0.01 \text{ mgd}) - 0.01 \text{ mgd}}{(0.08 \text{ mgd} + 0.01 \text{ mgd})}$$

$$Zn_{cwf} = \frac{4.2 \text{ mg/1 } (0.08 \text{ mgd})}{(0.09 \text{ mgd})}$$

$$Zn_{cwf} = 3.7 \text{ mg/1}$$

3.3.4.2 Example 2 - More Complex Combined Wastestream Formula Example Calculations with Concentration Limits

The following example provides the calculations for determining alternate CWF discharge limits for zinc. The example assumes a combination of various industries with the following wastestreams:

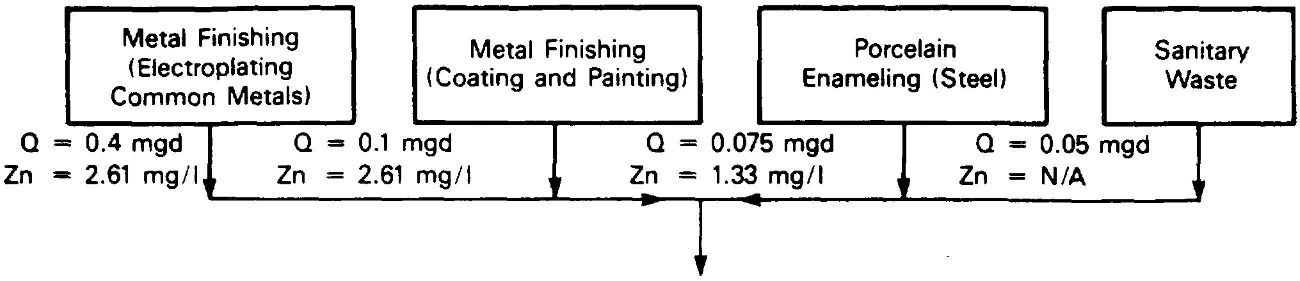
Industrial Category)	Wastestream Type	Flow (mgd)	Daily Max. Zn Limit (mg/l)	Compliance Date
Metal Finishing (Electroplating)[1]	Regulated	0.4	2.61	February 15, 1986
(Coating and Painting)[1]	Regulated	0.1	2.61	
Porcelain Enameling	Regulated	0.075	1.33[2]	November 25, 1985
Sanitary Waste	Dilution	0.05	N/A	N/A

[1]These are not subcategories; they are metal finishing processes. These operations are not associated with the porcelain enameling operations or materials.

[2]Alternative Production-based limits of 53.3 mg/m^2 for preparation and 0.85 mg/m^2 for coating were contained in 40 CFR 466.14 as of July 1985. Final amendments based upon litigation settlement agreement revises the 0.85 mg/m^2, to 1.68 mg/m^2; thus for the mass-based examples the revised limit will be used.

The calculation of alternate CWF limits (Zn_{cwf}) in this example is based on compliance dates for Porcelain Enameling and Metal Finishing.

Alternate CWF discharge limit for integrated electroplater/porcelain enameler after February 15, 1986 (compliance date for metal finishing).



$$Zn_{cwf} = \frac{2.61\ \text{mg/l}\ (0.4\ \text{mgd} + 0.1\ \text{mgd}) + 1.33\ \text{mg/l}\ (0.075\ \text{mgd})}{(0.5\ \text{mgd} + 0.075\ \text{mgd})} \times \frac{(0.5\ \text{mgd} + 0.075\ \text{mgd} + 0.05\ \text{mgd} - 0.05\ \text{mgd})}{0.625\ \text{mgd}}$$

$$Zn_{cwf} = 2.25\ \text{mg/l}$$

Note: The electroplating and coating/painting processes are covered by Metal Finishing in this example, and subject to a Zn limit of 2.61 mg/l. Thus, the alternate discharge limit is based on Metal Finishing and Porcelain Enameling categorical standards and proportioned by the flow of the three regulated wastestreams. Due to dilution from sanitary waste, the alternate discharge limit is reduced to 2.25 mg/l.

3.4.4.3 Example 3 - Above Combined Wastestream Formula Calculations with Concentration Limits for Cyanide

In the metal finishing category and certain others (e.g., pharmaceuticals), if cyanide is monitored after all wastestreams are combined, then all non-cyanide containing wastestreams are considered dilution. Wastestreams that contain cyanide could either be regulated or unregulated, but any non-cyanide bearing wastestreams are considered dilution. Therefore, an alternative CWF discharge limit for the above example with respect to cyanide is based upon the same wastestream types, flows and compliance dates except for the following:

Daily Maximum Total Cyanide Standard for Metal Finishing Category	1.20 mg/l (cyanide-bearing streams)
Coating and Painting Wastestream Type	Dilution (non-cyanide bearing)
Porcelain Enameling Wastestream Type	Dilution (non-cyanide bearing)
Electroplating Wastestream Type	Regulated (20%) and Dilution (80% non-cyanide bearing)

Note: Metal finishing standards (40 CFR 433.12(c)) require that the alternate cyanide limit for combined wastestream be based upon the dilution ratio of the cyanide containing wastestream to the effluent flow. Since the coating and painting and porcelain enameling wastestreams do not contain cyanide they are part of the effluent which is considered dilution. In addition, a portion of the electroplating wastestream (for this example 80 percent) does not contain cyanide and is considered dilution.

The calculation of the cyanide daily maximum limit is as follows:

Cyanide Standard 1.20 mg/l Daily Maximum
Cyanide Wastestream Flow 0.4 mgd (20%) = 0.08 mgd
Total Effluent Flow = (0.4 mgd + 0.1 mgd + 0.075 mgd + 0.05 mgd)= 0.625 mgd

$$Cyanide_{cwf} = \frac{1.20 \text{ mg/l } (0.08 \text{ mgd})}{0.625 \text{ mgd}}$$

$$= 0.15 \text{ mg/l}$$

3.4.4.4 Example 4 - Combined Wastestream Formula Example Calculations Using Concentration and Mass Limits

The following example provides the calculations for determining alternate discharge limits for zinc using the CWF after August 15, 1986 (compliance date for copper forming). The example assumes combinations of various industries with the following wastestreams:

Industrial Category	Wastestream Type	Flow (mgd)	Zn Limit (mg/l)	Compliance Date
Metal Finishing (Coating and Painting)[1]	Regulated	0.1	2.61	February 15, 1986
Porcelain Enameling (Steel-coating sub-category only)	Regulated	0.075	1.33[2]	November 25, 1985
Copper Forming	Regulated	0.4	Production Based[3]	August 15, 1986
Sanitary Waste	Dilution	0.05	N/A	N/A

[1]These are not subcategories; they are metal finishing processes.

[2]Alternate Mass/Production based limits = 53.3 mg/m^2 for preparation and 1.68 mg/m^2 for coating. (revised)

[3]Production based limits = 0.943 mg/off-kg of copper heat treated for solution heat treatment.

The calculated alternate discharge limits (Zn_{cwf}) in the following examples are based on compliance dates for Porcelain Enameling, Copper Forming and Metal Finishing.

Copper Forming and several other categorical standards are expressed as production-based limits. The example below converts production-based limits to equivalent concentration-based limits. These equivalent concentration limits can then be used as the standards for Copper Forming.

Copper Forming (Solution Heat Treatment) Maximum Daily Limit for Zinc	= 0.943 mg/off-kg of copper heat treated
Average Daily Production During Last 12 months	= 30,000 off-kg of copper heat treated per day
Average Daily Water Usage in Solution Heating Treating During Last 12 months	= 400,000 gpd

Note: Off-kg shall mean the mass of copper or copper alloy removed from a forming or ancillary operation at the end of a process cycle for transfer to a different machine or process.

