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Aluminum, Copper, And Nonferrous Metals Forming And Metal Powders Pretreatment Standards

A Guidance Manual

GUIDANCE MANUAL FOR ALUMINUM, COPPER, AND NONFERROUS METALS FORMING AND METAL POWDERS PRETREATMENT STANDARDS

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1. INTRODUCTION

The National Pretreatment Program establishes an overall strategy for controlling the introduction of nondomestic wastes to publicly owned treatment works (POTWs) in accordance with the overall objectives of the Clean Water Act. Sections 307(b) and (c) of the Act authorize the Environmental Protection Agency to develop national pretreatment standards for new and existing dischargers to POTWs. The Act made these pretreatment standards enforceable against dischargers to POTWs.

The General Pretreatment Regulations (40 CFR Part 403) establish administrative mechanisms requiring nearly 1,500 POTWs to develop local pretreatment programs to enforce general prohibitions, specific prohibitions, and categorical pretreatment standards. Categorical pretreatment standards are designed to prevent the discharge of pollutants that pass through, interfere with, or are otherwise incompatible with the operation of POTWs. The standards are technology-based for removal of toxic pollutants and contain specific numerical limits based on an evaluation of specific technologies for the particular industrial categories addressed. As a result of a settlement agreement between EPA and the Natural Resources Defense Council (NRDC), EPA was required to develop categorical pretreatment standards for 34 industrial categories, with primary emphasis on 65 classes of toxic pollutants.

This manual provides guidance to POTWs on the implementation and enforcement of the categorical pretreatment standards for the aluminum forming, copper forming, and nonferrous metals forming and metal powders categories. This guidance is based primarily on two sources: Federal Register notices, which contain the official announcements of the categorical standards, and the final development documents for aluminum forming, copper forming, and nonferrous metals forming and metal powders categories, which provide a summary of the technical support for the regulations. Additional information on the regulations, industrial manufacturing processes, and wastewater control technologies can be found in these sources.

This manual has been formatted to provide a brief introduction to the aluminum forming, copper forming, and nonferrous metals forming and metal powders categories in the first chapter (the Introduction). Chapter 2 provides a more in-depth explanation of each category and the subcategories established within each regulation. Chapter 2 also discusses the core and ancillary operations associated with the three forming categories. The treatment technologies upon which the regulations for each category have been based are discussed briefly in Chapter 3 with references to the development documents for more information. Chapter 4 of this manual summarizes the requirements of the General Pretreatment Regulations with emphasis on the reporting requirements applicable to all industrial users that are subject to categorical pretreatment standards. In addition, Chapter 4 introduces the mechanisms and provisions by which categorical pretreatment standards may be or must be revised [e.g., through removal credits authority, through fundamentally different factors (FDF) variances, or through use of the combined wastestream formula (CWF) and flow-weighted averaging (FWA)]. Chapter 4 concludes with a brief discussion of local limits. Finally, Chapter 5 provides examples of the application of categorical pretreatment standards for the forming categories illustrating the calculation of mass discharge allowances from production-based standards and the use of the CWA and FWA. The information provided in the appendices of this manual include a list of the references used during development of this guidance manual (Appendix A), a glossary of terms with which the reader should be familiar (Appendix B), a summary of the pretreatment standards for existing and new sources for each forming category (Appendix C), and a list of the EPA Regional, EPA Headquarters and State pretreatment coordinators and contact persons (Appendix D).

1.1 DESCRIPTIONS OF THE METALS FORMING CATEGORIES

Forming is the deformation of a metal or metal alloy into specific shapes by hot or cold working. The major forming operations include rolling (both hot and cold), extruding, forging, and drawing. Additional operations that are common to all three categories include casting, heat treatment, and surface treatment. For a description of these and other technical terms used in this document, refer to the Glossary of Terms provided in Appendix B. Because of the diversity of the nonferrous metals forming industry, EPA has divided it into three categories for regulation: aluminum forming, copper forming, and nonferrous metals forming and metal powders.

Forming of aluminum and aluminum alloys is covered by the aluminum forming regulation. The forming of copper and copper alloys is covered by the copper forming regulation. Discharges from the forming of all other nonferrous metals (except beryllium) are covered by the nonferrous metals forming regulation. As a result of a settlement agreement, EPA will regulate beryllium and all beryllium alloys in a separate subcategory under copper forming at a later date. The nonferrous metals forming regulation also includes metal powder production operations that produce metal powders using mechanical methods.

1.1.1 Aluminum Forming Category

Aluminum forming is the deformation of aluminum or aluminum alloys into specific shapes by hot or cold rolling, drawing, extruding, or forging. Aluminum is used in a wide variety of products because it is lightweight, strong, resistant to corrosion, and has high electrical conductivity. Many of the products manufactured at aluminum forming facilities are sold to other manufacturers for further fabrication or incorporation into consumer goods. Major industrial users of formed aluminum products include building and construction, transportation, electrical, and container and packaging industries.

Aluminum forming has become widespread since the commercial development of aluminum in the 1880s. The demand for formed aluminum products has increased greatly in the past 30 years. Two of the larger markets are the manufacturing of aeronautical and automobile components, where aluminum reduces weight and increases fuel efficiency.

There are approximately 271 aluminum forming facilities throughout the United States, the majority of which are located east of the Mississippi River. The aluminum forming industry employs an estimated 31,200 people and total production is estimated to be 11 billion pounds per year. There are 59 direct dischargers, 72 indirect dischargers, and 140 facilities with no discharge of process wastewaters.

1.1.2 Copper Forming Category

Copper forming facilities produce seven types of copper or copper alloy products: (1) plates, wide rigid pieces of metal over 1/4 inch thick normally used for copper structural parts; (2) sheets, wide flexible pieces of metal less than 1/4 inch thick with little rigidity; (3) strips, usually handled as coils of copper and used for roof gutters, gaskets, radio parts, trim, weather strip, washers, and diaphragms; (4) wires, which are circular in cross-section and flexible; (5) rods, which are circular in cross-section, rigid, and used for screening, fasteners, jewelry, welding rods, chains, hooks, and electrical conductors; (6) tubings, which are long hollow cylinders generally used for transporting fluids and heat transfer applications; and (7) forgings, which take virtually any shape and are formed by exerting pressure on dies or rolls of metal.

Approximately two-thirds of all formed copper and copper alloy products are rod and wire. Building construction and electrical and electronic products manufacturers are the largest users of formed copper materials, followed by industrial machinery and equipment, consumer products, and transportation. Only a small number of plants practice forging.

There are approximately 176 copper forming facilities in the United States, employing about 43,000 employees. Most of the copper forming facilities are located in the northeastern United States and the remainder are distributed throughout the country. Copper forming is a mature industry and has not grown substantially during the last decade. Of the 176, facilities, 45 discharge to POTWs, 37 discharge directly to surface waters, and 94 do not discharge process wastewaters.

1.1.3 Nonferrous Metals Forming and Metal Powders Category

The nonferrous metals forming and metal powders category includes plants engaged in the forming of nonferrous metals and their alloys, with the exception of copper, aluminum and beryllium. Nonferrous metals are formed by a variety of operations, and the product of one operation is often the starting material for a subsequent operation. Cast ingots and billets are the starting (or raw) material for making sheets, plates, extrusions, forgings, and rods. Rolled sheets and plates can be the starting material for stampings, can blanks, finished products in building and aircraft construction, or foil. Extrusions can be used as starting material for forgings and drawings or can be sold as final products, such as beams and extruded tubing. Forgings are either sold as consumer products or are used as parts in the production of machinery, aircraft, and engines.

Some forming operations are more commonly used on specific metals. The forming and associated operations in common use for a particular metal depend on the limiting physical properties of the metal and the requirements for a specific application. For example, lead, tin and bismuth are generally extruded and alloys of these metals are drawn into solder wire. Bismuth is rolled into strip for use in fuses. Hafnium is formed into control rods for nuclear reactors. Lead can be extruded and swaged into bullets. Magnesium is extruded into structural shapes. Nickel alloys are formed into tubing for use in steam and gas turbines and in jet engines. Zinc is rolled into sheet for architectural uses and is stamped into penny blanks. Precious metals (silver, gold, platinum, and palladium) are often used as a thin layer clad to a layer of base metal (usually copper or nickel), which is rolled into strip and stamped into electrical contacts. Pure and clad precious metals are also drawn into wire that is used to fabricate jewelry. Refractory metals (columbium, molybdenum, rhenium, tantalum, tungsten, and vanadium) must be formed at high temperatures or as powders. Columbium is used as a structural material in nuclear reactors. Molybdenum is drawn into semiconductor wires. Tantalum is used in very small capacitors and heat transfer and furnace equipment. Tungsten is used widely in filaments for electric light bulbs.

The nonferrous metals forming category employs an estimated 40,000 people and total production is estimated to be 470,000 tons per year. Although nonferrous metals forming plants are not limited to any one geographical area, the majority of these plants are located east of the Mississippi River. There are approximately 334 plants in the United States that form the nonferrous metals regulated under this category; 37 are direct dischargers, 121 are indirect dischargers, and 176 do not discharge process wastewater.

1.2 HISTORY OF THE ALUMINUM FORMING, COPPER FORMING, AND NONFERROUS METALS FORMING AND METAL POWDERS CATEGORICAL PRETREATMENT STANDARDS

Table 1-1 lists the dates on which the pretreatment standards for new and existing facilities in the three forming categories were first proposed and subsequently promulgated.

Following promulgation of the aluminum forming regulation, the Aluminum Association, Inc., the Aluminum Extruders Council, Inc., and other parties filed petitions for review challenging portions of the regulation. A settlement agreement resulted in amendments to the regulation. These amendments affect the pretreatment standards for existing sources (PSES) for cleaning and etching rinse discharges under Subpart C, Extrusion Subcategory (467.35) and Subpart D, the Forging Subcategory (467.45); PSES for oil and grease discharges under all subcategories; and the classification of hot water (e.g., a cleaning or etching rinse) discharges.

Following promulgation of the copper forming regulation, Brush Wellman, Inc., Cerro Copper Products Company, and the Village of Sauget filed petition for review challenging segments of the regulation. The Seventh Circuit Court of Appeals upheld all provisions of the regulation challenged by Cerro (Cerro Copper Products Company v. Ruckelshaus, 7th Cir., July 1, 1985). A settlement agreement with Brush Wellman, Inc. resulted in an amendment modifying the copper forming regulation to exclude the forming of beryllium copper alloys under Subpart A of the regulation and to create a new subcategory reserved for the forming of beryllium and its alloys.

TABLE 1-1. CITATIONS AND DATES OF PROPOSAL AND PROMULGATION OF PRETREATMENT STANDARDS

TYPE OF RULE	DATE	FEDERAL REGISTER CITATION
Aluminum Forming Category		
Proposed Rule	November 22, 1982	47 FR 52626
Final Rule	October 24, 1983	48 FR 49126
Technical Correction	March 27, 1984	49 FR 11629
Proposed Amendments	March 19, 1986	51 FR 9618
Final Rule	December 27, 1988	53 FR 52366
Copper Forming Category		
Proposed Rule	November 12, 1982	47 FR 51278
Final Rule	August 15, 1983	48 FR 36942
Technical Correction	November 3, 1983	48 FR 50717
Proposed Rule	June 24, 1985	50 FR 26128
Technical Amendment	August 23, 1985	50 FR 34334
Final Rule	March 5, 1986	51 FR 7568
Technical Correction	June 20, 1986	51 FR 22520
Nonferrous Metals Forming and Metal Powders Category		
Proposed Rule	March 5, 1984	49 FR 8112
Final Rule	August 23, 1985	50 FR 34242
Technical Correction	January 22, 1986	51 FR 2884
Proposed Rule	June 9, 1988	53 FR 21774
Metal Finishing Category		
Final Rule	July 15, 1983	48 FR 32462
Technical Amendment	September 15, 1983	48 FR 41409
Correction	September 26, 1983	48 FR 43680
Correction	October 3, 1983	48 FR 45105
Technical Amendment	September 4, 1984	49 FR 34823
Technical Amendment	November 7, 1986	51 FR 40420

2. CATEGORICAL PRETREATMENT STANDARDS FOR THE ALUMINUM, COPPER, AND NONFERROUS METALS FORMING AND METAL POWDERS CATEGORIES (40 CFR PARTS 467, 468, AND 471)

2.1 AFFECTED CATEGORIES

2.1.1 Aluminum Forming

The aluminum forming pretreatment standards apply to wastewaters discharged from any of the core and core-related forming operations, including rolling, drawing, extruding, and forging. Raw materials for aluminum forming can be pure aluminum or alloys of aluminum. Alloys of aluminum are used to improve the machinability, castability, hardness, strength and resistance to corrosion of a metal. Discharges from ancillary operations, such as heat treatment, casting, and surface treatment, are also regulated by this category because they are usually an integral part of aluminum forming and contribute pollutants to discharged wastewaters. Surface treatment operations (called cleaning and etching for the purpose of this regulation) are considered part of aluminum forming whenever they are performed at the same plant site. As such, these surface treatment discharges are regulated by aluminum forming categorical standards rather than by provisions of the electroplating or metal finishing categorical standards (40 CFR Parts 413 and 433, respectively).

Wastewater discharges from processes for casting aluminum or aluminum alloy conducted at plants that manufacture aluminum and also form aluminum may be subject to different categorical standards. Discharges from casting processes conducted at plants that manufacture and form aluminum are regulated by the nonferrous metals manufacturing categorical standards for casting if the processes cast primary or secondary aluminum without cooling (Federal Register, Vol. 49, p. 8742, March 8, 1984). If the aluminum cast at these plants is a remelted primary aluminum product made from refined ore or recycled aluminum and if these facilities also form aluminum, discharges from the casting processes subsequent to remelting are regulated by the aluminum forming categorical standards.

The facilities regulated under the aluminum forming category are generally included within SIC codes 3353, 3354, 3355, and 3463.

2.1.2 <u>Copper Forming</u>

The copper forming pretreatment standards apply to wastewater discharges from any of the copper forming operations. Raw materials can be pure copper or alloys of copper that contain copper as the major constituent by weight, with the following exceptions: alloys that contain 30 percent or greater precious metals by weight are considered precious metal alloys, and alloys that contain 0.1 percent or greater beryllium by weight are considered beryllium alloys. Alloys of copper are used to improve electrical conductivity, thermal conductivity, corrosion resistance, machinability, formability, and strength of a metal, all of which are properties significant to the end uses of copper. Examples of copper alloys are brass (copper/zinc) and bronze (copper/tin).

The facilities regulated by the copper forming category are generally included within SIC Codes 3351 and 3357.

2.1.3 <u>Nonferrous Metals Forming and Metal Powders</u>

The nonferrous metals forming standards apply to wastewater discharges from any of the nonferrous metals forming operations. Raw materials for this category can be any nonferrous metal or alloy of a nonferrous metal with the following exceptions: aluminum (covered under 40 CFR Part 467), copper (covered under 40 CFR Part 468) and beryllium and alloys of beryllium (to be regulated with beryllium copper alloys). The nonferrous metals forming category also includes metal powder production operations that produce metal powders using mechanical methods such as milling, abrading, and atomizing.

Discharges from the casting of nonferrous metals are regulated in the nonferrous metals forming category if casting is conducted as an integral part of the nonferrous metals forming process at the same site the metal is formed. Discharges from surface treatment of nonferrous metals are regulated under the nonferrous metals forming category when surface treatment is performed at the same site the nonferrous metal is formed. Under these circumstances, discharges from surface treatment are excluded from regulation under the electroplating category (40 CFR Part 413) or the metal finishing category (40 CFR Part 433).

The facilities regulated under the nonferrous metals forming category are generally included within SIC Codes 3356, 3357, 3463, and 3497.

2.2 SUBCATEGORIES

The aluminum forming category and the nonferrous metals forming and metal powders category are subcategorized to facilitate description of the regulation of wastewater discharges from the various process operations. Division of a category into subcategories provides a mechanism within the regulation for addressing process and produce variations which result in distinct wastewater characteristics. The copper forming category is not currently subcategorized. However, the regulation of beryllium and beryllium alloy forming operations may later lead to subcategorization within the copper forming category. The following sections describe the various subcategories within each regulation and identify the corresponding applicable process operations.

2.2.1 Aluminum Forming

The aluminum forming category is subcategorized on the basis of the principal forming operations characteristic of aluminum forming facilities. The principal or core operations as they are called in this category consist of rolling, extruding, forging and drawing forming operations and various related operations that almost always occur in conjunction with those forming operations. Typically, but not exclusively, an aluminum forming facility will conduct only one of these core operations at each individual site but will also conduct a number of ancillary operations. Ancillary operations are unit operations that may or may not be conducted at all facilities that carry out the same core operation (e.g., drawing) but do contribute significant volumes of wastewater and loadings of pollutants to a facility's discharge. Ancillary operations will be discussed in more detail in Section 2.3.2. In order to account for the variability of the core operations and ancillary operations that may be conducted at each facility, the categorical standards have established pollutant allowances for discharges from operations that are considered to be the "core" or principal operation of each subcategory and separate allowances for discharges from the various ancillary operations that may or may not be used by individual forming facilities. Therefore, an aluminum forming facility would be permitted to discharge a mass of a pollutant that is equivalent to the sum of the mass limitations established for the core operation and for each of the individual ancillary operations conducted at that facility. The six subcategories under the aluminum forming category, in addition to the core and ancillary operations of each subcategory, are discussed below and summarized in Table 2-1.

- Rolling with neat oils is applicable to all wastewater discharges resulting from or associated with aluminum rolling operations in which neat oils are used as a lubricant. Many of the plants in this subcategory are also associated with one or more additional subcategories. The most common case is overlap with the subcategory of rolling with emulsions. Rolling of aluminum with emulsions is frequently followed by rolling using neat oils. Also, in some plants, aluminum is first rolled and then drawn to form the desired product. If the drawn product is then etched or heat treated, the etching or heat treating operations are associated with drawing subcategory rather than with rolling subcategory. The core forming operations of this subcategory include rolling using neat oils, roll grinding, sawing, annealing, stationary casting, homogenizing, artificial aging, degreasing, and stamping. Ancillary operations regulated under this subcategory include continuous rod casting, continuous sheet casting, solution heat treatment, and cleaning or etching.

  Aluminum annealing operations do not use process water. However, some furnaces are equipped with wet scrubbers to remove contaminants from off gases. Discharge allowances have been established in the rolling with neat oils subcategory of the aluminum forming category for core operations that do have or do not have annealing furnace scrubbers.

- Rolling with emulsions is applicable to all wastewater discharges resulting from or associated with aluminum rolling operations in which oil-in-water emulsions are used as lubricants. The core forming operations of this subcategory include rolling with emulsions, roll grinding, stationary casting, homogenizing, artificial aging, annealing, and sawing. The ancillary operations regulated under this subcategory include direct chill casting, solution heat treatment, cleaning or etching, and degassing.

- Extrusion is applicable to all wastewater discharges resulting from or associated with aluminum extrusion operations. The core forming operations of this subcategory include extrusion die cleaning, dummy block cooling, stationary casting, artificial aging, annealing, degreasing, and sawing. Ancillary operations regulated under this subcategory include direct chill casting, press or solution heat treatment, cleaning or etching, degassing, and extrusion press hydraulic fluid leakage.

- Forging is applicable to all wastewater discharges resulting from or associated with aluminum forging operations. The core forming operations of this subcategory include forging, artificial aging,

TABLE 2-1. CORE OPERATIONS AND ANCILLARY OPERATIONS APPLICABLE TO EACH SUBCATEGORY OF THE ALUMINUM FORMING CATEGORY

	Aluminum Forming Subcategories					
Core Operations and Ancillary Operations	Rolling with Neat Oils	Rolling with Emulsions	Extrusion	Forging	Drawing with Neat Oils	Drawing with Emulsions or Soaps
Core Operations:						
Annealing	X	X	X	X	X	X
Artificial aging	X	X	X	X	X	X
Degreasing	X		X	X	X	X
Drawing with emulsions or soaps						X
Drawing with neat oils					X	
Dummy block cooling			X			
Extrusion die cleaning			X			
Forging				X		
Homogenizing	X	X				
Roll grinding	X	X				
Rolling with emulsions		X				
Rolling with neat oils	X					
Sawing	X	X	X	X	X	X
Stamping	X					
Stationary casting	X	X	X		X	X
Swaging					X	X
Miscellaneous waste-water sources*	X	X	X	X	X	X
Ancillary Operations:						
Cleaning or etching**	X	X	X	X	X	X
Continuous rod casting	X				X	X
Continuous sheet casting	X					
Degassing		X	X			

TABLE 2-1. CORE OPERATIONS AND ANCILLARY OPERATIONS APPLICABLE TO EACH SUBCATEGORY OF THE ALUMINUM FORMING CATEGORY (Continued)

Core Operations and Ancillary Operations	Aluminum Forming Subcategories: Rolling with Neat Oils	Rolling with Emulsions	Extrusion	Forging	Drawing with Neat Oils	Drawing with Emulsions or Soaps
Ancillary Operations (Continued):						
Direct chill casting		X	X			
Extrusion press hydraulic fluid leakage			X			
Forging air pollution control				X		
Press heat treatment			X			
Solution heat treatment	X	X	X	X	X	X

*Wastewaters from one or more of the following miscellaneous sources are to be grouped under the aluminum forming category into a single allowance and included with the allowances provided for other core operations: maintenance, clean-up, ultrasonic testing, processing area scrubbers, ingot scalping, roll grinding of caster rolls, and dye solution baths and seal baths (along with any other cleaning or etching baths, except a hot water seal) when not followed by a rinse.

**A hot water seal is classified as a cleaning or etching rinse.

annealing, degreasing, and sawing. Ancillary operations under this subcategory include forging air pollution scrubbers, solution heat treatment, and cleaning or etching.

- Drawing with neat oils is applicable to all wastewater discharges resulting from or associated with aluminum drawing operations in which neat oils are used as a lubricant. The drawing with neat oils subcategory is the second largest aluminum forming subcategory. The majority of the plants in the drawing with neat oils subcategory conduct only the core operations alone. Heat treatment contact cooling water and cleaning or etching baths and rinses are the most common ancillary streams in this subcategory. The core forming operations of this subcategory include drawing using neat oils, stationary casting, artificial aging, annealing, degreasing, sawing and swaging. Ancillary operations regulated under this subcategory include continuous rod casting, solution heat treatment, and cleaning or etching.

- Drawing with emulsions or soaps is applicable to all wastewater discharges resulting from or associated with the aluminum drawing operations which use oil-in-water emulsion or soap solution lubricants. The core forming operations of this subcategory include drawing using emulsions or soaps, stationary casting, artificial aging, annealing, degreasing, sawing and swaging. Ancillary operations regulated under this subcategory include continuous rod casting, solution heat treatment, and cleaning or etching.

In addition to the core operations specified above for each subcategory, the following wastewater sources shall be regulated as a single core operation, as established in the preamble of the aluminum forming regulations setting forth categorical standards (Federal Register, Vol. 48, p. 49140, October 24, 1983).

- Processing area scrubbers
- Ultrasonic testing
- Maintenance
- Cleanup.
- Ingot scalping
- Roll grinding of caster rolls
- Dye solution baths and seal baths (along with any other cleaning and etching bath, except a hot water seal) when not followed by a rinse

2.2.2 Copper Forming

The copper forming standards are applicable to wastewater discharges from the five principal operations used to form copper and copper alloys:

- Hot rolling
- Cold rolling
- Extrusion
- Drawing
- Forging.

In addition, twelve ancillary surface treatment and heat treatment processes used to give desired surface and physical properties to the metal being formed also generate wastewater.

- Annealing with oil
- Annealing with water
- Pickling bath
- Pickling rinse
- Pickling fume scrubber
- Alkaline bath
- Alkaline rinse
- Solution heat treatment
- Extrusion press heat treatment
- Tumbling or burnishing
- Surface coating
- Miscellaneous (includes hydrotesting, sawing, surface milling, and maintenance).

Although copper forming processes are used in different combinations within the category, the wastewater discharges from all plants are similar in both the type and concentration of pollutants discharged. Therefore, this category is not currently subcategorized. However, regulation of beryllium and beryllium alloy forming operations may lead to subcategorization within this category.

2.2.3 Nonferrous Metals Forming and Metal Powders

The nonferrous metals forming and metal powders category is subcategorized primarily on the basis of the type of metal being formed. Some subcategories contain more than one type of metal because metals that have the same metallurgical properties tend to be formed using the same processes at the same facilities, or are frequently combined together in alloys. The subcategories cover the major, minor and ancillary forming operations integral to the forming of metals. The ten nonferrous metals forming subcategories and their associated processes are listed below:

- Lead, tin, and bismuth forming consist of rolling, drawing, extrusion, and swaging processes. Some plants conduct casting operations as an integral part of the forming processes. Products made from lead forming include bullets made by extrusion and swaging lead; solder formed by extrusion and drawing of lead, tin, and bismuth in various alloy combinations; and sheathed cable in which lead is extruded over insulated copper cable.

- Magnesium forming consists of forging, rolling, and extrusion processes. Water is used in post-extrusion etching, chromating, and rinsing processes.

- Nickel and cobalt forming consists of rolling, drawing, extrusion, and forging processes, with extrusion being the least common forming process. Nickel and cobalt are commonly formed at the same plant and are frequently combined together in alloys.

- Precious metals forming includes processes used to form gold, silver, platinum, and palladium. Most plants in this subcategory form more than one of the precious metals using the same equipment and cleaning operations. In addition, the metals are alloyed with each other and other metals in many combinations. The precious metals subcategory includes any alloy of gold, platinum, palladium, or silver that contains 30 percent or greater of that metal (even if another metal occurs in a larger percentage). The most common forming operations are rolling and drawing. Extrusion and forging are practiced to a much smaller extent.

  The cladding of precious metals to base metals is closely associated with precious metals forming. Typically, a gold or silver overlay is roll bonded to a copper-alloy base. Nickel and stainless steel are also used as base metals. Since the clad metals are formed by the same techniques and on the same equipment as pure metals, precious metal cladding is grouped with precious metals forming.

- Refractory metals forming includes processes used to form molybdenum, tungsten, vanadium, rhenium, tantalum, and columbium. Most of the plants that form one refractory metal also form one or more other refractory metals and the resulting wastestreams are commonly commingled. The end product of refining these metals is metal powder that is consolidated into finished products or mill shapes. Only production of metal powders using mechanical methods such as milling, abrading, and atomizing, which do not significantly increase their purity, are included in this subcategory. Production of refractory metal powders in operations that significantly increase their purity is included in the nonferrous metals manufacturing category. The powders can be arc or electron beam melted and cast into ingots. The mill shapes and ingots are shaped into finished form by rolling, drawing, extrusion, and forging.

- Titanium forming consists of rolling, drawing, extrusion, and forging processes. Forging is practiced by many plants that primarily forge steel. Rolling is the second most common forming operation; drawing the least. Titanium is often acid-etched to remove a hard oxide surface layer that forms at elevated temperatures.

- Uranium forming consists of forging, rolling, and extrusion operations. Water is used in post-forming surface treatment steps. There are no existing uranium forming plants discharging process wastewaters to POTWs. Therefore, no PSES standards have been promulgated for this subcategory.

- Zinc forming consists of rolling, drawing, and forging operations. Zinc is surface treated and cleaned with alkaline detergents following forming. No PSES standards have been promulgated for this subcategory on the basis of the economic impact to zinc forming facilities by the promulgating of technology-based standards.

- Zirconium and hafnium forming consists of rolling, drawing, and extrusion. One common manufacturing process is tube reducing (roll-rocking or pilgering), a special type of cold rolling. Post-forming operations include annealing and (dry) sand blasting, acid and alkaline cleaning, and conversion coating. All of the plants that form hafnium also form zirconium by similar processes.

- Metal Powders production by mechanical processes is regulated under the appropriate metals forming subcategory. However, since aluminum, copper and iron forming are not regulated under the nonferrous metals forming category, a separate subcategory has been established for metal powders produced from these metals. Therefore, the metal powders subcategory includes operations for producing iron, copper, and aluminum powders and metal parts from iron, copper, and aluminum powders. Powders are produced by wet or dry atomization and mechanical grinding. Pressing and sintering, the major manufacturing processes in powder metallurgy, ordinarily use no process water. Most of the wastewater from operations in this subcategory is generated by post-forming surface treatment.

Major or minor forming operations in nonferrous metals forming and metal powders production include:

- Rolling
- Drawing
- Extrusion
- Forging
- Cladding
- Tube reducing
- Swaging
- Metal powder production
- Milling
- Abrading
- Atomizing.

Ancillary operations include:

- Casting for subsequent forming
- Cleaning or etching
- Sawing or grinding
- Hydrostatic or ultrasonic testing
- Tumbling or burnishing
- Electrocoating
- Heat treatment
- Surface treatment.

2.3 PROCESS OPERATIONS

The major and ancillary forming operations introduced in the previous sections and their associated wastewater characteristics are described below.

2.3.1 Forming Operations

The major operations associated with the aluminum, copper and nonferrous metals forming categories are:

- Rolling
- Drawing
- Extrusion
- Forging
- Cladding
- Metal powder production.

Rolling is used to transform cast metal into various intermediate or final products. Pressure exerted by cylindrical rollers as metal is passed between them reduces the thickness in the metal. It is necessary to use a cooling and lubricating compound during rolling to prevent excessive wear on the rolls, to prevent adhesion of metal to the rolls, and to aid in maintaining a suitable and uniform rolling temperature.

Lubricants (usually oil-water emulsions or water alone) are used in hot rolling operations. Evaporation of the lubricant as it is sprayed on the hot metal surface cools the equipment and the metal. The lubricant eventually degrades and must be eliminated from circulation. Wastewater discharges contain toxic organics and oil and grease that originate in the lubricants and suspended solids and toxic metals that originate from contact of the water or lubricant solution with the metal products or rolls.

Cold rolling occurs at temperatures below the recrystallization point of the metal. The metal is harder and less ductile, requiring more lubrication than in hot rolling. The lubricant also functions as a cooling medium, but to a lesser extent than in hot rolling. The lubricants used in cold rolling consist of more concentrated oil-water mixtures, mineral oil, kerosene-based lubricants (neat oils), or graphite-based lubricants. Cold rolling lubricants are recycled with sediment removal or filtration. After extended use, the rolling oils are periodically reclaimed, incinerated, or discharged in batches. Pollutants in the spent lubricant discharge are toxic organics, toxic metals, oil and grease, and suspended solids.

Drawing, when applied to the manufacture of tube, rod, bar, or wire, refers to the pulling of metal through a die or succession of dies to reduce the metal's diameter, to alter the cross sectional shape, or to increase its hardness. In the drawing of tubing, one end of the extruded tube is swaged to form a solid point and is then passed through the die. A clamp, known as a bogie, grips the swaged end of tubing. A mandrel is then inserted into the die orifice, and the tubing is pulled between the mandrel and die, reducing the outside diameter and the wall thickness of the tubing. Wire, rod, and bar drawing is accomplished in a similar manner, but the metal is drawn through a simple die orifice without using a mandrel. For example, copper wire is drawn (pulled) through a series of tungsten carbide dies decreasing the diameter in each draw. Diamond dies are used for fine copper wire.

In order to ensure uniform drawing temperatures and to avoid excessive wear on the dies and mandrels used, lubricants are applied during drawing. A wide variety of lubricants are used for this purpose. Heavier draws, which produce a larger reduction in diameter or cross-sectional area, may require oil-based lubricants (neat oils), but oil-in-water emulsions are used for many applications. Graphite, ground glass, and soap solutions can also be used for some of the lighter draws. Drawing oils are usually recycled until their lubricating properties are exhausted. Water-based lubricants are periodically discharged and replaced. Pollutants present in the discharge include toxic organics, toxic metals, oil and grease, and suspended solids. Toxic organics and oil and grease present in the discharge originate in the lubricants used or are generated by the action of pressure and heat imposed on the lubricant during the forming process. Toxic metals and suspended solids appear in the spent lubricants as a result of the direct contact with the metal and dies during the drawing process.

Intermediate annealing is frequently required between draws in order to restore the ductility of the metal which is lost by cold working of the drawn product. Degreasing of the metal may be required to prevent burning of heavy lubricating oils in the annealing furnaces.

Extrusion is the process of forcing metal to flow through a die orifice by applying high pressure to a cast billet of metal. The resulting product is an elongated shape or tube of uniform cross section. Extrusions are manufactured using either a mechanical or a hydraulic extrusion press. A heated cylindrical billet is placed into the ingot chamber, and the dummy block and ram are placed into position behind it. Pressure is exerted on the ram by hydraulic or mechanical methods, forcing the metal to flow through the die opening. The extrusion is sawed off next to the die, and the dummy block and ingot butt are released. Although some metals, such as lead, can be extruded cold, most metals are heated first to reduce adhesion of the die to the extruded metal. Heat treatment is frequently used after extrusion to attain desired mechanical properties.

Sources of wastewater from the extrusion process include extrusion die cleaning and wet scrubbers for the die cleaning baths. In aluminum forming, die cleaning is generally performed by immersion in caustic solutions. Wet scrubbers are usually used to control caustic fumes from the die cleaning bath. Wastewater is also generated from hydraulic fluids which are sometimes comprised of oil-water emulsions and from contact cooling waters.

Forging is a process in which metal is formed, usually hot, into shapes by employing compressive forces. The actual forging process is a dry operation. There are five basic methods of forging practiced in the forming categories:

- Closed die forging
- Open die forging
- Rolled ring forging
- Impacting
- Swaging.

In all of these techniques, pressure is exerted on dies or rolls, forcing the heated stock to take the desired shape. The first three processes are types of hot working; the other two are cold working.

Closed die forging is accomplished by hammering or squeezing the metal between two steel dies; one fixed to the hammer or press ram, and the other to the anvil. Forging hammers, mechanical presses, and hydraulic presses can be used for the closed die forging of metals. The heated stock is placed in the lower die and, by one or more blows of the ram, forced to take the shape of the die set. Open die forging is similar to that described above, but in this method the shape of the forging is determined by turning the stock and regulating the blows of the hammer or strokes of the press. Rolled ring forging is used in the manufacture of seamless rings. A hollow cylindrical billet is rotated between a mandrel and pressure roll to reduce its thickness and increase its diameter.

Impacting is performed by placing a cut-off piece of metal in a bottom die. A top die consisting of a round or rectangular punch and fastened to the press ram is driven into the slug, causing the metal to be driven up around the top punch. Swaging is the process of forming a taper or a reduction on metal products, such as rods or tubing. When swaging is the initial step in drawing tube or wire, a solid point is formed by repeated blows of opposing dies. Swaging can also be used to reduce the diameter of tube or wire without a subsequent drawing operation. The process of making tapered bullets from lead wire is also called swaging.

Lubricants are not required when forging copper. Consequently, there is no discharge of wastewater from copper forging processes. Proper lubrication of the dies is essential in forging aluminum and most nonferrous metals. Colloidal graphite in either a water or an oil medium is usually sprayed onto the dies for this purpose. Particulates and smoke may be generated from the partial combustion of oil-based lubricants as they contact the hot forging dies. In those cases, air pollution controls may be required. Baghouses, wet scrubbers, and commercially available dry scrubbers are in use at aluminum and nonferrous metals forming facilities.

Cladding is the process of forming a composite metal containing two or more layers that have been bonded together. The bonding may have been accomplished by roll bonding (co-rolling), solder application (brazing), or explosion bonding. In the roll bonding process, a permanent bond between two metals is obtained by rolling under high pressure in a bonding mill. The high pressure increases the temperature of the metals, promoting fusion so that a metallurgical bond forms at the interface. The solder application or brazing process is also used to make clad metals. The term soldering is used where the temperature range falls below 425°C (800°F). The term brazing is used where the temperature exceeds 425°C (800°F). In this process, a thin layer (film or foil) of a metal with a low melting point is placed between two layers of metal to be bonded. The three-layer assembly is then placed into a furnace at the melting temperature of the filler metal. Bonding results from the intimate contact produced by the mingling of a small amount of the base metal and the top metal in the molten filler metal, without direct fusion of the two metal layers. Upon cooling, the clad material can be formed by any of the forming operations previously described.

Pressure bonding is a combination of roll bonding and solder bonding. A three-layer assembly of solder and the metals to be bonded is placed into a furnace, just as in solder bonding. However, the heating is accompanied by the application of pressure, as in roll bonding. The bonded metal may be cooled by a water spray after it is removed from the bonding furnace. In explosion bonding, the metallurgical joining of two or more metals is accomplished by the force of a carefully detonated explosion. The explosion moves progressively across the surface of the ladder metal, accelerating it across a "standoff distance" and against the backer metal. The force of the explosion shears away the oxide- and nitride-containing surface layers of both metals, producing metallurgically clean surfaces which, under extreme pressure, allow normal interatomic and intermolecular forces to create an electron-sharing bond. The result is a cold weld.

Metal powder production, except beryllium powder production, is included in the nonferrous forming category to facilitate implementation of the regulations. Atomization is the most common method of producing metal powders. In this process, a stream of fluid, usually water or gas, impinges upon a molten metal stream, breaking it into droplets that solidify as powder particles. The size and shape of atomized powder is determined by jet configuration, jet design, composition of the impinging medium, and composition of the metal. Powders are also produced by disintegration of solid metal into powder by mechanical combination. This process is used for brittle ores or chemically embrittled metals. It is also used to produce powder from turnings and other scrap of more ductile metals. The most commonly utilized pieces of mechanical reduction equipment are ball mills, vortex mills, hammer mills, disc mills, and roll mills.

2.3.2 Ancillary Operations

The principal ancillary operations associated with the three forming categories are:

- Casting
- Heat treatment
- Surface treatment
- Degassing
- Miscellaneous operations.

Casting consists of filling a shaped container or mold with molten metal so that the shape of the mold is reproduced upon solidification. The choice of casting method depends on the metal or alloy being cast and the ultimate use of the cast form. The casting methods used in nonferrous metals forming consist of the following four classes:

- Stationary casting
- Direct chill casting, including arc casting
- Continuous or semi-continuous casting
- Shot casting.

The method of casting most widely practiced at nonferrous metals forming plants is stationary or pig casting, which allows for recycling of in-house scrap. In this process, molten metal is poured into cast iron molds and allowed to air cool. Lubricants are not usually required. Although water may be sprayed onto the molten metal to increase the cooling rate, this generally does not result in any discharge.