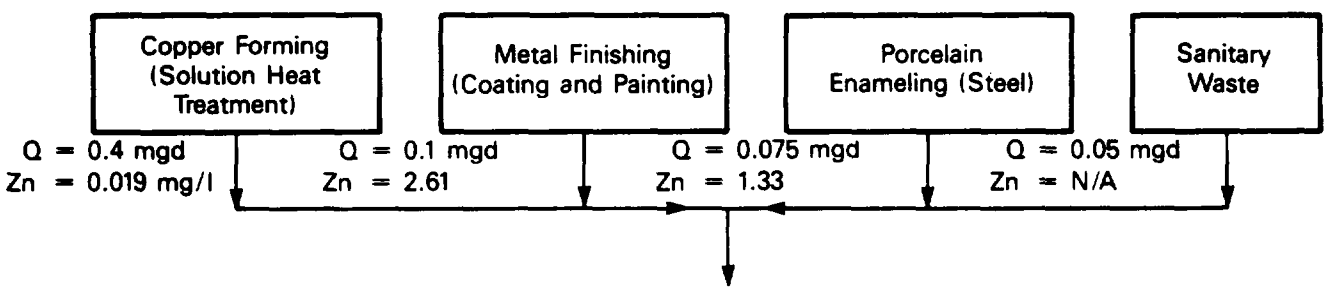
EXAMPLE

Step 1: Convert Production-based Standard to Equivalent Concentration Limit

$$\text{Concentration Equivalent} = \frac{\text{(Production-based Limit)(Avg. Daily Production Rate)}}{\text{Avg. Daily Flow from Regulated Process) (Conversion Factor)}}$$

$$Zn_{(equivalent)} = \frac{0.943 \text{ mg/off-kg } (30{,}000 \text{ off-kg/day})}{400{,}000 \text{ gpd } (3.785 \text{ liters/gallon})} = 0.019 \text{ mg/l}$$

Step 2: Once the concentration equivalent is determined, then the alternative CWF limit can be calculated as shown below:



$$Zn_{cwf} = \left[\frac{(0.019 \text{ mg/l} \times 0.4 \text{ mgd}) + (2.61 \text{ mg/l} \times 0.1 \text{ mgd}) + (1.33 \text{ mg/l} \times 0.075 \text{ mgd})}{(0.4 \text{ mgd} + 0.1 \text{ mgd} + 0.075 \text{ mgd})}\right] \times$$

$$\left[\frac{(0.4\text{ mgd} + 0.1\text{ mgd} + 0.075\text{ mgd} + 0.05\text{ mgd} - 0.05\text{ mgd})}{0.625\text{ mgd}}\right]$$

Zn_{cwf} = 0.59 mg/l

For the wastestreams shown in the first part of Example 4, permit authorities may wish to utilize mass limits. The example below converts both concentration-based and production-based standards to mass-based limits and utilizes the CWF to calculate an alternative mass per day limit.

EXAMPLE (Alternative Method)

Copper Forming

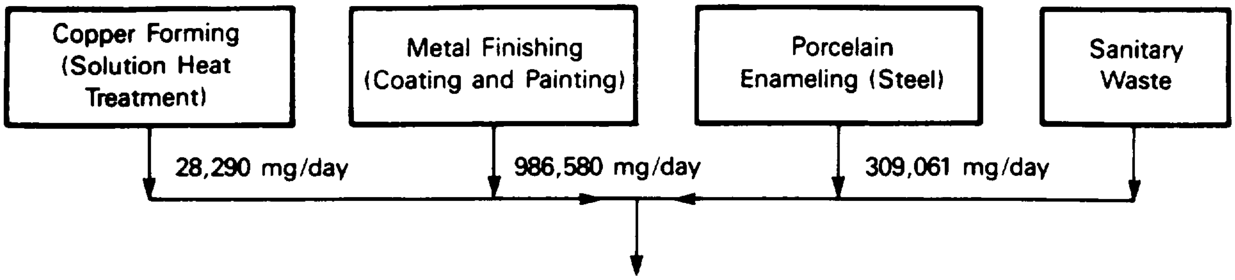
Copper Forming (Solution Heat Treatment Maximum Daily Limit for Zinc	= 0.943 mg/off-kg of copper heat treated
Average Daily Production During Last 12 months	= 30,000 off-kg of copper heat treated per day
Average Daily Water Usage in Solution Heat Treating During Last 12 months	= not required
Allowable Zn Mass = 0.943 (30,000)	= 28,290 mg/day

Metal Finishing

Metal Finishing Maximum Daily Limit for Zinc	= 2.6 mg/l
Average Daily Production During Last 12 months	= not required
Average Daily Water Usage in Metal Finishing	= 100,000 gpd
Allowable Zn Mass = 2.61 (100,000 x 3.78)	= 986,580 mg/day

Porcelain Enameling

Porcelain Enameling (steel basis material) Maximum Daily Limit for Zinc using the alternative mass limits	= (53.3 + 1.68) mg/m^2 of area processed or coated through metal preparation and coating operation, respectively.
Average Daily Production During Last 12 months	= 5570 m^2 of preparation 7250 m^2 of coating
Average Daily Water Usage in Porcelain Enameling	= not required
Allowable Zn Mass	= 53.3(5570)+1.68(7250)=309,061 mg/day



Zn_{cwf} = 28,290 + 986,580 + 309,061

= 1,323,931 mg/day

Zn_{cwf} = 1.32 kg/day or (2.9 lbs/day)

Note: Average daily water usages for the copper forming and porcelain enameling (production-based) limits are not required for the example calculations shown above.

3.4.4.5 Example 5 - Combined Wastestream Formula Example Calculations for an Integrated Facility

The following example provides the rationale and calculations for determining alternate CWF limits for copper, for a copper forming facility containing regulated, unregulated and dilution streams. It also provides a summary of calculated alternative limits for other regulated pollutants.

1. Facility Description: An integrated copper forming facility that produces 12-gauge copper wire and 22-gauge tin-plated copper wire that is used for electrical and electronic products.

2. Process Description: Purchased 3/8" annealed and cleaned copper rod is drawn to produce a 12-gauge copper wire. After being drawn, the copper wire is annealed and alkaline cleaned to produce the finished copper wire. Sixty percent of the finished 12-gauge copper wire is then redrawn, annealed, and alkaline cleaned, to produce a 22-gauge copper wire. The 22-gauge copper wire is then plated with tin to produce a second finished product. A process flow diagram for this example IU is shown in Figure 3.3.

3. Production Rates:

Average daily production rate for the 12-gauge copper wire forming process:	50,000 kg/day
Average daily production rate for the 22-gauge copper wire forming process:	30,000 kg/day

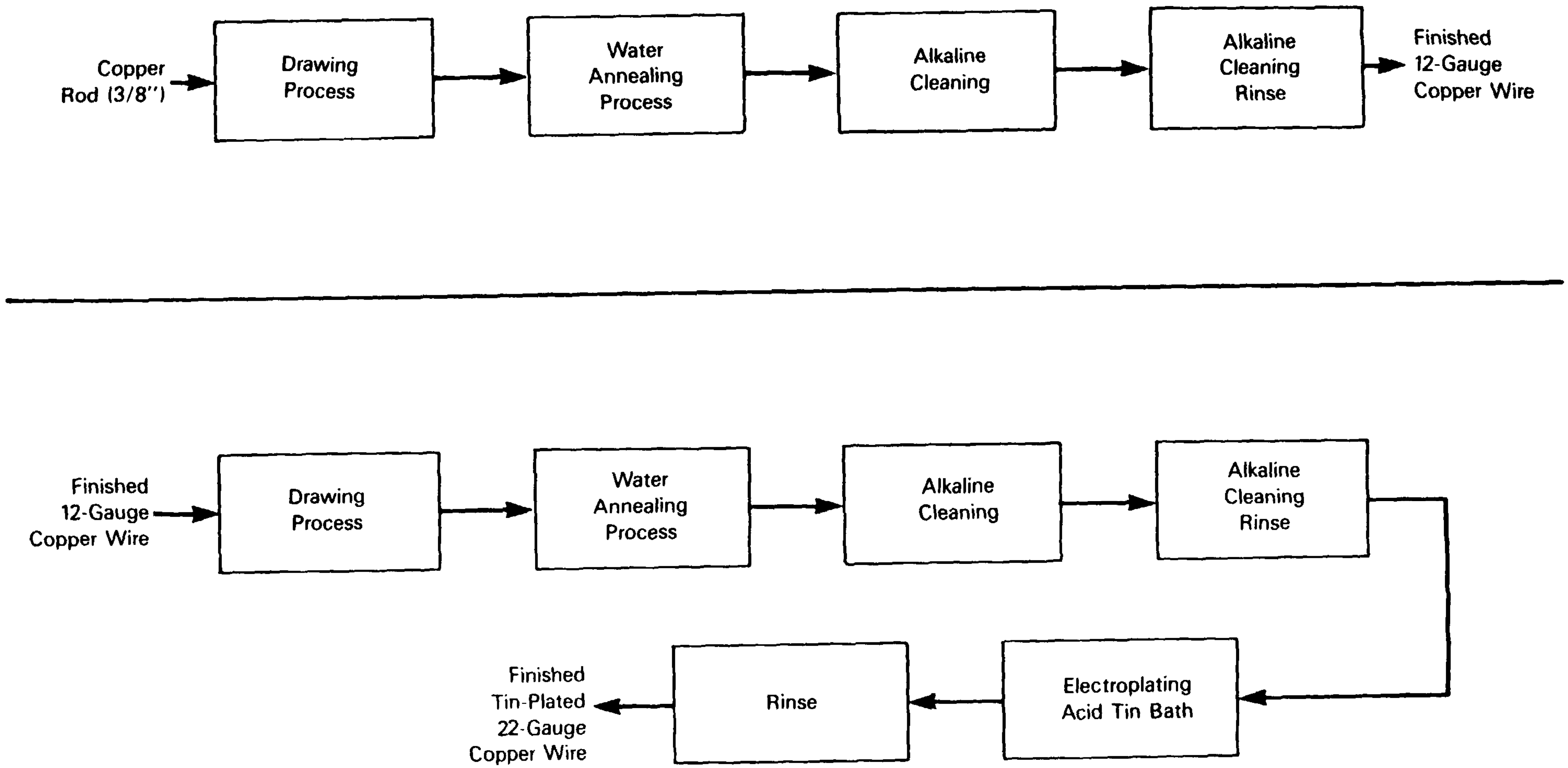


Figure 3.3
Process Flow Schematic for Example IU

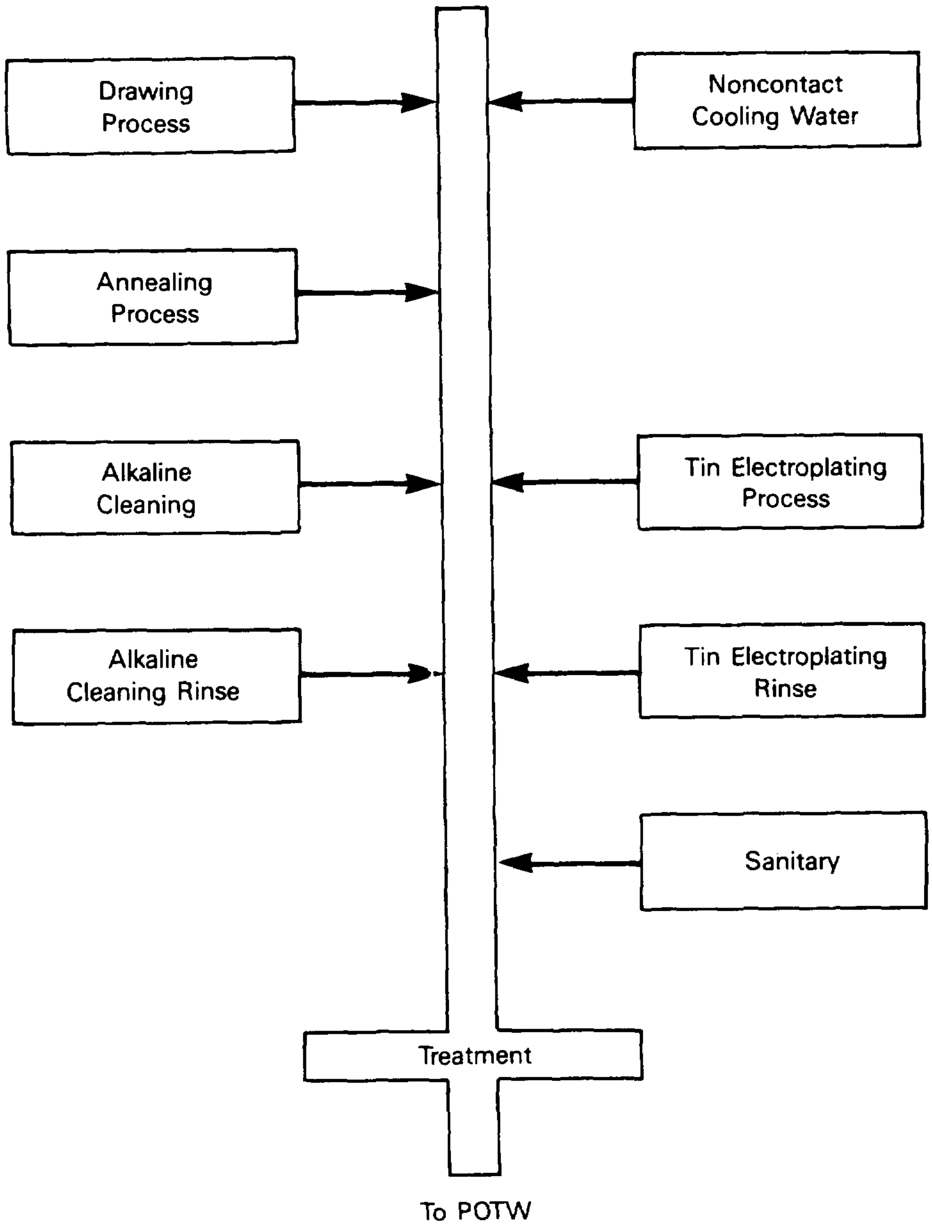


Figure 3.4
Example IU Wastewater Flow Diagram

4. Average Copper Forming Process Wastestream Flow Rates:

Process	Average Wastewater Flow Rate (gpd)	
Drawing	2000	(12-gauge process)
	1200	(22-gauge process)
Water Annealing	25,000	(12-gauge process)
	17,000	(22-gauge process)
Alkaline Cleaning	7,500	(12-gauge process)
	5,000	(22-gauge process)
Alkaline Cleaning Rinse	110,000	(12-gauge process)
	70,000	(22-gauge process)
Total	237,700	

* Note: Breakdown of process flows developed from model plant data in Copper Forming Development Document. Only the total flow is necessary for use in the CWF.

5. Average Electroplating Process Wastestream Flow Rates:

Process	Average Wastewater Flow Rate (gpd)
Tin Electroplating and rinse	11,300

6. Wastewater Flow Diagram: Figure 3.4 provides a wastewater flow diagram for the example facility. Note that two additional wastestreams, sanitary and noncontact cooling water, are combined with the process wastewater before treatment.

7. Applicable Categorical Standards: The copper forming and ancillary processes are regulated by 40 CFR Part 468.14; Copper Forming Categorical Pretreatment Standards; Copper Forming Category. The wastewater from the major copper forming process (drawing in this example) and each ancillary process (annealing, alkaline cleaning and rinse) are individually regulated by the copper forming categorical standard. For this example IU, the standards which apply and are utilized are shown in Appendix D. For the calculation determining the copper limit, the applicable standard is summarized in the results summary table later in this example.

8. Classification of Noncontact Cooling Water: In order to determine whether the noncontact cooling water discharged at this example IU would be classified as dilute or unregulated, the Control Authority required analysis of grab samples of the wastewater for all the regulated pollutants. Results of the analyses are as follows:

Noncontact Cooling Water

Parameter	Concentration (mg/l)
Cadmium	ND*
Chromium	ND
Copper	1.89
Lead	ND
Nickel	ND
Silver	ND
Zinc	ND
Cyanide (total)	ND

*ND = not detected, below analytical detection limits

Based on the above analyses, the Control Authority may classify the noncontact cooling water as a dilute wastestream for all the regulated pollutants. In the case of copper, which was the only pollutant detected, the measured value was not substantially above the treatability level as reflected by the maximum daily limit and maximum average monthly (4-day) limit in the electroplating regulations. In fact the measured level was substantially below these limits.

9. Example Calculation for Alternative Mass Limit for Copper after August 15, 1986

The following will illustrate how to calculate an alternative mass limit for copper, for the example IU described above after August 15, 1986 (compliance date for Copper Forming Categorical Pretreatment Standards).

a). Calculation of Mass Per Day Equivalent for Copper Forming Processes

In order to utilize one categorical standard for the entire copper forming process, the standards (or allowance) for the major forming and ancillary processes can be summed together based on the production rate of each process. For this example IU, the following table presents the applicable copper standard for each process and the total allowance for the entire copper forming process:

Daily Maximum Standard

Regulated Process	Applicable Copper Standard (mg/off-kg)	Daily Production Rate (off-kg/day)	Copper Allowance (mg/day)
Drawing:			
12-Gauge	0.161	50,000	8,050
22-Gauge	0.161	30,000	4,830
Annealing:			
12-Gauge	2.356	50,000	117,800
22-Gauge	2.356	30,000	70,680
Alkaline Cleaning:			
12-Gauge	0.088	50,000	4,400
22-Gauge	0.088	30,000	2,640
Alkaline Cleaning Rinse:			
12-Gauge	8.006	50,000	400,300
22-Gauge	8.006	30,000	240,180
Total Allowance			848,880 mg/day