Direct chill casting is a widely used method of casting aluminum for subsequent forming. Direct chill casting is characterized by continuous solidification of the metal while it is being poured. The length of an ingot cast using this method is determined by the vertical distance it is allowed to drop rather than by mold dimensions. Molten metal is tapped from the melting furnace and flows through a distributor channel into a shallow mold. Noncontact cooling water circulates within this mold, causing solidification of the metal. The base of the mold is attached to a hydraulic cylinder that is gradually lowered as pouring continues. As the solidified metal leaves the mold, it is sprayed with contact cooling water to reduce the temperature of the forming ingot. The cylinder continues to descend into a tank of water, causing further cooling of the ingot as it is immersed. When the cylinder has reached its lowest position, pouring stops and the ingot is lifted from the pit. The hydraulic cylinder is raised and positioned for another casting cycle. In direct chill casting, lubrication of the mold is required to ensure proper ingot quality. Much of the lubricant volatilizes on contact with the molten aluminum, but contamination of the contact cooling water with oil and oil residues does occur.

Arc casting is a form of direct chill casting used for refractory metals (tungsten, molybdenum, tantalum, columbium, vanadium, and rhenium) because the melting points of these metals are too high for them to be easily cast by conventional techniques. Under vacuum in an appropriate furnace consisting of a water-cooled copper crucible, performed bars, made of compacted and sintered powder, form an electrode for striking a high current, low voltage arc between the bar and a starting pad of metal. As the bar is progressively melted, molten metal falls through the arc and forms an ingot that gradually solidifies.

Continuous casting, unlike direct chill casting, is not constrained in the length of the casting. It is not necessary to interrupt production to remove the cast product. The use of continuous casting eliminates or reduces the degree of subsequent rolling required. Because continuous casting incorporates casting and rolling into a single process, rolling lubricants may be needed. Frequently, oil emulsions similar to those used in conventional hot rolling are used for this purpose. Graphite solutions may be suitable for roll lubrication of some continuous casting processes. In other instances, aqueous solutions of magnesia are used.

Heat treatment is performed to give the metal the desired mechanical properties. The general types of heat treatment include annealing, solution heat treatment, homogenizing, artificial aging, and press heat treatment.

Annealing is used to remove the effects of strain hardening or solution heat treatment. After raising the metal to its recrystallization temperature, the metal is cooled at a slow, controlled rate. After annealing, the metal is in a ductile, more workable condition suitable for subsequent forming operations. Plants commonly have multiple annealing units with several types of equipment. Heat is transferred by direct radiation and convection from the flame to the product. Combustion of the heating fuel also produces a reducing atmosphere within the annealing furnace that reduces surface oxidation that would otherwise occur at the elevated temperatures employed. The control of surface oxidation in annealing not only reduces metal loss in production, but also significantly reduces pickling that may be required at later points during copper processing.

Aluminum and nonferrous metals annealing is a dry process. However, off gases from furnace fuels may require cleaning with wet scrubbers if they are used to create an inert atmosphere inside the furnace.

Copper annealing may incorporate a quenching step. Cooling water quenches may consist of a tank through which cooling water flows, rapidly dissipating the heat at the surface of the copper or copper alloy. This continuous discharge contains toxic metals and suspended solids that result from contact of the quench water with the heated copper product. Oil-water quench solutions must be periodically discharged and replaced because of the continuous build-up of contaminants. The spent oil-water quench solution is contaminated with toxic organics, toxic metals, oil and grease, and suspended solids. Toxic organics and oil and grease present in this discharge apparently originate in the oil used in the quench solution. Toxic metals and suspended solids present in the discharge result from contact of the quench solution with the heated copper.

Solution heat treatment is accomplished by raising the temperature of a heat treatable alloy to the eutectic temperature, where it is held for the required length of time and quenched rapidly. As a result of this process, the metallic constituents in the alloy are held in a super-saturated solid solution, improving the mechanical properties. In copper forming, solution heat treatment is practiced following all major forming operations; however, it is most commonly used following hot rolling and extrusion because of the high temperatures at which these operations are performed. Quenching is typically achieved by immersing the workpiece in a tank through which the cooling water flows. Spray quenching is also practiced. Water is used exclusively as the quenching medium for solution heat treatment of copper products following all of the major forming operations except extrusion. In the case of extrusion, an oil-water solution is sometimes used. Pollutants present in the discharge from solution heat treatment water quenches include toxic organics, toxic metals, oil and grease, and suspended solids. Toxic organics and oil and grease present in the quench water discharge apparently originate in the lubricants used in the forming operations that precede solution heat treatment and also result from contact of the quench water with the surface of the hot copper product.

Homogenizing is accomplished by heating the metal to an appropriate temperature for four to 48 hours, then allowing the metal to air cool. Homogenization of a cast ingot provides a more uniform distribution of intermetallic compounds within the metal. This technique is commonly used in nonferrous metals forming.

Artificial aging, also known as precipitation heat treatment, is applied to some nonferrous metals in order to cause precipitation of super-saturated constituents in the metal. The metal is heated to a relatively low temperature for several hours and then is air-cooled.

Press heat treatment is solution heat treating of metals immediately following the extrusion process. In this procedure, the metal is extruded at the required temperatures and is quenched as it emerges from the die or press. The aluminum forming and nonferrous metals forming industries use contact cooling water as a quenching medium. Copper forming industry uses emulsified or soluble oils as quenching media. These oils are characteristically recycled and reused.

Surface treatments are used to alter the surface of the metal for the purpose of hardness, lubricity and appearance. Cleaning and etching treatments are surface treatments applied after the forming of metal products.

Solvents, acid and alkaline solutions, and detergents can be used to clean soils such as oil and grease from the aluminum surface. Deoxidizing and desmutting are accomplished with acid solutions. Surface treatments and their associated rinses are usually combined in a single line of successive tanks. Wastewater discharge from these lines is typically commingled prior to treatment or discharge. In some cases, rinse water from one treatment is reused in the rinse of another. These treatments may be used for cleaning purposes or to provide the desired finish for a formed product, or they may simply prepare the metal surface for subsequent coating by such processes as anodizing, conversion coating, electroplating, painting, and porcelain enameling.

The use of acids to treat the surface of metals is referred to as pickling and often also involves the use of additional chemicals such as sodium dichromate or hydrogen peroxide to produce a brighter and more tarnish-resistant finish. Bright dips consist of combinations of sulfuric acid, nitric acid, phosphoric acid, chromic acid, and hydrochloric acid. Periodic discharge of pickling baths ensures that contaminant concentrations will not affect product quality or reduce the effectiveness of the bath. The high acidity of the bath results in high concentrations of dissolved metals in the bath discharge that originate in the copper product. Discharges from pickling baths also contain hexavelent chromium that originates in the dichromate added to the baths. Water used for rinsing the pickled copper contains metals; however, they are found at lower concentrations than in the bath. The rinse water dilutes the concentration of toxic metal contaminants which are carried over from the pickling bath on the surface of the copper product.

The layer of oxide scale formed from hot working operations on nickel, cobalt, titanium, zirconium, and certain refractory metals is difficult to remove with acid surface treatment alone. Molten salt baths can be used to descale the metal prior to acid surface treatment. Molten salt baths are oxidizing baths composed of sodium or potassium hydroxide and sodium or potassium nitrate. The nitrate is the oxidizing agent in the bath, and the chloride is added to depress the melting point of the bath to increase fluidity and to inhibit attack on the metal itself. Sodium carbonate or potassium carbonate may be added in small proportions to adjust the melting point of the mixture and to inhibit deleterious reactions. *Molten salt baths* are maintained at 480°C to 540°C. The formed metal parts are dipped in the baths for 15 minutes or longer, then rinsed and quenched in a water bath.

Anodizing and chemical conversion coating are used to change the characteristics of the surface of formed metal by chemically or electrochemically depositing an inorganic coating on the surface of the metal. These coatings are applied for corrosion protection and in preparation for painting. Anodizing is an electrochemical oxidation process that forms an insoluble oxide of the metal on the surface of the formed metal. It is applied by immersing the metal form in an acid solution (containing fluoride, phosphate, chromate, or sulfate ions) and passing an electrical current through the metal form. After anodizing, parts are rinsed in cold, then hot, water to facilitate drying.

Chemical conversion coatings are applied to previously-deposited metal or base metal for increased protection, lubricity, or in preparation for another special coating or to achieve a special surface appearance. Typical operations include chromating and phosphating. Chromating forms a protective film the metal surface with a solution containing hexavalent chromium and active organic and inorganic compounds. When phosphating, the metal surface is wetted, usually by immersion, with a phosphate solution which reacts with the metal surface. Phosphating is used to provide a good base for paints and other organic coatings, to lubricate the metal surface before cold forming or drawing, or to impart corrosion resistance.

Electrocoating is depositing metal in an adherent form on the surface of a formed piece of metal that acts as a cathode. The coating may be applied as the finished surface. It may also act as a soft, lubricating coating for hard metal alloys before cold working (tube reducing or extruding). Lubricating coatings (often copper) are dissolved away in acid after the forming operation has been completed.

Alkaline cleaning can precede annealing to limit the amount of oil that is introduced into the furnace. It may also follow annealing and be used to remove the resulting tarnish and smut. Vapor or solvent degreasing, which does not use water, can be used in place of alkaline cleaning. To properly control the concentration of impurities, a portion of the alkaline cleaning bath is continuously or periodically discharged. The discharge will contain toxic organics, toxic metals, oil and grease, and suspended solids. The toxic organics and oil and grease present in the discharge originate in the lubricants that are cleaned from the surface of the product. Toxic metals and suspended solids present in the discharge that originate in the forming operation that precedes alkaline cleaning are also washed from the product surface. Rinse water contains oil and grease and metals in much lower concentrations than in the bath. The higher volume of water used in rinsing dilutes the concentrations of these contaminants.

Degreasing generally consists of the use of solvent cleaners to remove lubricants (oils and grease) applied to the surface of nonferrous metals during mechanical forming operations. Solvents commonly used for vapor degreasing are trichloroethylene, 1,1,1-trichloroethane, methylene chloride, perchloroethylene, and various chlorofluorocarbons. Solvent selection depends on the required process temperature (solvent boiling point), product dimension, and metal characteristics. Contaminated vapor degreasing solvents are frequently recovered by distillation. The sludge residue generated is toxic and may be flammable, requiring appropriate handling and disposal procedures.

Tumbling or burnishing is used to polish, to remove sharp corners, or to smooth parts for cosmetic and functional purposes. Water or oil-water lubricants are sometimes used to lubricate and cool the process, which is usually performed in rotating barrels or vibrating drums. Water is also used to rinse the finished parts and clean the abrasive media.

Degassing is performed during aluminum forming to remove hydrogen gas that is trapped in molten metal due to complex reactions that occur in furnaces. The metal is "degassed" by introducing a combination of nitrogen and chlorine gas, chlorine gas alone, or other chemicals.

Miscellaneous operations include hydrotesting, sawing, milling, and maintenance. Hydrotesting is used to check parts for surface defects or subsurface imperfections. Parts are submerged in a water bath and subjected to ultrasonic signals, high pressure, or air pressure. Such baths are periodically discharged. Sawing is performed on parts to remove defects and for cutting to size. Surface irregularities and oxides from metal products are removed by milling. Sawing and milling operations use water-soluble oil lubricants to provide cooling and lubrication. Maintenance operations such as machinery repair can generate wastewaters associated with the removal of production-related soils and dirts.

2.4 EXCEPTIONS FROM REGULATION COVERAGE

2.4.1 Aluminum Forming

Casting of aluminum may be performed prior to forming operations at aluminum forming plants or as the final step in the manufacture of primary and secondary aluminum. Casting performed at a plant which manufactures aluminum and also carries out aluminum forming is subject to the casting standards established for the aluminum manufacturing subcategory of the nonferrous metals manufacturing category (40 CFR Part 421) if the aluminum is cast without cooling. However, if the aluminum that is cast is a remelted primary aluminum product and the facility that performs the casting also conducts forming operations, then the casting subsequent to the remelting is subject to standards established for the aluminum forming category (40 CFR Part 467).

The manufacture of aluminum powders and the forming of parts from aluminum or aluminum alloy powders are not regulated under the aluminum forming category. Instead, these processes are included in the metal powders subcategory of the nonferrous metals forming regulation (40 CFR Part 471).

Surface treatment operations (e.g., pickling, anodizing, alkaline cleaning) are considered to be a part of aluminum forming when one or more of these operations are performed as an integral part of the forming process. An operation is considered an integral part of the forming process when it is performed at the same site at which the metal is formed. As such, surface treatment operations are considered ancillary operations that are regulated by the limitations and standards for cleaning or etching baths, rinses, and scrubbers established under the aluminum forming category and are not subject to regulation under the electroplating (40 CFR Part 413) or the metal finishing (40 CFR Part 433) categorical standards.

2.4.2 Copper Forming

Operations that are not covered by the copper forming regulations (40 CFR Part 468) include the following:

- Casting of copper or copper alloys
- Manufacturing of copper powders and the forming of parts from copper or copper alloy powders.

The casting of copper and copper alloys, even when conducted in conjunction with copper forming, is regulated under the metal molding and casting regulation (40 CFR Part 464). The manufacture of copper powders and the forming of parts from copper or copper alloy powders are regulated under the nonferrous metals forming regulation (40 CFR Part 421).

2.4.3 Nonferrous Metals Forming and Metal Powders

The nonferrous metals forming and metal powders category regulates facilities that are engaged in the forming of nonferrous metals and their alloys with the exception of aluminum, copper, iron and steel, and beryllium. Separate regulations have been promulgated for aluminum forming (40 CFR Part 467), copper forming (40 CFR Part 468), and iron and steel manufacturing including regulation of forming processes (40 CFR Part 420). At the time of this writing, standards were planned but had not promulgated to regulate beryllium and beryllium alloy forming operations. These operations will be regulated with beryllium copper alloys under amendments to the copper forming regulation.

The forming of cadmium, chromium, gallium, germanium, indium, lithium, manganese, neodymium, praseodymium, and alloys are also excluded from the nonferrous metals forming regulation because the forming of these metals is not carried out on a national basis or because the forming operations that are conducted do not result in the discharge of wastewaters.

The nonferrous metals forming category does not include the production of metal powders by chemical methods, such as precipitation. The production of metal powders as the final step in refining metal is regulated under the nonferrous metals manufacturing regulation (40 CFR Part 421).

Surface treatment operations that are conducted as an integral part of the nonferrous metals forming process are regulated by the limitations and standards established for the nonferrous metals forming and metal powders category. As such, discharges from these surface treatment operations are not subject to regulation by the electroplating (40 CFR Part 413) or metal finishing (40 CFR Part 433) categorical standards.

2.5 PRETREATMENT STANDARDS FOR THE ALUMINUM FORMING, COPPER FORMING, AND NONFERROUS METALS FORMING AND METAL POWDERS CATEGORIES

The aluminum forming standards (40 CFR Part 467) establish pretreatment limitations for existing and new sources (PSES and PSNS) for chromium, cyanide, zinc, and total toxic organics (TTO) for six subcategories. Aluminum is not regulated because aluminum is frequently used by POTWs as a flocculant to aid in the settling and removal of suspended solids. Therefore, aluminum in limited quantities does not pass through or interfere with a POTW; rather, it aids in the operations of a POTW.

In establishing the aluminum forming production-based standards, effluent flow data for the core and ancillary operations are production normalized (e.g., million gallons flow per pound aluminum produced). The production-based limits are established as the product of the production normalized flow times the model treatment effectiveness limit, in mg/l (also factoring in unit conversion constants). An aluminum forming plant is permitted to discharge a mass of pollutants equivalent to the sum of the mass limitations established for the core and ancillary operation(s) that are performed at the plant.

The copper forming standards (40 CFR Part 468) establish PSES and PSNS for chromium, copper, lead, nickel, zinc, and total toxic organics (TTO). Copper forming is presently regulated as a single subcategory. The mass standards vary for each process operation due to the differing water use requirements in each of the copper forming process operations.

The nonferrous metals forming and metal powders standards (40 CFR Part 471) establish PSES and PSNS for antimony, lead, chromium, zinc, ammonia, fluoride, nickel, cadmium, copper, cyanide, silver, and molybdemum for ten subcategories based on the type of metals formed.

For all three categories, PSES and PSNS are expressed in terms of mass per unit of production. The units of production specified in the regulations are "off-kilograms", or the kilograms of product removed at the end of a forming or ancillary process cycle for transfer to a different machine or process. For example, an industrial user forges 100,000 kg of aluminum per year. Ninety percent of this forged aluminum is transferred to an annealing process and the remaining ten percent is transferred to a heat treatment system. In determining production-based standards, the production rate for the forging operation would be 100,000 off-kg, the production rate for the annealing operation would be 90,000 off-kg, and the production rate for the heat treatment operation would be 10,000 off-kg. Mass-based limitations reflect the use of flow reduction to reduce the amount of toxic pollutants introduced into a POTW.

Daily maximum and maximum monthly standards are established for each process operation. These standards represent the best available technology economically achievable. Summaries of the PSES and PSNS discharge standards for the aluminum forming category, copper forming category, and nonferrous metals forming and metal powders category are presented in Appendix C of this manual. In the nonferrous metals forming and metal powders category, several process operations in each of the subcategories do not have specific numerical standards. Instead, the standard is expressed as "no discharge of process wastewater pollutants". This standard means there is no allowance for any pollutant. In practical terms, for the industry to comply with this standard, no discharge of any wastestream from the regulated process operation could be allowed.

2.6 COMPLIANCE DATES

The compliance dates for existing and new aluminum forming, copper forming, and nonferrous metals forming and metal powders industries are as follows:

Existing Sources (PSES)	
Aluminum Forming Facilities	October 24, 1986
Copper Forming Facilities	August 15, 1986
Nonferrous Metal Forming Facilities	August 23, 1988
New Sources (PSNS)	From commencement of discharge

2.7 ALTERNATIVES TO MONITORING REQUIREMENTS

Because the analysis of wastewaters for toxic organics is costly and requires sophisticated equipment, indirect dischargers regulated for total toxic organics (TTO) in the aluminum forming and copper forming category may monitor for oil and grease as an alternative to total toxic organics (TTO) monitoring. Any indirect discharger in compliance with the alternate oil and grease standards will be considered in compliance with the TTO standard. The alternate oil and grease limits are also presented in the tables provided in Appendix C. For more information on the requirements for reporting on TTO or oil and grease, please refer to the discussion contained in section 4.3.1.

In addition, indirect industrial users subject to standards under the aluminum forming category are regulated for cyanide. Periodic analysis for cyanide may not be required if industrial users comply with both of the following conditions: the first wastewater sample of each calendar year has been analyzed and found to contain less than 0.07 mg/l of cyanide, and the owner or operator of the aluminum forming facility certifies in writing to the POTW (or the Control Authority if the Control Authority is not a POTW) that cyanide is not and will not be used in the aluminum process.

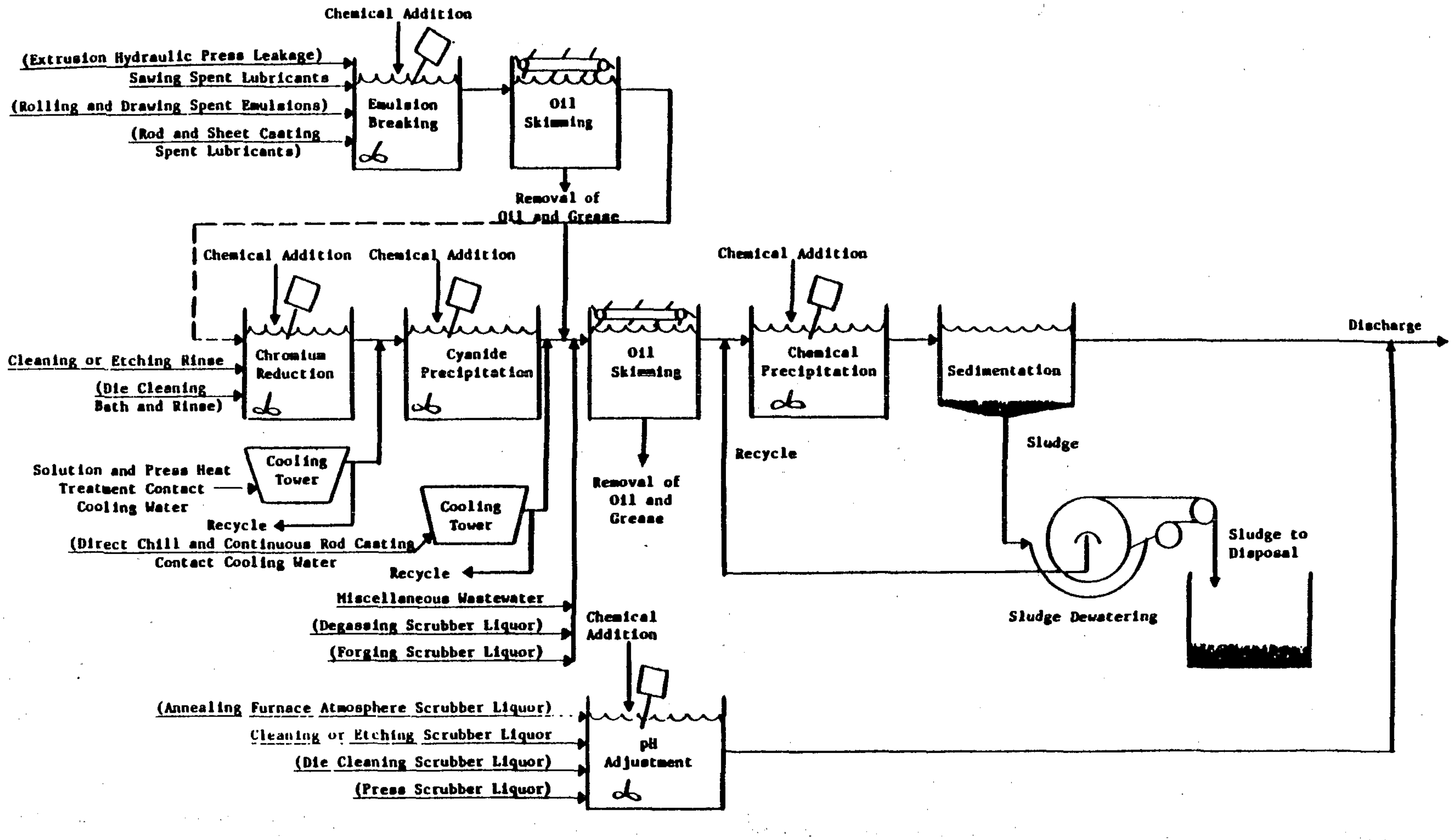
3. TREATMENT TECHNOLOGIES

The treatment technologies described in this chapter are used by the aluminum, copper, and nonferrous metals forming categories (also referred to herein as the forming categories) to remove or recover wastewater pollutants normally generated by the forming industrial processes. Included are brief discussions of the technology basis of the pretreatment standards for existing sources (PSES) and pretreatment standards for new sources (PSNS) for each category. End-of-pipe and in-plant treatment techniques typically used in each forming category are also described below.

3.1 ALUMINUM FORMING CATEGORY

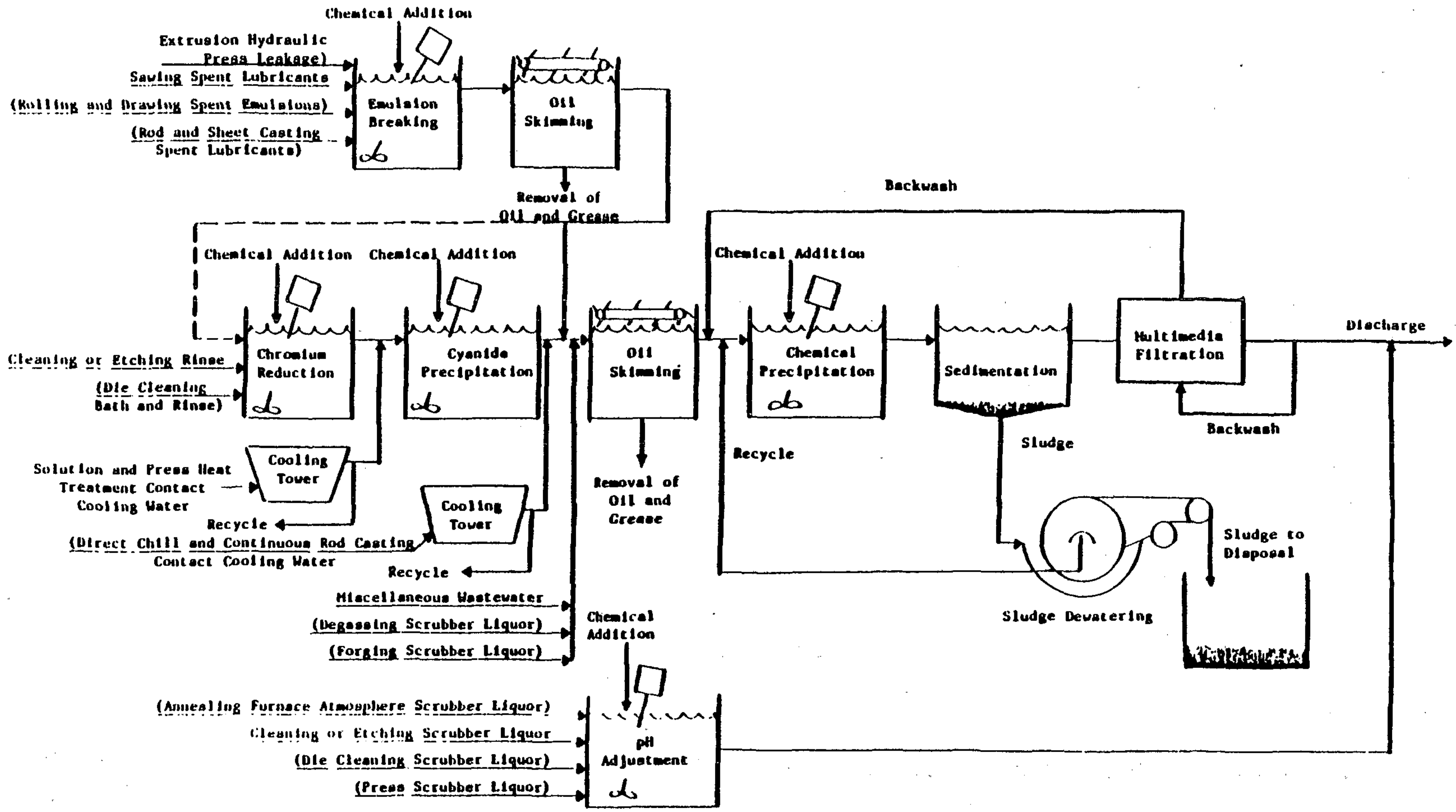
The technology basis for the pretreatment standards for existing sources (PSES) for the aluminum forming category includes end-of-pipe treatment consisting of oil skimming, lime precipitation and settling. Preliminary treatment, where necessary, consists of chemical emulsion breaking, chemical reduction of hexavalent chromium, and cyanide removal. Flow reduction for existing sources is limited to in-plant controls consisting of (1) recycle of the solution heat treatment and annealing wastestreams through cooling towers, (2) countercurrent rinsing of cleaning or etching rinses, (3) recycle of air pollution control system streams associated with cleaning or etching and forging operations, and (4) use of extrusion die cleaning rinse for bath make-up water. Additional in-plant controls to eliminate discharges include the use of alternative fluxing methods such as dry air pollution control and in-line refining, hauling or regeneration of cleaning or etching baths, wastewater segregation, and good housekeeping. The technology basis for pretreatment standards for new sources (PSNS) is the same as for existing sources with the addition of a multimedia polishing filter. Figure 3-1 illustrates the PSES treatment train and Figure 3-2 shows the PSNS treatment train.

The treatment technologies discussed for the aluminum forming operations are specifically geared toward the removal of significant concentrations of toxic metals typically found in aluminum forming wastewaters. These metals include chromium, aluminum, lead, nickel, and zinc. For more information on



NOTE: ( ) indicates waste streams not associated with all subcategories.

FIGURE 3-1. PSES TREATMENT TRAIN FOR ALUMINUM FORMING CATEGORY



NOTE: ( ) indicates waste streams not associated with all subcategories.

FIGURE 3-2. PSNS TREATMENT TRAIN FOR ALUMINUM FORMING CATEGORY the treatment technologies available to facilities subject to aluminum forming standards, the reader should review EPA's Development Document for Effluent Limitations Guidelines and Standards for the Aluminum Forming Point Source Category, June 1984.

3.2 COPPER FORMING CATEGORY

The technology basis for the pretreatment standards for existing sources (PSES) for the copper forming category includes end-of-pipe treatment consisting of lime precipitation and settling and, when necessary, preliminary treatment consisting of chemical emulsion breaking, oil skimming, and chemical reduction of chromium. Flow reduction for existing sources is limited to in-plant controls consisting of recycle of the solution heat treatment contact cooling waters, annealing with water wastestreams, spray rinsing and recirculation of all pickling rinse operations. The technology basis for the pretreatment standards for new sources (PSNS) is the same for existing sources with the addition of a multimedia polishing filter. Additional flow reduction is achieved by new sources with the addition of countercurrent cascade rinsing. Figure 3-3 diagrams the PSES treatment technology and Figure 3-4 shows the PSNS treatment process. The treatment technologies discussed for the copper forming category are specifically geared toward removal of toxic metal pollutants, such as chromium, copper, lead, nickel, and zinc. These toxic metals are found in copper forming wastewaters at significant concentrations. For more information the treatment technologies for copper forming facilities, the reader should refer to EPA's Development Document for Effluent Limitations Guidelines and Standards for the Copper Forming Point Source Category, March 1984.

3.3 NONFERROUS METALS FORMING AND METAL POWDERS CATEGORY

Treatment technologies and controls selected for each subcategory of the nonferrous metals forming and metal powders category to achieve the pretreatment standards for existing sources (PSES) and the pretreatment standards for new sources (PSNS) are based on the pretreatment options listed below.

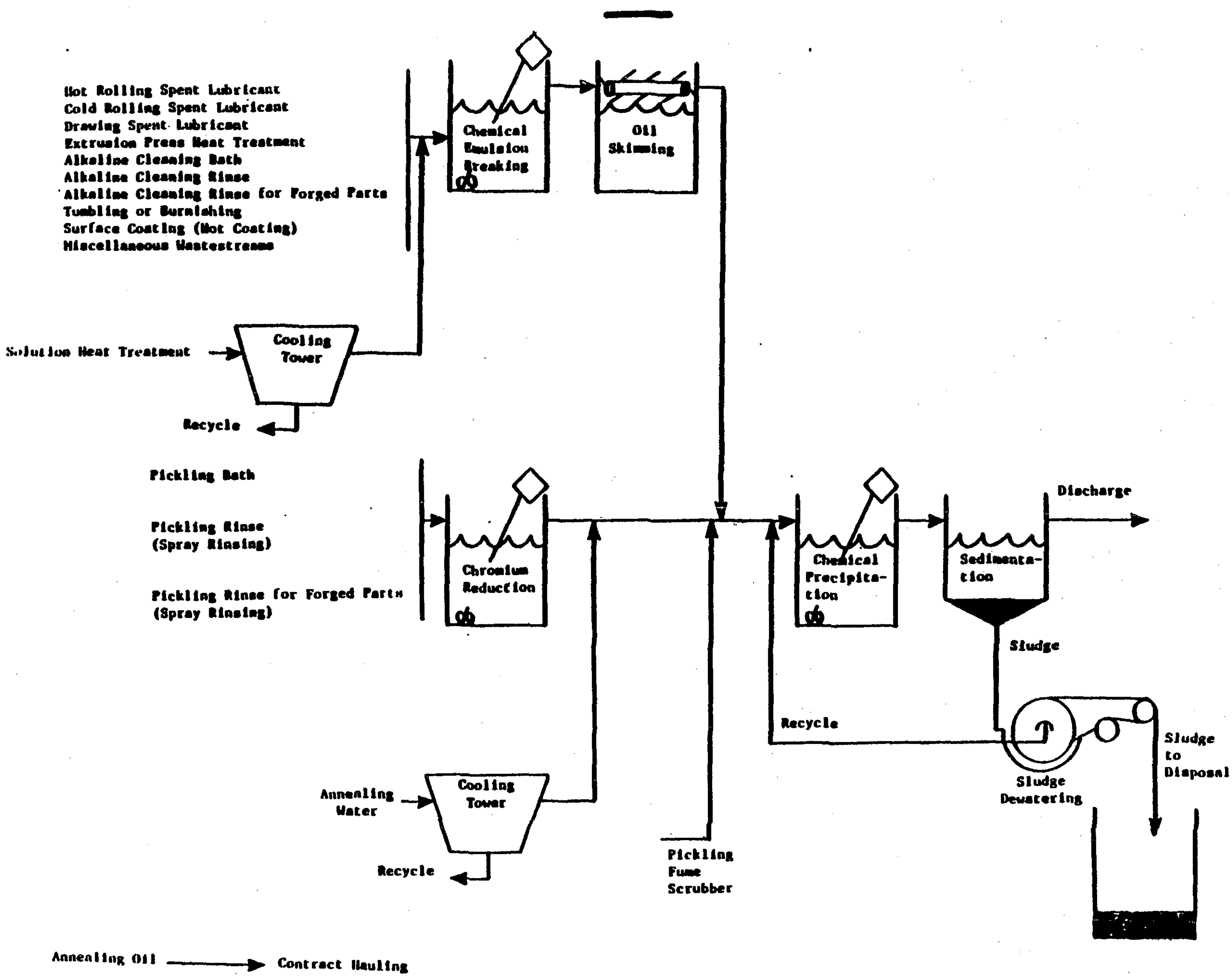


FIGURE 3-3. PSES TREATMENT TRAIN FOR COPPER FORMING CATEGORY

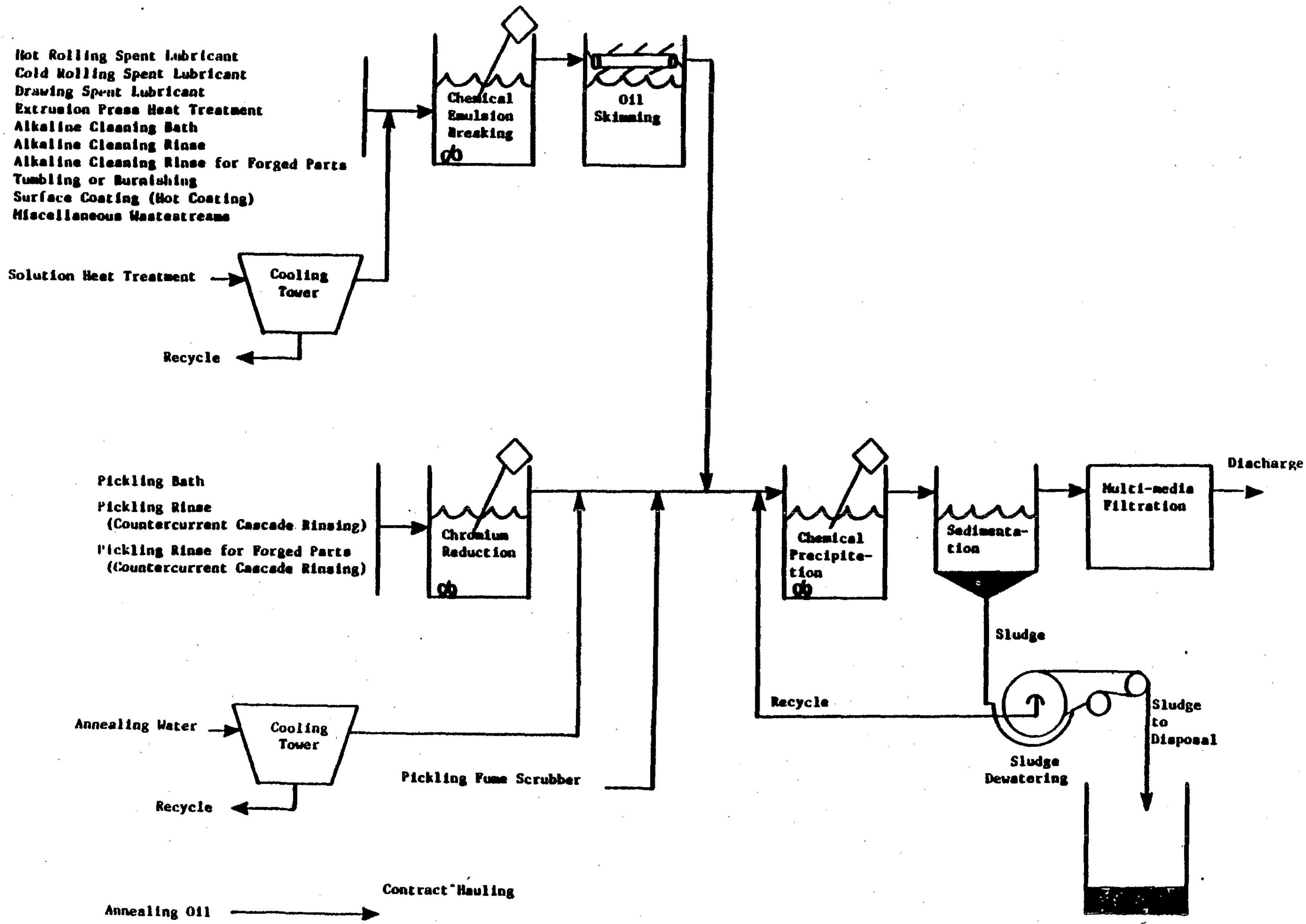


FIGURE 3-4. PSNS TREATMENT TRAIN FOR COPPER FORMING CATEGORY

Pretreatment Option 1 is based on:

- Oil skimming
- Lime and settle (chemical precipitation of metals followed by sedimentation)
- pH adjustment.

In addition, Pretreatment Option 1 includes the following, where required:

- Iron co-precipitation
- Chemical emulsion breaking
- Ammonia steam stripping
- Cyanide reduction precipitation
- Hexavalent chromium reduction.

Pretreatment Option 2 is based on Pretreatment Option 1, plus process wastewater flow minimization by the following methods:

- Contact cooling water recycle through cooling towers or holding tanks
- Air pollution control scrubber liquor recycle
- Countercurrent cascade rinsing or other water efficient methods applied to surface treatment rinses and alkaline cleaning rinses
- Use of periodic batch discharges or decreased flow rate for molten salt rinsewater
- Recycle of equipment cleaning wastewater; tumbling, burnishing, and cleaning wastewater; and other wastewater streams through holding tanks with suspended solids removal, if necessary.