Maximum Monthly Average Standard

Regulated Process	Applicable Copper Standard (mg/off-kg)	Daily Production Rate (off-kg/day)	Copper Allowance (mg/day)
Drawing:			
12-Gauge	0.085	50,000	4,250
22-Gauge	0.085	30,000	2,550
Annealing:			
12-Gauge	1.240	50,000	62,000
22-Gauge	1.240	30,000	37,200
Alkaline Cleaning:			
12-Gauge	0.046	50,000	2,300
22-Gauge	0.046	30,000	1,380
Alkaline Cleaning Rinse:			
12-Gauge	4.214	50,000	210,700
22-Gauge	4.214	30,000	126,420
Total Allowance			446,800

b). Adjustment of Metal Finishing Standards: The metal finishing categorical standards regulate only the concentration (in mg/l) of wastewaters discharged from electroplating processes. Therefore, the Control Authority has to convert the concentration-based metal finishing standard for copper to an equivalent mass limit. For this example, the equivalent daily maximum mass limit for copper is calculated as follows:

Daily Maximum
Equivalent Mass = 3.38 mg/l x 11,300 gpd x 3.785 liters/gal. = 144,564 mg/day
Limit for Copper

The monthly average mass limit for metal finishing standards is based directly on the maximum monthly concentration limit for copper in the regulation and can be calculated as follows:

Monthly Maximum
Equivalent Mass = 2.07 mg/l x 11,300 gpd x 3.785 l liter/gal. = 88,535 mq/day
Limit for Copper

b). Data Summary Table: The following table summarizes the data necessary to calculate an alternative discharge limit for copper when metal finishing and copper forming standards apply:

Wastestream Description	Wastestream Type	Average Flow (gpd)	Daily Max. Copper Limit	Max. Monthly Avg. Copper Limit
Copper Forming Processes	Regulated	237,000	848,880 mg/day	446,800mg/day
Electroplating (Tin)	Regulated	11,300	144,564 mg/day	88,535mg/day
Non-Contact Cooling Water	Dilute	6,400	N/A	N/A
Sanitary	Dilute	4,000	N/A	N/A

c). Alternate Daily Maximum Copper Limit Calculation: Using the data found in b) above, an alternate daily maximum copper limit can be calculated again using the alternative mass limit formula given in Section 3.3.1.2:

$$M_T = (848{,}880 \text{ mg/day} + 144{,}564 \text{ mg/day}) \times \left[\frac{(259{,}400 \text{ gpd} - 10{,}400 \text{ gpd})}{(237{,}700 \text{ gpd} + 11{,}300 \text{ gpd})}\right]$$

$$M_T = 993{,}444 \text{ mg/day} \times \left[\frac{249{,}000 \text{ gpd}}{249{,}000 \text{ gpd}}\right]$$

$$M_T = 993{,}444 \text{ mg/day}$$

d). Alternate Monthly Copper Limit Calculation: Again using the data in b) above and the alternative mass limit formula, an alternative maximum monthly average copper limit can be calculated. The calculation is the same as in c) above, however the values for M_i change to reflect the maximum monthly average limits:

$$M_T = (446{,}800 \text{ mg/day} + 88{,}535 \text{ mg/day}) \times \left[\frac{(259{,}400 \text{ gpd} - 10{,}400 \text{ gpd})}{(237{,}700 \text{ gpd} + 11{,}300 \text{ gpd})}\right]$$

$$M_T = 535{,}335 \text{ mg/day}$$

10. Example calculations for copper before August 15, 1986 (compliance date for copper forming) and after February 15, 1986 (compliance date for metal finishing)

a). Calculation of alternative concentration limit for Copper

Metal Finishing = Daily Maximum Concentration for Copper — 3.38 mg/l categorical limit

Copper Forming = Daily Maximum Concentration for Copper — Unregulated Process Wastestream for Purposes of CWF

Using the appropriate flow information for all wastestreams and whether the wastestream is dilution the following CWF calculation results:

$$Cu_{cwf} = \frac{Ci\,Fi}{Fi} \times \frac{F_T - F_D}{F_T}$$

$$Cu_{cwf} = \left[\frac{3.38 \text{ mg/l } (11{,}300 \text{ gpd})}{11{,}300 \text{ gpd}}\right] \times \left[\frac{(259{,}400 \text{ gpd} - 10{,}400 \text{ gpd})}{259{,}400 \text{ gpd}}\right]$$

$$Cu_{cwf} = 3.38 \text{ mg/l} \times 0.9599$$

$$Cu_{cwf} = 3.24 \text{ mg/l}$$

b). Calculation of alternative mass limit for Copper

Metal Finishing = 3.38 mg/l x 3.785 liters/gal x 11,300 gpd
Daily Maximum
Mass for Copper = 144,564 mg/l

$$M_{cwf} = M_i \times \frac{F_T - F_D}{Fi}$$

$$Cu_{mass\ cwf} = 144{,}564 \text{ mg/day} \times \left[\frac{(259{,}400 \text{ gpd} - 10{,}400 \text{ gpd})}{11{,}300 \text{ gpd}}\right]$$

$$= 3.186 \times 10^6 \text{ mg/day}$$

11. Calculation of Alternate Discharge Limits for the Remaining Regulated Pollutant Parameters (After August 15, 1986)

The remaining pollutant parameters that are regulated by both the copper forming and electroplating/metal finishing categorical standards include chromium (Cr), lead (Pb), nickel (Ni), zinc (Zn) and total toxic organics (TTO). In addition, cadmium (Cd), silver (Ag), total cyanide (CN), and total metals are regulated only by the electroplating/metal finishing standards.

For those regulated pollutants common to both categorical standards, the calculations would be similar to those described in this example, Parts 9 and 10. The only differences in the calculations would be utilization of the applicable standard for each pollutant.

12. Calculation of Alternative Discharge Limits for TTO

In order for this example facility to comply with the TTO standards in both the copper forming and electroplating/metal finishing categorical standards, an alternative TTO mass limit must be developed using the CWF or the TTO monitoring alternative provided in each regulation may be used independently or together. The copper forming regulation provides an oil and grease standard as an alternative to TTO monitoring and compliance; the electroplating/metal finishing provides a TTO monitoring alternative comprising a certification procedure and the development and implementation of a toxic organic management.

An example dealing with this type of occurrance is contained in the "Guidance Manual for Implementing Total Toxic Organics (TTO) Pretreatment Standards". The reader should refer to this manual for guidance on the implementation of the TTO standards.

13. Calculations of Remaining Pollutant Parameters Regulated by Electroplating and Metal Finishing Only

The remaining pollutant parameters regulated by the electroplating/metal finishing standards for the tin plating process (Cd, Ag, CN, total metals) would also need to be adjusted using the CWF. To do this, the copper forming process wastestreams would be classified as unregulated except in the case of cyanide and used as such in the CWF. For cyanide only the cyanide bearing wastestreams are considered regulated flows; the other flows are considered dilution (see previous example in Section 3.4.4.3).

3.4.5 Comparison of Local Limits and Categorical Standards

Control Authorities are required during pretreatment program development to establish local discharge limits to:

- Prevent the introduction of pollutants into the POTW which could interfere with its operations
- Prevent the pass through of untreated pollutants which could violate a POTW's NPDES permit limitations and applicable water quality standards
- Prevent the contamination of a POTW's sludge which would limit selected sludge uses or disposal practices.

These local limits are normally applicable to IUs at the point where they discharge into the POTW collection system ("end-of-pipe").

Categorical standards on the other hand, are treatment technology-based and apply at the point just downstream from the regulated process ("end-of-process").

To be able to perform a comparison between local limits and categorical standards to determine which standards are more stringent, it may be necessary to calculate a CWF alternative limit which applies to the regulated streams plus any wastestreams combined prior to treatment. This limit may then need to be further adjusted using the methodology described in Section 3.3 if non-regulated streams are added to the treated effluent.

The following example illustrates the process for comparing categorical standards to local limits using a typical integrated facility as shown in Figure 3.5. In this example, it is assumed that the Control Authority is not applying the CWF where non-regulated wastestreams are added after treatment.

3.4.5.1 Example - Integrated Facility Calculations Comparing Categorical Standards and Local Limits

Facility Data:

1. Description of the example facility:

   - The company is an electroplating job shop with a flow >10,000 gpd.

   - The electroplating operations consist of cadmium, nickel, and chrome plating.

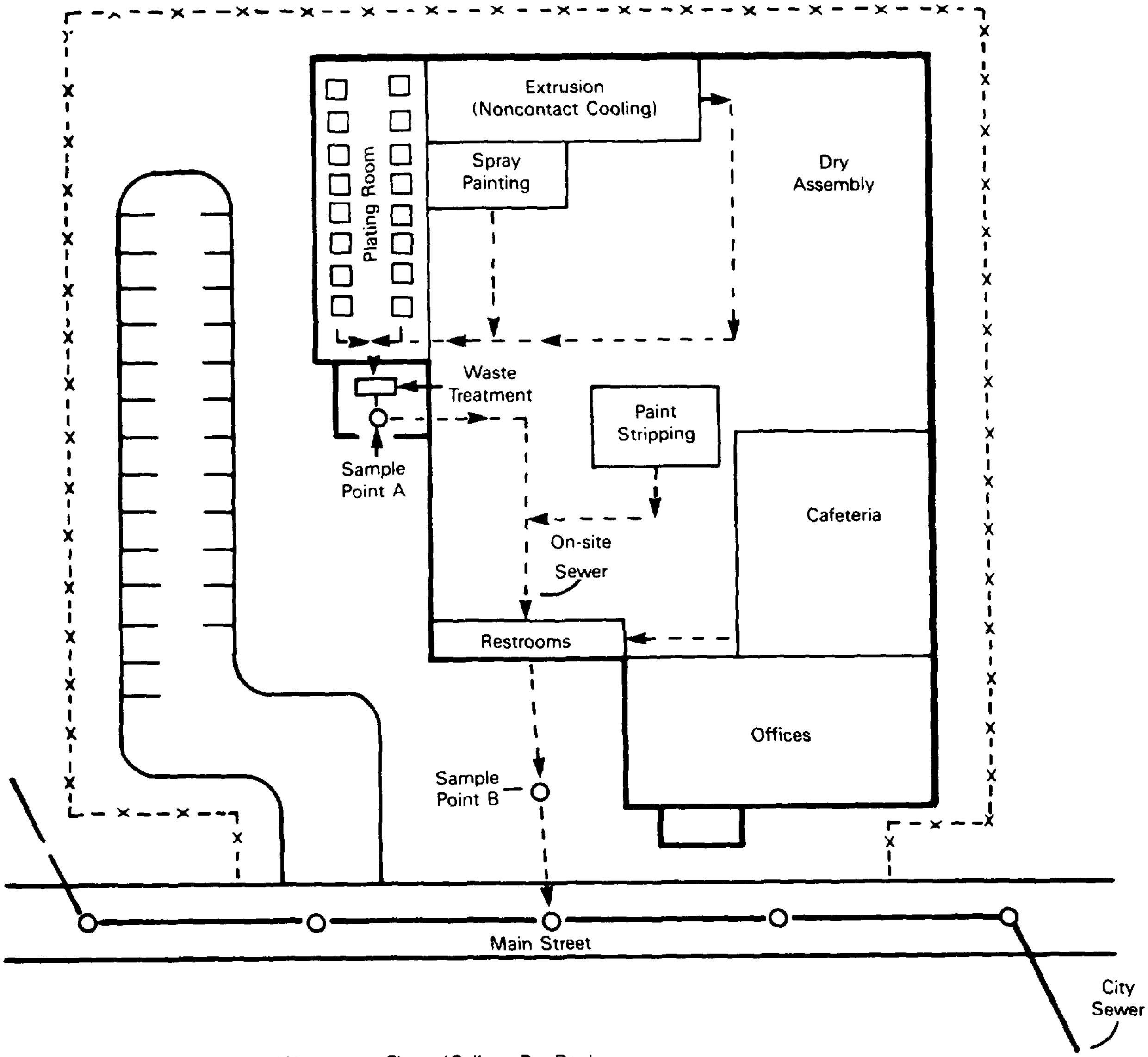
   - The other manufacturing operations consist of plastic extrusion, paint stripping and spray painting. Wastewater from the extrusion operation is noncontact cooling water.

   - The facility has sanitary and cafeteria wastewaters.

2. The electroplating pretreatment standards for job shops are promulgated in 40 CFR 413. The maximum limits for any one day (in mg/l) for flows >10,000 gpd are:

CN,T:	1.9	Zn:	4.2
Cu:	4.5	Pb:	0.6
Ni:	4.1	Cd:	1.2
Cr:	7.0	Total Metals:	10.5

   Daily maximum values are utilized for the comparison in this example, because POTW local limits are normally expressed as maximum limits for any one day. Hence, a Control Authority would apply to the categorical IU the categorical four-day average limit as adjusted for the combined flow, and the more stringent maximum standard for any one day (local or categorical).



Wastewater Flows (Gallons Per Day)	
Electroplating	50,000 gpd
Noncontact Cooling	30,000 gpd
Spray Painting	10,000 gpd
Paint Stripping	5,000 gpd
Sanitary and Cafeteria	10,000 gpd
Total Flow	105,000 gpd

Sample Point A – Sump located immediately after treatment (combined wastestream formula applies)

Sample Point B – On-site manhole, 10 feet NW of Main Street (local limits apply)

Figure 3.5
Example Flow Schematic of Example Integrated Facility

3. The POTW has the following maximum local limits (mg/l) which apply at Point B:

CN,T:	3.0	Zn:	4.0
Cu:	2.0	Pb:	0.1
Ni:	3.0	Cd:	0.5
Cr:	5.0		

4. As shown below, it appears that when comparing local limits vs. categorical standards on paper, six of the local limits are more stringent than the categorical standards. Since categorical standards are end-of-process limits and not end-of-pipe limits, this one-step, simple comparison is not applicable at a point where all wastewaters are combined.

	Federal Standard	Local Standard
CN,T	1.9	3.0
Cu	4.5	2.0
Ni	4.1	3.0
Cr	7.0	5.0
Zn	4.2	4.0
Pb	0.6	0.1
Cd	1.2	0.5
Total Metals	10.5	---

5. Flow Schematic of the Example Facility:

See Figure 3.5.

6. Example facility wastestream flow rates:

Regulated flow (electroplating only): F_i = 50,000 gpd

Flows added before treatment

Dilution flow: F_D = 30,000 gpd
(plastic extrusion non-contact cooling waters)

Unregulated process flows: 10,000 gpd (not required)
(spray painting only)

Total Flow at Point A: F_T = 90,000 gpd

Flows added after treatment (Not Regulated)

Sanitary and Cafeteria: 10,000 gpd
Paint Stripping: 5,000 gpd

Flow at Point B: 105,000 gpd

The flow from the spray painting operation is considered an unregulated stream because spray painting is not listed in Appendix D of the General Pretreatment

Regulations (which would have made it considered dilution) and it is not regulated under the Electroplating category 40 CFR Part 413 (which would have made it considered regulated). However, if the facility was not a job shop, then it would be covered under Metal Finishing, 40 CFR Part 433 after February 15, 1986, and the spray painting flow would be considered regulated and covered by the standards issued as part of that category standard. The flow from paint stripping is also not regulated under the Electroplating Standards.

B. Adjustment of Categorical Standards

The following illustrates how to calculate an adjusted categorical limit for cadmium (Cd), to be applied at Sample Point A, using the CWF and then adjusting the limit for the addition of non-regulated streams after treatment. These steps are important so that proper comparison of categorical standards and local limits can be performed.

STEP 1

Combined wastestream formula:

$$C_{T(A)} = \frac{\sum_{i=1}^{N} C_i F_i}{\sum_{i=1}^{N} F_i} \times \frac{F_T - F_D}{F_T}$$

$C_{T(A)}$ = Alternative concentration limit for combined flow of regulated wastesteam plus other (unregulated and dilute) wastestreams added prior to treatment. This limit applies at Sample Point A.

C_i = Federal categorical pretreatment standard for the pollutant in the regulated wastestream (F_i)

F_i = Regulated process wastestream flow

F_T = Total flow at Sample Point A

F_D = Dilution flow at Sample Point A

STEP 2

Calculating for cadmium using flows presented in A.6 above:

$$C_{T(A)} = \frac{1.2 \text{ mg/l} \times 50{,}000 \text{ gpd}}{50{,}000 \text{ gpd}} \times \frac{90{,}000 \text{ gpd} - 30{,}000 \text{ gpd}}{90{,}000 \text{ gpd}}$$

$$= 1.2 \text{ mg/l} \times 0.667$$

$$C_{T(A)} = 0.80 \text{ mg/l}$$

STEP 3

Adjusting CWF limit (C_T) to determine applicable limit at Point B.

First, determine the actual concentration of cadmium in the non-regulated streams added after treatment. The sanitary and cafeteria wastestreams contain no metals. The analysis of the paint stripping wastewater yields the following:

Pollutant	Actual Concentrations Paint Stripping (mg/l)
CN,T	ND
Cu	ND
Ni	ND
Cr	ND
Zn	0.9
Pb	0.3
Cd	1.4
Total Metals	1.4

Adjusted Concentration Limit for Point B

$$C_T(B) = \frac{\text{CWF Limit for Point A} \times \text{Flow at Point A} + \text{Actual Mass of Pollutant in Non-Regulated Streams Added After Treatment}}{\text{(Flow at Point B)}}$$

Adjusted Concentration Limit for Point B for Cd is:

$$C_T\ (B) = \frac{(0.80\ mg/l)\ (90{,}000\ gpd)\ +\ (1.4\ mg/l)(5{,}000\ gpd)}{105{,}000\ gpd}$$

$C_T(B) = 0.75$ mg/l

Step 4

Perform the above calculations for the other regulated pollutants and make a comparison and selection of the more stringent limits (i.e., local limits vs. adjusted categorical limits to apply at Point B. It should be noted that the requirement contained in the metal finishing (CFR Part 433) categorical standards that non-cyanide wastestream are considered dilution does not apply for the electroplating (CFR Part 413) limitations used in the combined wastestream formula. Thus, the cyanide calculations are conducted in the same manner as the metals.