Pretreatment Option 3 is based on Pretreatment Option 2, plus multimedia filtration at the end of the Pretreatment Option 2 treatment train.

The options selected as the model technology bases for PSES and PSNS for each nonferrous metals forming subcategory are given in Table 3-1. The corresponding schematic diagrams showing the treatment processes for each

TABLE 3-1. OPTIONS SELECTED AS THE MODEL TECHNOLOGY BASES FOR PSES AND PSNS FOR THE NONFERROUS METALS FORMING AND METAL POWDERS SUBCATEGORIES

SUBCATEGORY	PSES	PSNS
Lead-Tin-Bismuth Forming	Option 2	Option 2
Magnesium Forming	Option 2	Option 3
Nickel-Cobalt Forming	Option 3	Option 3
Precious Metals Forming	Option 2	Option 2
Refractory Metals Forming	Option 2	Option 3
Titanium Forming	Option 2	Option 2
Uranium Forming	Exempted	Option 3
Zinc Forming	Exempted	Option 3
Zirconium-Hafnium Forming	Option 2	Option 2
Metal Powders	Option 1	Option 2

Option 1 - Flow Normalization, Lime and Settle
Option 2 - Flow Reduction, Lime and Settle
Option 3 - Flow Reduction, Lime and Settle, Multimedia Filtration.

option are given in Figures 3-5 and 3-6. Differences exist between the potential preliminary treatment requirements for each nonferrous metals forming subcategory. For a breakdown of the various potential preliminary treatment requirements the reader should review EPA's Development Document for Effluent Limitations Guidelines and Standards for the Nonferrous Metals Forming and Metal Powders Point Source Category, September 1986.

PSES are promulgated for each of the nonferrous metals forming and metal powders subcategories except for the uranium, zinc, and refractory metals forming subcategories. EPA is excluding the uranium forming subcategory from from regulation of PSES because there are no existing indirect dischargers in the uranium forming subcategory. EPA did not promulgate categorical PSES for zinc forming due to economic impacts. PSES treatment technology for the refractory metals subcategories includes lime and settling, but does not include filtration because of potential economic impacts to industrial users caused by installation of this technology.

Nonferrous metals forming wastewaters characteristically contain substantial concentrations of cadmium, chromium, copper, lead, nickel, silver, zinc, cyanide, ammonia, and fluoride. The wastestreams may be acidic or alkaline and contain oils and emulsions and trace concentrations of toxic organics.

3.4 END-OF-PIPE TREATMENT TECHNOLOGIES

The model end-of-pipe treatment technologies used by the aluminum, copper, and nonferrous metals forming categories to remove toxic pollutants include oil removal (skimming, emulsion breaking, and flotation), chemical precipitation and sedimentation, chemical reduction, and filtration. Most toxic metals are effectively removed by precipitation of metal hydroxides or carbonates utilizing the reaction with lime, sodium hydroxide, or sodium carbonate. In some cases, improved removals can be achieved by the use of sodium sulfide or ferrous sulfate to precipitate the pollutants as sulfide compounds with very low solubilities.

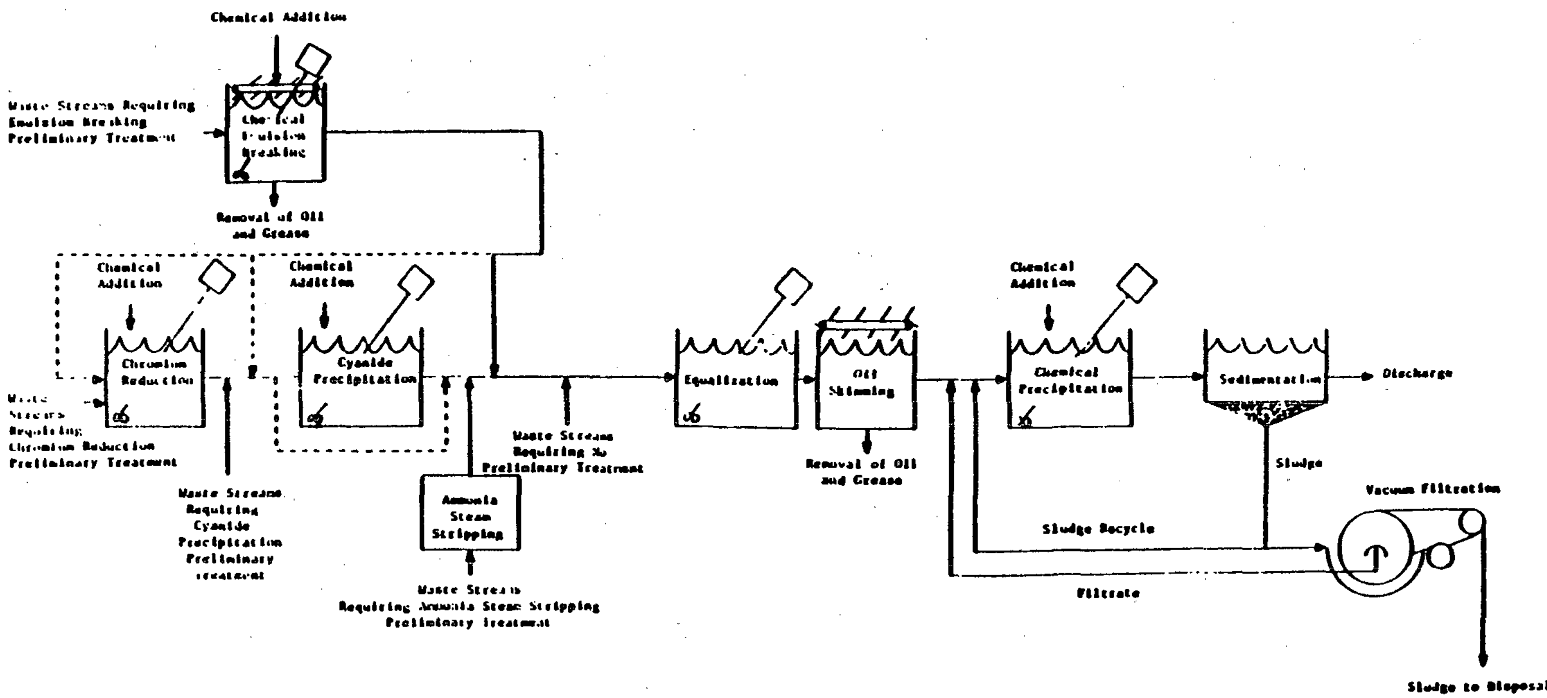


FIGURE 3-5. PSES/PSNS OPTION 1 AND 2 TREATMENT TRAIN FOR THE NONFERROUS METALS FORMING AND METAL POWDERS CATEGORY

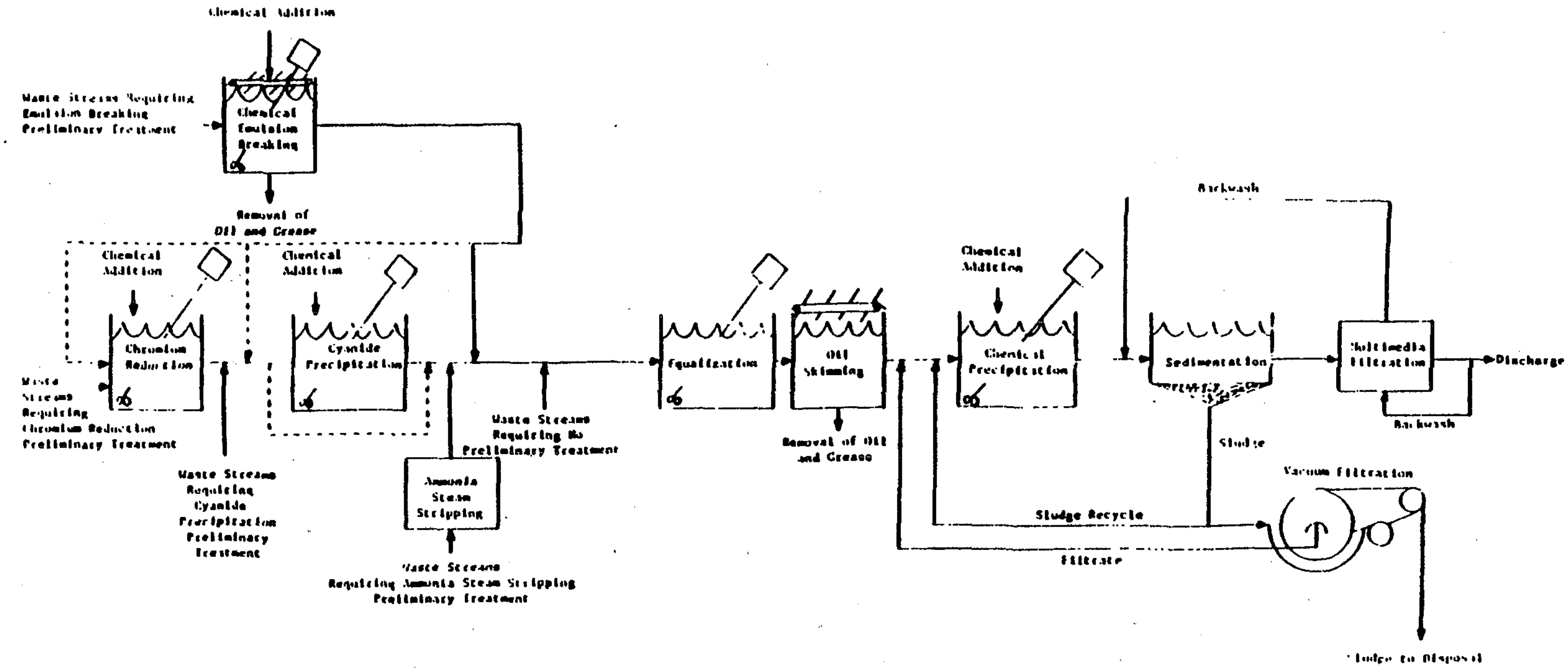


FIGURE 3-6. PSES/PSNS OPTION 3 TREATMENT TRAIN FOR THE NONFERROUS METALS FORMING AND METAL POWDERS CATEGORY

The major end-of-pipe technologies discussed here include chemical reduction of chromium, chemical precipitation, cyanide precipitation, granular bed filtration, pressure filtration, settling, skimming, chemical emulsion breaking, and thermal emulsion breaking. Each technology is applicable for all forming categories (aluminum, copper, and nonferrous metals), unless otherwise noted in the discussion.

Chemical reduction of chromium is used in aluminum forming for rinses of chromic acid etching solutions and chromium conversion coating processes. In the copper forming industry, chemical reduction of chromium is used for treating pickling baths and pickling rinses. Surface treatment baths and rinses are treated by this method in the nonferrous metals forming industry. The treatment of hexavalent chromium involves reducing the chromium to its trivalent form, and removal with a conventional lime precipitation-solids removal system. A pH of 2 to 3 is necessary for complete chromium reduction. The reduction allows removal of chromium from solution in conjunction with other metallic salts by alkaline precipitation. In most cases, gaseous sulfur dioxide is used as the reducing agent in the reduction of chromium from its hexavalent form to its trivalent form, which enables the trivalent chromium to be precipitated out from solution.

Chemical precipitation is used in the forming categories for precipitation of dissolved metals. It can also be used to remove metal ions as hydroxides and any substance that can be transformed into an insoluble form, such as fluorides, phosphates, or sulfides. Alkaline compounds, such as lime or sodium hydroxide, can be used to precipitate toxic metal ions as metal hydroxides so they can be removed by physical means such as sedimentation, filtration, or centrifugation. The addition or presence of iron in wastewaters aids in the removal of toxic pollutants such as molybdenum through co-precipitation. Other treatment chemicals include soluble and insoluble sulfides, ferrous or zinc sulfate, or carbonate precipitates.

Cyanide precipitation is used as a preliminary treatment in the forming categories for the removal of cyanide. Cyanide precipitation is used as the model technology because it achieves lower cyanide levels than other treatments and is applicable when cyanide destruction is not feasible because of the presence of cyanide complexes that are difficult to destroy. Cyanide can be precipitated and settled out of wastewaters by the addition of zinc sulfate or ferrous sulfate at a pH of 9.0. Although precipitation of cyanide is a method of treating cyanide in wastewaters, the cyanide is retained in the sludge that is formed and the sludge must be properly disposed.

Granular bed filtration is used for polishing aluminum, copper, and nonferrous metals forming wastewaters after clarification, sedimentation, or other similar solids removal operations. Filter media, such as silica sand, anthracite coal, and garnet, supported by gravel are commonly used to remove suspended solids and colloidal particles. The typical granular bed filter operates by gravity flow.

Pressure filtration can be used in aluminum, copper, and nonferrous metals forming for sludge dewatering and for direct removal of precipitated and other suspended solids from wastewater. Pressure filtration works by pumping the liquid through a filter material that is inpenetrable to the solid phase. The positive pressure exerted by the feed pumps or other mechanical methods provides the pressure differential or force necessary to drive the liquid through the retained solids.

Settling and clarification are used in aluminum, copper, and nonferrous metals forming for removal of metals and other suspended materials. Settling removes suspended solid particles from a liquid by gravitational force and is accomplished by reducing the velocity of the feed stream in a large volume tank or lagoon so that suspended solids are able to settle out. Long retention times are normally required for settling. Therefore, the process is often preceded by chemical precipitation, which converts dissolved pollutants to a solid form, and by coagulation, which enhances settling by coagulating suspended precipitates into larger, faster settling particles.

Skimming is most often used in the forming categories to remove free oil, grease, soaps, or other pollutants with a specific gravity less than water. Skimming is often found in conjunction with air flotation or clarification to increase its effectiveness. Skimming normally takes place in a tank designed to allow the floating material to rise and remain on the surface, while the liquid flows to an outlet below the floating layer. Common skimming mechanisms include the rotating drum type skimmer, the belt type skimmer, which pulls a belt laterally through the water to collect oil, and the API (or other gravity-type) separator, which skims a floating oil layer from the surface of the wastewater.

Chemical emulsion breaking is applicable to all forming wastestreams containing emulsified oils or lubricants, such as rolling and drawing emulsions. Chemical treatment is used to break the stable oil-in-water emulsions, allowing the oil to float to the surface of the water. Chemicals such as polymers, alum, ferric chlorides, and organic emulsion breakers are used most often. Long retention times and proper mixing result in a more complete separation between the oil, water, and solids.

Thermal emulsion breaking is used for the treatment of spent emulsions in the aluminum and copper forming categories. Dispersed oil droplets in a spent emulsion can be destabilized by the application of heat to the waste by use of an evaporation-decantation-condensation process. As the water evaporates, the oil concentration increases, thereby enhancing agglomeration and gravity separation of oils.

3.5 IN-PLANT CONTROL TECHNOLOGIES

In-plant control techniques are used in aluminum, copper, and nonferrous metals forming plants for the purpose of eliminating or reducing the quantity of wastewaters requiring end-of-pipe treatment. Flow reduction, in conjunction with end-of-pipe treatment, can further reduce the mass of pollutants discharged. The primary flow reduction techniques applicable to forming plants are: 1) process water recycle and reuse, 2) alternative rinsing techniques (particularly countercurrent cascade and spray rinsing), 3) regeneration of chemical baths, 4) wastewater segregation, 5) oil and solvent recovery, 6) dry air pollution control, 7) contract hauling, 8) reduction of water use, and 9) good housekeeping practices. These in-plant controls are discussed below.

Recycling of some process wastewater streams is practiced at most forming plants. The most commonly recycled streams include spent lubricating solutions, annealing contact cooling water, solution heat treatment contact cooling water, casting contact cooling water, rolling emulsions, and scrubber liquors. Some treatment may be required to allow process wastewater recycle; however, the degree of treatment is less than would be necessary for discharge and most often includes suspended solids removal, oil skimming, and cooling.

Alternative rinsing techniques reduce the amount of water used and discharged in forming plants. Rinsing is used to decrease the concentration of contaminants adhering to the surface of a workpiece to an acceptable level before the workpiece passes on to the next step of a cleaning, etching, or pickling operation. These rinsing techniques are alternatives to flowing rinses and can result in water cost savings, reduced chemical treatment, and improved waste treatment efficiency. Process variations, such as counter-current cascade rinsing, decrease process water use by introducing clean water in the last rinse stage, and routing the more contaminated water stage by stage up the rinsing line. Spray rinsing, whereby water is sprayed onto the surface of the workpiece, as opposed to submerging it in a tank, reduces the amount of water necessary to achieve the required cleanliness of the workpiece. Water use and discharge rates can be further reduced through recirculation of the rinse water.

Regeneration of chemical baths is sometimes used in the forming categories to remove contaminants and recover and reuse the bath chemicals. The process minimizes the chemical requirements of the bath while achieving zero discharge. Chemical bath regeneration is applicable in the aluminum forming category to recover and reuse chemicals associated with caustic cleaning or etching baths, sulfuric acid etching baths, conversion coating or anodizing baths, chromic acid etching baths, and alkaline cleaning baths. Chemical bath regeneration can be used in nonferrous metals forming for treatment baths consisting of caustic, sulfuric acid, and chromic acid baths, and alkaline solutions. Regeneration methods which may be employed include applying a temperature change or addition of chemicals (such as lime) to precipitate metal salts from the baths. Ultrafiltration can be used to remove oils and particulates from alkaline cleaning baths. Advantages of regeneration include a reduction in the volume of discharge of bath water, and an increase in the efficiency of surface treatment, cleaning, or etching operations because the bath can be kept at a relatively constant strength. Costs savings can also achieved through reductions in maintenance labor and chemical usage.

Wastewater segregation, whereby dissimilar wastestreams are prevented from mixing, is a valuable control technology for the forming categories and may reduce treatment costs. Individual process wastestreams may exhibit very different chemical characteristics, and separating the steams may allow application of the most effective method of treatment or disposal to each stream. Segregation should be based on the type of treatment to be performed for a given pollutant.

Lubricating oil and deoiling solvent recovery is a common practice in aluminum and nonferrous metals forming. The degree of recycle is dependent on any in-line treatment (e.g., filtration to remove metal fines and other contaminants) and the useful life of the specific oil in its application. Usually, this involves continuous recirculation of the oil, with losses in the recycle loop from evaporation, oil carried off by the metal product, and minor losses from in-line treatment. Some plants periodically replace the entire batch of oil once its required properties are depleted. In other cases, a continuous bleed or blowdown stream of oil is withdrawn from the recycle loop to maintain a constant level of oil quality. Fresh make-up oil is added to compensate for the blowdown and other losses, and in-line filtration is used between cycles.

Dry air pollution control devices allow control of air emissions without generating a wastewater stream. The choice of air pollution control equipment is complicated, and sometimes a wet system is the necessary choice. The important difference between wet and dry devices is that wet devices control gaseous pollutants, as well as particulates.

Contract hauling of low-volume, high concentration wastestreams reduces the amount of wastewater discharged by forming operations. Wastestreams often transported off site from aluminum forming operations include etching baths, drawing lubricants, cold rolling lubricants, annealing oil, and extrusion press solution heat treatment wastes. Nonferrous metals forming operations contract haul wastestreams such as pickling bath wastewater, drawing lubricants, and cold rolling lubricants to off site disposal facilities.

Reduction of water use by simple actions requiring little or no cost is an effective approach for forming operations to reduce treatment costs and pollutant discharges. Practices include shutting off process wastestreams during inoperative periods and adjustment of flow rates during periods of low activity, changes in production techniques and equipment, improved design of spray quenches to ensure that a high percentage of water contacts the product, the use of drag-out reduction techniques, and improved operator performance.

Good housekeeping practices, including proper equipment maintenance, are necessary methods to reduce wastewater loads to treatment systems. These techniques can be implemented by all forming operations. Control of accidental spills of oils, process chemicals, and wastewater from washdown and filter cleaning or removal can aid in maintaining the segregation of wastewater streams. Curbed areas should be used to contain or control these wastes.

Leaks in pump casing, process piping, etc., should be minimized to maintain efficient water use. One particular type of leakage that can cause a water pollution problem is the contamination of noncontact cooling water by hydraulic oils, especially if this type of water is discharged without treatment.

Good housekeeping is also important in chemical, solvent, and oil storage areas to preclude a catastrophic failure situation. Storage areas should be isolated from high fire-hazard areas and arranged so that if a fire or explosion occurs, treatment facilities will not be overwhelmed nor create uncontrolled releases to the environment caused by large quantities of chemical-laden fire-protection water.

Bath or rinse waters that drip off the metal product while it is being transferred from one tank to another (dragout) should be collected and returned to their originating tanks. This can be done with simple drain boards.

A conscientiously applied program of water use reduction by forming operations can also be an effective method of curtailing unnecessary wastewater flows. Judicious use of washdown water and avoidance of unattended running hoses can significantly reduce water use.

4. REQUIREMENTS OF THE GENERAL PRETREATMENT REGULATIONS

4.1 INTRODUCTION

This section provides a brief overview of the General Pretreatment Regulations for Existing and New Sources (40 CFR Part 403) and identifies those provisions of the regulations that have direct bearing on the application and enforcement of categorical pretreatment standards for the aluminum forming, copper forming and nonferrous metals forming and metal powders categories.

The General Pretreatment Regulations (40 CFR 403) establish the framework and responsibilities for implementation of the National Pretreatment Program. The effect of these regulations is three-fold:

- The regulations establish general and specific discharge prohibitions as required by Sections 307(b) and (c) of the Clean Water Act. The general and specific prohibitions are described in 403.5 of the pretreatment regulations and apply to all nondomestic sources introducing pollutants into a POTW, regardless of whether or not the source is subject to categorical pretreatment standards.

- The regulations establish an administrative mechanism to ensure that national pretreatment standards (prohibited discharge standards and categorical pretreatment standards) are applied and enforced upon industrial users. Approximately 1,500 POTWs are required to develop locally administered pretreatment programs to ensure that nondomestic users comply with applicable pretreatment standards and requirements.

- Most importantly for the purposes of this guidance manual, the General Pretreatment Regulations contain provisions relating directly to the implementation and enforcement of the categorical pretreatment standards. Provisions governing basic reporting requirements, local limits, compliance monitoring activities, and the procedures associated with categorical determinations are set out in the regulations. POTW representatives are referred to 40 CFR Part 403 for specific language and requirements.

EPA is considering making a number of changes to the General Pretreatment Regulations. These changes may affect some of the provisions of the pretreatment regulations discussed in this section and could alter the guidance in this section. Therefore, the reader is advised to keep abreast of changes to the General Pretreatment Regulations.

4.2 REQUESTS FOR CATEGORICAL DETERMINATIONS

An existing industrial user or its POTW can request written certification from EPA or the delegated state specifying whether or not the industrial user falls within a particular industry subcategory and is subject to a particular categorical pretreatment standard. Although the deadlines for submitting categorical determination requests by existing industrial users subject to the aluminum forming, copper forming, or nonferrous forming and metal powders categorical pretreatment standards have passed, new industrial users can request this certification for a category determination any time before commencing its discharge. Similarly, a POTW can request the certification on behalf of an industrial user. Requests should be directed to the EPA Regional Water Management Division Director or to the State Director, as appropriate, using the procedures set out in 40 CFR 403.6(a). Additional assistance in determining the proper category for wastewaters from such operations can be obtained by contacting the Industrial Technology Division at U.S. EPA Headquarters.

4.3 MONITORING AND REPORTING REQUIREMENTS OF THE GENERAL PRETREATMENT REGULATIONS

In addition to any specific monitoring or reporting requirements contained in the aluminum forming, copper forming or nonferrous forming and metal powders categorical pretreatment standards, industrial users must fulfill the reporting requirements contained in 403.12 of the General Pretreatment Regulations. These requirements include the submission of baseline monitoring reports, compliance schedule progress reports (when necessary), periodic compliance reports and notices of slug loading, as well as a three year record-keeping requirement. Each of these reporting requirements is briefly summarized below.

4.3.1 Baseline Monitoring Reports

All industrial users subject to categorical pretreatment standards must submit a baseline monitoring report (BMR) to the Control Authority. The purpose of the BMR is to provide information to the Control Authority to document the industrial user's compliance status with applicable categorical pretreatment standards. The Control Authority is defined as the POTW if it has an approved pretreatment program, the state regulatory agency if the state has an approved state pretreatment program, or the EPA regional office if neither the POTW or the State have an approved pretreatment program. Additional guidance on BMR reporting is available from the state agencies or from EPA regional pretreatment coordinators. A complete listing of current EPA and state pretreatment coordinators is provided in Appendix D.

BMR Due Dates

Section 403.12(b) requires that BMRs be submitted to the Control Authority within 180 days after the effective date of a newly promulgated categorical pretreatment standard or 180 days after the final administrative decision is made on a categorical determination request (see section 4.2 above), whichever is later. The BMR due dates for existing facilities in the three forming categories are listed below:

Aluminum Forming	June 4, 1984
Copper Forming	March 25, 1984
Nonferrous Metals Forming and Metal Powders	April 5, 1986

At least 90 days prior to commencement of disharge, new sources shall submit a BMR.

BMR Content

A BMR must contain the following information as required by §403.12(b).

- Name and address of the facility, including names of operator(s) and owner(s).
- List of all environmental control permits held by or for the facility.
- Brief description of the nature, average production rate, and SIC code of each of the operations conducted, including a schematic process diagram that indicates points of discharge from the regulated processes to the POTW.
- Average daily and maximum daily flow data (in gallons per day) for regulated process streams discharged to the POTW. Flow measurements of other wastestreams will be necessary if application of the combined wastestream formula is anticipated (see section 4.4, below).
- Identification of the applicable pretreatment standards for each regulated process wastestream and the results of measurements of flow

rates and pollutant concentrations. This information must include an analysis of the nature and concentration (or mass where so specified by the categorical standard or the Control Authority) expressed in terms of daily average and daily maximum values. These analyses must be performed in accordance with the procedures contained in 40 CFR Part 136, or as otherwise directed and approved by EPA. Samples must be representative of daily operations. For most pollutants, 24-hour composite samples must be obtained through flow-proportional composite sampling techniques where feasible. For pH, cyanide, total phenols, oil and grease, sulfide, and volatile organics, a minimum of four (4) grab samples must be used. If the industrial user demonstrates that flow-proportional sampling is infeasible, the Control Authority may waive flow-proportional sampling and instead obtain samples through time-proportional composite sampling techniques or through a minimum of four (4) grab samples where the user demonstrates that this will provide a representative sample of the effluent being discharged. The user must take a minimum of one representative sample (or set of samples, where grab samples are used). Prior to November 16, 1988, the effective date of the recent revisions to the Federal pretreatment regulations where the flow of the regulated stream being sampled was less than or equal to 250,000 gallons per day, the industrial user was required to take three samples within a two week period. Where the flow of the stream was greater than 250,000 gallons per day, the industrial user was required to take six samples within a two week period. Note that the Control Authority may accept historical flow data if it provides sufficient information to determine the industrial user's (IU's) need for new or additional pretreatment controls. These samples are to be taken immediately downstream from the existing treatment or, if no treatment has been installed, immediately downstream from the regulated process. If other wastewaters are mixed with the regulated process, the industrial user should measure flows and concentrations of the appropriate wastestreams to allow use of the combined wastestream formula (see Section 4.4, below).

- The dates, times and sampling locations as well as the analytical methods used to derive the testing results.

- An authorized representative of the IU [see 40 CFR 403.12(l)] must certify as to whether the facility is currently meeting the pre-treatment standards. In the event the standards are not being achieved, the certification must contain a compliance schedule which identifies the additional operation and maintenance measures and/or abatement technology necessary to bring the IU into compliance and a timetable for completing those actions necessary to achieve such compliance. The final date for completing the actions and achieving compliance must not exceed the compliance deadline established by the standard. Industrial users are referred to 40 CFR §403.12(b)(7) and (c) for more specific instructions on preparing this compliance schedule.

- For new sources the report must contain information on the method of pretreatment intended to be used to meet the applicable pretreatment standards and an estimate of the average daily and maximum daily flow and pollutant concentrations.

BMR Reporting of Toxic Organics

Unlike the metal finishing categorical standard for TTO, industrial users regulated by standards for the aluminum forming and copper forming categories cannot sample and analyze for only those compounds that are reasonably expected to be in their wastestreams. Industrial users must sample and analyze for all the toxic organic compounds identified as comprising total toxic organics (TTO) under the categorical standards for the aluminum forming or copper forming category, as appropriate. The term "total toxic organics" is the sum of the masses or concentrations of each of the regulated toxic organic compounds found at a concentration greater than 0.01 mg/l in a regulated wastestream.

The toxic organic compounds regulated under the TTO standards for the aluminum forming subcategories are:

- P-chloro-m-cresol
- 2-Chlorophenol
- 2,4-Dinitrotoluene
- 1,2-Diphenylhydrazine
- Ethylbenzene
- Fluoranthene
- Isophorone
- Napthalene
- N-nitrosodiphenylamine
- Phenol
- Benzo(a)pyrene
- Benzo(ghi)perylene
- Fluorene
- Phenanthrene
- Dibenzo(a,h)anthracene
- Indeno(1,2,3,-c,d)pyrene
- Pyrene
- Tetrachloroethylene
- Toluene
- Trichloroethylene
- Endosulfan sulfate
- Bis(2-ethyl hexyl)phthalate
- Diethylphthalate
- 3,4-Benzofluoranthene
- Benzo(k)fluoranthene
- Acenaphthylene
- Anthracene
- Chrysene
- Di-n-butyl phthalate
- Endrin
- Endrin aldehyde
- PCB 1242, 1254, 1221
- PCB 1232, 1248, 1260, 1016
- Acenaphthene

The toxic organic compounds identified as comprising TTO under the categorical standards for copper forming are:

- Benzene
- 1,1,1-Trichloroethane
- Chloroform
- 2,6-dinitrotoluene
- Ethylbenzene
- Methylene chloride
- Napthalene
- N-nitrosodiphenylamine
- Anthracene
- Phenanthrene
- Toluene
- Trichloroethylene

Section 468.01(b) of the copper forming regulation limits the applicability of the TTO pretreatment standards for drawing spent lubricant discharges [40 CFR Section 468.14(c) and 468.15(c)]. These TTO standards apply only to those copper forming facilities that discharge this spent lubricant wastestream to their POTW. These standards do not apply when this spent lubricant is hauled off site for disposal or is otherwise not discharged from the facility.

The tables contained in Appendix C present the applicable TTO limits for each subcategory in the aluminum forming and copper forming categories. There are no TTO standards for the nonferrous metals forming and metal powders category.

As an alternative to monitoring for TTO, industrial users can monitor for oil and grease (O&G) and meet the O&G categorical standards. When an industrial user elects the alternative O&G monitoring, the facility is subject to the O&G standard and is not subject to the TTO standard. The TTO or O&G monitoring results must be submitted in the BMR and subsequent 90-day compliance report and periodic reports on continued compliance. Additional guidance on the application of TTO standards is provided in EPA's Guidance Manual for Implementation Total Toxic Organics (TTO) Pretreatment Standards, September 1985.

4.3.2 Compliance Schedule Progress Reports

In the event the industrial user certifies that it is not meeting the appropriate categorical standard on a consistent basis, a compliance schedule must be submitted with the BMR that describes the actions the industrial user will take and a timetable for completing those actions in order to achieve compliance with the standard. The completion date in the schedule must not be later than the compliance date established for the particular categorical standard. The compliance schedule must contain increments of progress and dates for completion of each increment. Further, no increment of progress shall exceed nine months.

Within 14 days of each milestone date in the compliance schedule, the user must submit a progress report to the Control Authority. The compliance schedule progress report must indicate whether or not the user complied with the increment of progress intended to be met. If the milestone date was not met, the report must indicate a revised date on which it expects to comply, the reasons for the delay, and the steps to be taken to return to the scheduled established in the BMR.

4.3.3 Report on Compliance

Within 90 days of the respective compliance dates, or following commencement of the introduction of wastewaters into the POTW in the case of a new source, any industrial user subject to the standards must submit to the Control Authority a compliance report that provides the nature and concentration of all regulated pollutants in the facility's regulated process wastestreams; the average and maximum daily flows of the regulated streams; a reasonable measure of the long term production rate if equivalent mass or concentration limits have been imposed, or the actual average production rate for the reporting period if subject to categorical standards expressed only in terms of allowable pollutant discharge per unit of production (or other measure of production); and, a statement as to whether compliance is consistently being achieved and, if not, what additional operation and maintenance or pretreatment is necessary to achieve compliance [see 40 CFR 403.12(d)].

4.3.4 Periodic Reports on Continued Compliance

Unless required more frequently by the Control Authority, all industrial users subject to categorical pretreatment standards must submit a biannual "periodic compliance report" during the months of June and December. The Control Authority may change the months during which the reports must be submitted. The report must indicate the precise nature and concentrations (and/or mass if required by the Control Authority) of the regulated pollutants in its discharge to the POTW during the reporting period, the average and maximum daily flow rates, a reasonable measure of the long term production rate if equivalent mass or concentration limits have been imposed, or the actual average production rate for the reporting period if subject to categorical standards expressed only in terms of allowable pollutant discharge per unit of production (or other measure of production), and a certification of the accuracy and completeness of the information submitted. [see 40 CFR 403.12(e)].

4.3.5 Notice of Potential Problems, Including Slug Loading

Section 403.12(f) requires IUs to notify the POTW immediately of all discharges that could cause problems to the POTW, including slug loading (i.e., discharge of any pollutant, including oxygen demanding pollutants, released to the POTW system at a flow rate or pollutant concentration that might cause interference with the POTW).

4.3.6 Monitoring and Analysis to Demonstrate Continued Compliance

Section 403.12(g) states that industrial user reports must contain the results of sampling and analysis of the user's discharge. This sampling and analysis may be performed by the Control Authority in lieu of the industrial user. If sampling by the industrial user indicates a violation, the industrial user must notify the Control Authority within 24 hours of learning of the violation. In addition, the industrial user must repeat the sampling and analysis and submit the results to the Control Authority within 30 days after becoming aware of the violation, unless Control Authority sampling takes place in that time period.

While Section 403.12(g) does not specify any particular frequency of monitoring, it states that a frequency sufficient to assure compliance with applicable pretreatment standards and requirements must be maintained. Further, the data on which these reports are based must be obtained through appropriate sampling and analysis, which is performed during the period of the report and is representative of conditions occurring during the reporting period. The pretreatment standards for the aluminum forming, copper forming, and nonferrous metals forming and metal powders category also do not establish monitoring frequencies. Therefore, the appropriate Control Authority must establish the monitoring frequency deemed adequate to demonstrate that indirect dischargers subject to these pretreatment standards are in compliance with the applicable standards. EPA has issued guidance on suggested monitoring frequencies for the first year until sufficient baseline data are collected (see Pretreatment Compliance Monitoring and Enforcement Guidance, July 1986).

Sampling and analysis shall be in accordance with the procedures established in 40 CFR Part 136. When Part 136 techniques are not available or are inappropriate for any pollutant, sampling and analysis shall be conducted in accordance with procedures established by the Control Authority or using any validated procedure. However, all procedures for sampling and analysis not included in Part 136 must be approved in advance by EPA.

4.3.7 Notification of Changed Discharge

Section 403.12(j) requires that all industrial users shall promptly notify the Control Authority in advance of any substantial change in the volume or character of pollutants in their discharge.

4.3.8 Signatory Requirements for Industrial User Reports

All reports submitted by industrial users (i.e., BMR, Initial Report on Compliance, and Periodic Reports, etc.) must be signed by an authorized representative in accordance with Section 403.12(l) and include the certification statement set forth in Section 403.6(a)(2)(ii). Note that false statements or misrepresentations in the aforementioned reports are punishable by a fine of up to $10,000, by imprisonment for up to two years, or by both under Section 309(c)(4) of the Clean Water Act.

4.3.9 Recordkeeping Requirements

Records of all sampling activities required under the regulations above must include dates, times, exact place(s), and methods of sampling, as well as identify the person(s) collecting the sample. In addition, analytical reports must indicate the dates and person(s) performing the sample analysis, the analytical techniques used, and the results thereof. These records must be maintained for a minimum of three years [see 40 CFR §403.12(o)(2)] and must be available for inspection and copying by the Control Authority.

4.4 THE COMBINED WASTESTREAM FORMULA

The combined wastestream formula (CWF) [40 CFR §403.6(e)] is a method for calculating appropriate discharge limitations for combined wastestreams. The CWF was developed to account for the dilutional effect of mixing one regulated wastestream with other regulated, unregulated, or dilution streams prior to treatment. The following definitions and conditions are important to proper use of the CWF.

Definitions

- Regulated process wastestream - an industrial process wastestream regulated by national categorical pretreatment standards.

- Unregulated process wastestream - an industrial process wastestream that is not regulated by a categorical standard and is not a dilute wastestream as defined below.

- Dilute wastestream - boiler blowdown, noncontact cooling water, and sanitary wastewater (unless regulated by the categorical pretreatment standard). The Control Authority has discretion to classify boiler blowdown and noncontact cooling water as unregulated wastestreams when these streams contain a significant amount of a regulated pollutant. A decision to combine contaminated (unregulated) wastestreams with regulated process wastestreams prior to treatment will result in a substantial reduction in the amount of pollutant discharged to the POTW.

  Note: These definitions apply to individual pollutants. Therefore, a wastestream from a process may be "regulated" for one pollutant and "unregulated" for another.

- Mass-based production related standard - a standard setting for the the quantity (mass) of a pollutant allowed to be discharged per unit of production. This standard is usually expressed in the forming categorical standards as milligram per off-kilogram (pounds per million off-pounds). An off-kilogram or off-pound, as previously described in Section 2.5, is defined as the mass of metal or metal alloy removed from a forming or ancillary operation at the end of a process cycle for transfer to a different machine or process.

- Mass-based limit - a limitation setting forth the quantity (mass) of a pollutant which may be discharged in a specific wastestream.

- Concentration-based limit - a limit based on the relative strength of a pollutant in a wastestream, usually expressed in mg/l (lbs/gal).

CWF Conditions

The regulations specify that the following conditions must be met by a POTW and its industrial users industries when applying the CWF:

- Alternative discharge limits calculated in place of a categorical pretreatment standard must be as enforceable as the categorical standards themselves.

- Calculation of alternative limits must be performed by the Control Authority (generally the POTW) or by the industrial user with written permission from the POTW.

- Alternative limits must be established for all regulated pollutants in each of the regulated processes.

- The Control Authority and/or the industrial user must use mass-based limitations rather than concentration-based limitations when only production-based mass standards are provided by the applicable categorical pretreatment standard.

- Both daily maximum and long-term average (usually monthly average) alternative limits must be calculated for each regulated pollutant.

- An industrial users operating under an alternative limit derived from the CWF must immediately report to the Control Authority any significant or material changes in the regulated, unregulated or dilution wastestreams or any changes in production rates.

- If a facility institutes process changes or production rate changes and if the changes warrant, the Control Authority can recalculate the alternative limits at its discretion or at the request of the industrial user. The new alternative limits will be calculated within 30 days of receiving notice of the process change.

- The Control Authority can impose stricter alternative limits but cannot impose alternative limits that are less stringent than the calculated alternative limits.

- A calculated alternative limit cannot be used if it results in a discharge limit below the analytical detection level for that pollutant. If a calculated limit is below the detection limit, the industrial user must either: (1) not combine the dilute streams before they reach the combined treatment facility, or (2) segregate all wastestreams entirely.

- The categorical standards of the regulated wastestreams which are applied to the CWF must be consistent in terms of the number of samples on which the standard is based.

Monitoring Requirements for Industrial Users Using the CWF

Self-monitoring requirements by an industrial user are necessary to ensure compliance with the alternative discharge limit. Because the categorical pretreatment standards for aluminum forming, copper forming, and nonferrous metals forming and metal powders do not include self-monitoring requirements, the Control Authority will establish minimum self-monitoring requirements.

Application of the CWF

The combined wastestream formulas used to adjust the categorical pretreatment standards are presented in Table 4-1. When two or more regulated wastestreams from different regulated categories are mixed before treatment, it is necessary to determine which pretreatment regulation applies to each separate regulated wastestream. All dilution and unregulated wastestreams need to be identified.

Flow-Weighted Averaging

The CWF is applicable to situations where wastestreams are combined before treatment. However, for facilities that combine regulated process wastewaters with nonregulated waters after treatment but prior to monitoring by the Control Authority (usually at the discharge point to the sanitary sewer), a flow-weighted average or more stringent approach must be used to adjust categorical pretreatment standards. The flow-weighted averaging formula for use in these circumstances is set out in Table 4-2.

TABLE 4-1. COMBINED WASTESTREAM FORMULAS

FORMULA 1 -- <u>ALTERNATIVE CONCENTRATION LIMIT FORMULA</u>

$$C_{cwf} = \left(\frac{\sum_{i=1}^{N} C_i \times F_i}{\sum_{i=1}^{N} F_i} \right) \times \left(\frac{F_t - F_d}{F_t} \right)$$

C_{cwf} - alternative concentration limit for the pollutant

C_i - Categorical Pretreatment Standard concentration limit 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)

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

FORMULA 2 -- <u>ALTERNATIVE MASS LIMIT FORMULA</u>

$$M_{cwf} = \left(\sum_{i=1}^{N} M_i \right) \times \left(\frac{F_t - F_d}{\sum_{i=1}^{N} F_i} \right)$$

M_{cwf} - alternative mass limit for the pollutant

M_i - Categorical Pretreatment Standard mass limit 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)

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

TABLE 4-2. FLOW-WEIGHTED AVERAGING (FWA) FORMULAS

FORMULA 1 -- ALTERNATIVE CONCENTRATION-BASED LIMIT

$$C_{fwa} = \left(\frac{\left(C_{cwf} \times F_t \right) + \left(\sum_{i=1}^{N} C_{nri} \times F_{nri} \right)}{F_t'} \right)$$

C_{fwa} - alternative pollutant concentration limit in combined wastestreams after treatment derived using FWA

C_{cwf} - alternative pollutant concentration limit in treatment unit effluent, derived using the CWF

F_t - average daily flow (at least 30 day average) through the combined treatment facility

C_{nri} - concentration of nonregulated wastestream i

F_{nri} - average daily flow (at least 30 day average) of nonregulated wastestream i

F_t' - average daily flow (at least 30 day average) into regulated monitoring point (generally point of discharge to sanitary sewer)

N - total number of regulated streams

FORMULA 2 -- ALTERNATIVE MASS-BASED LIMIT

$$M_{fwa} = M_{cwf} + M_{nr}$$

M_{fwa} - alternative pollutant limit in combined wastestreams after treatment derived using FWA

M_{cwf} - alternative pollutant mass limit in treatment unit effluent, derived using the CWF

M_{nr} - mass of the pollutant in nonregulated wastestreams

4.5 REMOVAL CREDITS

A removal credit allows a POTW to provide its industrial users with a credit (in the form of adjusted categorical pretreatment standards) for consistent removal of pollutants by the POTW. Industrial users receiving such a credit are allowed to discharge to the POTW greater quantities of regulated pollutants than otherwise permitted by applicable categorical standards. Section 403.7 of the General Pretreatment Regulations establishes the conditions under which a POTW can obtain authorization to grant removal credits. Removal credits are pollutant-specific (i.e., may only be granted on a pollutant-by-pollutant basis).

In order to qualify for removal credit authority, a POTW must satisfy the conditions set out in the regulations, including a demonstration of the POTW's ability to "remove" the pollutant in question on a long-term or consistent basis; that is, the removal of the pollutant is not subject to significant seasonal or other periodic variations.

Removal credits can only be granted for indicator pollutants regulated by a categorical pretreatment standard and only where the standard expressly provides that removal credits are obtainable.

Approval for removal credits cannot be granted if resulting discharges would cause the POTW to violate its NPDES permit. Even though the POTW may be located in an NPDES state which has an approved state pretreatment program, final approval of the POTW's request for removal credit authority rests with EPA, unless EPA has granted/delegated to the state through a State/EPA Memorandum of Agreement (MOA) this final approval authority.

Note: The regulatory basis for the criteria and procedures governing removal credits is in a state of uncertainty at the time of this writing. EPA regulations governing removal credits have had a long and complex history. EPA has revised the removal credits regulations four times (1973, 1978, 1981 and 1984). The central objective of all versions of these regulations has been to establish the conditions by which POTWs can demonstrate consistent removal of pollutants and, in so doing, extend removal credits to industries on a pollutant-specific basis to prevent redundant treatment.

The 1984 revision of the removal credits regulations (49 FR 31212, 1984) was challenged as being too lenient by the National Resources Defense Council (NRDC), and as being too stringent by an industry, Cerro Copper Products Co., and by a POTW, the Village of Sauget, in a consolidated petition before the United States Court of Appeals for the Third Circuit [NRDC v. U.S. EPA, 16 ELR 20693 (3rd Cir. 1986)]. In addition, the Chemical Manufacturers Association, the Chicago Association of Commerce and Industry, the Illinois Manufacturers Association, and the Mid-America Legal Foundation intervened in this lawsuit. The Third Circuit Court of Appeals ruled in favor of NRDC, concluding that EPA's 1984 removal credit rule fails to meet the requirements mandated by Section 307 of the Clean Water Act.

On November 5, 1987 EPA replaced those portions of the 1984 regulatory revision which had been invalidated by the U.S. Third Circuit Court of Appeals with language from the previously upheld 1981 version of the regulations and made other minor revisions thereto. However, the removal credit rules remain ineffective pending the promulgation of technical sludge criteria (proposal expected in the Fall of 1988). As a matter of policy, EPA will not approve new applications until these sludge regulations have been promulgated.

4.6 FUNDAMENTALLY DIFFERENT FACTORS (FDF) VARIANCE

A fundamentally different factors (FDF) variance is a mechanism available under Section 402(n) of the CWA and 40 CFR 403.13, by which a categorical pretreatment standard can be adjusted, making it more or less stringent, on a case-by-case basis. If an industrial user believes that the factors relating to its processes or other circumstances are fundamentally different from those factors considered during development of the relevant categorical pretreatment standard and that the existence of those factors justifies a different discharge limit from that specified in the categorical standard, the party can submit a request to EPA within 180 days after the effective date of the standard for such a variance (see 40 CFR §403.13). Note that the deadlines for submitting FDF variances for the copper forming, aluminum forming, and nonferrous metal forming and metal powders categories have passed.

4.7 LOCAL LIMITS

Local limits are pollutant concentration-based or mass-based values that are developed by a POTW for controlling the discharge of conventional, nonconventional, or toxic pollutants into its sewer system. They differ from national categorical pretreatment standards in that categorical pretreatment standards are developed by EPA and are based on the demonstrated performance of available pollutant control technologies (for specific categorical industries). These national technology-based categorical standards do not consider local environmental criteria or conditions and are developed only to assure that each point source within a specified category meets a minimum discharge standard that is consistent across the United States for all POTWs.

Local limits, on the other hand, are developed to address specific localized impacts and factors that are unique to the POTW. Local limitations are typically designed to protect the POTW from:

- The introduction of pollutants into the POTW that could interfere with its operation (the term "interference" is defined in 40 CFR §403.3).
- Pass through of inadequately treated pollutants that could violate a POTW's NPDES permit or applicable water quality standards (the term "pass through" is defined in 40 CFR §403.3).
- The contamination of a POTW's sludge which would limit sludge uses or disposal practices.

Local limits are required under 40 CFR §403.5 and must be developed when it is determined that categorical pretreatment standards are not sufficient to enable the POTW to meet the above three pretreatment program objectives.

To assist municipalities in developing defensible and technically sound numerical effluent limitations, EPA has provided guidelines on the development of local limits in its document, Guidance Manual On the Development and Implementation of Local Discharge Limitations Under the Pretreatment Program . This manual is available from EPA Regional offices and NPDES states and should be carefully followed when developing local limits. Although a detailed discussion of local limits development is beyond the scope of this document, the general development process involves the following four steps:

Step 1 - Screening for pollutants of concern
Step 2 - Derivation of allowable headworks loadings
Step 3 - Allocation of allowable headworks loadings
Step 4 - Evaluating collection system impacts

A pollutant of concern is defined as any pollutant which might reasonably be expected to be discharged to the POTW in quantities which could pass through or interfere with the POTW, contaminate the sludge, or jeopardize POTW worker health or safety. Derivation of allowable headworks loadings must be performed for each pollutant of concern based on POTW removal efficiencies and criteria which regulate or provide guidance concerning pollutant levels at the POTW. Detailed instructions on identifying pollutants of concern, deriving and allocating headworks loadings and evaluating collection system effects are provided in the guidance manual mentioned earlier.

EPA has also developed a computer software program (PRELIM) that incorporates the general methodology required to develop local limits and that alleviates a substantial amount of the tedious calculations required to develop these limits. This computer program has the following capabilities to aid the POTW in developing discharge limits:

- Performs the four-step limit setting analysis on microcomputer.
- Supplements POTW site specific data with default files containing data on industrial/municipal wastewater characteristics, POTW removal rates, and biological process inhibition data.
- Allocates controllable pollutant loads using several methodologies.

POTWs can obtain information on this computer program by contacting any of the ten EPA regional offices. Instructions will be provided on how to use the computer program and how to access a compatible computer system.

5. APPLICATION OF PRODUCTION-BASED CATEGORICAL PRETREATMENT STANDARDS

5.1 INTRODUCTION

The standards issued for the aluminum forming, copper forming, and nonferrous metals forming and metal powders categories are production-based. Production-based standards are expressed in terms of allowable pollutant mass discharge per unit of production (e.g., allowable pounds of pollutant per 1,000 pounds of product). To determine compliance with production-based standards, the Control Authority must collect a wastewater sample, measure the concentration of the regulated pollutant(s), measure the flow of each regulated wastestream, determine the corresponding production rate(s), and compare the results to the standards.

Rather than measure the production rate each time that compliance monitoring is performed, Control Authorities may use equivalent mass or equivalent concentration limits as a tool for routine monitoring and enforcement purposes. Equivalent mass or equivalent concentration limits use an industrial facility's average production and average flow rates to derive limits that are essentially equivalent to the applicable production-based standards but that are expressed as mass per day or as a concentration (e.g., lb/day or mg/l).

The following sections provide a brief overview of the use of equivalent limits and the information required for implementation. Additional information on the application of production-based standards and equivalent limits may be obtained from a review of EPA's Guidance Manual for the Use of Production-Based Pretreatment Standards and the Combined Wastestream Formula.

5.2 USE OF EQUIVALENT MASS LIMITS

Production-based standards are applied directly to an industrial user's manufacturing process unless equivalent limits are established. Direct application of production-based standards requires the Control Authority or the industrial user to make direct measurements of the current production and flow rates each time that monitoring is 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 rate or other estimate based on a reasonable measure of the actual production rate to develop equivalent mass limits, using the formula below:

$$\frac{\text{production-based standard} \times \text{regulatory production rate}^{*}}{\text{conversion factor}} = \text{equivalent mass limit}$$

*average or other reasonable estimate

The same production rate is multiplied by both the daily maximum and maximum monthly average standards to produce equivalent daily maximum mass per day and maximum monthly average mass per day standards. A long-term average production value, usually a 12-month average, that will be representative during the life of the permit or control mechanism should be used. 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. The advantage of using equivalent mass limits instead of applying production-based 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 concentration of pollutants.

5.3 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. In this case, the Control Authority may decide, on the basis of cost, technical or managerial considerations, to develop equivalent concentration limits using an average daily flow rate based on a reasonable measure of actual flow rates. 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 appropriate production-based standard, then this product is divided by the average daily flow rate, according to the formula below:

$$\frac{\text{production-based standard x regulatory production rate}^{*}}{\text{average flow rate x conversion factor}} = \text{equivalent concentration limit}$$

*average or other reasonable estimate

It is proper to use the same long-term average production and flow values to derive both daily maximum and monthly average limits. It is important to select average production and flow rates that will be representative during the life of the permit. When using equivalent concentration limits, it is also important to ensure that dilution will not be used by an industrial user to achieve compliance with the limits. If dilution is an expected problem, it may be better to impose mass per day limits and to routinely measure actual flow rates.

5.4 OBTAINING PRODUCTION AND FLOW RATE INFORMATION

Industrial users 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. Similarly, discharge permit applications should request production and flow rate information from industrial users subject to production-based standards. After the compliance deadline of a categorical standard, industrial users are required to submit production and flow rate information in the 90-day compliance report and in periodic reports on continued compliance.

Upon receiving baseline monitoring reports, 90-day compliance reports, reports on continued compliance, or other information from industrial users, Control Authorities may be approached by industrial users requesting that information submitted be held as confidential so as not to divulge trade secrets. 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 are 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.

Once the production and flow rate data have been collected, and the production-based standards translated to impose equivalent mass limits <u>or</u> equivalent concentration limits, it is strongly recommended that the equivalent limits be applied through a permit or other control document that is transmitted to an industrial user. The document should clearly spell out: 1) all equivalent mass or equivalent concentration limits, 2) flow and production rates upon which the equivalent limits are based, 3) a requirement that the industrial user provide the Control Authority with current average production and flow rates in periodic self-monitoring reports, and 4) a requirement to notify the Control Authority of significant changes in flow or production rates which would require revision of the equivalent limits. As a general rule, a change in the long-term average production or flow rate of greater than 20 percent is considered significant. Unless there is such a control document, it may be difficult to determine compliance with the standard or to enforce production-based standards.

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

5.5 DETERMINING AN APPROPRIATE PRODUCTION RATE

Categorical standards are expected to be achievable even with normal variation in day-to-day production rates and the effect that routine variation has on effluent quality. When using equivalent mass or equivalent concentration 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 a permit or other control mechanism. Long-term average shall mean an average based on the production over an extended period of time that captures a normal range of variation in production. Using 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 equivalent limit on the production rate for a high day, week, or month should be avoided.

Equivalent limits should be based on an industrial user's actual production rate, not on design production capacities. 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 (preferably 3 to 5) of production data should be examined, if possible. Data that are not representative of normal operation or that are due to specific events which are not expected to recur should be disregarded. In order to verify the accuracy and reliability of production data submitted by an industrial user, the Control Authority can and should periodically inspect the facility's production (and similarly, flow) records and measuring techniques. The Control Authority may also require the industrial user to perform actual measures of production (and flow) in the presence of a Control Authority representative.

Generally, the daily average production rate is calculated by dividing the annual (or monthly) production rate by the number of production days per year (or month). However, if the number of wastewater discharge days is different from the number of production days, the former number should be used to calculate the daily average production rate. As described previously, this daily average production rate is used to develop equivalent mass or equivalent concentration limits.

5.6 DETERMINING AN APPROPRIATE FLOW RATE

When using equivalent concentration limits to implement production-based standards, 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 for determining an appropriate production rate. In both cases, it is important to:

- Determine reasonable estimates of actual long-term rates; for example, the normal daily average during a representative year.
- Use actual rates rather than design rates; emphasize historical data rather than future projections.
- Use the same average rates to calculate both daily maximum and maximum monthly average alternative limits.
- Establish rates that are expected to be representative during the entire term of the permit or 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.
- Re-evaluate equivalent limits every six months using additional monitoring data. If actual average rates change by more than 20 percent from the estimated rates 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 used to determine the average production rate.

As a minimum, it is always necessary to determine the average daily flow for regulated process wastestreams. In addition, when the combined wastestream formula and flow-weighted averaging are used, not only are flow rates for the regulated wastestreams required, but flow rates of unregulated and dilution streams are required as well when these streams combine with regulated process wastestreams. It is often necessary to conduct a water balance of the entire plant which accounts for all water entering and leaving the facility. 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. A water balance is useful to verify that flow rates have been accurately determined for use of the combined wastestream formula and flow-weighted averaging or to enable estimation of certain flows which are difficult to measure.

5.7 CATEGORIZATION OF ALUMINUM, COPPER AND NONFERROUS FORMING FACILITIES

The categorization and subcategorization of integrated industrial facilities and the process operations they conduct is often a complex and difficult task. Categorical standards for a variety of industrial categories and subcategories can apply to the various wastestreams produced within such facilities. As this guidance alluded to during previous discussions of metal forming operations, some facilities perform manufacturing, forming, and finishing operations at one location. Wastewaters generated by these operations are regulated by different categorical standards.

As a rule, a facility that (re) melts, casts, and cools base metal (aluminum, copper, or other nonferrous metals), without associated forming operations, is subject to metal molding and casting categorical standards (40 CFR Part 464). Ancillary operations at these facilities may be covered under metal molding and casting categorical standards (40 CFR Part 464) or electroplating or metal finishing categorical standards (40 CFR Part 413 and 40 CFR Part 433, respectively).

A facility that performs aluminum forming operations is subject to the aluminum forming categorical standards. Any re(melting), casting, and cooling operations performed at this aluminum forming facility are covered under the aluminum forming categorical standards (40 CFR Part 467).

However, a facility that performs copper (re)melting, casting and cooling operations and forming operations is subject to two sets of standards. The (re)melting, casting, and cooling operations are still subject to metal molding and casting categorical standards while the forming operations and associated ancillary operations are covered under the copper forming categorical standards (40 CFR Part 468).

A facility that conducts nonferrous metals forming operations is covered under the nonferrous metals forming and metal powders categorical standards. Any re(melting), casting and cooling operations conducted at this facility would also be covered under the nonferrous metals forming and metal powders categorical standards (40 CFR Part 471).

5.8 APPLICATION OF PRETREATMENT STANDARDS TO METAL FORMING FACILITIES

This section provides examples of metal forming facilities and the application of categorical standards to those facilities. Example 5-1 illustrates one method of using historical production data to calculate long-term daily average production rates. Other methods for deriving long-term production values are discussed in EPA's Guidance Manual for the Use of Production-Based Standards and the Combined Wastestream Formula. Example 5-2 illustrates the calculation of equivalent limits for a copper casting and copper forming facility. This example also involves the use of the combined wastestream formula. Finally, Example 5-3 provides an example of the application of categorical standards to a facility regulated by the nonferrous metal forming and metal powders category. This example includes the use of the flow-weighted averaging formula to calculate equivalent pollutant discharge limits.

Each of the following examples involves the calculation of equivalent limits from average production values. In the aluminum forming, copper forming, and nonferrous metals forming and metal powders categories, categorical pretreatment standards have been established in units of milligrams of pollutant discharge allowed per off-kilogram of product (mg/off-kg). As previously discussed in Section 2.5, an off-kilogram refers to the mass of metal or metal alloy product (aluminum, copper, or other nonferrous metal or metal alloy) removed from one forming operation (e.g., rolling) at the end of the process cycle to be transferred to another operation or process (e.g., annealing). Categorical standards established for each of the forming categories include separate milligram per off-kilogram standards for primary and ancillary forming operations. The Control Authority must use production data gathered from each primary and ancillary operation to calculate equivalent discharge standards, as illustrated in Examples 5-1 through 5-3.

Example 5-1

An industrial facility conducts cold rolling of aluminum alloys using neat oils as a lubricating agent. Rolling processes are intermingled with heat treatment operations. Solution heat treatment operations are performed to improve the mechanical properties of the metal, followed by annealing to soften the work-hardened aluminum alloys and to stabilize metal properties. This facility utilizes wet furnace scrubbers to treat off-gases of annealing furnace fuels for the high sulfide levels of the fuels. After annealing, the aluminum alloy products are passed through vapor degreasing units to remove residual lubricants. Finally, the alloys undergo chemical brightening of product surfaces.

A process diagram of this facility is provided in Figure 5-1. No major operational changes have occurred during the past five years nor are any planned for the future. The Control Authority must first determine the appropriate daily average production rates (for each industrial process) before calculating equivalent mass or concentration limits that could be issued to this facility in a 5-year discharge permit.

To make such a determination, the following sequence of steps has been used to complete this example. For additional explanation of other methods that could be used to determine appropriate production rates, the Control Authority should refer to the Guidance Manual for the Use of Production-Based Standards and the Combined Wastestream Formula.

Assume for the purpose of this example, that the Control Authority has obtained actual monthly plant production data by each forming operation for the past 5 years and these data have already been converted to measures of off-kg of aluminum alloy processed. A representative long-term average daily production rate is then determined for each regulated forming operation conducted at the facility as outlined in the steps below.

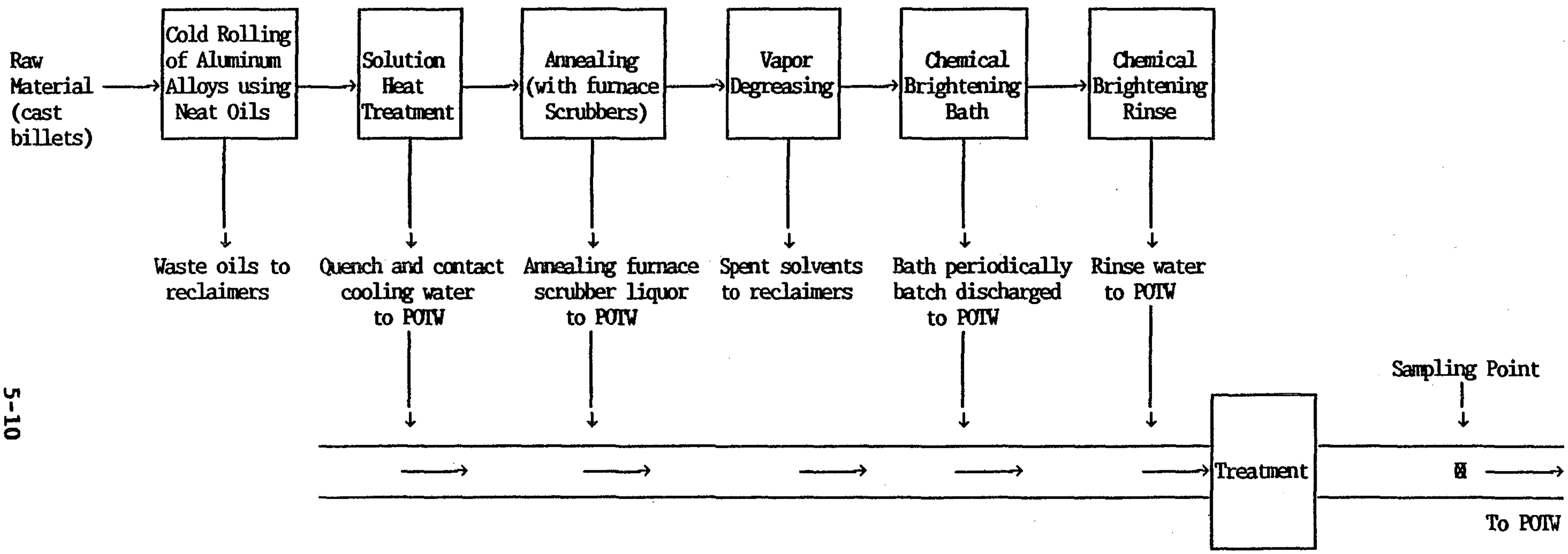


FIGURE 5-1. ALUMINUM FORMING FACILITY PROCESS DIAGRAM

Step 1 - An average monthly production rate should be calculated for the entire year as shown below using the 1982 production data shown in Table 5-1.

$$\text{Average Monthly Production Rate} = \frac{\text{Annual Production Rate}}{\text{Operating Months in Year}} = \frac{1{,}014{,}000 \text{ off-kg/yr}}{12 \text{ mo/yr}}$$

$$= 84{,}500 \text{ off-kg/mo}$$

Step 2 - The average monthly production rate calculated for the year should then be independently compared with each monthly production value of the year to determine a positive or negative percent difference from the average monthly production rate. This step is illustrated in Table 5-1 and shown below.

$$\text{Percent Difference from Average Monthly Production Rate} = \left(\frac{\text{Monthly Rate} - \text{Average Monthly Rate}}{\text{Average Monthly Rate}}\right) \times 100\%$$

$$= \left(\frac{81{,}000 \text{ off-kg/mo} - 84{,}500 \text{ off-kg/mo}}{84{,}500 \text{ off-kg/mo}}\right) \times 100\%$$

$$= -4.1\%$$

The percent difference from the average monthly production rate will provide an indication of the representativeness of the monthly values and should alert the Control Authority to question the industrial user about possible process changes or about nonrepresentative production conditions.

Step 3 - Calculated percent differences from the average monthly rate should be reviewed and nonrepresentative monthly production rates (indicated by percent differences that are substantially out of line with those of other months) should be excluded from further consideration. Note in Table 5-1 the production data for December is significant higher (27.8 percent) than the average monthly production rate for the entire year and after consultation with the industrial user is determined to not be typical of normal production.

TABLE 5-1. CALCULATION OF THE 1982 REPRESENTATIVE MONTHLY PRODUCTION RATE FOR THE COLD ROLLING WITH NEAT OILS ALUMINUM FORMING OPERATION

Month	Monthly Production Rate (off-kg/mo)	Average Monthly Production Rate (off-kg/mo)	Difference from Average (%)	Representative Monthly Production Rate (off-kg/mo)
January	81,000		-4.1	
February	76,000		-10.1	
March	83,000		-1.8	
April	91,000		+7.7	
May	93,000		+10.1	
June	87,000	84,500	+3.0	93,000
July	84,000		-0.6	
August	82,000		-3.0	
September	78,000		-7.7	
October	75,000		-11.2	
November	76,000		-10.1	
December	108,000		+27.8[1]	
	1,014,000			

[1]Data discarded as determined to be nonrepresentative.

Thereafter, the highest monthly production rate should be chosen as the representative monthly production rate (May - 93,000 off-kg/mo.). Selection of the highest representative monthly production rate will account for nonsignificant (less than 20 percent) increases in production anticipated during the life of the permit or control mechanism.

Step 4 - After selecting representative monthly production rates for <u>each</u> of the five years, an average of the values is calculated as shown below and in Table 5-2. This average value using the representative monthly production rate is referred to as the long-term average Monthly Production Rate.

$$\text{Long-term Average Monthly Production Rate} = \frac{\Sigma\ (\text{Representative Monthly Production Rates})}{\text{Number of Representative Monthly Production Rates}}$$

$$= \frac{(93{,}000 + 82{,}000 + 94{,}000 + 86{,}000 + 90{,}000)}{5}$$

$$= 89{,}000 \text{ off-kg/mo.}$$

Step 5 - The Control Authority should calculate the percent difference between the long-term average monthly production rate and the representative monthly production rates. Significant differences should again alert the Control Authority to question the individual user as to process changes or other nonrepresentative conditions. The Control Authority may exclude a monthly production rate if this rate is significantly higher or lower than the average and determined to be atypical of process conditions.

Step 6 - The representative long-term average monthly production rate should be divided by the average number of production days per month (in this example, it was assumed to be 20 production days per month) to calculate a long-term average daily production rate as illustrated below.

$$\text{Long-term Average Daily Production Rate} = \frac{\text{Representative Long-term Monthly Production Rate}}{\text{Average Number of Production Days Per Month}}$$

$$= \frac{89{,}000 \text{ off-kg/mo}}{20 \text{ days/mo}} = 4{,}450 \text{ off-kg/day}$$

TABLE 5-2. CALCULATION OF LONG-TERM AVERAGE PRODUCTION RATE FOR AN ALUMINUM FORMING FACILITY

Aluminum Forming Operation	Year(s)	Representative Monthly Production Rate (off-kg/mo)	Long-Term Average Monthly Production Rate (off-kg/mo)	Difference from Average (%)	Representative Long-Term Average Monthly Production Rate (off-kg/mo)	Long-Term Average Daily Production Rate (off-kg/day)
Cold Rolling with Neat Oils (off-kg aluminum alloy rolled)	1982	93,000		+4.5		
	1983	82,000		-7.9		
	1984	94,000	89,000	+5.6	89,000	4,450
	1985	86,000		-3.4		
	1986	90,000		+1.1		
Solution Heat Treatment (off-kg aluminum alloy annealed)	1982-1986	Data not Shown	78,500		78,500	3,925
Annealing (off-kg aluminum alloy annealed)	1982-1986	Data not Shown	59,500		59,500	2,975
Vapor Degreasing (off-kg aluminum alloy degreased)	1982-1986	Data not Shown	59,500		29,800	1,490
Chemical Brightening Bath (off-kg aluminum alloy brightened)	1982-1986	Data not Shown	29,800		44,500	2,225
Chemical Brightening Rinse (off-kg aluminum alloy brightened)	1982-1986	Data not Shown	44,500		44,500	2,225

In some instances, the number of operating days and the corresponding production rates may vary significantly from month to month although the average daily production rate per operating day may or may not vary considerably. Under these circumstances, the monthly average daily production rate should be calculated prior to Steps 1 through 5 for each month as shown below.

$$\text{Monthly Average Daily Production Rate} = \frac{\text{Monthly Production Rate}}{\text{Operating Day in Month}}$$

$$= \frac{\text{Production Rate}}{\text{Operating Day}}$$

All other calculations remain the same except that all monthly values have been adjusted to daily values prior to Step 6 (Step 6 is no longer necessary).

The average daily production rates calculated would now be applied by the Control Authority during development of equivalent mass and equivalent concentration limits for regulated core and ancillary aluminum forming operations.

<u>Example 5-2</u>

An industrial facility obtains pure copper ingots from a primary copper refinery to use in the production of brass wire. The copper ingots are remelted and molten zinc is added to produce brass, an alloy of copper. The alloy is cast and cooled into billets using direct chill casting methods [i.e., molten brass is poured into a mold and allowed to solidify with the aid of noncontact cooling water that circulates within the mold. As the solidified billet emerges from the mold, it is sprayed or quenched with contact cooling water, then immersed in a tank of water for further cooling. The mold noncontact cooling water is recycled with some blowdown (bleeding discharge) to the POTW]. The brass billets are sawed and thereafter extruded into rods. The rods are solution heat treated, then drawn into brass wire. The wire is cleaned to remove oils and other residues using an alkaline cleaning solution, then rinsed several times. The wire is annealed then quenched (cooled) in an oil-water mixture to remove the effects previously induced by solution heat treatment of the brass rod prior to drawing. Finally, the brass wire is pickled to remove surface oxides then rinsed.

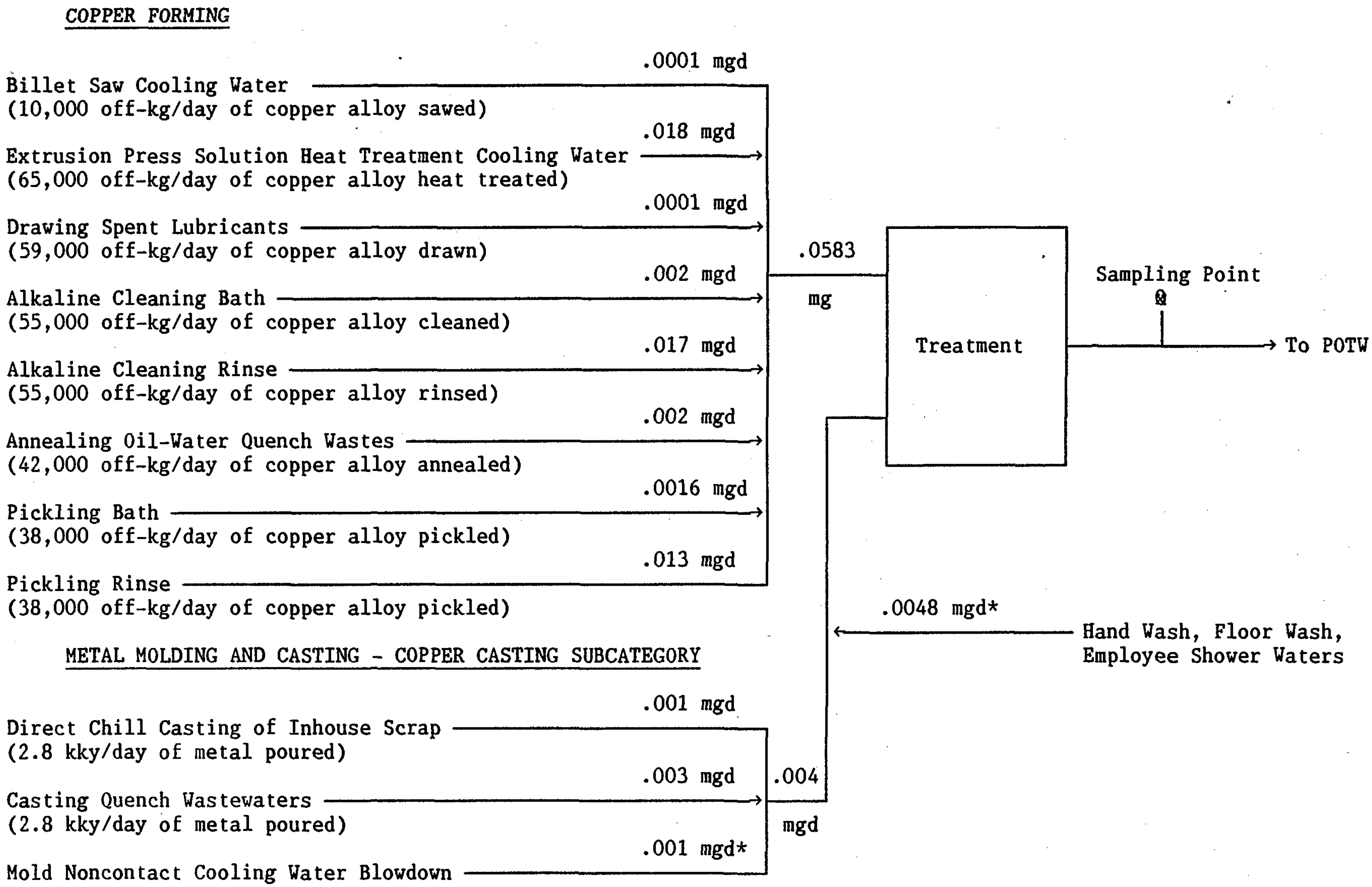
Regulated process wastewaters discharged by this facility include the following:

- Direct chill casting contact cooling waters
- Casting quench wastewaters
- Extrusion press solution heat treatment (quench) wastewaters
- Spent drawing lubricants
- Spent alkaline cleaning baths (periodically batch discharged and replaced)
- Alkaline cleaning rinse wastewaters
- Spent annealing oil-water quench mixtures (periodically batch discharged and replaced)
- Spent pickling baths (periodic bleed discharges from the baths to reduce contaminant levels)
- Pickling rinse wastewaters
- Billet saw cooling water[1].

A process flow diagram of this facility's operations including representative production levels has been provided in Figure 5-2. As illustrated by the diagram, hand wash, floor wash, and employee shower waters are combined with regulated casting and forming process wastestreams prior to treatment. Using the information provided, daily maximum and monthly average discharge allowances must be calculated for each regulated pollutant as the first step to deriving equivalent limits. Due to the fact that regulated, unregulated and dilution wastestreams are combined prior to treatment, the combined wastestream formula must be used to adjust the discharge allowances previously calculated. Finally, the Control Authority would need to convert the adjusted daily and monthly discharge allowances to equivalent mass or equivalent concentration limits by multiplying the calculated discharge allowances by the appropriate categorical pretreatment standards. In this case, the Control Authority has chosen to apply equivalent mass limits to the industrial user.

Step 1 - A process diagram of the facility should be developed. This step has been completed in this example as illustrated in Figure 5-2. The process diagram should identify all regulated process wastestreams as well as all other wastestreams that are combined prior to treatment. In this example this facility has wastestreams regulated by two different categorical pretreatment regulations: copper forming and metal molding and casting, copper casting subcategory. The Control Authority will also need to gather production rates and discharge flow data for <u>each</u> regulated category or subcategory wastestream.

[1]The miscellaneous wastestreams applies when any or all of the following operations are performed: hydrotesting, sawing, surface milling and maintenance.



*Dilution

FIGURE 5-2. PROCESS FLOW DIAGRAM OF A COPPER CASTING AND FORMING FACILITY

Step 2 - Develop a table (as illustrated in Tables 5-3 and 5-4 for this example) for each regulated industrial category (e.g., copper forming, metal molding and casting) which identifies applicable regulated process segments, appropriate production values, all regulated pollutants, and the corresponding categorical discharge standards, and which provides space for the mass discharge allowances to be calculated. Note that adjusted discharge allowances are only calculated for copper and chromium for the regulated wastestreams in Table 5-4. This was done strictly to shorten the example. A list of regulated pollutants is included in the footnotes under the appropriate category.