	(a)	(b)	(c)	(d)
	Categorical Standard Daily Max (mg/l)	Adjusted Categorical Standard Daily Max (mg/l)	Local Limit Daily Max (mg/l)	Applicable Limit (most stringent) (mg/l)
CN,T	1.9	1.1	3.0	1.1 (Categorical)
Cu	4.5	2.6	2.0	2.0 (Local)
Ni	4.1	2.3	3.0	2.5 (Categorical)
Cr	7.0	4.0	5.0	4.2 (Categorical)
Zn	4.2	2.4	4.0	2.5 (Categorical)
Pb	0.6	0.3	0.1	0.1 (Local)
Cd	1.2	0.75	0.5	0.5 (Local)
Total Metals	10.5	5.8	---	5.8 (Categorical)

Examining the table above, the following observations are made:

(1) Local limits are more stringent for Cu, Pb, and Cd.

(2) Without adjusting the categorical standards, comparing column (c) with column (a), it appears as discussed earlier that local limits for Ni, Cr, and Zn are more stringent. However, after calculating the adjusted categorical standards, the adjusted categorical limits for these three pollutant parameters are more stringent then the local limit at the point at which local limit apply.

(3) In summary, comparison of the limits without adjusting the categorical standard shows that six local limits would be more stringent. After the adjustment, only three limits remain more stringent.

4. REFERENCES

"Development Document for Effluent Limitations Guidelines and Standards for the Copper Forming Point Source Category; Final," March 1984, EPA 440/1-84/074.

"Development Document for Effluent Limitations Guidelines and Standards for the Metal Finishing Point Source Category; Final," June 1983, EPA 440/1-83/091.

"Development Document for Effluent Limitations Guidelines and Standards for the Porcelain Enameling Point Source Category; Final," November 1982, EPA 440/1-82-072.

"Guidance Manual for Electroplating and Metal Finishing Pretreatment Standards," February 1984, EPA Effluent Guidelines and Permits Division.

"Guidance Manual for POTW Pretreatment Program Development," October 1983, EPA Office of Water Enforcement and Permits.

"Pretreatment Program Implementation Guidance Manual," May 1984, EPA Region X Permits Branch.

"Guidance Manual for Implementing Total Toxic Organics (TTO) Pretreatment Standards, "September 1985, U.S. EPA Permits Division.

APPENDIX A

PUBLICATIONS AVAILABLE FROM THE GOVERNMENT PRINTING OFFICE (GPO) AND/OR THE NATIONAL TECHNICAL INFORMATION SERVICE (NTIS)

APPENDIX A

PUBLICATIONS ORDERING INFORMATION

Copies of all Development Documents published by the Industrial Technology Division (formerly Effluent Guidelines Division) are maae available for review at the following EPA Office's:

ENVIRONMENTAL PROTECTION AGENCY
Public Information Reference Unit
Waterside Mall, Room 2922
401 M Street, SW
Washington, DC 20460

or

Any Environmental Protection Agency
Regional Office Library

Publications can be obtained by purchasing from the following sources using the document numbers shown in the attached table:

GOVERNMENT PRINTING OFFICE (GPO)
ATTN: Superintendent of Document
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Springfield, VA 22151
Order Desk Phone Number (703) 487-4650
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APPENDIX A (CONT'D)

PUBLICATIONS AVAILABLE FROM THE GOVERNMENT PRINTING OFFICE (GPO) AND/OR THE NATIONAL TECHNICAL INFORMATION SERVICE (NTIS)

CATEGORY OF ITD INDUSTRIAL STUDIES	CFR PART NUMBER	SUBCATEGORY	ITD DOCUMENT NUMBER	GPO STOCK NUMBER	NTIS ACCESSION NUMBER
Aluminum Forming	467	Aluminum (Final)	EPA 440/1-84/073	--	PB84-244425
Battery Manufacting	461	Battery Mfg. (Final)	EPA 440/1-84/067 Vol I	--	PB85-121507
			Vol II	--	PB85-121515
Coil Coating	465	a) Coil Coating (Final)	EPA 440/1-82/071	--	PB83-205542
		b) Coil Coating Canmaking (Final)	EPA 440/1-83/071	--	PB84-198647
Copper Forming	468	Copper (Final)	EPA 440/1-84/074	--	PB84-192459
Electroplating	413	Electroplating (Pretreatment Final)	EPA 440/1-79/003	--	PB80-196488
Electrical & Electronics Components	469	a) Phase I (Final)	EPA 440/1-83/075	--	PB82-249673
		b Phase II (Final)	EPA 440/1-84/075	--	
Inorganic Chemicals	415	a) (Phase I) (Final)	EPA 440/1-82/007	--	PB82-265612
		b) (Phase II) (Final)	EPA 440/1-84/007	--	PB85-156446
Iron & Steel Manufacturing	420	Iron & Steel (Final)	EPA 440/1-82/024	--	
		Volume I			PB82-240425
		Volume II			PB82-240433
		Volume III			PB82-240441
		Volume IV			PB82-240458
		Volume V			PB82-240466
		Volume VI			PB82-240474

* Also available from Effluent Guidelines Division

APPENDIX A (CONT'D)

PUBLICATIONS AVAILABLE FROM THE GOVERNMENT PRINTING OFFICE (GPO) AND/OR THE NATIONAL TECHNICAL INFORMATION SERVICE (NTIS)

CATEGORY ITD INDUSTRIAL STUDIES	CFR PART NUMBER	SUBCATEGORY	ITD DOCUMENT NUMBER	GPO STOCK NUMBER	NTIS ACCESSION NUMBER
Leather Tanning & Finishing	425	Leather (Final)	EPA 440/1-82/016	--	PB83-172593
Metal Finishing	433	Metal Finishing (Final)	EPA 440/1-82/091	--	PB84-115989
Nonferrous Metal	421	a) Bauxite Refining	EPA 440/1-74/091-c	5501-00116	PB128463/AS
		b) Primary Aluminum Smelting	EPA 440/1-74/019-d	5501-00817	PB234859/AS
		c) Secondary Aluminum Smelting	EPA 440/1-74/019-e	5501-00819	PB238464/AS
Petroleum Refining	419	Petroleum Refining (Final)	EPA 440/1-82/014	--	PB83-172569
Pharmaceuticals	439	Pharmaceutical (Final)	EPA 440/1-83/084	--	PB84-180066
Plastics Molding & Forming	463	Forming (Final)	EPA 440/1-84/069	--	
Porcelain Enameling	466	Porcelain Enameling (Final)	EPA 440/1-82/072	--	

APPENDIX A (CONT'D)

PUBLICATIONS AVAILABLE FROM THE GOVERNMENT PRINTING OFFICE (GPO)
AND/OR THE NATIONAL TECHNICAL INFORMATION SERVICE (NTIS)

CATEGORY ITD DUSTRIAL STUDIES	CFR PART NUMBER	SUBCATEGORY	ITD DOCUMENT NUMBER	GPO STOCK NUMBER	NTIS ACCESSION NUMBER
Pulp & Paper & Paperboard	430 & 431	Pulp, Paper & Paperboard and Builders' Paper & Board Mills (Final)	EPA 440/1-82/025	--	PB83-163949
Steam Electric	423	Steam Electric (Final)	EPA 440/1-82/029	--	--
Textile Mills	410	Textile Mills (Final)	EPA 440/1-82/022	--	PB83-116871
Timber Products	429	Timber Products (Final)	EPA 440/1-81/023	--	PB81-227282

APPENDIX B

STATUS OF CATEGORICAL PRETREATMENT STANDARDS

INDUSTRIES SUBJECT TO CATEGORICAL PRETREATMENT STANDARDS
FINAL REGULATIONS

Industry Category	PSES[1] Compliance Date
Timber Products	12-09-79
Electroplating[2]	4-27-84 (Nonintegrated) 6-30-84 (Integrated) 6/15/86 (TTO)
Iron & Steel	7-10-85
Inorganic Chemicals (Phase I)	8-12-85
Petroleum Refining	12-01-85
Pulp & Paper Mills	7-01-84
Steam Electric Power Plants	7-01-84
Leather Tanning & Finishing	11-25-85
Porcelain Enameling	11-25-85
Coil Coating	12-01-85
Electric and Electronic Components (Phase I)	7-01-84 (TTO) 11-08-85(Arsenic)
Metal Finishing	6/30/84 (TTO) 2-15-86
Copper Forming	8-15-86
Aluminum Forming	10-24-86
Pharmaceuticals	10-27-86
Coil Coating (Canmaking)	11-17-86
Electrical & Electronic Components (Phase II)	7-14-87
Nonferrous Metals (Phase I)	3-09-87
Battery Manufacturing	3-09-87
Inorganic Chemicals (Phase II)	8-22-87
Nonferrous Forming	8-23-88
Nonferrous Metals (Phase II)[3]	
Metals Molding and Casting [3]	

[1]PSES - Pretreatment Standards for Existing Sources.