Step 3 - Determine discharge allowances for all regulated pollutants by multiplying the appropriate production values by the applicable daily maximum and monthly average categorical standards. Discharge allowances should be calculated for pollutants regulated by all applicable industrial categories and subcategories. Categorical pretreatment standards for copper forming processes of existing sources (PSES) can be found in Appendix C-3 of this manual, which summarizes the standards established in 40 CFR Part 468. Pretreatment standards for use in calculating allowable mass loadings and equivalent limits for copper casting operations are loadings and equivalent limits for copper casting operations are established in the metal molding and casting categorical standards (40 CFR Part 464) (refer to Federal Register, Vol. 50, October 30, 1985). Note that oil and grease is an alternative standard to monitoring for and complying with total toxic organics in both the copper forming and metal molding and casting categories.

During this calculation, the Control Authority must verify that all units of production correspond with those established in the categorical standard and make changes if needed. For example, to calculate mass discharge allowances for this facility's copper casting operations, the facility's production data must be converted from units of kkg/day to 1,000 kkg/day (by dividing each production value by 1,000) to correspond with categorical standards--established units of kg of pollutant/1,000 kkg of copper aloy poured. A second example would have been illustrated if, as part of the casting operations, this facility were to have employed dust collection scrubber operations. Pretreatment standards for dust collection scrubber operations

TABLE 5-3. ALLOWABLE MASS LOADINGS FROM OPERATIONS REGULATED BY METAL MOLDING AND CASTING CATEGORICAL PRETREATMENT STANDARDS - COPPER CASTING SUBCATEGORY

Regulated Wastestream (Regulated Pollutants)[2]	Production (1,000 kkg/day of Metal Poured)	Sample Pollutant	Categorical Limit[1] Daily Maximum and Monthly Average (kg/1,000 kkg)	Discharge Allowance: Daily Maximum (kg/day)	Discharge Allowance: Monthly Average (kg/day)	Adjusted Discharge Allowance: Daily Maximum (mg/day)	Adjusted Discharge Allowance: Monthly Average (mg/day)
Direct Chill Casting Operations	0.0028	Cu	0.928	0.00260		2,600	
			0.506		0.00142		1,420
Casting Quench Operations	0.0028	Cu	0.0307	0.000086		86	
			0.0168		0.00005		50
Totals		Cu		0.002686		2,686	
					0.00147		1,470

[1]Pretreatment standards for existing sources (PSES) for the metal molding and casting category, copper casting subcategory (40 CFR Part 464).

[2]Regulated parameters are Cu, Pb, Zn for direct chill casting operations and Cu, Pb, Zn, TTO, and oil and grease[4] for casting quench operations.

[3]No pretreatment standards have been established for TTO and oil and grease for direct chill casting operations.

[4]Oil and grease (O&G) is an alternative standard to monitoring for and complying with total toxic organics (TTO).

TABLE 5-4. ALLOWABLE MASS LOADINGS FROM OPERATIONS REGULATED BY COPPER FORMING CATEGORICAL PRETREATMENT STANDARDS

Regulated Wastestream (Regulated Pollutants)[2]	Production	Sample Pollutant	Categorical Limit[1] Daily Max. and Monthly Average (mg/off-kg)	Discharge Allowance Daily Max. (mg/day)	Discharge Allowance Monthly Average (mg/day)
Extrusion Press Solution Heat Treatment	65,000 off-kg/day of copper alloy heat treated on an extrusion press	Cr	0.00088	57	
			0.00036		23
		Cu	0.0030	195	130
			0.0020		
Drawing Spent Lubricant	59,000 off-kg/day of copper alloy drawn	Cr	0.037	2,183	
			0.015		885
		Cu	0.161	9,499	
			0.085		5,015
Alkaline Cleaning Bath	55,000 off-kg/day of copper alloy alkaline cleaned	Cr	0.020	1,100	
			0.0084		462
		Cu	0.088	4,840	
			0.046		2,530
Alkaline Cleaning Rinse	55,000 off-kg/day of copper alloy alkaline cleaned	Cr	1.854	101,970	
			0.758		41,690
		Cu	8.006	440,330	
			4.214		231,770
Annealing With Oil[3]	42,000 off-kg/day of copper alloy annealed with oil	Cr	0	0	
			0		0
		Cu	0	0	
			0		0

TABLE 5-4. ALLOWABLE MASS LOADINGS FROM OPERATIONS REGULATED BY COPPER FORMING CATEGORICAL PRETREATMENT STANDARDS (Continued)

Regulated Wastestream (Regulated Pollutants)	Production	Sample Pollutant	Categorical Limit[1] Daily Max. and Monthly Average (mg/off-kg)	Discharge Allowance Daily Max. (mg/day)	Discharge Allowance Monthly Average (mg/day)
Pickling Bath	38,000 off-kg/day of copper alloy pickled	Cr	0.051	1,938	
			0.020		760
		Cu	0.220	8,360	
			0.116		4,408
Pickling Rinse	38,000 off-kg/day of copper alloy pickled	Cr	0.574	21,812	
			0.235		8,930
		Cu	2.481	94,278	
			1.306		49,628
Miscellaneous Wastestreams (Billet saw cooling water)	10,000 off-kg/day of copper alloy sawed	Cr	0.009	90	30
			0.003	410	210
		Cu	0.041		
			0.021		
Totals		Cr		129,410	
					52,780
		Cu		557,912	
					293,691

[1]*Pretreatment standards for existing sources (PSES) for the copper forming category (40 CFR Part 468).*

[2]Regulated parameters are Cr, Cu, Pb, Ni, Zn, TTO, and oil and grease.[4]

[3]Zero discharge standards have been established for annealing with oil wastestreams under the copper forming categorical pretreatment standards. This means that no pollutant discharge allowance for the regulated pollutant can be established by the Control Authority although a flow discharge may be allowed.

[4]Oil and grease (O&G) is an alternative standard to monitoring for and complying with total toxic organics (TTO).

established in the metal molding and casting operations are based upon the volume of air scrubbed (kilograms of pollutant per 62.3 billion standard cubic meters or pounds of pollutant per billion standard cubic feet of air scrubbed).

Note that no categorical standards have been established for chromium, nickel, total toxic organics (TTO) or oil and grease (O&G) in the direct chill casting operations of the copper casting subcategory of the metal molding and casting regulation. Also note that zero allowance standards have been established for all pollutants regulated in the copper forming annealing with oil process. This means that no discharge allowance for pollutants is allowed although a flow discharge may be allowed. Calculation of mass discharge allowances is illustrated below.

Pollutant discharge allowance = average production rate x pollutant limit

Metal molding and casting - direct chill casting of copper alloy (pollutant: copper)

$$\text{Daily maximum (Cu)} = \frac{2.8 \text{ kkg/day}}{1{,}000} \times 0.928 \text{ kg/1,000 kkg}$$

$$= 0.0026 \text{ kg/day}$$

Copper forming - extrusion press solution heat treatment (pollutant: chromium)

$$\text{Daily maximum (Cr)} = 65{,}000 \text{ off-kg/day} \times 0.00088 \text{ mg/off-kg}$$

$$= 57.2 \text{ mg/day}$$

Step 4 - Individually sum the daily maximum and monthly average mass allowances for each pollutant within each category to derive total daily maximum and monthly average mass discharge allowances for each regulated category (see Tables 5-3 and 5-4).

Step 5 - Make a distinction (possibly with the aid of a format such as that used in Table 5-5) between all regulated, unregulated, and dilution wastestreams discharged by this facility. The flows of all wastestreams should be summarized to facilitate calculation of alternative or equivalent

TABLE 5-5. CHARACTERIZATION OF WASTEWATER FLOWS FROM A COPPER CASTING AND FORMING FACILITY

Wastestream	Flow (MGD)	Flow[1] (l/day)
Regulated Wastestreams (Metal Molding and Casting)		
Direct Chill Casting Operations*	0.001	3,785
Casting Quench Operations	0.003	11,355
Total	0.004	15,140
(Copper Forming)		
Extrusion Press Solution Heat Treatment	0.018	68,130
Drawing Spent Lubricants	0.0001	378.5
Alkaline Cleaning Bath	0.002	7,570
Alkaline Cleaning Rinse	0.017	64,345
Annealing With Oil	0.002	7,570
Pickling Bath	0.0016	6,056
Pickling Rinse	0.013	49,205
Billet Saw Cooling Water	0.0001	378.5
Total	0.0538	203,633.0
Dilution Wastestreams		
Hand Wash, Floor Wash, and Employee Shower Waters	0.0048	18,168
Mold Noncontact Cooling Water Blowdown	0.001	3,785
Total	0.0058	21,953

[1]Wastestream flows converted from million gallons per day (MGD) to liters per day (l/day) using the conversion factor 3.785×10^6 l/MGD.

*Note that for Cr, Ni, TTO, and oil and grease this wastestream is considered an unregulated wastestream.

mass limits. Derive cumulative total flows from all regulated, unregulated, and dilution wastestreams which are combined prior to treatment.

Step 6 - Using the total flows presented in Table 5-5 and the allowable mass loadings presented in Table 5-3 and 5-4, derive alternative daily maximum and monthly average mass-based limits for all regulated pollutants using the combined wastestream formula for calculating alternative mass limits (Table 4-1, Formula 2). Calculation of these limits is illustrated in the examples below for the pollutants, copper and chromium.

<u>Alternative mass limit formula</u>:

$$M_{cwf} = \Sigma M_i \times \left[\frac{(F_t - F_d)}{\Sigma F_i}\right]$$

<u>Daily maximum (copper)</u>:

$$M_{cu} = (2,686 \text{ mg/day} + 557,912 \text{ mg/day}) \times \left[\frac{(15,140 \text{ l/day} + 203,633 \text{ l/day} + 21,953 \text{ l/day} - 21,953 \text{ l/day})}{(15,140 \text{ l/day} + 203,633 \text{ l/day})}\right]$$

$$M_{cu} = 560,598 \text{ mg/day} \times \left[\frac{(218,733 \text{ l/day})}{(218,773 \text{ l/day})}\right]$$

$$M_{cu} = 560,598 \text{ mg/day}$$

<u>Monthly average (copper)</u>:

$$M_{cu} = (1,470 \text{ mg/day} + 293,691 \text{ mg/day}) \times \left[\frac{(15,140 \text{ l/day} + 203,633 \text{ l/day} + 21,953 \text{ l/day} - 21,953 \text{ l/day})}{(15,140 \text{ l/day} + 203,633 \text{ l/day})}\right]$$

$$M_{cu} = 295,161 \text{ mg/day} \times \left[\frac{(218,733 \text{ l/day})}{(218,773 \text{ l/day})}\right]$$

$$M_{cu} = 295,161 \text{ mg/day}$$

Daily maximum (chromium):

$$M_{cr} = (129{,}060 \text{ mg/day}) \times \left[\frac{15{,}140 \text{ l/day} + 203{,}633 \text{ l/day} + 21{,}953 \text{ l/day} - 21{,}953 \text{ l day})}{203{,}633 \text{ l/day}}\right]$$

$$M_{cr} = 129{,}410 \text{ mg/day} \times \left[\frac{(218{,}733 \text{ l/day})}{(203{,}633 \text{ l/day})}\right]$$

$$M_{cr} = 139{,}006.1 \text{ mg/day}$$

Monthly average (chromium):

$$M_{cr} = 52{,}780 \text{ mg/day}) \times \left[\frac{(15{,}140 \text{ l/day} + 203{,}633 \text{ l/day} + 21{,}953 \text{ l/day} - 21{,}953 \text{ l/day})}{203{,}633 \text{ l/day}}\right]$$

$$M_{cr} = 52{,}780 \text{ mg/day} \times \left[\frac{(218{,}733 \text{ l/day})}{(203{,}633 \text{ l/day})}\right]$$

$$M_{cr} = 56{,}693.8 \text{ mg/day}$$

These calculations must be performed for all pollutants regulated by the categorical pretreatment standards for metal molding and casting and for copper forming to which this facility is subject. Remember, however, during the calculations of alternative mass limits for chromium (and nickel), that wastestreams discharged from casting and associated quench operations are not considered regulated for chromium (or nickel) as these pollutants are not regulated by the metal molding and casting categorical pretreatment standards. Calculations of alternative or equivalent limits must be made on a pollutant by pollutant basis taking into consideration whether particular process or category wastestreams are regulated for each of the pollutants of concern. For example, although TTO and oil and grease are regulated pollutants under both the copper forming and metal molding and casting categories, wastewater discharges from the direct chill casting operation should not be considered regulated because standards for TTO and oil and grease have not been established for that process wastestream. Table 5-6 contains alternative mass limits calculated for the pollutants of concern to this problem.

TABLE 5-6. ALTERNATIVE MASS-BASED DISCHARGE LIMITS FOR A COPPER CASTING AND FORMING FACILITY

Regulated Pollutant	Daily Maximum Limits (mg/day)	Monthly Average Limits (mg/day)
Chromium (Cr)	139,006	56,694
Copper (Cu)	560,598	285,161
Lead (Pb)	45,807	39,001
Nickel (Ni)	605,488	400,444
Zinc (Zn)	431,356	180,014
Total Toxic Organics (TTO)	187,611	98,011
Oil & Grease (O&G)	5,776,228	3,586,973

Step 7 (Optional) - should the Control Authority desire, the alternative mass discharge limits calculated in the previous step may be converted to equivalent concentration limits by dividing the alternative mass limit by the industrial facility's total average discharge flow.

Problem 5-3

An industrial facility manufactures lead-tin solder and lead piping (as illustrated in Figure 5-3). Lead and tin billets are melted and cast into solder billets in a semi-continuous casting operation. After casting, the solder billets are extruded, degreased and cleaned. In a separate process, lead billets are extruded into thick-walled piping [e.g., 2" inside diameter (I.D.), 2 1/2" outside diameter (O.D.)]. Some of the thick-walled piping is finished and sold. The remainder of the piping is swaged and drawn into thinner-walled piping (e.g., 2 1/4" I.D., 2 1/2" O.D.).

All wastewater discharges from this facility are shown in the process diagram in Figure 5-3. All discharges entering the treatment system are regulated under the standards promulgated in Subpart A of the nonferrous metals forming and metal powders categorical pretreatment standards. All of the facility's process wastewater discharges except one, a noncontact cooling water wastestream, are combined prior to treatment. The noncontact cooling water wastestream is combined with wastewaters exiting the treatment unit prior to the monitoring location. Representative production data for this industrial facility are provided in Figure 5-3. Using the data provided, the Control Authority will need to first calculate daily maximum and monthly average discharge allowances for each regulated pollutant. Next, the Control Authority will need to use the flow-weighted averaging formula to account for the addition of the unregulated wastestream. Finally, equivalent concentration limits for the discharges from this facility can be calculated.

Step 1 - Develop a table that facilitates the calculation of daily maximum and monthly average discharge allowances for each regulated pollutant of all regulated wastestreams entering the treatment system. The table should identify each regulated wastestream, production data used to calculate each wastestream's mass discharge allowance, the pollutants regulated and their corresponding categorical discharge standards, and the mass discharge allowances calculated (see Table 5-7).

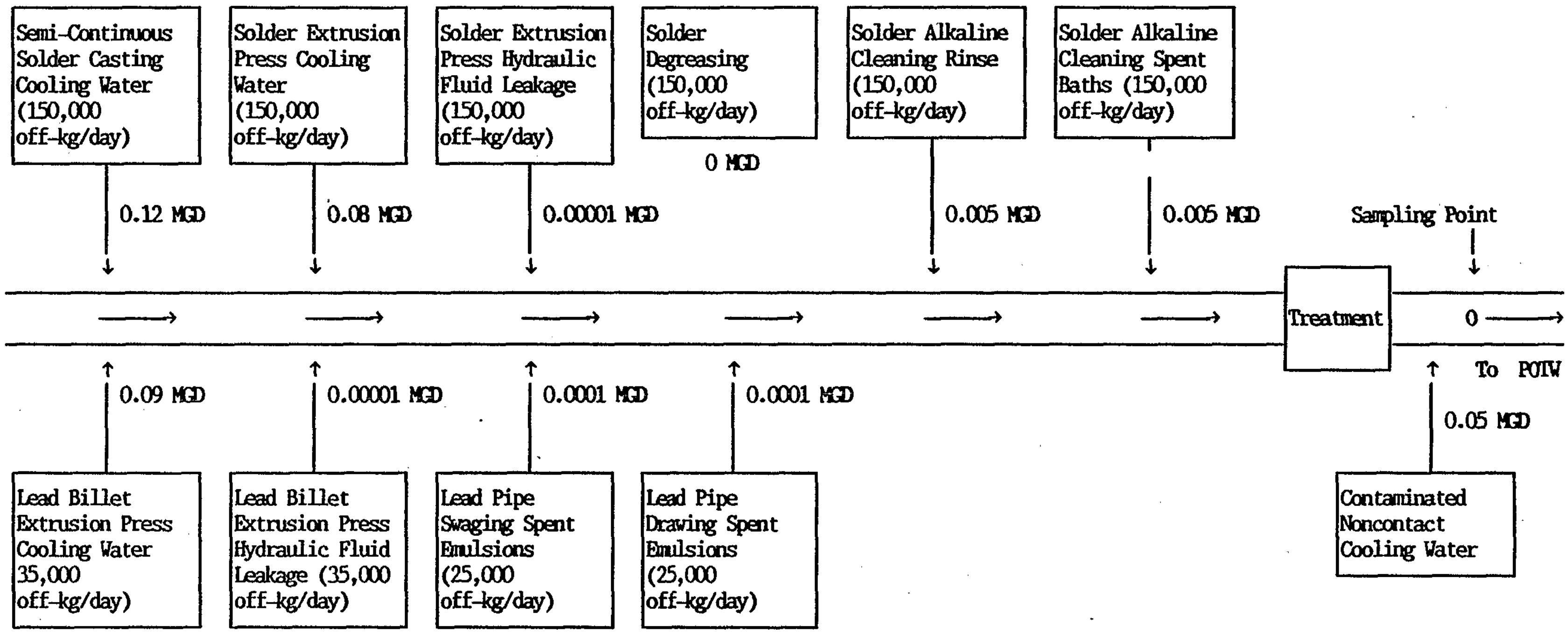


FIGURE 5-3. PROCESS FLOW DIAGRAM FOR A LEAD PIPE FORMING FACILITY

TABLE 5-7. ALLOWABLE MASS LOADINGS FROM PROCESS OPERATIONS REGULATED BY NONFERROUS METALS FORMING AND METAL POWDERS CATEGORICAL STANDARDS – LEAD-TIN-BISMUTH SUBCATEGORY

Regulated Wastestream	Production Rate (off-kg*/day)	Pollutant	Limit[1] Daily Maximum Monthly Average (mg/off-kg*)	Discharge Allowance (mg/day) Sb Daily Maximum	Sb Monthly Average	Pb Daily Maximum	Pb Monthly Average
Semi-continuous Solder Casting Cooling Water (*of lead-tin solder cast by semi-continuous strip method)	150,000	Sb	0.009	1,350			
			0.004		600		
		Pb	0.001			150	
			0.0006				90
Solder Extrusion Press Cooling Water (*of lead-tin solder heat treated)	150,000	Sb	0.414	62,100			
			0.185		27,750		
		Pb	0.061			9,150	
			0.029				4,350
Solder Extrusion Press Hydraulic Fluid Leakage (*of lead-tin solder-extruded)	150,000	Sb	0.158	23,700			
			0.071		10,650		
		Pb	0.023			3,450	
			0.011				1,650
Solder Degreasing	150,000	Sb	0[2]	0			
			0		0		
		Pb	0[2]			0	
			0				0
Solder Alkaline Cleaning Rinse (*of lead-tin solder alkaline cleaned)	150,000	Sb	0.678	101,700			
			0.302		45,300		
		Pb	0.099			14,850	
			0.047				7,050
Solder Alkaline Cleaning Spent Bath (*of lead-tin solder alkaline cleaned)	150,000	Sb	0.345	51,750			
			0.154		23,100		
		Pb	0.051			7,650	
			0.024				3,600
Lead Billet Extrusion Press Cooling Water (*of lead heat treated)	35,000	Sb	0.414	14,490			
			0.185		6,475		
		Pb	0.061			2,135	
			0.029				1,015

TABLE 5-7. ALLOWABLE MASS LOADINGS FROM PROCESS OPERATIONS REGULATED BY NONFERROUS METALS FORMING AND METAL POWDERS CATEGORICAL STANDARDS - LEAD-TIN-BISMUTH SUBCATEGORY (Continued)

Regulated Wastestream	Production Rate (off-kg*/day)	Pollutant	Limit[1] Daily Maximum Monthly Average (mg/off-kg*)	Discharge Allowance (mg/day) Sb Daily Maximum	Sb Monthly Average	Pb Daily Maximum	Pb Monthly Average
Lead Billet	35,000	Sb	0.158	5,530			
Extrusion Press			0.071		2,485		
Hydraulic Fluid		Pb	0.023			805	
Leakage			0.011				385
(*of lead extruded)							
Lead Pipe	25,000	Sb	0.005	125			
Swaging Spent			0.002		50		
Emulsions		Pb	0.0008			20	
(*of lead swaged			0.0004				10
with emulsions)							
Lead Pipe	25,000	Sb	0.076	1,900			
Drawing Spent			0.034		850		
Emulsions		Pb	0.011			275	
(*of lead drawn			0.005				125
with emulsions)							
TOTAL				262,645	117,260	38,485	18,275

[1]Pretreatment standards for existing sources (PSES) for nonferrous metals forming and metal powders, subpart A - lead/tin/bismuth forming subcategory (40 CFR Part 471).

[2]No discharge of process wastewater pollutants is allowed from degreasing wastestreams. Any discharge of wastewater from this process operation is a violation of the regulation.

Step 2 - Calculate pollutant discharge allowances by multiplying the appropriate production values (expressed in mg/off-kg) by the daily maximum and monthly average standards (from Appendix C-5) for each regulated wastestream, as illustrated below for antimony for the semi-continuous solder casting wastestream.

Pollutant discharge allowance = production rate x pollutant limit

Daily maximum (Sb) = 150,000 off-kg/day x 0.009 mg/off-kg
= 1,350 mg/day

Monthly average (Sb) = 150,000 off-kg/day x 0.004 mg/off-kg
= 600 mg/day

Note that the solder degreasing operation should not receive a discharge allowance. Although wastewaters are received from this operation, the categorical standards for the lead-tin-bismuth subpart state "no discharge of process wastewater pollutants" from this operation.

Step 3 - Sum the daily maximum and monthly average mass allowances individually to derive total daily maximum and monthly average mass discharge allowances for each regulated pollutant.

Step 4 - Using the total daily maximum and monthly average mass limits above and the flow-weighted averaging formula provided in Table 4-2 (Formula 2), calculate alternative daily maximum and monthly average mass discharge limits to account for pollutants occurring in the contaminated noncontact cooling water discharged after treatment. Assume that the results of monitoring conducted by the industrial user indicate that an average of 215 mg/day of antimony and 145 mg/day of lead are discharged as contaminants in the noncontact cooling water.

$M_{fwa} = M_{cwf} + M_{noncontact}$

Daily Maximum (Antimony)

$M_{fwa} = 262,645 + 215 = 262,860$ mg/day

Monthly Average (Antimony)

$M_{fwa} = 117,260 + 215 = 117,475$ mg/day

Daily Maximum (Lead)

$M_{fwa} = 38,485 + 145 = 38,630$ mg/day

Monthly Average (Lead)

$M_{fwa} = 18,275 + 145 = 18,420$ mg/day

Step 5 - Finally, to convert the adjusted alternative mass discharge limits to concentration limits, divide the alternative mass limits by the total facility discharge flow including the flow from the noncontact cooling wastestream.

$$\text{Total facility discharge} = \text{total flow to treatment} + \text{flow of noncontact cooling wastestream}$$

$$= 0.30022 \text{ MGD} + 0.05 \text{ MGD} = 0.35022 \text{ MGD}$$

$$\text{Equivalent concentration limit} = \frac{\text{alternative mass limit}}{\text{total plant discharge x conversion factor}}$$

<u>Daily Maximum (Antimony)</u>

$$C_{Sb} = \frac{262{,}860 \text{ mg/day}}{0.35022 \text{ MGD} \times 3.7854 \times 10^6 \ \frac{\text{l/day}}{\text{MGD}}}$$

$$= 0.198 \text{ mg/l}$$

<u>Monthly Average (Antimony)</u>

$$C_{Sb} = \frac{117{,}475 \text{ mg/day}}{0.35022 \text{ MGD} \times 3.7854 \times 10^6 \ \frac{\text{l/day}}{\text{MGD}}}$$

$$= 0.089 \text{ mg/l}$$

<u>Daily Maximum (Lead)</u>

$$C_{Pb} = \frac{38{,}630 \text{ mg/day}}{0.35022 \text{ MGD} \times 3.7854 \times 10^6 \ \frac{\text{l/day}}{\text{MGD}}}$$

$$= 0.029 \text{ mg/l}$$

<u>Monthly Average (Lead)</u>

$$C_{Pb} = \frac{18{,}420 \text{ mg/day}}{0.35022 \text{ MGD} \times 3.7854 \times 10^6 \ \frac{\text{l/day}}{\text{MGD}}}$$

$$= 0.014 \text{ mg/l}$$

After developing equivalent concentration limits, the Control Authority must verify that the limits calculated for each pollutant are within the detection range of the analytical methods used by both the Control Authority's and industrial user's in-house or contract laboratory.

APPENDIX A

REFERENCES

REFERENCES

Aluminum Forming - 40 CFR Part 467	Federal Register Notice	
Proposed Rule	11/22/82	47 FR 52626
Final Rule	10/24/83	48 FR 49126
Final Rule, Technical Correction	03/27/84	49 FR 11629
Final Rule, Technical Amendment	01/31/85	50 FR 4513
Proposed Rule, Amendments	03/19/86	51 FR 9618
Final Rule	12/27/88	53 FR 52366

Copper Forming - 40 CFR Part 468

Proposed Rule	11/12/82	47 FR 51278
Final Rule	08/15/83	48 FR 36942
Final Rule, Technical Amendment	09/15/83	48 FR 41409
Final Rule, Technical Correction	11/03/83	48 FR 50717
Proposed Rule, Modifications to Final Rule	06/24/85	50 FR 26128
Amendment	08/23/85	50 FR 34334
Final Rule	03/05/86	51 FR 7568
Final Rule, Technical Correction	06/20/86	51 FR 22520

Metal Molding and Casting - 40 CFR Part 464

Proposed Rule	11/15/82	47 FR 51512
Final Rule	10/30/85	50 FR 45212
Correction	06/16/86	51 FR 21760

Nonferrous Metals Forming - 40 CFR Part 471

Proposed Rule	03/05/84	49 FR 8112
Final Rule	08/23/85	50 FR 34242
Final Rule, Technical Correction	01/22/86	51 FR 2884
Proposed Regulations, Amendments	06/09/88	53 FR 21774

General Pretreatment Regulations - 40 CFR Part 403

Proposed Rule	10/29/79	44 FR 62260
Final Rule	1/28/81	46 FR 9404
Deferral of Effective Dates	4/2/81	46 FR 19936
Final Rule	10/13/81	46 FR 50502
Final Rule; Postponement of Effective Date	2/1/82	47 FR 4518
Correction	2/5/82	47 FR 5413
Final Rule	9/28/82	47 FR 42688
Final Rule, Deadline Change	1/21/83	48 FR 2774
Denial of Petitions	6/3/83	48 FR 24933
Final Rule	2/10/84	49 FR 5131
Final Regulation	5/17/84	49 FR 21024
Final Rule	7/10/84	49 FR 28058

General Pretreatment Regulations - 40 CFR Part 403 (Continued)	Federal Register Notice	
Final Rule, Removal Credits	8/3/84	49 FR 31212
Final Rule	9/25/85	50 FR 38809
Final Rule	4/30/86	51 FR 16028
Final Rule, Technical Amendment	6/4/86	51 FR 20426
Correction	6/9/86	51 FR 20828
Proposed Rule	6/12/86	51 FR 21454
Final Rule, Correction	7/1/86	51 FR 23759
Extension of Comment Period	8/21/86	51 FR 29950
Final Rule, Appendix D Revision	10/9/86	51 FR 36368
Final Rule, Definition of Interference and Pass Through	1/14/87	52 FR 1586

Development Document for Effluent Limitations Guidelines and Standards for the Aluminum Forming Point Source Category. June 1984. EPA 440/1-84/073 NTIS: Vol. I: PB84-244425, Vol. II: PB84-244433

Development Document for Effluent Limitations Guidelines and Standards for the Copper Forming Point Source Category. March 1984. EPA 440/1-84/074 NTIS: PB84-292459

Development Document for Effluent Limitations Guidelines and Standards for the Nonferrous Metals Forming Point Source Category. September 1986. EPA 440/1-86/019 NTIS: Vol. I: PB87-121760/AS Vol. II: PB87-121778 Vol. III: PB87-121786

Additional Guidance

Guidance Manual for POTW Pretreatment Program Development	October 1983
Guidance Manual for Electroplating and Metal Finishing Pretreatment Standards	February 1984
Pretreatment Implementation Review Task Force (PIRT) Final Report	January 1985
Guidance Manual for Implementing Total Toxic Organics (TTO) Pretreatment Standards	September 1985
Guidance Manual for Use of Production-Based Pretreatment Standards and the Combined Wastestream Formula	September 1985
RCRA Information on Hazardous Wastes for Publicly Owned Treatment Works	September 1985

Additional Guidance (Continued)

Guidance Manual for Iron and Steel Manufacturing Pretreatment Standards	September 1985
Pretreatment Compliance Monitoring and Enforcement Guidance	September 1986
PRELIM 3.0: EPA Computer Model for Development of Local Limits (user manual and computer disk for use on an IBM compatible microcomputer)	June 1987
Guidance Manual for Preventing Interference at POTWs	September 1987

Copies of the technical development and economic documents may be obtained from the National Technical Information Services (NTIS), Springfield, VA 22161 (703-487-4650). Pretreatment program manuals may be obtained from U.S. EPA, Permits Division (EN-336), Washington, DC 20460.

APPENDIX B

GLOSSARY OF TERMS

GLOSSARY OF TERMS

The Act

The Federal Water Pollution Control Act Amendments of 1972 as amended by the Clean Water Act of 1977 (PL 92-500).

Aging

A change in the properties of certain metals and alloys that occurs at ambient or moderately elevated temperatures after hot working or heat treatment (quench aging in ferrous alloys, natural or artificial aging in ferrous and nonferrous alloys) or after a cold working operation (strain aging). The change in properties is often due to a phase change (precipitation), but never involves a change in chemical composition of the metal or alloy.

Alkaline Cleaning

A process where dirt, mineral and animal fats and oils are removed from the metal surface by exposure at high temperatures to solutions containing alkaline compounds, such as caustic soda, soda ash, alkaline silicates, alkaline phosphates, ionic detergents, and nonionic detergents.

Alkaline Cleaning Bath

A bath consisting of an alkaline cleaning solution through which a workpiece is processed.

Alkaline Cleaning Rinse

A rinse following an alkaline cleaning bath through which a workpiece is processed. A rinse consisting of a series of rinse tanks is considered as a single rinse.

Alloy

A substance having metallic properties and being composed of two or more chemical elements of which at least one is an elemental metal.

Aluminum Forming

A set of manufacturing operations in which aluminum and aluminum alloys are made into semifinished products by hot or cold working.

Ancillary Operations

A manufacturing operation that has a large flow, discharges significant amounts of pollutants, and may not be present at every plant in a subcategory, but when present it is an integral part of the aluminum forming process.

Annealing

A generic term describing a metals treatment process that is used primarily to soften metallic materials, but also to simultaneously produce desired changes in other properties or in microstructure. The purpose of such changes may be improvement of machinability, facilitation of cold work, improvement of mechanical or electrical properties, and increase in stability of dimensions. Annealing consists of heating and cooling the metal at varying rates to achieve the desired properties.

Annealing with Oil

The use of oil to quench a workpiece as it passes from an annealing furnace.

Annealing with Water

The use of a water spray or bath, of which water is the major constituent, to quench a workpiece as it passes from an annealing furnace.

Approval Authority

The Director in an NPDES state with an approved state pretreatment program and the Administrator of the EPA in a non-NPDES state or NPDES state without an approved state pretreatment program.

Atomization

The process in which a stream of water or gas impinges upon a molten metal stream, breaking it into droplets which solidify as powder particles.

Authorized Representative of Industrial User

An authorized representative of an industrial user may be: 1) a principal executive officer of at least the level of vice-president, if the industrial user is a corporation; 2) a general partner or proprietor if the industrial user is a partnership or proprietorship, respectively; 3) a duly authorized representative of the individual designated above if such representative is responsible for the overall operation of the facilities from which the indirect discharge originates.

Ball Mill

A mill in which materials are finely ground on a rotating cylinder containing balls (usually steel).

Best Available Technology Economically Achievable

Level of technology applicable to toxic and nonconventional pollutants on which effluent limitations are established.

Billet

A long slender cast product used as a raw material in subsequent forming operations.

Biochemical Oxygen Demand (BOD)

The quantity of oxygen utilized in the biochemical oxidation of organic matter under standard laboratory procedures, five (5) days at 20° centigrade expressed in terms of weight and concentration [milligrams per liter (mg/l)].

Blowdown

The minimum discharge of circulating water for the purpose of discharging dissolved solids or other contaminants contained in the water, the further buildup of which would cause concentration in amounts exceeding limits established by best engineering practice.

Brazing

A process that bonds two metal pieces by heating them to a suitable temperature and by using a filler material which melts above 425°C (800°F) but below the melting point of the metals being joined. The filler material is distributed between the surfaces of the joint by capillary action.

Bright Annealing

Annealing in a protective medium to prevent discoloration of the bright surface.

Brittleness

The quality of a metal that leads to crack propagation without appreciable plastic deformation.

Burnishing

A surface finishing process in which minute surface irregularities are displaced rather than removed.

Categorical Standards

National categorical pretreatment standards or pretreatment standard.

Chromate Conversion Coating (or Chromating)

Process of forming a conversion coating (protective coating) on a metal by immersing or spraying with a hexavalent chromium compound solution to produce a hexavalent and/or trivalent chromium compound coating. Also known as chromate treatment. Most often applied to aluminum, zinc, cadmium or magnesium surfaces.

Clad Metal

A composite metal containing two or more layers that have been metallurgically bonded together by roll bonding (co-rolling), solder application (or brazing) and explosion bonding.

Cleaning (see etching)

Cold Rolling

An operation that produces aluminum or copper sheet with a thickness between 6.25 cm and 0.015 cm (0.249 to 0.006 inches) by passing the metal through a set of rolls. The process is an exothermic process and causes strain-hardening of the product.

Cold Working

Deforming metal plastically at a temperature lower than the recrystallization temperature of the metal, generally at room temperature.

Contact Water

Any water or oil that comes into direct contact with nonferrous metal during forming operations, whether the metal is raw material, intermediate product, waste product, or finished product.

Continuous Casting

A casting process that produces sheet, rod, or other long shapes by solidifying the metal while it is being poured through an open-ended mold using little or no contact cooling water. Thus, no restrictions are placed on the length of the product and it is not necessary to stop the process to remove the cast product.

Continuous Treatment

Treatment of wastestreams operating without interruption as opposed to batch treatment. Sometimes referred to as flow-through treatment.

Contractor Removal (Contract Hauling)

Disposal of oils, spent solutions, or sludge by a commercial firm.

Control Authority

The "Approval Authority", defined hereinabove; or the superintendent of a municipality if the municipality has an approved pretreatment program under the provisions of 40 CFR Part 403.

Conversion Coating

A coating produced by chemical or electrochemical treatment of a metallic surface that gives a surface layer containing a compound of the metal. Examples include chromate coatings on zinc and cadmium, and oxide coatings on steel.

Core Stream

A wastestream generated by operations that always occur within a particular subcategory.

Cooling Water

The water discharged from any use such as air conditioning, cooling or refrigeration, or to which the only pollutant added is heat.

Corrosion

The deterioration of a metal by chemical or electrochemical reaction with its environment.

Countercurrent Cascade Rinsing

A staged process that employs recycled, often untreated, water as a rinsing medium to clean metal products. Water flow is opposite to product flow such that the most contaminated water encounters incoming product first.

Degassing

The removal of dissolved hydrogen from the molten aluminum prior to casting. Chemicals are added and gases are bubbled through the molten aluminum. Sometimes a wet scrubber is used to reduce opacity created by excess chlorine gas. This process also helps to remove oxides and impurities from the melt.

Die

Various tools used to impart shape to metal primarily because of the shape of the die itself. Examples are forging dies, drawing dies, and extrusion dies.

Direct Chill Casting

A method of casting where the molten metal is poured into a water-cooled mold. The base of this mold is the top of a hydraulic cylinder that lowers the metal first through the mold and then through a water spray and bath to cause solidification. The vertical distance of the drop limits the length of the ingot. This process is also known as semi-continuous casting.

Drag-out

The solution that adheres to the objects removed from a bath or rinse, more precisely defined as that solution which is carried past the edge of the tank.

Drawing

Pulling metal through a die or succession of dies to reduce the metal's diameter or alter its shape.

Ductility

The ability of a metal to deform plastically without fracturing.

Effluent

Discharge from a point source.

Effluent Limitation

Any standard (including schedules of compliance) established by a state or EPA on quantities, rates, and concentrations of chemical, physical, biological, and other constituents that are discharged from point sources into navigable waters, the waters of the contiguous zone, or the ocean.

Electrochemical Finishing

Producing a desired finish on the surface of a metallic product by immersing the workpiece in an electrolyte bath through which direct current is passed.

Electroplating

The production of metal coatings on the surface of another material by electrodeposition.

Emulsions

Stable dispersions of two immiscible liquids. In the aluminum forming and nonferrous metals forming categories, this is usually an oil and water mixture.

End-of-Pipe Treatment

The reduction of pollutants by wastewater treatment prior to discharge or reuse.

Etching

A chemical solution bath and a rinse or series of rinses designed to produce a desired surface finish on the work piece, either to remove surface imperfections, oxides or scratches or to provide surface roughness. Conversion coating and anodizing when performed as an integral part of forming operations are considered cleaning or etching operations. When conversion coating or anodizing are covered under forming categorical standards, they are not subject to regulation under the provisions of 40 CFR Parts 413 and 433, electroplating and metal finishing.

Eutectic Temperature

The lowest temperature at which a solution (in this case, the solution is molten metal and various alloying materials) remains completely liquid.

Extrusion

A process in which high pressures are applied to a metal billet, forcing the metal to flow through a die orifice to form rods, tubes or special sections.

Extrusion Heat Treatment

The spray application of water to a workpiece immediately following extrusion for the purpose of heat treatment.

Finishing

The coating or polishing of a metal surface.

Fluxes

Substances added to molten metal to help remove impurities and prevent excessive oxidation, or to promote the fusing of the metals.

Foil Rolling

A process which produces aluminum foil less than 0.006 inches thick. Foil is usually produced by cold rolling.

Forging

Deforming metal (usually hot) with compressive forces into desired shapes, with or without dies. Where dies are used, the metal is forced to take the shape of the die.

Grinding

The process of removing stock from a workpiece by the use of a tool consisting of abrasive grains held by a rigid or semi-rigid binder. Grinding includes surface finishing, sanding, and slicing.

Hammer Forging

Forging in which the workpiece is deformed by repeated blows.

Hardness

Resistance of metal to plastic deformation by indentation, scratching, abrasion or cutting.

Heat Treatment

A process that changes such physical properties of a metal as strength, ductility, and malleability by controlled heating and cooling at specified temperatures and durations. Such operations as tempering, carburizing, cyaniding, nitriding, annealing, aging, normalizing, austenizing, austempering, siliconizing, martempering, and malleablizing are included in this definition.

Homogenizing

Holding solidified metal at high temperature to eliminate or decrease chemical segregation by diffusion.

Hot Rolling

The process in which aluminum is heated to between 400°C and 495°C and passed through a set of rolls which reduces the thickness of the metal to a plate 6.3 mm (0.25 inches) thick or less. Hot rolling does not strain-harden the aluminum.

Hot Working

Deforming metal plastically at such a temperature and rate that strain hardening does not occur. The low limit of temperature is the recrystallization temperature of the metal.

Hydraulic Press

A press in which fluid pressure is used to actuate and control the ram.

Impacting

Forming, usually cold, a part from a metal slug confined in a die, by rapid single-stroke application of force through a punch, causing the metal to flow around the punch.

In-Process Control Technology

Any procedure or equipment used to conserve chemicals and water throughout the production operations, resulting in a reduction of the wastewater volume.

Indirect Discharge

The discharge or the introduction of nondomestic pollutants from any source regulated under section 307(b) or (c) of the Act into the POTW.

Indirect Discharger

Any point source that discharges to a publicly owned treatment works.

Industrial User

A source of indirect discharge which does not constitute a "discharge of pollutants" under regulations issued pursuant to section 402 of the Act.

Ingot

A large, block-shaped casting produced by various methods. Ingots are intermediate products from which other products are made.

Interference

A discharge which, alone or in conjunction with a discharge or discharges from other sources, both: 1) inhibits or disrupts the POTW, its treatment processes or operations, or its sludge processes, use or disposal; and 2) therefore is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation) or of the prevention of sewage sludge use or disposal in compliance with the following statutory provisions and regulations or permits issued thereunder (or more stringent State or local regulations): Section 405 of the Clean Water Act, the Solid Waste Disposal Act (SWDA) (including Title II, more commonly referred to as the Resource Conservation and Recovery Act (RCRA), and including State regulations contained in any State sludge management plan prepared pursuant to Subtitle D of the SWDA), the Clean Air Act, the Toxic Substances Control Act, and the Marine Protection, Research and Sanctuaries Act.

Jet

A stream of fluid (gas or liquid) discharged from a narrow opening or nozzle.

Mandrel

A rod used to retain the cavity in hollow metal products during working.

Metal Powder Production

Any process operations which convert metal to a finely divided form without an increase in metal purity.

National Categorical Pretreatment Standard or Pretreatment Standard

Any regulation containing pollutant discharge limits promulgated by the EPA in accordance with section 307(b) and (c) of the Act which applies to a specific category of industrial users.

National Pollutant Discharge Elimination System (NPDES)

National program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements under sections 307, 402, 318 and 405 of the Act.

National Prohibitive Discharge Standard or Prohibitive Discharge Standard

Any regulation developed under the authority of 307(b) of the Act and 40 CFR 403.5.

Neat Oil

A pure oil, usually a mineral oil, with no or few impurities added. In aluminum forming and nonferrous metals forming, its use is mostly as a lubricant.

New Source

Any building, structure, facility, or installation from which there is or may be a discharge of pollutants, the construction of which commenced after the publication of proposed pretreatment standards under section 307(c) of the Act which will be applicable to such source if such standards are thereafter promulgated in accordance with that section.

Nonferrous Metal

Any pure metal other than iron, copper or aluminum, or metal alloy for which a metal other than iron, copper, and aluminum is its major constituent in percent by weight.

Nonferrous Metals Forming

A set of manufacturing operations in which nonferrous metals and nonferrous alloys are made into semifinished products by hot or cold working. It also includes metal powder production and powder metallurgy of all metals, including iron, copper, and aluminum.

Off-Gases

Gases, vapors, and fumes produced as a result of an aluminum forming or nonferrous metals forming operation.

Water Use Factor

The total amount of contact water or oil entering a process divided by the amount of metal product produced by this process. The amount of water involved includes the recycle and makeup water.

Wastewater

The liquid and water-carried industrial or domestic wastes from dwellings, commercial, buildings, industrial facilities, and institutions, whether treated or untreated, which is discharged to a POTW.

Wastewater Discharge Factor

The ratio between water discharged from a production process and the mass of product of that production process. Recycle water is not included.

Wet Scrubbers

Air pollution control devices used to remove particulates and fumes from air by entraining the pollutants in a water spray.

Wire

A slender strand of metal with a diameter less than 9.5 mm (3/8 inches).

Work-Hardening

An increase in hardness and strength and a loss of ductility that occurs in the workpiece as a result of passing through cold forming or cold working operations. Also known as strain-hardening.

APPENDIX C

PRETREATMENT STANDARDS FOR EXISTING AND NEW SOURCES

APPENDIX C-1. PRETREATMENT STANDARDS FOR EXISTING SOURCES (PSES) ALUMINUM FORMING CATEGORY

Pollutant limits in mg/off-kg (pounds/million off-pounds)[1] of Aluminum (40 CFR Part 467)

Subpart	Subcategory	Chromium Max[2]	Chromium Avg[3]	Cyanide (T) Max	Cyanide (T) Avg	Zinc Max	Zinc Avg	TTO Max	TTO Avg	Oil and Grease[4] Max	Oil and Grease[4] Avg	Pollutant Unit Basis
A	Rolling with Neat Oils											
	- Core with annealing furnace scrubber	.036	.015	.024	.010	.119	.050	.057	---	4.3	2.1	rolled w/neat oils
	- Core without annealing furnace scrubber	.025	.010	.016	.007	.081	.034	.038	---	2.9	1.5	rolled w/neat oils
	- Continuous sheet casting lubricant	.00086	.00035	.00057	.00024	.0029	.0012	.0014	---	.10	.052	cast
	- Solution heat treatment contact cooling water	.90	.37	.59	.25	2.98	1.25	1.41	---	110	53	quenched
	- Cleaning or etching bath	.079	.032	.052	.022	.262	.109	.124	---	9.3	4.7	cleaned or quenched
	- Cleaning or etching rinse	.61	.25	.41	.17	2.03	.85	.96	---	73	36	cleaned or etched
	- Cleaning or etching scrubber liquor	.85	.35	.56	.23	2.82	1.18	1.34	---	100	50	cleaned or etched
B	*Rolling with Emulsions*											
	- Core	.057	.024	.038	.016	.190	.079	.090	---	6.8	3.4	rolled w/emulsions
	- Direct chill casting contact cooling water	.59	.24	.39	.16	1.94	.81	.92	---	69	3.5	cast by semi-continuous methods
	- Solution heat treatment contact cooling water	.90	.37	.59	.25	2.98	1.25	1.41	---	110	53	quenched
	- Cleaning or etching bath	.079	.032	.052	.022	.262	.109	.124	---	9.3	4.7	cleaned or etched
	- Cleaning or etching rinse	.61	.25	.41	.17	2.03	.85	.96	---	73	36	cleaned or etched
	- Cleaning or etching scrubber liquor	.85	.35	.56	.23	2.83	1.18	1.34	---	100	50	cleaned or etched
C	Extrusion											
	- Core	.15	.061	.098	.041	.49	.21	.23	---	18	8.8	extruded
	- Extrusion press leakage	.65	.27	.43	.18	2.16	.90	1.02	---	77	39	extruded
	- Direct chill casting contact cooling water	.59	.24	.39	.16	1.94	.81	.92	---	69	35	cast
	- Press heat treatment contact cooling water	.90	.37	.59	.25	2.98	1.25	1.41	---	110	53	quenched
	- Solution heat treatment contact cooling water	.90	.37	.59	.25	2.98	1.25	1.41	---	110	53	quenched

APPENDIX C-1. PRETREATMENT STANDARDS FOR EXISTING SOURCES (PSES) (Continued)
ALUMINUM FORMING CATEGORY

Pollutant limits in mg/off-kg (pounds/million off-pounds)[1] of Aluminum (40 CFR Part 467)

		Chromium		Cyanide (T)		Zinc		TTO		Oil and Grease[4]		Pollutant Unit Basis
Subpart	Subcategory	Max[2]	Avg[3]	Max	Avg	Max	Avg	Max	Avg	Max	Avg	
	- Cleaning or etching bath	.079	.032	.052	.022	.26	.109	.124	---	9.3	4.7	cleaned or etched
	- Cleaning or etching rinse	1.7	.7	1.2	.5	5.7	2.4	2.7	---	200	100	cleaned or etched
	- Cleaning or etching scrubber liquor	.85	.35	.56	.23	2.82	1.18	1.34	---	100	50	cleaned or etched
D	Forging											
	- Core	.022	.009	.015	.006	.073	.031	.035	---	2.6	1.3	forged
	- Forging scrubber liquor	.042	.017	.028	.011	.14	.058	.065	---	4.9	2.5	forged
	- Solution heat treatment contact cooling water	.897	.37	.591	.25	2.98	1.24	1.41	---	110	53	quenched
	- Cleaning or etching bath	.079	.032	.052	.022	.26	.11	.123	---	9.3	4.7	cleaned or etched
	- Cleaning or etching rinse	1.7	.7	1.2	.5	5.7	2.4	2.7	---	200	100	cleaned or etched
	- Cleaning or etching scrubber liquor	.851	.35	.561	.23	2.82	1.18	1.34	---	100	50	cleaned or etched
E	Drawing with Neat Oils											
	- Core	.022	.009	.015	.006	.073	.031	.035	---	2.6	1.3	drawn w/neat oils
	- Continuous rod casting lubricant	.0009	.0004	.0006	.0003	.0029	.0012	.0014	---	.10	.052	rod cast
	- Continuous rod casting contact cooling water	.086	.035	.057	.023	.283	.118	.133	---	10	5.1	rod cast
	- Solution heat treatment contact cooling water	.896	.367	.591	.245	2.98	1.24	1.41	---	110	53	quenched
	- Cleaning or etching bath	.079	.033	.052	.022	.262	.109	.124	---	9.3	4.7	cleaned or etched
	- Cleaning or etching rinse	.612	.251	.404	.17	2.03	.85	.96	---	73	36	cleaned or etched
	- Cleaning or etching scrubber liquor	.851	.348	.561	.232	2.82	1.18	1.34	---	100	50	cleaned or etched
	Drawing with Emulsions or Soaps											
	- Core	.205	.084	.135	.056	.681	.285	.32	---	25	12	drawn w/emulsions or soap
	- Continuous rod casting lubricant	.0009	.0004	.0006	.0003	.0029	.0012	.0014	---	.10	.052	rod cast
	- Continuous rod casting contact cooling water	.086	.035	.056	.024	.283	.119	.134	---	10	5.1	rod cast

APPENDIX C-1. PRETREATMENT STANDARDS FOR EXISTING SOURCES (PSES) (Continued)
ALUMINUM FORMING CATEGORY

Pollutant limits in mg/off-kg (pounds/million off-pounds)[1] of Aluminum (40 CFR Part 467)

Subpart	Subcategory	Chromium		Cyanide (T)		Zinc		TTO		Oil and Grease[4]		Pollutant Unit Basis
		Max[2]	Avg[3]	Max	Avg	Max	Avg	Max	Avg	Max	Avg	
	- Solution heat treatment contact cooling water	.896	.367	.591	.245	2.98	1.25	1.41	---	110	53	quenched
	- Cleaning or etching bath	.079	.032	.052	.022	.262	.11	.124	---	9.3	4.7	cleaned or etched
	- Cleaning or etching rinse	.612	.251	.404	.167	2.03	.849	.96	---	73	36	cleaned or etched
	- Cleaning or etching scrubber liquor	.851	.348	.561	.232	2.82	1.18	1.34	---	100	50	cleaned or etched

[1]These standards are expressed in terms of mass of pollutant allowed per mass of product produced (off-kg or off-pound) in the given process. Off-kilogram or off-pound is defined as the mass of aluminum or aluminum alloy removed from a forming or ancillary operation at the end of a process cycle for transfer to a different machine or process.
[2]Max = Maximum pollutant discharge for any one day.
[3]Avg = Maximum pollutant discharge for a monthly average of all samples collected.
[4]Oil and grease is an alternative monitoring parameter for total toxic organics (TTO) under provisions of the aluminum forming category.

APPENDIX C-2. PRETREATMENT STANDARDS FOR NEW SOURCES (PSNS)
ALUMINUM FORMING CATEGORY

Pollutant limits in mg/off-kg (pounds/million off-pounds)[1] of Aluminum (40 CFR Part 467)

Subpart	Subcategory	Chromium Max[2]	Chromium Avg[3]	Cyanide (T) Max	Cyanide (T) Avg	Zinc Max	Zinc Avg	TTO Max	TTO Avg	Oil and Grease[4] Max	Oil and Grease[4] Avg	Pollutant Unit Basis
A	Rolling with Neat Oils											
	- Core with annealing furnace scrubber	.030	.013	.017	.007	.084	.035	.057	---	.817	.817	rolled w/neat oils
	- Core without annealing furnace scrubber	.021	.009	.011	.005	.057	.024	.038	---	.54	.54	rolled w/neat oils
	- Continuous sheet casting lubricant	.00073	.00029	.00039	.00016	.0020	.00082	.0014	---	.020	.020	cast
	- Solution heat treatment contact cooling water	.76	.31	.41	.17	2.08	.86	1.41	---	20.37	20.37	quenched
	- Cleaning or etching bath	.067	.027	.036	.015	.183	.075	.124	---	1.79	1.79	cleaned or etched
	- Cleaning or etching rinse	.52	.21	.28	.11	1.42	.59	.96	---	13.91	13.91	cleaned or etched
	- Cleaning or etching scrubber liquor	.72	.29	.39	.16	1.97	.81	1.34	---	19.33	19.33	cleaned or etched
B	Rolling with Emulsions											
	- Core	.048	.020	.026	.011	.133	.055	.090	---	1.30	1.30	rolled w/emulsions
	- Direct chill casting contact cooling water	.49	.20	.27	.11	1.36	.56	.92	---	13.29	13.29	cast by semi-continuous methods
	- Solution heat treatment contact cooling water	.76	.31	.41	.17	2.08	.86	1.41	---	20.37	20.37	quenched
	- Cleaning or etching bath	.067	.027	.036	.015	.183	.075	.124	---	1.79	1.79	cleaned or etched
	- Cleaning or etching rinse	.52	.21	.28	.11	1.42	.59	.96	---	13.91	13.91	cleaned or etched
	- Cleaning or etching scrubber liquor	.72	.29	.39	.16	1.97	.81	1.34	---	19.33	19.33	cleaned or etched
C	Extrusion											
	- Core	.13	.05	.07	.03	.35	.15	.24	---	3.40	3.40	extruded
	- Extrusion press leakage	.11	.05	.06	.03	.31	.13	.21	---	2.98	2.98	extruded
	- Direct chill casting contact cooling water	.49	.20	.27	.11	1.36	.56	.92	---	13.29	13.29	cast
	- Press heat treatment contact cooling water	.76	.31	.41	.17	2.08	.86	1.41	---	20.37	20.37	quenched
	- Solution heat treatment contact cooling water	.76	.31	.41	.17	2.08	.86	1.41	---	20.37	20.37	quenched

APPENDIX C-2. PRETREATMENT STANDARDS FOR NEW SOURCES (PSNS) (Continued)
ALUMINUM FORMING CATEGORY

Pollutant limits in mg/off kg (pounds/million off-pounds)[1] of Aluminum (40 CFR Part 467)

Subpart	Subcategory	Chromium		Cyanide (T)		Zinc		TTO		Oil and Grease[4]		Pollutant Unit Basis
		Max[2]	Avg[3]	Max	Avg	Max	Avg	Max	Avg	Max	Avg	
	- Cleaning or etching bath	.067	.027	.036	.015	.183	.075	.124	---	1.79	1.79	cleaned or etched
	- Cleaning or etching rinse	.52	.21	.28	.11	1.42	.59	.96	---	13.91	13.91	cleaned or etched
	- Cleaning or etching scrubber liquor	.72	.29	.39	.16	1.97	.81	1.34	---	19.33	19.33	cleaned or etched
D	Forging											
	- Core	.019	.008	.010	.004	.051	.021	.035	---	.50	.50	forged
	- Forging scrubber liquor	.035	.014	.019	.008	.096	.040	.065	---	.95	.95	forged
	- Solution heat treatment contact cooling water	.76	.31	.41	.16	2.08	.86	1.41	---	20.37	20.37	quenched
	- Cleaning or etching bath	.067	.027	.036	.015	.183	.075	.124	---	1.79	1.79	cleaned or etched
	- Cleaning or etching rinse	.52	.21	.28	.11	1.42	.59	.96	---	13.91	13.91	cleaned or etched
	- Cleaning or etching scrubber liquor	.72	.29	.39	.16	1.97	.812	1.34	---	19.33	19.33	cleaned or etched
E	Drawing with Neat Oils											
	- Core	.019	.008	.010	.004	.051	.021	.035	---	.50	.50	drawn w/neat oils
	- Continuous rod casting lubricant	.0007	.0003	.0004	.0002	.0020	.0008	.0014	---	.020	.020	rod cast
	- Continuous rod casting contact cooling water	.072	.029	.039	.016	.198	.082	.134	---	1.94	1.94	rod cast
	- Solution heat treatment contact cooling water	.76	.306	.41	.163	2.08	.856	1.41	---	20.37	20.37	quenched
	- Cleaning or etching bath	.067	.027	.036	.015	.183	.075	.124	---	1.79	1.79	cleaned or etched
	- Cleaning or etching rinse	.52	.21	.28	.11	1.42	.59	.96	---	13.91	13.91	cleaned or etched
	- Cleaning or etching scrubber liquor	.72	.29	.39	.16	1.97	.812	1.34	---	19.33	19.33	cleaned or etched
F	Drawing with Emulsions or Soaps											
	- Core	.173	.070	.094	.038	.48	.196	.32	---	4.67	4.67	drawn w/emulsions or soap
	- Continuous rod casting lubricant	.0008	.0003	.0004	.0002	.0020	.0008	.0014	---	.020	.020	rod cast
	- Continuous rod casting contact cooling water	.072	.029	.039	.016	.198	.082	.134	---	1.94	1.94	rod cast

APPENDIX C-2. PRETREATMENT STANDARDS FOR NEW SOURCES (PSNS) (Continued)
ALUMINUM FORMING CATEGORY

Pollutant limits in mg/off-kg (pounds/million off-pounds)[1] of Aluminum (40 CFR Part 467)

		Chromium		Cyanide		Zinc		TTO		Oil and Grease[4]		Pollutant Unit Basis
Subpart	Subcategory	Max[2]	Avg[3]	Max	Avg	Max	Avg	Max	Avg	Max	Avg	
	- Solution heat treatment contact cooling water	.76	.306	.41	.163	2.08	.856	1.41	---	20.37	20.37	quenched
	- Cleaning or etching bath	.067	.027	.036	.015	.183	.075	.124	---	1.79	1.79	cleaned or etched
	- Cleaning or etching rinse	.52	.21	.28	.11	1.42	.59	.96	---	13.91	13.91	cleaned or etched
	- Cleaning or etching scrubber liquor	.715	.290	.387	.155	1.97	.812	1.34	---	19.33	19.33	cleaned or etched

[1]These standards are expressed in terms of mass of pollutant allowed per mass of product produced (off-kg or off-pound) in the given process. Off-kilogram or off-pound is defined as the mass of aluminum or aluminum alloy removed from a forming or ancillary operation at the end of a process cycle for transfer to a different machine or process.
[2]Max = Maximum pollutant discharge for any one day.
[3]Avg = Maximum pollutant discharge for a monthly average of samples collected.
[4]Oil and grease is an alternative monitoring parameter for total toxic organics (TTO) under provisions of the aluminum forming category.

APPENDIX C-3. PRETREATMENT STANDARDS FOR EXISTING SOURCES (PSES) COPPER FORMING CATEGORY

Pollutant limits in mg/off-kg (pounds/million off-pounds)[1] of Copper or Copper Alloy (40 CFR Part 468)

	Chromium		Copper		Lead		Nickel		Zinc		Total Toxic Organics (TTO)		Oil and Grease[2]		Pollutant Unit Basis
Process	Max.[3]	Avg.[4]	Max.	Avg.	Max.	Avg.	Max.	Avg.	Max.	Avg.	Max.	Avg.	Max.	Avg.	
(a) Hot Rolling Spent Lubricant	0.045	0.018	0.195	0.103	0.015	0.013	0.197	0.130	0.150	0.062	0.066	0.035	2.060	1.236	(a)
(b) Cold Rolling Spent Lubricant	0.166	0.068	0.720	0.379	0.056	0.049	0.727	0.481	0.553	0.231	0.246	0.128	7.580	4.548	(b)
(c) Drawing Spent Lubricant	0.037	0.015	0.161	0.085	0.012	0.011	0.163	0.107	0.124	0.051	0.055	0.028	1.700	1.020	(c)
(d) Solution Heat Treatment	0.284	0.116	1.227	0.646	0.096	0.083	1.240	0.820	0.943	0.394	0.419	0.219	12.920	7.752	(d)
(e) Extrusion Heat Treatment	0.00088	0.00036	0.0030	0.0020	0.00030	0.00026	0.0030	0.0020	0.0020	0.0010	0.0010	0.00068	0.040	0.024	(e)
(f) Annealing with Water	0.545	0.223	2.356	1.240	0.186	0.161	2.380	1.574	1.810	0.756	0.806	0.421	24.800	14.880	(f)
(g) Annealing with Oil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	(g)
(h) Alkaline Cleaning Rinse	1.854	0.758	8.006	4.214	0.632	0.547	8.090	5.351	6.152	2.570	2.739	1.432	84.280	50.568	(h)
(i) Alkaline Cleaning Rinse for Forged Parts	5.562	2.275	24.019	12.642	1.896	1.643	24.272	16.055	18.457	7.711	8.217	4.298	252.840	151.704	(i)
(j) Alkaline Cleaning Bath	0.020	0.0084	0.088	0.046	0.0070	0.0060	0.089	0.059	0.068	0.028	0.030	0.015	0.93	0.56	(j)
(k) Pickling Rinse	0.574	0.235	2.481	1.306	0.195	0.169	2.507	1.658	1.906	0.796	0.848	0.444	26.120	15.672	(k)
(l) Pickling Rinse for Forged Parts	1.723	0.705	7.444	3.918	0.587	0.509	7.522	4.975	5.720	2.389	2.546	1.332	78.360	47.016	(l)
(m) Pickling Bath	0.051	0.020	0.220	0.116	0.017	0.015	0.222	0.147	0.169	0.070	0.075	0.039	2.320	1.392	(m)
(n) Pickling Fume Scrubber	0.275	0.112	1.189	0.626	0.093	0.081	1.201	0.795	0.913	0.381	0.406	0.212	12.520	7.512	(n)
(o) Tumbling or Burnishing	0.256	0.104	1.107	0.583	0.087	0.075	1.119	0.740	0.851	0.355	0.378	0.198	11.660	6.996	(o)
(p) Surface Coating	0.326	0.133	1.411	0.743	0.111	0.096	1.426	0.943	1.084	0.453	0.482	0.252	14.860	8.916	(p)
(q) Miscellaneous Waste Streams[5]	0.009	0.003	0.041	0.021	0.003	0.002	0.041	0.027	0.031	0.013	0.014	0.007	0.436	0.261	(q)

[1] These standards are expressed in terms of mass of pollutant allowed per mass of product produced (off-kg or off-pound) in a given process. Off-kg (off-pound) means 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.

[2] Oil and grease is an alternative monitoring parameter for total toxic organics (TTO) for the copper forming category.

[3] Max = Maximum pollutant level for any one day

[4] Avg = Maximum pollutant level for a monthly average of all samples taken

[5] Miscellaneous Waste Streams - wastestreams from hydrotesting, sawing, surface milling, and maintenance.

Pollutant Unit Basis - see notes below.

(a) Hot rolled
(b) Cold rolled
(c) Drawn
(d) Heat treated
(e) Heat treated on an extrusion press
(f) Annealed with water
(g) Annealed with oil
(h) Alkaline cleaned
(i) Forged parts alkaline cleaned
(j) Alkaline cleaned
(k) Pickled
(l) Forged parts pickled
(m) Pickled
(n) Pickled
(o) Tumbled or burnished
(p) Surface coated
(q) Formed

APPENDIX C-4. PRETREATMENT STANDARDS FOR NEW SOURCES (PSNS)
COPPER FORMING CATEGORY

Pollutant limits in mg/off-kg (pounds/million off-pounds)[1] of Copper or Copper Alloy (40 CFR Part 468)

Process	Chromium Max.[3]	Chromium Avg.[4]	Copper Max.	Copper Avg.	Lead Max.	Lead Avg.	Nickel Max.	Nickel Avg.	Zinc Max.	Zinc Avg.	Total Toxic Organics (TTO) Max.	Total Toxic Organics (TTO) Avg.	Oil and Grease[2] Max.	Oil and Grease[2] Avg.	Pollutant Unit Basis
(a) Hot Rolling Spent Lubricant	0.038	0.015	0.131	0.062	0.010	0.0092	0.056	0.038	0.105	0.043	0.035	0.035	1.030	1.030	(a)
(b) Cold Rolling Spent Lubricant	0.140	0.056	0.485	0.231	0.037	0.034	0.208	0.140	0.386	0.159	0.128	0.128	3.790	3.790	(b)
(c) Drawing Spent Lubricant	0.031	0.012	0.108	0.051	0.0085	0.0076	0.046	0.031	0.086	0.035	0.028	0.028	0.850	0.850	(c)
(d) Solution Heat Treatment	0.239	0.096	0.826	0.394	0.064	0.058	0.355	0.239	0.658	0.271	0.219	0.219	6.460	6.460	(d)
(e) Extrusion Heat Treatment	0.00074	0.00030	0.0020	0.0010	0.00020	0.00018	0.0010	0.00074	0.0020	0.00084	0.00068	0.00068	0.020	0.020	(e)
(f) Annealing with Water	0.458	0.186	1.587	0.756	0.124	0.111	0.682	0.458	1.264	0.520	0.421	0.421	12.400	12.400	(f)
(g) Annealing with Oil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	(g)
(h) Alkaline Cleaning Rinse	1.559	0.632	5.393	2.570	0.421	0.379	2.317	1.559	4.298	1.769	1.432	1.432	42.140	42.140	(h)
(i) Alkaline Cleaning Rinse for Forged Parts	4.677	1.896	16.181	7.711	1.264	1.137	6.953	4.677	12.894	5.309	4.298	4.298	126.420	126.420	(i)
(j) Alkaline Cleaning Bath	0.017	0.0070	0.059	0.028	0.0046	0.0042	0.025	0.017	0.047	0.019	0.015	0.015	0.46	0.46	(j)
(k) Pickling Rinse	0.216	0.087	0.748	0.356	0.058	0.052	0.321	0.216	0.596	0.245	0.198	0.198	5.850	5.850	(k)
(l) Pickline Rinse for Forged Parts	0.649	0.263	2.246	1.070	0.175	0.157	0.965	0.649	1.790	0.737	0.596	0.596	17.550	17.550	(l)
(m) Pickling Bath	0.042	0.017	0.148	0.070	0.011	0.010	0.063	0.042	0.118	0.048	0.039	0.039	1.160	1.160	(m)
(n) Pickling Fume Scrubber	0.231	0.093	0.801	0.381	0.062	0.056	0.344	0.231	0.638	0.262	0.212	0.212	6.260	6.260	(n)
(o) Tumbling or Burnishing	0.215	0.087	0.746	0.355	0.058	0.052	0.320	0.215	0.594	0.244	0.198	0.198	5.830	5.830	(o)
(p) Surface Coating	0.274	0.111	0.951	0.453	0.074	0.066	0.408	0.274	0.757	0.312	0.252	0.252	7.430	7.430	(p)
(q) Miscellaneous Waste Streams[5]	0.008	0.003	0.027	0.013	0.0021	0.0019	0.011	0.008	0.022	0.009	0.007	0.007	0.218	0.218	(q)

[1] These standards are expressed in terms of mass of pollutant allowed per mass of product produced (off-kg or off-pound) in a given process. Off-kg (off-pound) means 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.
[2] Oil and grease is an alternative monitoring parameter for total toxic organics (TTO) for the copper forming category.
[3] Max = Maximum pollutant level for any one day
[4] Avg = Maximum pollutant level for a monthly average of all samples taken
[5] Miscellaneous Waste Streams - wastestreams from hydrotesting, sawing, surface milling, and maintenance.

Pollutant Unit Basis - see notes below.
(a) Hot rolled
(b) Cold rolled
(c) Drawn
(d) Heat-treated
(e) Head treatment on an extrusion press
(f) Annealed with water
(g) Annealed with oil
(h) Alkaline Cleaned
(i) Forged parts alkaline cleaned
(j) Alkaline cleaned
(k) Pickled
(l) Forged parts pickled
(m) Pickled
(n) Pickled
(o) Tumbled or burnished
(p) Surface coated
(q) Formed

APPENDIX C-5. PRETREATMENT STANDARDS FOR EXISTING SOURCES (PSES)
NONFERROUS METALS FORMING CATEGORY
SUBPART A - LEAD-TIN-BISMUTH FORMING SUBCATEGORY

Pollutant Limits in mg/off-kg (pounds/million off-pounds)[1] of Lead-Tin-Bismuth (40 CFR Part 471)

	Antimony		Lead		Pollutant Unit Basis
Process	Max[2]	Avg[3]	Max	Avg	
(a) Rolling Spent Emulsions	0.067	0.030	0.010	0.005	rolled with emulsions
(b) Rolling Spent Soap Solutions	0.120	0.055	0.018	0.009	rolled with soap solutions
(c) Drawing Spent Neat Oils	ND[4]		ND		
(d) Drawing Spent Emulsions	0.076	0.034	0.011	0.005	drawn with emulsions
(e) Drawing Spent Soap Solutions	0.022	0.010	0.003	0.002	drawn with soap solutions
(f) Extrusion Press and Solution Heat Treatment Contact Cooling Water	0.414	0.185	0.061	0.029	heat treated
(g) Extrusion Press Hydraulic Fluid Leakage	0.158	0.071	0.023	0.011	extruded
(h) Continuous Strip Casting Contact Cooling Water	0.003	0.001	0.0004	0.0002	cast by continuous strip method
(i) Semi-Continuous Ingot Casting Contact Cooling Water	0.009	0.004	0.001	0.0006	ingot case by semi-continuous strip method
(j) Shot Casting Contact Cooling Water	0.107	0.048	0.016	0.008	shot cast
(k) Shot-Forming Wet Air Pollution Control Scrubber Blowdown	0.169	0.076	0.025	0.012	shot formed
(l) Alkaline Cleaning Spent Baths	0.345	0.154	0.051	0.024	alkaline cleaned
(m) Alkaline Cleaning Rinse	0.678	0.302	0.099	0.047	alkaline cleaned
(n) Swaging Spent Emulsions	0.005	0.002	0.0008	0.0004	swaged with emulsion
(o) Degreasing Spent Solvents	ND		ND		

[1]These standards are expressed in terms of mass of pollutant allowed per mass of product produced (off-kg or off-pound) in a given process. Off-kilogram or off-pound means the mass of metal or metal alloy removed from a forming operation at the end of a process cycle for transfer to a different machine or process.
[2]Max = Maximum pollutant level for any one day
[3]Avg = Maximum pollutant level for a monthly average of all samples taken
[4]ND = No discharge of process wastewater pollutants

APPENDIX C-6. PRETREATMENT STANDARDS FOR NEW SOURCES (PSNS)
NONFERROUS METALS FORMING CATEGORY
SUBPART A - LEAD-TIN-BISMUTH FORMING SUBCATEGORY

Pollutant Limits in mg/off-kg (pounds/million off-pounds)[1] of Lead-Tin-Bismuth (40 CFR Part 471)

	Antimony		Lead		Pollutant Unit Basis
Process	Max[2]	Avg[3]	Max	Avg	
(a) Rolling Spent Emulsions	0.067	0.030	0.010	0.005	rolled with emulsions
(b) Rolling Spent Soap Solutions	0.120	0.055	0.018	0.009	rolled with soap solutions
(c) Drawing Spent Neat Oils	ND[4]		ND		
(d) Drawing Spent Emulsions	0.076	0.034	0.011	0.005	drawn with emulsions
(e) Drawing Spent Soap Solutions	0.022	0.010	0.003	0.002	drawn with soap solutions
(f) Extrusion Press and Solution Heat Treatment Contact Cooling Water	0.414	0.185	0.061	0.029	heat treated
(g) Extrusion Press Hydraulic Fluid Leakage	0.158	0.071	0.023	0.011	extruded
(h) Continuous Strip Casting Contact Cooling Water	0.003	0.001	0.0004	0.0002	cast by continuous strip method
(i) Semi-Continuous Ingot Casting Contact Cooling Water	0.009	0.004	0.001	0.0006	ingot case by semi-continuous strip method
(j) Shot Casting Contact Cooling Water	0.107	0.048	0.016	0.008	shot cast
(k) Shot-Forming Wet Air Pollution Control Scrubber Blowdown	0.169	0.076	0.025	0.012	shot formed
(l) Alkaline Cleaning Spent Baths	0.345	0.154	0.051	0.024	alkaline cleaned
(m) Alkaline Cleaning Rinse	0.678	0.302	0.099	0.047	alkaline cleaned
(n) Swaging Spent Emulsions	0.005	0.002	0.0008	0.0004	swaged with emulsion
(o) Degreasing Spent Solvents	ND		ND		

[1] These standards are expressed in terms of mass of pollutant allowed per mass of product produced (off-kg or off-pound) in a given process. Off-kilogram or off-pound means the mass of metal or metal alloy removed from a forming operation at the end of a process cycle for transfer to a different machine or process.
[2] Max = Maximum pollutant level for any one day
[3] Avg = Maximum pollutant level for a monthly average of all samples taken
[4] ND = No discharge of process wastewater pollutants

APPENDIX C-7. PRETREATMENT STANDARDS FOR EXISTING SOURCES (PSES)
NONFERROUS METALS FORMING CATEGORY
SUBPART B - MAGNESIUM FORMING SUBCATEGORY

Pollutant Limits in mg/off-kg (pounds/million off-pounds)[1] of Magnesium (40 CFR Part 471)

Process	Chromium		Zinc		Ammonia		Fluoride		Pollutant Unit Basis
	Max[2]	Avg[3]	Max	Avg	Max	Avg	Max	Avg	
(a) Rolling Spent Emulsions	0.033	0.014	0.109	0.046	9.95	4.37	4.44	1.97	rolled with emulsions
(b) Forging Spent Lubricants	ND[4]		ND		ND		ND		
(c) Forging Contact Cooling Water	0.127	0.052	0.422	0.177	38.5	17.0	17.2	7.63	(forged magnesium) cooled with water
(d) Forging Equipment Cleaning Wastewater	0.002	0.0007	0.006	0.003	0.532	0.234	0.238	0.106	forged
(e) Direct Chill Casting Contact Cooling Water	1.74	0.711	5.77	2.41	527	232	235	105	cast with direct chill method
(f) Surface Treatment Spent Baths	0.205	0.084	0.681	0.285	62.1	27.3	27.8	12.3	surface treated
(g) Surface Treatment Baths	0.832	0.340	2.76	1.16	252	111	113	49.9	surface treated
(h) Sawing/Grinding Spent Emulsions	0.009	0.004	0.029	0.012	2.60	1.15	1.16	0.515	sawed or ground
(i) Degreasing Spent Solvent	ND		ND		ND		ND		
(j) Wet Air Pollution Control Scrubber Blowdown	0.273	0.112	0.904	0.378	8.25	36.3	36.9	16.4	sanded and repaired or forged

[1]These standards are expressed in terms of mass of pollutant allowed per mass of product produced (off-kg or off-pound) in a given process. Off-kilogram or off-pound means the mass of metal or metal alloy removed from a forming operation at the end of a process cycle for transfer to a different machine or process.
[2]Max = Maximum pollutant level for any one day
[3]Avg = Maximum pollutant level for a monthly average of all samples taken
[4]ND = No discharge of process wastewater pollutants

APPENDIX C-8. PRETREATMENT STANDARDS FOR NEW SOURCES (PSNS)
NONFERROUS METALS FORMING CATEGORY
SUBPART B - MAGNESIUM FORMING SUBCATEGORY

Pollutant Limits in mg/off-kg (pounds/million off-pounds)[1] of Magnesium (40 CFR Part 471)

Process	Chromium		Zinc		Ammonia		Fluoride		Pollutant Unit Basis
	Max[2]	Avg[3]	Max	Avg	Max	Avg	Max	Avg	
(a) Rolling Spent Emulsions	0.028	0.011	0.076	0.032	9.95	4.37	4.44	1.97	rolled with emulsions
(b) Forging Spent Lubricants	ND[4]		ND		ND		ND		
(c) *Forging Contact Cooling Water*	*0.107*	*0.044*	*0.295*	*0.122*	38.5	17.0	17.2	7.63	(forged magnesium) cooled with water
(d) Forging Equipment Cleaning Wastewater	0.002	0.0006	0.004	0.002	0.532	0.234	0.238	0.106	forged
(e) Direct Chill Casting Contact Cooling Water	1.46	0.593	4.03	1.66	527	232	235	105	cast with direct chill method
(f) Surface Treatment Spent Baths	0.173	0.070	0.476	0.196	62.1	27.3	27.8	12.3	surface treated
(g) Surface Treatment Baths	0.700	0.284	1.93	0.794	252	111	113	49.9	surface treated
(h) Sawing/Grinding Spent Emulsions	0.007	0.003	0.020	0.008	2.60	1.15	1.16	0.515	sawed or ground
(i) Degreasing Spent Solvent	ND		ND		ND		ND		
(j) Wet Air Pollution Control Scrubber Blowdown	0.229	0.093	0.632	0.260	8.25	36.3	36.9	16.4	sanded and repaired or forged

[1] These standards are expressed in terms of mass of pollutant allowed per mass of product produced (off-kg or off-pound) in a given process. Off-kilogram or off-pound means the mass of metal or metal alloy removed from a forming operation at the end of a process cycle for transfer to a different machine or process.