[2]Existing job shop electroplaters and independent printed circuit board manufacturers must comply with only the electroplating regulations. All other electroplating subcategories are now covered by both the electroplating and metal finishing standards.

[3]Standards are not yet final.

INDUSTRIAL TECHNOLOGY DIVISION
PROPOSED AND FINAL RULES - PRIMARY CATEGORIES
FEDERAL REGISTER CITATIONS
(1979 - Present)

9/16/85

Industry	40 CFR PART	TYPE RULE	SIGNATURE*	FEDERAL REGISTER CITATION	
° ALUMINUM FORMING	467	PROPOSED	11/05/82	47 FR 52626	11/22/82
		PROMULGATION	09/30/83	48 FR 49126	10/24/83
		Correction	--	49 FR 11629	03/27/84
		Notice (Approval)	--	50 FR 4513	01/31/85
° BATTERY MANUFACTURING	461	PROPOSED	10/29/82	47 FR 51052	11/10/82
		PROMULGATION	02/27/84	49 FR 9108	03/09/84
		Correction	--	49 FR 13879	04/09/84
		Correction	--	49 FR 27946	07/09/84
		Notice (Records)	--	49 FR 47925	12/07/84
° COAL MINING	434	PROPOSED	12/30/80	46 FR 3136	01/13/81
		PROMULGATION	09/30/82	47 FR 45382	10/13/82
		Correction	--	48 FR 58321	11/01/83
		Prop. Amend.	--	49 FR 19240	05/04/84
		Notice (Comment Period)	--	49 FR 24388	06/13/84
		Notice (Approval)	--	50 FR 4513	01/31/85
° COIL COATING					
Phase I	465	PROPOSED	12/30/80	46 FR 2934	01/12/81
		PROMULGATION	11/05/82	47 FR 54232	12/01/82
		Final Amend.	--	48 FR 31403	07/08/83
		Final Amend.	--	48 FR 41409	09/15/83
		Correction	--	49 FR 33648	08/24/84
Phase II (Canmaking)............	465	PROPOSED	01/31/83	48 FR 6268	02/10/83
		PROMULGATION	11/09/83	48 FR 52380	11/17/83
		Correction	--	49 FR 14104	04/10/84
		Notice (Approval)	--	50 FR 4513	01/31/85
° COPPER FORMING	468	PROPOSED	10/29/82	47 FR 51278	11/12/82
		PROMULGATION	08/04/83	48 FR 36942	08/15/83
		Final Amend.	--	48 FR 41409	09/15/83
		Prop. Amend.	--	50 FR 4872	02/04/85
		Prop. Amend.	--	50 FR 26128	06/27/85
		Final Amend.	--	50 FR 34242	08/23/85
° ELECTRICAL/ELECTRONIC COMPONENTS					
Phase I	469	PROPOSED	08/11/82	47 FR 37048	08/24/82
		PROMULGATION	03/31/83	48 FR 15382	04/08/83
		Interim Final/ Prop. Amend.	--	48 FR 45249	10/04/83
		Final Amendment	--	49 FR 5922	02/16/84
		Notice (Approval)	--	49 FR 34823	09/04/84
		Notice (Approval)	--	50 FR 4513	01/31/85
Phase II	469	PROPOSED	02/28/83	48 FR 10012	03/09/83
		PROMULGATION	11/30/83	48 FR 55690	12/14/83
		Correction	--	49 FR 1056	01/09/84

* Administrator's signature; ( ) is the projected schedule approved by the court.

NOTE: THIS LISTING DOES NOT INCLUDE RULEMAKING ACTIVITIES SUBSEQUENTLY PUBLISHED BETWEEN PROPOSAL AND PROMULGATION UNLESS THE SCHEDULED PROMULGATION HAS NOT YET BEEN COMPLETED. THESE, AND PUBLICATIONS ISSUED PRIOR TO 1979, ARE IDENTIFIED IN THE PREAMBLES TO EACH PROMULGATED REGULATION.

Industry	40 CFR PART	TYPE RULE	SIGNATURE*	FEDERAL REGISTER CITATION	
° ELECTROPLATING [Pretreatment - PSES only]	413	PROPOSED	01/24/78	43 FR 6560	02/14/78
		PROMULGATION	08/09/79	44 FR 52590	09/07/79
		Correction	--	44 FR 56330	10/01/79
		Correction	--	45 FR 19245	03/25/80
		Prop. Amend.	--	45 FR 45322	07/03/80
		Prop. Amend.	--	46 FR 9462	01/28/81
		Prop. Amend.	--	46 FR 43972	09/02/81
		Prop. Amend.	--	47 FR 38462	08/31/82
		Prop. Amend.	--	48 FR 2774	01/21/83
		Final Amend.	--	48 FR 32462	07/15/83
		Correction	--	48 FR 43680	09/26/83
		Final Amend.	--	48 FR 41409	09/15/83
		Notice (Approval)	--	49 FR 34823	09/04/84
° FOUNDRIES (Metal Molding and Casting)	464	PROPOSED	10/29/82	47 FR 51512	11/15/82
		Notice (Add. Data)	--	49 FR 10280	03/20/84
		Notice (Add. Data)	--	50 FR 6572	02/15/85
		Notice (Comment Period)	--	50 FR 11187	03/20/85
		PROMULGATION	(09/85)**	---	---
° INORGANIC CHEMICALS					
Phase I	415	PROPOSED	07/10/80	45 FR 49450	07/24/80
		PROMULGATION	06/16/82	47 FR 28260	06/29/82
		Correction	--	47 FR 55226	12/08/82
Phase II	415	PROPOSED	09/30/83	48 FR 49408	10/25/83
		PROMULGATION	07/26/84	49 FR 33402	08/22/84
		Correction	--	49 FR 37594	09/25/84
° IRON α STEEL MANUFACTURING...........	420	PROPOSED	12/24/80	46 FR 1858	01/07/81
		PROMULGATION	05/18/82	47 FR 23258	05/27/82
		Correction	--	47 FR 24554	06/07/82
		Correction	--	47 FR 41738	09/22/82
		Final Amend. Correction	--	48 FR 51773	11/14/83
		Prop. Amend.	--	48 FR 46944	10/14/83
		Correction	--	48 FR 51647	11/10/83
		Final Amend.	--	49 FR 21024	05/17/84
		Correction	--	49 FR 24726	06/15/84
		Correction	--	49 FR 25634	06/22/84
° LEATHER TANNING α FINISHING	425	PROPOSED	06/13/79	44 FR 38746	07/02/79
		PROMULGATION	11/07/82	47 FR 52848	11/23/82
		Correction/ Notice (Add. Data)			
		Final Amend.	--	48 FR 30115	06/30/83
		Final Ammed.	--	48 FR 31404	07/08/83
		Correction	--	48 FR 32346	07/15/83
		Correction	--	48 FR 35649	08/05/83
		Correction/ Final. Amend. (PSES)	--	48 FR 41409	09/15/83
		Notice (Add. Data)	--	49 FR 17090	04/23/84
		Notice (Waiver, Reg. II)	--	49 FR 42794	10/24/84
		Notice (Waiver, Reg. II)	--	49 FR 44143	11/02/84

* Administrator's signature; ( ) is the projected schedule approved by the court.
** Schedule pending approval by the court.