[2] Max = Maximum pollutant level for any one day

[3] Avg = Maximum pollutant level for a monthly average of all samples taken

[4] ND = No discharge of process wastewater pollutants

APPENDIX C-9. PRETREATMENT STANDARDS FOR EXISTING SOURCES (PSES)
NONFERROUS METALS FORMING CATEGORY
SUBPART C - NICKEL-COBALT FORMING SUBCATEGORY

Pollutant Limits in mg/off-kg (pounds/million off-pounds)[1] of Nickel-Cobalt (40 CFR Part 471)

Process	Chromium		Nickel		Fluoride		Pollutant Unit Basis
	Max[2]	Avg[3]	Max	Avg	Max	Avg	
(a) Rolling Spent Neat Oils	ND[4]		ND		ND		
(b) Rolling Spent Emulsions	0.063	0.026	0.094	0.063	10.1	4.49	rolled with emulsions
(c) Rolling Contact Cooling Water	0.028	0.011	0.042	0.028	4.49	1.99	rolled with water
(d) Tube Reducing Spent Lubricants	ND		ND		ND		
(e) Drawing Spent Neat Oils	ND		ND		ND		
(f) Drawing Spent Emulsions	0.036	0.014	0.053	0.036	5.68	2.52	drawn with emulsions
(g) Extrusion Spent Lubricants	ND		ND		ND		
(h) Extrusion Press and Solution Heat Treatment Contact Cooling Water	0.031	0.013	0.046	0.031	4.95	2.20	heat treated
(i) Extrusion Press Hydraulic Fluid Leakage	0.086	0.034	0.128	0.086	13.8	6.13	extruded
(j) Forging Equipment Cleaning Wastewater	0.002	0.0006	0.002	0.002	0.238	0.106	forged
(k) Forging Contact Cooling Water	0.018	0.007	0.026	0.018	2.82	1.25	(forged nickel-cobalt) cooled with water
(l) Forging Press Hydraulic Fluid Leakage	0.069	0.028	0.103	0.069	11.2	4.94	forged
(m) Forging Spent Lubricants	ND		ND		ND		
(n) Stationary Casting Contact Cooling Water	0.448	0.182	0.666	0.448	72.0	32.0	cast with stationary methods methods
(o) Vacuum Melting Steam Condensate	ND		ND		ND		
(p) Metal Powder Production *Atomization Wastewater*	0.970	0.393	1.44	0.970	156	69.2	metal powder atomized
(q) Annealing Solution Heat Treatment Contact Cooling Water	ND		ND		ND		
(r) Wet Air Pollution Control Scrubber Blowdown	0.300	0.122	0.446	0.300	48.2	21.4	formed
(s) Surface Treatment Spent Baths	0.346	0.141	0.514	0.346	55.7	24.7	surface treated
(t) Surface Treatment Rinse	0.873	0.354	1.30	0.873	141	62.3	surface treated
(u) Alkaline Cleaning Spent Baths	0.013	0.005	0.019	0.013	2.02	0.895	alkaline cleaned
(v) Alkaline Cleaning Rinse	0.086	0.035	0.128	0.086	13.9	6.15	alkaline cleaned
(w) Molten Salt Rinse	0.312	0.127	0.464	0.312	50.2	22.3	treated with molten salt
(x) Ammonia Rinse	0.006	0.002	0.008	0.006	0.881	0.391	treated with ammonia solution
(y) Sawing/Grinding Spent Emulsions	0.015	0.006	0.022	0.015	2.35	1.04	sawed or ground with emulsions
(z) Sawing/Grinding Rinse	0.067	0.027	0.100	0.067	10.8	4.78	(sawed or ground nickel-cobalt) rinsed
(aa) Steam Cleaning Condensate	0.011	0.005	0.017	0.011	1.79	0.795	steam cleaned
(bb) Hydrostatic Tube Testing and Ultrasonic Testing Wastewater	ND		ND		ND		
(cc) Degreasing Spent Solvents	ND		ND		ND		
(dd) Dye Penetrant Testing Wastewater	0.079	0.032	0.117	0.079	---	---	tested with dye penetrant methods
(ee) Electrocoating Rinse	1.25	0.506	1.86	1.25	201	89.0	electrocoated
(ff) Miscellaneous Wastewater[5]	0.091	0.037	0.136	0.091	14.7	6.50	formed

[1]These standards are expressed in terms of mass of pollutant allowed per mass of product produced (off-kg or off-pound) in a given process. Off-kilogram or off-pound means the mass of metal or metal alloy removed from a forming operation at the end of a process cycle for transfer to a different machine or process.
[2]Max = Maximum pollutant level for any one day
[3]Avg = Maximum pollutant level for a monthly average of all samples taken
[4]ND = No discharge of process wastewater pollutants
[5]Miscellaneous Wastewater - wastestreams from maintenance and clean-up

APPENDIX C-10. PRETREATMENT STANDARDS FOR NEW SOURCES (PSNS)
NONFERROUS METALS FORMING CATEGORY
SUBPART C - NICKEL-COBALT FORMING SUBCATEGORY

Pollutant Limits in mg/off-kg (pounds/million off-pounds)[1] of Nickel-Cobalt (40 CFR Part 471)

Process	Chromium		Nickel		Fluoride		Pollutant Unit Basis
	Max[2]	Avg[3]	Max	Avg	Max	Avg	
(a) Rolling Spent Neat Oils	ND[4]		ND		ND		
(b) Rolling Spent Emulsions	0.063	0.026	0.094	0.063	10.1	4.49	rolled with emulsions
(c) Rolling Contact Cooling Water	0.028	0.012	0.042	0.028	4.49	1.99	rolled with water
(d) Tube Reducing Spent Lubricants	ND		ND		ND		
(e) Drawing Spent Neat Oils	ND		ND		ND		
(f) Drawing Spent Emulsions	0.036	0.015	0.053	0.036	5.68	2.52	drawn with emulsions
(g) Extrusion Spent Lubricants	ND		ND		ND		
(h) Extrusion Press and Solution Heat Treatment Contact Cooling Water	0.031	0.013	0.046	0.031	4.95	2.20	heat treated
(i) Extrusion Press Hydraulic Fluid Leakage	0.086	0.034	0.128	0.086	13.8	6.13	extruded
(j) Forging Equipment Cleaning Wastewater	0.002	0.0006	0.002	0.002	0.238	0.106	forged
(k) Forging Contact Cooling Water	0.018	0.007	0.026	0.018	2.82	1.25	(forged nickel-cobalt) cooled with water
(l) Forging Press Hydraulic Fluid Leakage	0.069	0.028	0.103	0.069	11.2	4.94	forged
(m) Forging Spent Lubricants	ND		ND		ND		
(n) Stationary Casting Contact Cooling Water	0.448	0.182	0.666	0.448	72.0	32.0	cast with stationary methods methods
(o) Vacuum Melting Steam Condensate	ND		ND		ND		
(p) Metal Powder Production Atomization Wastewater	0.970	0.393	1.44	0.970	156	69.2	metal powder atomized
(q) Annealing Solution Heat Treatment Contact Cooling Water	ND		ND		ND		
(r) Wet Air Pollution Control Scrubber Blowdown	0.300	0.122	0.450	0.300	48.2	21.4	formed
(s) Surface Treatment Spent Baths	0.346	0.141	0.515	0.346	55.7	24.7	surface treated
(t) Surface Treatment Rinse	0.874	0.354	1.30	0.873	141	62.3	surface treated
(u) Alkaline Cleaning Spent Baths	0.013	0.005	0.019	0.013	2.02	0.895	alkaline cleaned
(v) Alkaline Cleaning Rinse	0.086	0.035	0.128	0.086	13.9	6.15	alkaline cleaned
(w) Molten Salt Rinse	0.312	0.127	0.464	0.312	50.2	22.3	treated with molten salt
(x) Ammonia Rinse	0.006	0.002	0.008	0.006	0.881	0.391	treated with ammonia solution
(y) Sawing/Grinding Spent Emulsions	0.015	0.006	0.022	0.015	2.35	1.04	sawed or ground with emulsions
(z) Sawing/Grinding Rinse	0.067	0.027	0.100	0.067	10.8	4.78	(sawed or ground nickel-cobalt) rinsed
(aa) Steam Cleaning Condensate	0.011	0.005	0.017	0.011	1.79	0.795	steam cleaned
(bb) Hydrostatic Tube Testing and Ultrasonic Testing Wastewater	ND		ND		ND		
(cc) Degreasing Spent Solvents	ND		ND		ND		
(dd) Dye Penetrant Testing Wastewater	0.079	0.032	0.117	0.079	--	--	tested with dye penetrant methods
(ee) Electrocoating Rinse	1.25	0.506	1.86	0.125	201	89.0	electrocoated
(ff) Miscellaneous Wastewater[5]	0.091	0.037	0.136	0.091	14.7	6.50	formed

[1]These standards are expressed in terms of mass of pollutant allowed per mass of product produced (off-kg or off-pound) in a given process. Off-kilogram or off-pound means the mass of metal or metal alloy removed from a forming operation at the end of a process cycle for transfer to a different machine or process.
[2]Max = Maximum pollutant level for any one day
[3]Avg = Maximum pollutant level for a monthly average of all samples taken
[4]ND = No discharge of process wastewater pollutants
[5]Miscellaneous Wastewater - wastestreams from maintenance and clean-up

APPENDIX C-11. PRETREATMENT STANDARDS FOR EXISTING SOURCES (PSES)
NONFERROUS METALS FORMING CATEGORY
SUBPART D - PRECIOUS METALS FORMING SUBCATEGORY

Pollutant Limits in mg/off-kg (pounds/million off-pounds)[1] of Precious Metals (40 CFR Part 471)

	Cadmium		Copper		Cyanide		Silver		Pollutant Unit Basis
Process	Max[2]	Avg[3]	Max	Avg	Max	Avg	Max	Avg	
(a) Rolling Spent Neat Oils		ND[4]		ND		ND		ND	
(b) Rolling Spent Emulsions	0.026	0.012	0.147	0.077	0.023	0.010	0.032	0.013	rolled with emulsions
(c) Drawing Spent Neat Oils		ND		ND		ND		ND	
(d) Drawing Spent Emulsions	0.016	0.007	0.091	0.048	0.014	0.006	0.020	0.008	drawn with emulsions
(e) Drawing Spent Soap Solutions	0.001	0.0005	0.006	0.003	0.0009	0.0004	0.002	0.0006	drawn with soap solutions
(f) Metal Powder Production Atomization Wastewater	2.27	1.00	12.7	6.68	1.94	0.802	2.74	1.14	powder wet atomized
(g) Heat Treatment Contact Cooling Water	0.142	0.063	0.793	0.417	0.121	0.050	0.171	0.071	heat treated
(h) Semi-Continuous and Continuous Casting Contact Cooling Water	0.350	0.155	1.96	1.03	0.299	0.124	0.423	0.175	cast by semi-continuous or continuous method
(i) Stationary Casting Contact Cooling Water		ND		ND		ND		ND	
(j) Direct Chill Casting Contact Cooling Water	0.367	0.162	2.05	1.08	0.313	0.130	0.443	0.184	cast by direct chill method
(k) Shot Casting Contact Cooling Water	0.125	0.055	0.698	0.367	0.107	0.044	0.151	0.063	shot cast
(l) Wet Air Pollution Control Scrubber Blowdown		ND		ND		ND		ND	
(m) Pressure Bonding Contact Cooling Water	0.029	0.013	0.159	0.084	0.024	0.010	0.034	0.014	(precious metals) and base metal pressure bonded
(n) Surface Treatment Spent Baths	0.033	0.015	0.183	0.097	0.028	0.012	0.040	0.017	surface treated
(o) Surface Treatment Rinse	0.210	0.093	1.17	0.616	0.179	0.074	0.253	0.105	surface treated
(p) Alkaline Cleaning Spent Baths	0.021	0.009	0.114	0.060	0.018	0.007	0.025	0.010	alkaline cleaned
(q) Alkaline Cleaning Rinse	0.381	0.168	2.13	1.12	0.325	0.135	0.459	0.191	alkaline cleaned
(r) Alkaline Cleaning Prebonding Wastewater	0.400	0.174	2.21	1.16	0.337	0.139	0.476	0.197	(precious metals) and base metal cleaned prior to bonding
(s) Tumbling or Burnishing Wastewater	0.412	0.182	2.300	1.21	0.351	0.145	0.496	0.206	tumbled or burnished
(t) Sawing/Grinding Spent Neat Oils		ND		ND		ND		ND	
(u) Sawing/Grinding Spent Emulsions	0.032	0.014	0.178	0.094	0.027	0.011	0.038	0.016	sawed or ground with emulsions
(v) Degreasing Spent Solvents		ND		ND		ND		ND	

[1]These standards are expressed in terms of mass of pollutant allowed per mass of product produced (off-kg or off-pound) in a given process. Off-kilogram or off-pound means the mass of metal or metal alloy removed from a forming operation at the end of a process cycle for transfer to a different machine or process.
[2]Max = Maximum pollutant level for any one day
[3]Avg = Maximum pollutant level for a monthly average of all samples taken
[4]ND = No discharge of process wastewater pollutants

APPENDIX C-12. PRETREATMENT STANDARDS FOR NEW SOURCES (PSNS)
NONFERROUS METALS FORMING CATEGORY
SUBPART D - PRECIOUS METALS FORMING SUBCATEGORY

Pollutant Limits in mg/off-kg (pounds/million off-pounds)[1] of Precious Metals (40 CFR Part 471)

	Cadmium		Copper		Cyanide		Silver		Pollutant Unit Basis
Process	Max[2]	Avg[3]	Max	Avg	Max	Avg	Max	Avg	
(a) Rolling Spent Neat Oils		ND[4]		ND		ND		ND	
(b) Rolling Spent Emulsions	0.026	0.012	0.147	0.077	0.023	0.010	0.032	0.013	rolled with emulsions
(c) Drawing Spent Neat Oils		ND		ND		ND		ND	
(d) Drawing Spent Emulsions	0.016	0.007	0.091	0.048	0.014	0.006	0.020	0.008	drawn with emulsions
(e) Drawing Spent Soap Solutions	0.001	0.0005	0.006	0.003	0.0009	0.0004	0.002	0.0006	drawn with soap solutions
(f) Metal Powder Production Atomization Wastewater	2.27	1.00	12.7	6.68	1.94	0.802	2.74	1.14	powder wet atomized
(g) Heat Treatment Contact Cooling Water	0.142	0.063	0.793	0.417	0.121	0.050	0.171	0.071	heat treated
(h) Semi-Continuous and Continuous Casting Contact Cooling Water	0.350	0.155	1.96	1.03	0.299	0.124	0.423	0.175	cast by semi-continuous or continuous method
(i) Stationary Casting Contact Cooling Water		ND		ND		ND		ND	
(j) Direct Chill Casting Contact Cooling Water	0.367	0.162	2.05	1.08	0.313	0.130	0.443	0.184	cast by direct chill method
(k) Shot Casting Contact Cooling Water	0.125	0.055	0.698	0.367	0.107	0.044	0.151	0.063	shot cast
(l) Wet Air Pollution Control Scrubber Blowdown		ND		ND		ND		ND	
(m) Pressure Bonding Contact Cooling Water	0.029	0.013	0.159	0.084	0.024	0.010	0.034	0.014	(precious metals) and base metal pressure bonded
(n) Surface Treatment Spent Baths	0.033	0.015	0.183	0.097	0.028	0.012	0.040	0.017	surface treated
(o) Surface Treatment Rinse	0.210	0.093	1.17	0.616	0.179	0.074	0.253	0.105	surface treated
(p) Alkaline Cleaning Spent Baths	0.021	0.009	0.114	0.060	0.018	0.007	0.025	0.010	alkaline cleaned
(q) Alkaline Cleaning Rinse	0.381	0.168	2.13	1.12	0.325	0.135	0.459	0.191	alkaline cleaned
(r) Alkaline Cleaning Prebonding Wastewater	0.400	0.174	2.21	1.16	0.337	0.139	0.476	0.197	(precious metals) and base metal cleaned prior to bonding
(s) Tumbling or Burnishing Wastewater	0.412	0.182	2.300	1.21	0.351	0.145	0.496	0.206	tumbled or burnished
(t) Sawing/Grinding Spent Neat Oils		ND		ND		ND		ND	
(u) Sawing/Grinding Spent Emulsions	0.032	0.014	0.178	0.094	0.027	0.011	0.038	0.016	sawed or ground with emulsions
(v) Degreasing Spent Solvents		ND		ND		ND		ND	

[1]These standards are expressed in terms of mass of pollutant allowed per mass of product produced (off-kg or off-pound) in a given process. Off-kilogram or off-pound means the mass of metal or metal alloy removed from a forming operation at the end of a process cycle for transfer to a different machine or process.
[2]Max = Maximum pollutant level for any one day
[3]Avg = Maximum pollutant level for a monthly average of all samples taken
[4]ND = No discharge of process wastewater pollutants

APPENDIX C-13. PRETREATMENT STANDARDS FOR EXISTING SOURCES (PSES)
NONFERROUS METALS FORMING CATEGORY
SUBPART E - REFRACTORY METALS FORMING SUBCATEGORY

Pollutant Limits in mg/off-kg (pounds/million off-pounds)[1] of Refractory Metals (40 CFR Part 471)

Process	Copper Max[2]	Copper Avg[3]	Nickel Max	Nickel Avg	Fluoride Max	Fluoride Avg	Molybdenum Max	Molybdenum Avg	Pollutant Unit Basis
(a) Rolling Spent Neat Oils and Graphite-Based Lubricants	ND[4]		ND		ND		ND		
(b) Rolling Spent Emulsions	0.815	0.429	0.824	0.545	25.5	11.4	2.84	1.47	rolled with emulsions
(c) Drawing Spent Lubricants	ND		ND		ND		ND		
(d) Extrusion Spent Lubricants	ND		ND		ND		ND		
(e) Extrusion Press Hydraulic Fluid Leakage	2.26	1.19	2.29	1.51	70.8	31.4	7.87	4.07	extruded
(f) Forging Spent Lubricants	ND		ND		ND		ND		
(g) Forging Contact Cooling Water	0.062	0.033	0.062	0.041	1.92	0.853	0.214	0.111	(forged refractory metals) cooled with water
(h) Equipment Cleaning Wastewater	0.259	0.136	0.261	0.173	8.09	3.59	0.899	0.465	formed
(i) Metal Powder Production Wastewater	0.534	0.281	0.540	0.357	16.7	7.42	1.86	0.961	powder produced
(j) Metal Powder Production Floor Wash Wastewater	ND		ND		ND		ND		
(k) Metal Powder Pressing Spent Lubricants	ND		ND		ND		ND		
(l) Surface Treatment Spent Baths	0.739	0.389	0.747	0.494	23.2	10.3	2.57	1.33	surface treated
(m) Surface Treatment Rinse	23.0	12.1	23.3	15.4	720	320	80.0	41.4	surface treated
(n) Alkaline Cleaning Spent Baths	0.635	0.334	0.642	0.424	19.9	8.82	2.21	1.14	alkaline cleaned
(o) Alkaline Cleaning Rinse	15.5	8.16	15.7	10.4	486.0	216.0	54.0	27.9	alkaline cleaned
(p) Molten Salt Rinse	1.20	0.633	1.22	0.804	37.7	16.7	4.19	2.17	treated with molten salt
(q) Tumbling/Burnishing Wastewater	2.38	1.25	2.40	1.59	74.4	33.0	8.27	4.28	tumbled or burnished
(r) Sawing/Grinding Spent Neat Oils	ND		ND		ND		ND		
(s) Sawing/Grinding Spent Emulsions	0.565	0.297	0.570	0.377	17.7	7.84	1.97	1.02	sawed or ground with emulsions
(t) Sawing/Grinding Contact Cooling Water	4.62	2.43	4.67	3.09	145.0	64.2	16.1	8.31	sawed or ground with contact cooling water
(u) Sawing/Grinding Rinse	0.026	0.014	0.026	0.017	0.804	0.357	0.089	0.046	(sawed or ground refractory metals) rinsed
(v) Wet Air Pollution Control Blowdown	1.50	0.787	1.51	1.00	46.9	20.8	5.20	2.69	sawed, ground, surface coated or surface treated
(w) Miscellaneous Wastewater Sources	0.656	0.345	0.663	0.438	20.6	9.11	2.28	1.18	formed
(x) Dye Penetrant Testing Wastewater	0.148	0.078	0.149	0.099	4.62	2.05	0.513	0.266	product tested
(y) Degreasing Spent Solvents	ND		ND		ND		ND		

[1] These standards are expressed in terms of mass of pollutant allowed per mass of product produced (off-kg or off-pound) in a given process. Off-kilogram or off-pound means the mass of metal or metal alloy removed from a forming operation at the end of a process cycle for transfer to a different machine or process.
[2] Max = Maximum pollutant level for any one day
[3] Avg = Maximum pollutant level for a monthly average of all samples taken
[4] ND = No discharge of process wastewater pollutants

APPENDIX C-14. PRETREATMENT STANDARDS FOR NEW SOURCES (PSNS)
NONFERROUS METALS FORMING CATEGORY
SUBPART E - REFRACTORY METALS FORMING SUBCATEGORY

Pollutant Limits in mg/off-kg (pounds/million off-pounds)[1] of Refractory Metals (40 CFR Part 471)

Process	Copper		Nickel		Fluoride		Molybdenum		Pollutant Unit Basis
	Max[2]	Avg[3]	Max	Avg	Max	Avg	Max	Avg	
(a) Rolling Spent Neat Oils and Graphite-Based Lubricants	ND[4]		ND		ND		ND		
(b) Rolling Spent Emulsions	0.549	0.262	0.236	0.159	25.5	11.3	2.16	0.957	rolled with emulsions
(c) Drawing Spent Lubricants	ND		ND		ND		ND		
(d) Extrusion Spent Lubricants	ND		ND		ND		ND		
(e) Extrusion Press Hydraulic Fluid Leakage	1.53	0.726	0.655	0.441	70.8	31.4	5.99	2.66	extruded
(f) Forging Spent Lubricants	ND		ND		ND		ND		
(g) Forging Contact Cooling Water	0.041	0.320	0.018	0.21	1.92	0.853	0.163	0.072	(forged refractory metals) cooled with water
(h) Equipment Cleaning Wastewater	0.174	0.063	0.075	0.051	8.09	3.59	0.684	0.303	formed
(i) Metal Powder Production Wastewater	0.360	0.172	0.155	0.104	16.7	7.42	1.42	0.627	powder produced
(j) Metal Powder Production Floor Wash Wastewater	ND		ND		ND		ND		
(k) Metal Powder Pressing Spent Lubricants	ND		ND		ND		ND		
(l) Surface Treatment Spent Baths	0.496	0.237	0.214	0.144	23.2	10.3	1.96	0.868	surface treated
(m) Surface Treatment Rinse	15.5	7.36	6.66	4.48	720	320	60.9	27.0	surface treated
(n) Alkaline Cleaning Spent Baths	0.428	0.204	0.184	0.124	19.9	8.82	1.68	0.745	alkaline cleaned
(o) Alkaline Cleaning Rinse	10.5	4.96	4.49	3.02	48.6	216.0	41.1	18.2	alkaline cleaned
(p) Molten Salt Rinse	0.810	0.386	0.348	0.234	37.7	16.7	3.19	1.41	treated with molten salt
(q) Tumbling/Burnishing Wastewater	1.60	0.763	0.688	0.463	74.4	33.0	6.29	2.79	tumbled or burnished
(r) Sawing/Grinding Spent Neat Oils	ND		ND		ND		ND		
(s) Sawing/Grinding Spent Emulsions	0.380	0.181	0.164	0.110	17.7	7.84	1.50	0.663	sawed or ground with emulsions
(t) Sawing/Grinding Contact Cooling Water	3.11	1.48	1.34	0.899	145.0	64.2	12.2	5.42	sawed or ground with contact cooling water
(u) Sawing/Grinding Rinse	0.018	0.009	0.008	0.005	0.803	0.357	0.068	0.030	(sawed or ground refractory metals) rinsed
(v) Wet Air Pollution Control Blowdown	1.01	0.480	0.433	0.291	46.8	20.8	3.96	1.76	sawed, ground, surface coated or surface treated
(w) Miscellaneous Wastewater Sources	0.442	0.211	0.192	0.128	--	--	1.74	0.770	formed
(x) Dye Penetrant Testing Wastewater	0.100	0.048	0.043	0.029	4.62	2.05	0.391	0.173	product tested
(y) Degreasing Spent Solvents	ND		ND		ND		ND		

[1] These standards are expressed in terms of mass of pollutant allowed per mass of product produced (off-kg or off-pound) in a given process. Off-kilogram or off-pound means the mass of metal or metal alloy removed from a forming operation at the end of a process cycle for transfer to a different machine or process.
[2] Max = Maximum pollutant level for any one day
[3] Avg = Maximum pollutant level for a monthly average of all samples taken
[4] ND = No discharge of process wastewater pollutants

APPENDIX C-15. PRETREATMENT STANDARDS FOR EXISTING SOURCES (PSES)
NONFERROUS METALS FORMING CATEGORY
SUBPART F - TITANIUM FORMING SUBCATEGORY

Pollutant Limits in mg/off-kg (pounds/million off-pounds)[1] of Titanium (40 CFR Part 471)

Process	Cyanide		Lead		Zinc		Ammonia		Fluoride		Pollutant Unit Basis
	Max[2]	Avg[3]	Max	Avg	Max	Avg	Max	Avg	Max	Avg	
(a) Rolling Spent Neat Oils	ND[4]		ND		ND		ND		ND		
(b) Rolling Contact Cooling Water	0.142	0.059	0.205	0.098	0.713	0.298	65.1	28.6	29.1	12.9	rolled with contact cooling water
(c) Drawing Spent Neat Oils	ND		ND		ND		ND		ND		
(d) Extrusion Spent Neat Oils	ND		ND		ND		ND		ND		
(e) Extrusion Spent Emulsions	0.021	0.009	0.030	0.015	0.105	0.044	9.59	4.22	4.28	1.90	extruded
(f) Extrusion Press Hydraulic Fluid Leakage	0.052	0.022	0.75	0.036	0.260	0.109	23.7	10.5	10.6	4.70	extruded
(g) Forging Spent Lubricants	ND		ND		ND		ND		ND		
(h) Forging Contact Cooling Water	0.029	0.012	0.042	0.020	0.146	0.061	13.3	5.86	5.95	2.64	(forged titanium) cooled with water
(i) Forging Equipment Cleaning Wastewater	0.012	0.005	0.017	0.008	0.059	0.025	5.33	2.35	2.38	1.06	forged
(j) Forging Press Hydraulic Fluid Leakage	0.293	0.121	0.424	0.202	1.48	0.616	135	59.2	60.1	26.7	forged
(k) Tube Reducing Spent Lubricants	ND		ND		ND		ND		ND		
(l) Heat Treatment Contact Cooling Water	ND		ND		ND		ND		ND		
(m) Surface Treatment Spent Baths	0.061	0.025	0.088	0.042	0.304	0.127	27.7	12.2	12.4	5.49	surface treated
(n) Surface Treatment Rinse	0.847	0.351	1.23	0.584	4.27	1.78	389	171	174	77.1	surface treated
(o) Wet Air Pollution Control Scrubber Blowdown	0.062	0.026	0.090	0.043	0.313	0.131	28.5	12.6	12.8	5.65	surface treated or forged
(p) Alkaline Cleaning Spent Baths	0.070	0.029	0.101	0.048	0.351	0.147	32.0	14.1	14.3	6.34	alkaline cleaned
(q) Alkaline Cleaning Rinse	0.080	0.033	0.116	0.055	0.403	0.169	36.8	16.2	16.4	7.29	alkaline cleaned
(r) Molten Salt Rinse	0.277	0.115	0.401	0.191	1.40	0.583	128	56.0	56.8	25.2	treated with molten salt
(s) Tumbling Wastewater	0.023	0.010	0.033	0.016	0.116	0.048	10.6	4.63	4.70	2.09	tumbled
(t) Sawing/Grinding Spent Neat Oils	ND		ND		ND		ND		ND		
(u) Sawing/Grinding Spent Emulsions	0.053	0.022	0.077	0.037	0.267	0.112	24.4	10.7	10.9	4.83	sawed or ground with emulsions
(v) Sawing/Grinding Contact Cooling Water	0.138	0.057	0.200	0.095	0.695	0.291	63.5	27.9	28.3	12.6	sawed or ground with contact cooling water
(w) Dye Penetrant Testing Wastewater	0.325	0.135	0.471	0.224	1.64	0.638	149	65.7	66.7	29.6	treated using dye penetrant method
(x) Miscellaneous Wastewater Sources	0.010	0.004	0.014	0.007	0.048	0.020	4.32	1.90	1.93	0.858	formed
(y) Degreasing Spent Solvents	ND		ND		ND		ND		ND		

[1]These standards are expressed in terms of mass of pollutant allowed per mass of product produced (off-kg or off-pound) in a given process. Off-kilogram or off-pound means the mass of metal or metal alloy removed from a forming operation at the end of a process cycle for transfer to a different machine or process.
[2]Max = Maximum pollutant level for any one day
[3]Avg = Maximum pollutant level for a monthly average of all samples taken
[4]ND = No discharge of process wastewater pollutants

APPENDIX C-16. PRETREATMENT STANDARDS FOR NEW SOURCES (PSNS)
NONFERROUS METALS FORMING SUBCATEGORY
SUBPART F - TITANIUM FORMING SUBCATEGORY

Pollutant Limits in mg/off-kg (pounds/million off-pounds)[1] of Titanium (40 CFR Part 471)

	Cyanide		Lead		Zinc		Ammonia		Fluoride		Pollutant Unit Basis
Process	Max[2]	Avg[3]	Max	Avg	Max	Avg	Max	Avg	Max	Avg	
(a) Rolling Spent Neat Oils	ND[4]		ND		ND		ND		ND		
(b) Rolling Contact Cooling Water	0.142	0.059	0.205	0.098	0.713	0.298	65.1	28.6	29.1	12.9	rolled with contact cooling water
(c) Drawing Spent Neat Oils	ND		ND		ND		ND		ND		
(d) Extrusion Spent Neat Oils	ND		ND		ND		ND		ND		
(e) Extrusion Spent Emulsions	0.021	0.009	0.030	0.015	0.105	0.044	9.59	4.22	4.28	1.90	extruded
(f) Extrusion Press Hydraulic Fluid Leakage	0.052	0.022	0.75	0.036	0.260	0.109	23.7	10.5	10.6	4.70	extruded
(g) Forging Spent Lubricants	ND		ND		ND		ND		ND		
(h) Forging Contact Cooling Water	0.029	0.012	0.042	0.020	0.146	0.061	13.3	5.86	5.95	2.64	(forged titanium) cooled with water
(i) Forging Equipment Cleaning Wastewater	0.012	0.005	0.017	0.008	0.059	0.025	5.33	2.35	2.38	1.06	forged
(j) Forging Press Hydraulic Fluid Leakage	0.293	0.121	0.424	0.202	1.48	0.616	135	59.2	60.1	26.7	forged
(k) Tube Reducing Spent Lubricants	ND		ND		ND		ND		ND		
(l) Heat Treatment Contact Cooling Water	ND		ND		ND		ND		ND		
(m) Surface Treatment Spent Baths	0.061	0.025	0.088	0.042	0.304	0.127	27.7	12.2	12.4	5.49	surface treated
(n) Surface Treatment Rinse	0.847	0.351	1.23	0.584	4.27	1.78	389	171	174	77.1	surface treated
(o) Wet Air Pollution Control Scrubber Blowdown	0.062	0.026	0.090	0.043	0.313	0.131	28.5	12.6	12.8	5.65	surface treated or forged
(p) Alkaline Cleaning Spent Baths	0.070	0.029	0.101	0.048	0.351	0.147	32.0	14.1	14.3	6.34	alkaline cleaned
(q) Alkaline Cleaning Rinse	0.080	0.033	0.116	0.055	0.403	0.169	36.8	16.2	16.4	7.29	alkaline cleaned
(r) Molten Salt Rinse	0.277	0.115	0.401	0.191	1.40	0.583	128	56.0	56.8	25.2	treated with molten salt
(s) Tumbling Wastewater	0.023	0.010	0.033	0.016	0.116	0.048	10.6	4.63	4.70	2.09	tumbled
(t) Sawing/Grinding Spent Neat Oils	ND		ND		ND		ND		ND		
(u) Sawing/Grinding Spent Emulsions	0.053	0.022	0.077	0.037	0.267	0.112	24.4	10.7	10.9	4.83	sawed or ground with emulsions
(v) Sawing/Grinding Contact Cooling Water	0.138	0.057	0.200	0.095	0.695	0.291	63.5	27.9	28.3	12.6	sawed or ground with contact cooling water
(w) Dye Penetrant Testing Wastewater	0.325	0.135	0.471	0.224	1.64	0.638	149	65.7	66.7	29.6	treated using dye penetrant method
(x) Miscellaneous Wastewater Sources	0.010	0.004	0.014	0.007	0.048	0.020	4.32	1.90	1.93	0.858	formed
(y) Degreasing Spent Solvents	ND		ND		ND		ND		ND		

[1] These standards are expressed in terms of mass of pollutant allowed per mass of product produced (off-kg or off-pound) in a given process. Off-kilogram or off-pound means the mass of metal or metal alloy removed from a forming operation at the end of a process cycle for transfer to a different machine or process.
[2] Max = Maximum pollutant level for any one day
[3] Avg = Maximum pollutant level for a monthly average of all samples taken
[4] ND = No discharge of process wastewater pollutants

APPENDIX C-17. PRETREATMENT STANDARDS FOR EXISTING SOURCES (PSES)
NONFERROUS METALS FORMING CATEGORY
SUBPART G - URANIUM FORMING SUBCATEGORY

RESERVED

PRETREATMENT STANDARDS FOR NEW SOURCES (PSNS)
NONFERROUS METALS FORMING CATEGORY
SUBPART G - URANIUM FORMING SUBCATEGORY

Pollutant Limits in mg/off-kg (pounds/million off-pounds)[1] of Uranium (40 CFR Part 471)

	Cadmium		Chromium		Copper		Lead		Nickel		Fluoride		Molybdenum		Pollutant Unit Basis
Process	Max[2]	Avg[3]	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	
(a) Extrusion Spent Lubricants	ND[4]		ND		ND		ND		ND		ND		ND		
(b) Extrusion Tool Contact Cooling Water	0.007	0.003	0.013	0.005	0.044	0.021	0.010	0.005	0.019	0.013	2.05	0.908	0.173	0.077	extruded
(c) Heat Treatment Contact Cooling Water	0.006	0.003	0.012	0.005	0.040	0.019	0.009	0.004	0.017	0.012	1.86	0.827	0.158	0.070	(extruded or forged uranium) heat treated
(d) Forging Spent Lubricants	ND		ND		ND		ND		ND		ND		ND		
(e) Surface Treatment Spent Baths	0.006	0.002	0.010	0.004	0.035	0.017	0.008	0.004	0.015	0.010	1.62	0.718	0.137	0.061	surface treated
(f) Surface Treatment Rinse	0.068	0.027	0.125	0.051	0.432	0.206	0.095	0.044	0.186	0.125	20.1	8.90	1.70	0.752	surface treated
(g) Wet Air Pollution Control Scrubber Blowdown	0.0007	0.0003	0.001	0.0005	0.005	0.002	0.001	0.0005	0.002	0.001	0.208	0.092	0.018	0.008	surface treated
(h) Sawing/Grinding Spent Emulsions	0.001	0.0005	0.002	0.0009	0.007	0.004	0.002	0.0008	0.003	0.002	0.338	0.150	0.029	0.013	sawed or ground with emulsions
(i) Sawing/Grinding Contact Cooling Water	0.033	0.013	0.061	0.025	0.211	0.101	0.046	0.022	0.091	0.061	9.82	4.36	0.830	0.368	sawed or ground with contact cooling water
(j) Sawing/Grinding Rinse	0.001	0.0004	0.002	0.0007	0.006	0.003	0.002	0.0006	0.003	0.002	0.277	0.123	0.024	0.011	(sawed or ground titanium) rinsed
(k) Area Cleaning Rinse	0.009	0.004	0.016	0.007	0.055	0.026	0.012	0.006	0.024	0.016	2.56	1.14	0.216	0.096	formed
(l) Drum Washwater	0.009	0.004	0.017	0.007	0.057	0.027	0.013	0.006	0.025	0.017	2.64	1.17	0.223	0.099	formed
(m) Laundry Washwater**	5.24	2.10	9.70	3.93	33.6	16.0	7.34	3.41	14.4	9.70	1,560	692.	132.	58.4	**mg/employee day
(n) Degreasing Spent Solvents	ND		ND		ND		ND		ND		ND		ND		

[1]These standards are expressed in terms of mass of pollutant allowed per mass of product produced (off-kg or off-pound) in a given process. Off-kilogram or off-pound means the mass of metal or metal alloy removed from a forming operation at the end of a process cycle for transfer to a different machine or process.
[2]Max = Maximum pollutant level for any one day
[3]Avg = Maximum pollutant level for a monthly average of all samples taken
[4]ND = No discharge of process wastewater pollutants

APPENDIX C-18. PRETREATMENT STANDARDS FOR EXISTING SOURCES (PSES)
NONFERROUS METALS FORMING CATEGORY
SUBPART H - ZINC FORMING SUBCATEGORY

RESERVED

PRETREATMENT STANDARDS FOR NEW SOURCES (PSNS)
NONFERROUS METALS FORMING CATEGORY
SUBPART H - ZINC FORMING SUBCATEGORY

Pollutant Limits in mg/off-kg (pounds/million off-pounds)[1] of Zinc (40 CFR Part 471)

	Chromium		Copper		Cyanide		Zinc		Pollutant Unit Basis
Process	Max[2]	Avg[3]	Max	Avg	Max	Avg	Max	Avg	
(a) Rolling Spent Neat Oils	ND[4]		ND		ND		ND		
(b) Rolling Spent Emulsions	0.0005	0.0002	0.002	0.0009	0.0003	0.0001	0.002	0.0006	rolled with emulsions
(c) Rolling Contact Cooling Water	0.020	0.008	0.069	0.033	0.011	0.004	0.055	0.023	rolled with contact cooling water
(d) Drawing Spent Emulsions	0.002	0.0009	0.008	0.004	0.001	0.0005	0.006	0.003	drawn with emulsions
(e) Direct Chill Casting Contact Cooling Water	0.019	0.008	0.065	0.031	0.010	0.004	0.052	0.021	cast by direct chill method
(f) Stationary Casting Contact Cooling Water	ND		ND		ND		ND		
(g) Heat Treatment Contact Cooling Water	0.029	0.012	0.098	0.047	0.016	0.006	0.078	0.032	heat treated
(h) Surface Treatment Spent Baths	0.033	0.014	0.114	0.054	0.018	0.007	0.091	0.038	surface treated
(i) Surface Treatment Rinse	0.133	0.054	0.459	0.219	0.072	0.029	0.365	0.151	surface treated
(j) Alkaline Cleaning Spent Baths	0.002	0.0006	0.005	0.002	0.0007	0.0003	0.004	0.002	alkaline cleaned
(k) Alkaline Cleaning Rinse	0.626	0.254	2.17	1.03	0.338	0.134	1.73	0.710	alkaline cleaned
(l) Sawing/Grinding Spent Emulsions	0.009	0.004	0.031	0.015	0.005	0.002	0.025	0.010	sawed or ground with emulsions
(m) Electrocoating Rinse	0.085	0.035	0.293	0.140	0.046	0.019	0.234	0.096	electrocoated
(n) Degreasing Spent Solvents	ND		ND		ND		ND		

[1]These standards are expressed in terms of mass of pollutant allowed per mass of product produced (off-kg or off-pound) in a given process. Off-kilogram or off-pound means the mass of metal or metal alloy removed from a forming operation at the end of a process cycle for transfer to a different machine or process.
[2]Max = Maximum pollutant level for any one day
[3]Avg = Maximum pollutant level for a monthly average of all samples taken
[4]ND = No discharge of process wastewater pollutants

APPENDIX C-19. PRETREATMENT STANDARDS FOR EXISTING SOURCES (PSES)
NONFERROUS METALS FORMING CATEGORY
SUBPART I - ZIRCONIUM/HAFNIUM FORMING SUBCATEGORY

Pollutant Limits in mg/off-kg (pounds/million off-pounds)[1] of Zirconium-Hafnium (40 CFR Part 471)

Process	Chromium		Cyanide		Nickel		Ammonia		Fluoride		Pollutant Unit Basis
	Max[2]	Avg[3]	Max	Avg	Max	Avg	Max	Avg	Max	Avg	
(a) Rolling Spent Neat Oils	ND[4]		ND		ND		ND		ND		
(b) Drawing Spent Lubricants	ND		ND		ND		ND		ND		
(c) Extrusion Spent Emulsions	ND		ND		ND		ND		ND		
(d) Extrusion Press Hydraulic Fluid Leakage	0.104	0.043	0.069	0.029	0.455	0.301	31.6	13.9	14.1	6.26	extruded
(e) Swaging Spent Neat Oils	ND		ND		ND		ND		ND		
(f) Heat Treatment Contact Cooling Water	0.015	0.006	0.010	0.004	0.066	0.044	4.57	2.01	2.04	0.906	heat treated
(g) Tube Reducing Spent Lubricants	ND		ND		ND		ND		ND		
(h) Surface Treatment Spent Baths	0.150	0.061	0.099	0.041	0.653	0.432	45.3	20.0	20.0	8.98	surface treated
(i) Surface Treatment Rinse	0.391	0.160	0.258	0.107	1.71	1.13	119	52.1	52.9	23.5	surface treated
(j) Alkaline Cleaning Spent Baths	0.704	0.288	0.464	0.192	3.07	2.03	214	93.8	95.2	42.3	alkaline cleaned
(k) Alkaline Cleaning Rinse	1.38	0.565	0.911	0.377	6.03	3.99	419	184	187	82.9	alkaline cleaned
(l) Sawing/Grinding Spent Emulsions	0.124	0.051	0.082	0.034	0.540	0.357	37.5	16.50	16.7	7.42	sawed or ground with emulsions
(m) Wet Air Pollution Control Scrubber Blowdown	NA[5]		NA		NA		NA		NA		
(n) Degreasing Spent Solvents	ND		ND		ND		ND		ND		
(o) Degreasing Rinse	ND		ND		ND		ND		ND		
(p) Molten Salt Rinse	0.333	0.136	0.220	0.091	1.45	0.960	101	44.3	45	20	treated with molten salt
(q) Sawing/Grinding Contact Cooling Water	0.142	0.058	0.093	0.039	0.617	0.408	42.8	18.8	19.1	8.48	sawed or ground with contact cooling water
(r) Sawing/Grinding Rinse	0.079	0.033	0.052	0.022	0.346	0.229	24.0	10.6	10.7	4.75	(sawed or ground zirconium hafnium) rinsed
(s) Sawing/Grinding Spent Neat Oils	ND		ND		ND		ND		ND		
(t) Inspection and Testing Wastewater	0.007	0.003	0.005	0.002	0.030	0.020	2.06	0.903	0.917	0.407	tested

[1]These standards are expressed in terms of mass of pollutant allowed per mass of product produced (off-kg or off-pound) in a given process. Off-kilogram or off-pound means the mass of metal or metal alloy removed from a forming operation at the end of a process cycle for transfer to a different machine or process.
[2]Max = Maximum pollutant level for any one day
[3]Avg = Maximum pollutant level for a monthly average of all samples taken
[4]ND = No discharge of process wastewater pollutants
[5]NA = No allowance for the discharge of process wastewater pollutants

APENDIX C-20. PRETREATMENT STANDARDS FOR NEW SOURCES (PSNS)
NONFERROUS METALS FORMING CATEGORY
SUBPART I - ZIRCONIUM/HAFNIUM FORMING SUBCATEGORY

Pollutant Limits in mg/kg (pounds/million off-pounds)[1] of Zirconium-Hafnium (40 CFR Part 471)

Process	Chromium		Cyanide		Nickel		Ammonia		Fluoride		Pollutant Unit Basis
	Max[2]	Avg[3]	Max	Avg	Max	Avg	Max	Avg	Max	Avg	
(a) Rolling Spent Neat Oils	ND[4]		ND		ND		ND		ND		
(b) Drawing Spent Lubricants	ND		ND		ND		ND		ND		
(c) Extrusion Spent Emulsions	ND		ND		ND		ND		ND		
(d) Extrusion Press Hydraulic Fluid Leakage	0.104	0.043	0.069	0.029	0.455	0.301	31.6	13.9	14.1	6.26	extruded
(e) Swaging Spent Neat Oils	ND		ND		ND		ND		ND		
(f) Heat Treatment Contact Cooling Water	0.015	0.006	0.010	0.004	0.066	0.044	4.57	2.01	2.04	0.906	heat treated
(g) Tube Reducing Spent Lubricants	ND		ND		ND		ND		ND		
(h) Surface Treatment Spent Baths	0.150	0.061	0.099	0.041	0.653	0.432	45.3	20.0	20.0	8.98	surface treated
(i) Surface Treatment Rinse	0.391	0.160	0.258	0.107	1.71	1.13	119	52.1	52.9	23.5	surface treated
(j) Alkaline Cleaning Spent Baths	0.704	0.288	0.464	0.192	3.07	2.03	214	93.8	95.2	42.3	alkaline cleaned
(k) Alkaline Cleaning Rinse	1.38	0.565	0.911	0.377	6.03	3.99	419	184	187	82.9	alkaline cleaned
(l) Sawing/Grinding Spent Emulsions	0.124	0.051	0.082	0.034	0.540	0.357	37.5	16.50	16.7	7.42	sawed or ground with emulsions
(m) Wet Air Pollution Control Scrubber Blowdown	NA[5]		NA		NA		NA		NA		
(n) Degreasing Spent Solvents	ND		ND		ND		ND		ND		
(o) Degreasing Rinse	ND		ND		ND		ND		ND		
(p) Molten Salt Rinse	0.333	0.136	0.220	0.091	1.45	0.960	101	44.3	45.0	20.0	treated with molten salt
(q) Sawing/Grinding Contact Cooling Water	0.142	0.058	0.093	0.039	0.617	0.408	42.8	18.8	19.1	8.48	sawed or ground with contact cooling water
(r) Sawing/Grinding Rinse	0.079	0.033	0.052	0.022	0.346	0.229	24.0	10.6	10.7	4.75	(sawed or ground zirconium hafnium) rinsed
(s) Sawing/Grinding Spent Neat Oils	ND		ND		ND		ND		ND		
(t) Inspection and Testing Wastewater	0.007	0.003	0.005	0.002	0.030	0.020	2.06	0.903	0.917	0.407	tested

[1]These standards are expressed in terms of mass of pollutant allowed per mass of product produced (off-kg or off-pound) in a given process. Off-kilogram or off-pound means the mass of metal or metal alloy removed from a forming operation at the end of a process cycle for transfer to a different machine or process.
[2]Max = Maximum pollutant level for any one day
[3]Avg = Maximum pollutant level for a monthly average of all samples taken
[4]ND = No discharge of process wastewater pollutants
[5]NA = No allowance for the discharge of process wastewater pollutants

APPENDIX C-21. PRETREATMENT STANDARDS FOR EXISTING SOURCES (PSES)
NONFERROUS METALS FORMING CATEGORY
SUBPART J - METAL POWDERS SUBCATEGORY

Pollutant Limits in mg/kg (pounds/million off-pounds)[1] of Powder (40 CFR Part 471)

Process	Copper		Cyanide		Lead		Pollutant Unit Basis
	Max[2]	Avg[3]	Max	Avg	Max	Avg	
(a) Metal Powder Production Atomization Wastewater	9.58	5.040	1.46	0.605	2.12	1.01	wet atomized
(b) Sizing Spent Emulsions	0.028	0.015	0.004	0.002	0.006	0.003	sized
(c) Oil-Resin Impregnation Wastewater	ND[4]		ND		ND		
(d) Steam Treatment Wet Air Pollution Control Scrubber Blowdown	1.51	0.792	0.230	0.095	0.333	0.159	metallurgy part steam treated
(e) Tumbling, Burnishing and Cleaning Wastewater	8.36	4.40	1.28	0.528	1.85	0.880	metallurgy part tumbled, burnished or cleaned
(f) Sawing/Grinding Spent Neat Oils	ND		ND		ND		
(g) Sawing/Grinding Spent Emulsions	0.035	0.018	0.005	0.002	0.008	0.004	sawed or ground with emulsions
(h) Sawing/Grinding Contact Cooling Water	3.08	1.62	0.470	0.195	0.681	0.324	sawed or ground with contact cooling water
(i) Hot Press Contact Cooling Water	16.7	8.80	2.55	1.06	3.70	1.76	cooled after pressing
(j) Mixing Wet Air Pollution Control Scrubber Blowdown	15.0	7.90	2.29	0.948	3.32	1.58	mixed
(k) Degreasing Spent Solvents	ND		ND		ND		

[1] These standards are expressed in terms of mass of pollutant allowed per mass of product produced (off-kg or off-pound) in a given process. Off-kilogram or off-pound means the mass of metal or metal alloy removed from a forming operation at the end of a process cycle for transfer to a different machine or process.
[2] Max = Maximum pollutant level for any one day
[3] Avg = Maximum pollutant level for a monthly average of all samples taken
[4] ND = No discharge of process wastewater pollutants

APPENDIX C-22. PRETREATMENT STANDARDS FOR NEW SOURCES (PSNS)
NONFERROUS METALS FORMING CATEGORY
SUBPART J - METAL POWDERS SUBCATEGORY

Pollutant Limits in mg/off-kg (pounds/million off-pounds)[1] of Powder (40 CFR Part 471)

Process	Copper Max[2]	Copper Avg[3]	Cyanide Max	Cyanide Avg	Lead Max	Lead Avg	Pollutant Unit Basis
(a) Metal Powder Production Atomization Wastewater	9.58	5.04	1.46	0.605	2.12	1.01	wet atomized
(b) Sizing Spent Emulsions	0.028	0.015	0.004	0.002	0.006	0.003	sized
(c) Oil-Resin Impregnation Wastewater	ND[4]		ND		ND		
(d) Steam Treatment Wet Air Pollution Control Scrubber Blowdown	0.151	0.079	0.023	0.010	0.033	0.016	metallurgy part steam treated
(e) Tumbling, Burnishing and Cleaning Wastewater	0.836	0.440	0.128	0.053	0.185	0.088	metallurgy part tumbled, burnished or cleaned
(f) Sawing/Grinding Spent Neat Oils	ND		ND		ND		
(g) Sawing/Grinding Spent Emulsions	0.035	0.018	0.005	0.002	0.008	0.004	sawed or ground with emulsions
(h) Sawing/Grinding Contact Cooling Water	3.08	1.620	0.470	0.195	0.681	0.324	sawed or ground with contact cooling water
(i) Hot Press Contact Cooling Water	1.67	0.880	0.255	0.106	0.370	0.176	cooled after pressing
(j) Mixing Wet Air Pollution Control Scrubber Blowdown	15.0	7.90	2.29	0.948	3.32	1.58	mixed
(k) Degreasing Spent Solvents	ND		ND		ND		

[1]These standards are expressed in terms of mass of pollutant allowed per mass of product produced (off-kg or off-pound) in a given process. Off-kilogram or off-pound means the mass of metal or metal alloy removed from a forming operation at the end of a process cycle for transfer to a different machine or process.
[2]Max = Maximum pollutant level for any one day
[3]Avg = Maximum pollutant level for a monthly average of all samples taken
[4]ND = No discharge of process wastewater pollutants

APPENDIX D

PRETREATMENT COORDINATORS

(MARCH 1989)

APPENDIX D

PRETREATMENT COORDINATORS
U.S. EPA Headquarters and Regional Contacts - 1989

Region	Address	Contact	Phone
1	U.S. Environmental Protection Agency Region 1 Water Division Permits Compliance Section Room 2103 John F. Kennedy Federal Building Boston, MA 02203	Mr. John (Jack) Stoecker Environmental Engineer Pretreatment Engineer Ms. Joan Serra Environmental Engineer General Regional Information	(617) 565-3492 (617) 565-3490 (617) 565-3400
2	U.S. Environmental Protection Agency Region 2 26 Federal Plaza Room 845A New York, NY 10278	Mr. Phil Sweeney Chief, Permits Management Section Mr. John S. Kushwara Pretreatment Compliance Coordinator General Regional Information	(212) 264-2676 (212) 264-9826 (212) 264-2525
3	U.S. Environmental Protection Agency Region 3 841 Chestnut Building Philadelphia, PA 19107	Mr. John Lovell (3WM-52) Pretreatment Coordinator General Regional Information	(215) 597-6279 (215) 597-9800
4	Water Management Division Facilities Performance Branch U.S. Environmental Protection Agency Region 4 345 Courtland Street, N.E. Atlanta, GA 30365	Mr. Albert Herndon Chief, Pretreatment (O&M Unit) General Regional Information	(404) 347-2211 (404) 881-4727

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PRETREATMENT COORDINATORS (Continued)

Region	Address	Contact	Phone
5	U.S. Environmental Protection Agency Region 5 230 S. Dearborn Street Chicago, IL 60604	Mr. Dave Rankin (WQP-TUB-8) Pretreatment Coordinator	(312) 886-6111
		Mr. Don Schregardus (WQC-TUB-8) (E) Section Chief, Enforcement	(312) 353-2105
	ALL FEDERAL EXPRESS 111 W. Jackson St. 8th Floor Chicago, IL 60604	General Regional Information	(312) 353-2000
6	U.S. Environmental Protection Agency Region 6 1445 Ross Avenue Dallas, TX 75202	Mr. Lee Bohme (6W-PM) Regional Pretreatment Coordinator	(214) 655-7175
		Mr. Bob Goodfellow (6W-EO) Enforcement Coordinator	(214) 655-6470
		General Regional Information	(214) 767-2600
7	U.S. Environmental Protection Agency Region 7 726 Minnesota Avenue Kansas City, KS 66101	Mr. Lee Duvall (WACM) Pretreatment Coordinator	(913) 236-2817
		Mr. Paul Marshall (WACM) Environmental Engineer	(913) 236-2817
		General Regional Information	(913) 236-2800

PRETREATMENT COORDINATORS (Continued)

Region	Address	Contact	Phone
8	U.S. Environmental Protection Agency Region 8 1 Denver Place 999 18th Street, Suite 500 Denver, CO 80202-2405	Mr. Marshall Fischer (8WM-C) Industrial Pretreatment Program Cooordinator	(303) 293-1592
		Ms. Dana Allen (8WM-C) Associate Industrial Pretreatment Program Coordinator	(303) 293-1593
		General Regional Information	(303) 293-1603
9	U.S. Environmental Protection Agency Region 9 215 Fremont Street San Francisco, CA 94105	Mr. Frank Laguna (W-5-2) Pretreatment Coordinator	(415) 974-8268
		Ms. Juliet Hannafin (W-4-1) Pretreatment Compliance Coordinator	(415) 974-7271
		General Regional Information	(415) 974-8071
10	U.S. Environmental Protection Agency Region 10 Permits Branch 1200 Sixth Avenue Seattle, WA 98101	Mr. Robert Robichaud (M/S 521) Pretreatment Coordinator	(206) 442-1448
		Mr. Don Dossett (Idaho Compliance) Ms. Florence Carroll (Alaska Compliance)	
		General Regional Information	(206) 442-5810

PRETREATMENT COORDINATORS (Continued)

Headquarters	Address	Contact	Phone
OFFICE OF WATER ENFORCEMENT AND PERMITS	U.S. Environmental Protection Agency 401 M Street, S.W. Washington, DC 20460	Mr. James R. Elder (EN-335) Director, Office of Water Enforcement and Permits Room 220, N.E. Mall	(202) 475-8488
PERMITS DIVISION	Permits Division U.S. Environmental Protection Agency 401 M Street, S.W. Washington, DC 20460	Mr. Rick Brandes (EN-336) Chief Program Development Branch Room 214, N.E. Mall	(202) 475-9537
		Mr. Gene Chou (EN-336) Environmental Engineer Technical Support Branch Room 202, N.E. Mall	(202) 382-6960
		Ms. Debra Clovis Attorney Sludge Task Force Program Development Branch Room 2702, Mall	(202) 475-7052
		Mr. Paul Connor (EN-336) Attorney - Advisor Program Development Branch Room 211, N.E. Mall	(202) 475-7718
		Ms. Desiree DiMauro (EN-336) Environmental Protection Specialist Program Implementation Branch Room 220	(202) 245-3715
		Ms. Cynthia Dougherty (EN-336) Director Permits Division Room 214, N.E. Mall	(202) 475-9545

PRETREATMENT COORDINATORS (Continued)

Headquarters	Address	Contact	Phone
PERMITS DIVISION (Continued)	Permits Division U.S. Environmental Protection Agency 401 M Street, S.W. Washington, DC 20460	Mr. Tim Dwyer (EN-336) Environmental Engineer Technical Support Branch Room 2840, Mall	(202) 475-7056
		Mr. Louis Eby (EN-336) Attorney - Advisor Program Implementation Branch Room 2702, Mall	(202) 475-9553
		Dr. James Gallup (EN-336) Chief, Technical Support Branch Room 208, N.E. Mall	(202) 475-9541
		Mr. Robert Goo (EN-336) Environmental Protection Specialist Program Development Branch Room 202, N.E. Mall	(202) 382-6961
		Ms. Marilyn Goode (EN-336) Attorney - Advisor Program Development Branch Room 208, N.E. Mall	(202) 475-9526
		Mr. Frank Hall (EN-336) Deputy Director Permits Division Room 214, N.E. Mall	(202) 475-9545
		Mr. John Hopkins (EN-336) Environmental Protection Specialist Program Implementation Branch Room 214, N.E. Mall	(202) 475-9527

PRETREATMENT COORDINATORS (Continued)

Headquarters	Address	Contact	Phone
PERMITS DIVISION (Continued)	Permits Division U.S. Environmental Protection Agency 401 M Street, S.W. Washington, DC 20460	Mr. Ephraim King (EN-336) Chief, Program Implementation Branch Room 211, N.E. Mall	(202) 475-9539
		Ms. Martha Kirkpatrick (EN-336) Project Manager, Sludge Task Force Program Development Branch Room 208, N.E. Mall	(202) 475-9529
		Mr. Jeffrey Lape (EN-336) Chief, NPDES and Pretreatment Program Section Program Implementation Branch Room 212, N.E. Mall	(202) 475-9525
		Ms. Christina Morrison (EN-336) Environmental Engineer Sludge Task Force Program Development Branch Room 208, N.E. Mall	(202) 475-9535
		Mr. William Swietlik (EN-336) Environmental Protection Specialist Program Implementation Branch Room 202, N.E. Mall	(202) 382-6284
		Mr. Jim Taft (EN-336) Chief, Multi-Media Section Program Development Branch Room 208, N.E. Mall	(202) 475-9536
		Mr. George Utting (EN-336) Attorney Program Implementation Branch Room 208, N.E. Mall	(202) 475-9533

PRETREATMENT COORDINATORS (Continued)

Headquarters	Address	Contact	Phone
PERMITS DIVISION	Permits Division U.S. Environmental Protection Agency 401 M Street, S.W. Washington, DC 20460	Mr. Tom Wall (EN-336) Environmental Scientist Program Implementation Branch Room 214, N.E. Mall	(202) 475-9515
		Ms. Katharine Wilson (EN-336) Environmental Protection Specialist Program Development Branch Room 2702, Mall	(202) 475-7050
ENFORCEMENT DIVISION	Enforcement Division U.S. Environmental Protection Agency 401 M Street, S.W. Washington, D.C. 20460	Dr. Edward Bender (EN-338) Biologist Policy Development Branch Room 216-F, N.E. Mall	(202) 475-8331
		Ms. Karen Gray (EN-338) Environmental Protection Specialist Policy Development Branch Room 216, N.E. Mall	(202) 382-4373
		Mr. Andy Hudock (EN-338) Environmental Engineer Policy Development Branch Room 216, N.E. Mall	(202) 382-7745
		Mr. William Jordan (EN-338) Director, Enforcement Division Room 216, N.E. Mall	(202) 475-8304
		Mr. Richard Kinch (EN-338) Environmental Engineer Policy Development Branch Room 216, N.E. Mall	(202) 475-8319

PRETREATMENT COORDINATORS (Continued)

Headquarters	Address	Contact	Phone
ENFORCEMENT DIVISION (Continued)	Enforcement Division U.S. Environmental Protection Agency	Ms. Anne Lassiter (EN-338) Chief, Policy Development Branch Room 216, N.E. Mall	(202) 475-8307
		Ms. Virginia Lathrop (EN-338) Environmental Scientist Enforcement Support Branch Room 216, N.E. Mall	(202) 475-8299
		Mr. Brian Maas (EN-338) Environmental Engineer Room 216, N.E. Mall	(202) 475-8330
		Mr. Lee Okster (EN-338) Environmental Engineer Policy Development Branch Room 217, N.E. Mall	(202) 475-9511
		Mr. Gary Polvi (EN-338) Supervisor, Enforcement Support Branch Room 216, N.E. Mall	(202) 475-8316
INDUSTRIAL TECHNOLOGY DIVISION	Industrial Technology Division U.S. Environmental Protection Agency 401 M Street, S.W. Washington, DC 20460	Mr. Thomas P. O'Farrell (WH-552) Director, ITD Room E911C	(202) 382-7120
		Mr. Ernst P. Hall (WH-552) Chief, Metals Industry Branch Room E905C	(202) 382-7126

PRETREATMENT COORDINATORS (Continued)

Headquarters	Address	Contact	Phone
INDUSTRIAL TECHNOLOGY DIVISION (Continued)	Industrial Technology Division U.S. Environmental Protection Agency 401 M Street, S.W. Washington, DC 20460	Mr. George M. Jett (WH-552) Project Officer, Metals Forming Manufacturing Room E905A	(202) 382-7151
		Mr. Marvin Rubin (WH-552) Chief, Chemicals Branch Room E901C	(202) 382-7124
OFFICE OF GENERAL COUNSEL	Office of General Counsel U.S. Environmental Protection Agency 401 M Street, S.W. Washington, DC 20460	Ms. Ruth G. Bell (LE-132W) Asst. General Counsel Office of General Counsel - Water Division Room W503	(202) 382-7706
		Mr. Dave Gravallese (LE-132W) Attorney, Metal Forming Industry Office of General Counsel	

(MARCH 1989)

STATE PRETREATMENT CONTACTS

State	Address	Contact	Phone
REGION 1			
CT	CT Department of Environmental Protection Division of Water Compliance 122 Washington Street Hartford, CT 06106	Mr. Mike Harder Assistant Director	(203) 566-3245
		Mr. James Grier Principal Sanitary Engineer	(203) 566-2719
		Mr. Simon Mobarek Principal Sanitary Engineer	(203) 566-3282
RI	Rhode Island Department of Environmental Management Water Resources Division Permits and Planning Section 291 Promenade Street Providence, RI 02908	Ms. Christine Volkay-Hilditch Sanitary Engineer	(401) 277-6519
		Ms. Eileen Gleber Senior Environmental Scientist	(401) 277-6519
		Ms. Gina Natale-Friedman Jr. Environmental Engineer	(401) 277-6519
MA	MA Department of Environmental Quality and Engineering Division of Water Pollution Control 1 Winter Street Boston, MA 02108	Mr. Joe Dorant Environmental Engineer	(617) 292-5645
ME	ME Department of Environmental Protection 21 Vocational Drive South Portland, ME 04106	Mr. James Jones Environmental Specialist	(207) 767-4761

STATE PRETREATMENT CONTACTS (Continued)

State	Address	Contact	Phone
REGION 1 (Continued)			
NH	NH Department of Environmental Services Water Supply and Pollution Control Division P.O. Box 95 Concord, NH 03301	Mr. Dan H. Allen Supervisor, Industrial Pretreatment Program	(603) 271-2052
VT	Agency of Natural Resources Department of Environmental Conservation 103 S. Maine Street Waterbury, VT 05676	Mr. Gary Shokes Environmental Engineer	(802) 244-5674
REGION 2			
NJ	NJ Department of Environmental Protection Division of Water Resources Office of Sludge Management and Industrial Pretreatment 401 E. State Street (CN-029) Trenton, NJ 08625	Ms. Mary Joe Aiello Acting Chief - Industrial Pretreatment Section	(609) 292-4860
		Mr. Paul Kurisko Chief - Bureau Industrial Waste Management	(609) 292-4860
NY	NY State Department of Environmental Conservation 50 Wolf Road Albany, NY 12233-0001	Mr. Robert Cronin Chief, Compliance Section Room 320	(518) 457-3790
		Mr. Angus Eaton Senior Sanitary Engineer Room 318	(518) 457-6716

STATE PRETREATMENT CONTACTS (Continued)

State	Address	Contact	Phone
REGION 2 (Continued)			
		Mr. Robert E. Townsend Senior Sanitary Engineer Room 320	(518) 457-3790
PR	Puerto Rico Aquieduct and Sewer Authority P.O. Box 7066 Barrio Obrero Station Santurce, PR 00916	Mr. Carl-Axel P. Soderberg Director, Pretreatment Area	(809) 765-9113
REGION 3			
DC	Water Resources Management Administration 5010 Overlook Avenue, S.W. Washington, DC 20032	Mr. Jean Levesque Administrator	(202) 767-7651
DE	Dept. of Natural Resources and Environmental Control Edward Tatnell Building 89 Kings Highway P.O. Box 1401 Dover, DE 19901	Mr. Paul Janiga Environmental Engineer Water Resources Section	(302) 736-5731
		Mr. Frank Henshaw Environmental Engineer Point Source Control Program	(302) 736-3829
MD	Maryland Department of the Environment Pretreatment Division State of Maryland 2500 Broening Highway Baltimore, MD 21224	Ms. Karen Irons Chief, Pretreatment and Envorcement Division	(301) 225-6228
		Mr. Gary Kelman Section Head, Pretreatment Division	(301) 333-7480

STATE PRETREATMENT CONTACTS (Continued)

State	Address	Contact	Phone
REGION 3 (Continued)			
PA	Bureau of Water Quality Management Pennsylvania Department of Environmental Resources P.O. Box 2063 Harrisburg, PA 17120	Mr. Tim Carpenter Chief, Operation Section Division of Sewerage and Grants	(717) 787-8184
		Mr. Peter Slack Chief, Permits Section	(717) 787-8184
VA	VA State Water Control Board Office of Engineering Application P.O. Box 11143 2111 N. Hamilton Street Richmond, VA 23230	Ms. LaVern Corkran Pretreatment Program Director	(804) 367-6313
		Mr. Donald Richwine Program Manager	(804) 367-6389
WV	West Virginia Dept. of Natural Resources 1201 Greenbrier Street Charleston, WV 25311	Mr. Pravin Sangani Engineer	(304) 348-4086
		Mr. Dave Montali Engineer	(304) 348-4086
REGION 4			
AL	Alabama Department of Environmental Management Water Division State Office Building 1751 Federal Drive Montgomery, AL 36130	Mr. John Pool Chief, Industrial Branch	(205) 271-7700
		Mr. Curt Johnson Environmental Engineer II	(205) 271-7700

STATE PRETREATMENT CONTACTS (Continued)

State	Address	Contact	Phone
REGION 4 (Continued)			
GA	Water Quality Control Environmental Protection Division Georgia Department of Natural Resources 205 Butler Street E. Tower Atlanta, GA 30334	Mr. Alan Hallum Manager Municipal Permitting Program	(404) 656-7400
KY	Permit Review Branch Division of Water Natural Resources and Environmental Protection Cabinet 18 Reilly Road Frankfort, KY 40601	Mr. Michael Welch Pretreatment Coordinator	(502) 564-3410
FL	Facilities Planning Section FL Department of Environmental Regulation Twin Towers Office Building 2600 Blair Stone Road Tallahassee, FL 32301	Noel Jack	(904) 488-8163
MS	Mississippi Department of Natural Resources Bureau of Pollution Control P.O. Box 10385 Jackson, MS 39209	Mr. Louis LaVallee Chief, Pretreatment Section	(601) 961-5171
		Mr. William S. Spengler Assistant Coordinator, Industrial Wastewater Control Section	(601) 961-5171
NC	North Carolina Dept. of Natural Resources & Community Develop. P.O. Box 27687 512 North Salisbury Street Raleigh, NC 27611-7687	Mr. Doug Finan Supervisor Pretreatment Unit	(919) 733-5083
		Ms. Dana Folley Environmental Scientist	(919) 733-5083

STATE PRETREATMENT CONTACTS (Continued)

State	Address	Contact	Phone
REGION 4 (Continued)			
NC (Continued)		Ms. Suzanne Hoover Environmental Scientist	(919) 733-5083
		Mr. Nile Testerman Environmenal Engineer	(919) 733-5083
SC	South Carolina Department of Health and Environmental Control 2600 Bull Street Columbia, SC 29201	Mr. Russ Sherer Domestic Wastewater Division	(803) 734-5296
		Mr. Brian Rivers Pretreatment Coordinator	(803) 734-5319
		Mr. Michael Montebello Section Manager, Municipal Wastewater	(803) 734-5262
TN	Tennessee Dept. of Health and Environment 150 9th Avenue North Terra Building, 4th Floor Nashville, TN 37219-5405	Mr. Roger Leemasters Pretreatment Coordinator	(615) 741-0633
		Mr. Robert Slayden	(615) 741-0633
		Mr. Scott Crabtree	(615) 741-0633
REGION 5			
IL	Division of Water Pollution Control Illinois Environmental Protection Agency 2200 Churchhill Road Springfield, IL 62706	Mr. Tim Kluge Supervisor, Permits Section	(217) 782-0610
		Candy Morin Pretreatment Coordinator	

STATE PRETREATMENT CONTACTS (Continued)

State	Address	Contact	Phone
REGION 5 (Continued)			
IN	Indiana Dept. of Environmental Management Office of Water Management 105 South Meridian Indianapolis, IN 46225	Mr. Phil Preston Indiana Pretreatment Coordinator	(317) 232-8728
MI	Dept. of Natural Resources P.O. Box 30028 Lansing, MI 48909	Mr. Paul Blakeslee Pretreatment Coordinator Industrial Pretreatment Program	(517) 373-4624 (517) 373-4625
MN	Minnesota Pollution Control Agency Water Quality Division 520 Lafayette Road, North St. Paul, MN 55155	Mr. Randy Dunnette Pretreatment Coordinator	(612) 296-8006
OH	Ohio Environmental Protection Agency 1800 Watermark Drive P.O. Box 1049 Columbus, OH 43266-0149	Mr. John Sadcewicz Manager, Public Wastewater Section	(614) 466-3791
		John Albrecht Supervisor, Pretreatment Unit	(614) 644-2028
		Ms. Heidi Sorin Group Leader, Compliance and Enforcement	(614) 644-2027
WI	Wisconsin Dept. of Natural Resources P.O. Box 7921 Madison, WI 53707	Mr. Stan Kleinert Environmental Specialist	(608) 267-7635
		Mr. Randy Case Pretreatment Unit Leader	(608) 267-7639

STATE PRETREATMENT CONTACTS (Continued)

State	Address	Contact	Phone
REGION 6			
AR	Arkansas Department of Pollution Control and Ecology 8001 National Drive Little Rock, AR 72009	Ms. Donna Parks Pretreatment Coordinator Enforcement Division	(501) 562-7444
LA	LA Department of Environmental Quality Office of Water Resources P.O. Box 44091 Baton Ruoge, LA 70804-4091	Ms. Barbara Romanowsky Regulations Unit Coordinator	(504) 342-6363
NM	NM Environmental Improvement Division Surface Water Quality Bureau P.O. Box 968 Santa Fe, NM 87504-0968	Ms. Ann Young Environmental Scientist	(505) 827-2796
OK	OK State Department of Health 1000 N.E. 10th Street Oklahoma City, OK 73152	Mr. Ted Williamson Pretreatment Engineer	(405) 271-7335
TX	TX Water Commission 1700 N. Congress P.O. Box 13087 Capital Station Austin, TX 78711-3087	Ms. Ann McGinley Chief, Wastewater Permits Section Mr. Randy Palachek Environmental Scientist	(512) 463-7788 (512) 463-8420

STATE PRETREATMENT CONTACTS (Continued)

State	Address	Contact	Phone
REGION 7			
IA	Iowa Department of Natural Resources Henry A. Wallace Building 900 East Grand Des Moines, IA 50319	Mr. Steve Williams Environmental Specialist Wastewater Permits Branch	(515) 281-8884
KS	Kansas Department of Health and Environment Water Pollution Control Section 6700 S. Topeka Boulevard Building 740 - Forbes Field Topeka, KS 66620	Mr. Don Carlson Chief, Industrial Unit	(913) 296-1500
		Mr. Steve Casper Environmental Technician	(913) 296-5551
		Mr. Elborn Mendenhall Chief, Pretreatment Unit	(913) 296-5552
MO	Missouri Dept. of Natural Resources Division of Environmental Quality P.O. Box 176 Jefferson City, MO 65101	Mr. Richard Kuntz Environmental Engineer	(314) 751-6996
NE	Nebraska Dept. of Environmental Control Water Pollution Control Division Box 94877, Statehouse Station 301 Centennial Mall, South Lincoln, NE 68509	Mr. Jay Ringenberg Environmental Specialist	(402) 471-2186
		Mr. Jim Yeggy Pretreatment Coordinator Environmental Specialist	(402) 471-4239

STATE PRETREATMENT CONTACTS (Continued)

State	Address	Contact	Phone
REGION 8			
CO	Colorado Dept. of Health Water Quality Control Division 4210 E. 11th Avenue Denver, CO 80220	Mr. Phil Hegeman Industrial Pretreatment Coordinator	(303) 331-4564
MT	Montana Department of Health Water Quality Bureau Capitol Station Helena, MT 59601	Mr. Fred Shewman Sanitary Engineer	(406) 444-2406
ND	North Dakota State Department of Health 1200 Missouri Avenue Bismarck, ND 58505	Ms. Sheila McClenathen Permits	(701) 224-4578
SD	SD Department of Water and Natural Resources Foss Building, Room 416 Pierre, SD 57501	Mr. Brad Archibald Natural Resource Engineer	(605) 773-3351
UT	Utah Department of Health Division of Environmental Health Bureau of Water Pollution Control P.O. Box 16690 Salt Lake City, UT 84116-0690	Mr. Donald Hilden Environmental Health Specialist	(801) 538-6146
WY	Wyoming Dept. of Environmental Quality Hathaway Office Building 122 West 25th Street Cheyenne, WY 82002	Mr. John Wagner Technical Supervisor Water Quality Division	(307) 777-7781

STATE PRETREATMENT CONTACTS (Continued)

State	Address	Contact	Phone
REGION 9			
AZ	AZ Department of Environmental Quality Office of Water Quality 2655 E. Magnolia Phoenix, AZ 85034	Mr. Charles E. Ohr Quality Assurance Officer	(602) 392-4003
CA	CA State Water Resource Control Board Division of Water Quality 901 P Street P.O. Box 100 Sacramento, CA 95801	Mr. Scott McFarland Water Resources Control Engineer (Acting Contact)	(916) 323-1033
HI	Hawaii State Department of Health P.O. Box 3378 Honolulu, HI 96801	Mr. Charley Oumi Chief of NPDES Section	(808) 548-6410
NV	Department of Environmental Protection 201 S. Fall Street Capitol Complex Carson City, NV 89710	Mr. Joe Livak Pretreatment Coordinator	(702) 885-4670
REGION 10			
OR	Oregon Department of Environmental Quality Executive Building 811 Southwest 6th Avenue Portland, OR 97204	Mr. John Harrison Supervisor, Source Control	(503) 229-5371

STATE PRETREATMENT CONTACTS (Continued)

State	Address	Contact	Phone
REGION 10 (Continued)			
WA	Washington Department of Ecology Mail Stop PV-11 Olympia, WA 98504	Ms. Nancy Winters Pretreatment Coordinator	(206) 438-7036
		General Information	(206) 459-6000