INDUSTRIAL TECHNOLOGY DIVISION
PROPOSED AND FINAL RULES - PRIMARY CATEGORIES
FEDERAL REGISTER CITATIONS
(1979 - Present)

9/16/85

- continued -

Industry	40 CFR PART	TYPE RULE	SIGNATURE*	FEDERAL REGISTER CITATION	
° METAL FINISHING	433	PROPOSED	08/11/82	47 FR 38462	08/31/82
	& 413	PROMULGATION	07/05/83	48 FR 32462	07/15/83
		Final Amend.	--	48 FR 41409	09/15/83
		Correction	--	48 FR 43680	09/26/83
° NONFERROUS METALS					
Phase I	421	PROPOSED	01/31/83	48 FR 7032	02/17/83
		PROMULGATION	02/23/84	49 FR 8742	03/08/84
		Correction	--	49 FR 26738	06/29/84
		Correction	--	49 FR 29792	07/24/84
		Correction	--	50 FR 12252	03/28/85
Phase II..........................	421	PROPOSED	05/15/84	49 FR 26352	06/27/84
		PROMULGATION	08/27/85	50 FR --	09/--/85
° NONFERROUS METALS FORMING	471	PROPOSED	02/03/84	49 FR 8112	03/05/84
		PROMULGATION	07/19/85	50 FR 34242	08/23/85
° OIL & GAS (OFFSHORE)..................		PROPOSED	08/02/85	50 FR 34592	08/26/85
		PROMULGATION	(1986)		
° ORE MINING	440	PROPOSED	05/25/82	47 FR 25682	06/14/82
		PROMULGATION	11/05/82	47 FR 54598	12/03/82
° ORGANIC CHEMICALS AND PLASTICS &	414	PROPOSED	02/28/83	48 FR 11828	03/21/83
SYNTHETIC FIBERS	& 416	Notice (Records)	--	49 FR 34295	08/29/84
		Notice (Records)	--	50 FR 20290	05/15/85
		Notice (Add. Data)	--	50 FR 29068	07/17/85
		PROMULGATION	(03/86)	---	---
° PESTICIDES............................	455	PROPOSED	11/05/82	47 FR 53994	11/30/82
		Proposed (Analytical Methods)	--	48 FR 6250	02/10/83
		Notice (Add. Data)	--	49 FR 24492	06/13/84
		Notice (Comment Period)	--	49 FR 30752	08/01/84
		Notice (Add Data)	--	50 FR 3366	01/24/85
		Notice (Records)	--	50 FR 20290	05/15/85
		PROMULGATION	09/11/85	50 FR ---	10/--/85

* Administrator's signature; ( ) is the projected schedule approved by the court.

INDUSTRIAL TECHNOLOGY DIVISION
PROPOSED AND FINAL RULES - PRIMARY CATEGORIES
FEDERAL REGISTER CITATIONS
(1979 - Present)

9/16/85

- continued -

Industry	40 CFR PART	TYPE RULE	SIGNATURE*	FEDERAL REGISTER CITATION	
° PETROLEUM REFINING..................	419	PROPOSED	11/27/79	44 FR 75926	12/21/79
		PROMULGATION	09/30/82	47 FR 46434	10/18/82
		Prop. Amend.	--	49 FR 34152	08/28/84
		Final Amend.	--	50 FR 28516	07/12/85
		Correction	--	50 FR 32414	08/12/85
° PHARMACEUTICALS......................	439	PROPOSED	11/07/82	47 FR 53584	11/26/82
		PROMULGATION	09/30/83	48 FR 49808	10/27/83
		Correction	--	48 FR 50322	11/01/83
		Notice (Approval)	--	50 FR 4513	01/31/85
		Notice (Approval)	--	50 FR 18486	05/01/85
		PROPOSED -			
		NSPS	--	48 FR 49832	10/27/83
		Correction	--	49 FR 1190	01/10/84
		BCT Cost	--	49 FR 8967	03/09/84
		Extension	--	49 FR 17978	04/26/84
		Notice (Add. Data)	--	49 FR 27145	07/02/84
		Notice (Add. Data - Toxic Volatiles)	--	50 FR 36638	09/09/85
° PLASTICS MOLDING α FORMING	463	PROPOSED	02/03/84	49 FR 5862	02/15/84
		PROMULGATION	12/04/84	49 FR 49026	12/17/84
		Correction	--	50 FR 18248	04/30/85
° PORCELAIN ENAMELING..................	466	PROPOSED	01/19/81	46 FR 8860	01/27/81
		PROMULGATION	11/05/82	47 FR 53172	11/24/82
		Final Amend.	--	48 FR 31403	07/08/83
		Final Amend.	--	48 FR 41409	09/15/83
		Prop. Amend.	--	49 FR 18226	04/27/84
		Final Amend.	--	50 FR 36540	09/06/85

* Administrator's signature; ( ) is the projected schedule approved by the court.

Industry	40 CFR PART	TYPE RULE	SIGNATURE*	FEDERAL REGISTER CITATION	
• PULP α PAPER........................	430	PROPOSED	12/11/80	46 FR 1430	01/06/81
	α 431	PROMULGATION	10/29/82	47 FR 52006	11/18/82
		Notice (Add. Data)	--	48 FR 11451	03/18/83
		Correction	--	48 FR 13176	03/30/83
		Final Amend.	--	48 FR 31414	07/08/83
		Notice (FDF)	--	48 FR 43682	09/16/83
		Correction	--	48 FR 45105	10/06/83
		Public Hearing (NPDES Decision)	--	48 FR 45841	10/07/83
		Notice (Petition Denied)	--	49 FR 40546	10/16/84
		Notice (Variance Denied)	--	49 FR 40549	10/16/84
		PROPOSED (PCB)	--	47 FR 52066	11/18/82
		Notice (Comment Period)	--	48 FR 2804	01/21/83
		PROPOSED (BOD_5 - Acetate)	--	45 FR 15952	03/12/80
		Notice (Add. Data)	--	50 FR 36444	09/06/85
• STEAM-ELECTRIC......................	423	PROPOSED	10/03/80	45 FR 68328	10/14/80
		PROMULGATION	11/07/82	47 FR 52290	11/19/82
		Final Amend.	--	48 FR 31404	07/08/83
• TEXTILE MILLS.......................	410	PROPOSED	10/16/79	44 FR 62204	10/29/79
		PROMULGATION	08/27/82	47 FR 38810	09/02/82
		Notice (Add. Data)	--	48 FR 1722	01/14/83
		Correction	--	48 FR 39624	09/01/83
• TIMBER..............................	429	PROPOSED	10/16/79	44 FR 62810	10/31/79
		PROMULGATION	01/07/81	46 FR 8260	01/26/81
		Final Amend.	--	46 FR 57287	11/23/81

* Administrator's signature; ( ) is the projected schedule approved by the Court.

APPENDIX C

FLOW MEASUREMENT REFERENCES

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APPENDIX D

COPPER FORMING CATEGORICAL PRETREATMENT STANDARDS SUBPARTS UTLIZIED IN EXAMPLE

APPENDIX D

A. COPPER FORMING PRETREATMENT STANDARDS

40 CFR Part 468

Subpart C - PSES for Drawing Spent Lubricant

	Maximum for Any 1 Day	Maximum For Monthly Average
	mg/off-kg (lbs/million off-lbs) of copper or copper alloy drawn	
Chromium	0.037	0.015
Copper	0.161	0.085
Lead	0.012	0.011
Nickel	0.163	0.107
Zinc	0.124	0.051
TTO	0.055	0.028
Oil and Grease*	1.700	1.020

*For alternate monitoring

Subpart F - PSES for Annealing With Water

	Maximum for Any 1 Day	Maximum For Monthly Average
	mg/off-kg (lbs/million off-lbs) of copper or copper alloy annealed with water	
Chromium	0.545	0.223
Copper	2.356	1.240
Lead	0.186	0.161
Nickel	2.380	1.574
Zinc	1.810	0.758
TTO	0.806	0.421
Oil and Grease*	24.800	14.880

*For Alternate Monitoring

APPENDIX D (CONT'D)

Subpart H - PSES for Alkaline Cleaning Rinse

	Maximum for Any 1 Day	Maximum For Monthly Average
	mg/off-kg (lbs/million off-lbs) of copper or copper alloy alkaline cleaned	
Chromium	1.854	0.758
Copper	8.006	4.214
Lead	0.632	0.547
Nickel	8.090	5.351
Zinc	6.152	2.570
TTO	2.739	1.432
Oil and Grease*	84.280	50.588

*For Alternate Monitoring

Subpart J - PSES for Alkaline Cleaning Bath

	Maximum for Any 1 Day	Maximum For Monthly Average
	mg/off-kg (lbs/million off-lbs) of copper or copper alloy alkaline cleaned	
Chromium	0.020	0.0084
Copper	0.088	0.046
Lead	0.0070	0.0060
Nickel	0.089	0.059
Zinc	0.068	0.028
TTO	0.030	0.015
Oil and Grease*	0.93	0.56

*For Alternate Monitoring

APPENDIX E

PORTION OF

NPDES PERMIT APPLICATION

REQUESTING PRODUCTION AND FLOW INFORMATION

Please print or type in the unshaded areas only.

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

Form Approved.
OMB No. 2000-0059
Approval expires 12-31-85

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

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. OUT-FALL 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)*

CONTINUE ON REVERSE

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. 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 *(go 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 level of production, expressed in the terms and units used in the applicable effluent guideline, and indicate the affected outfalls.

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

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