

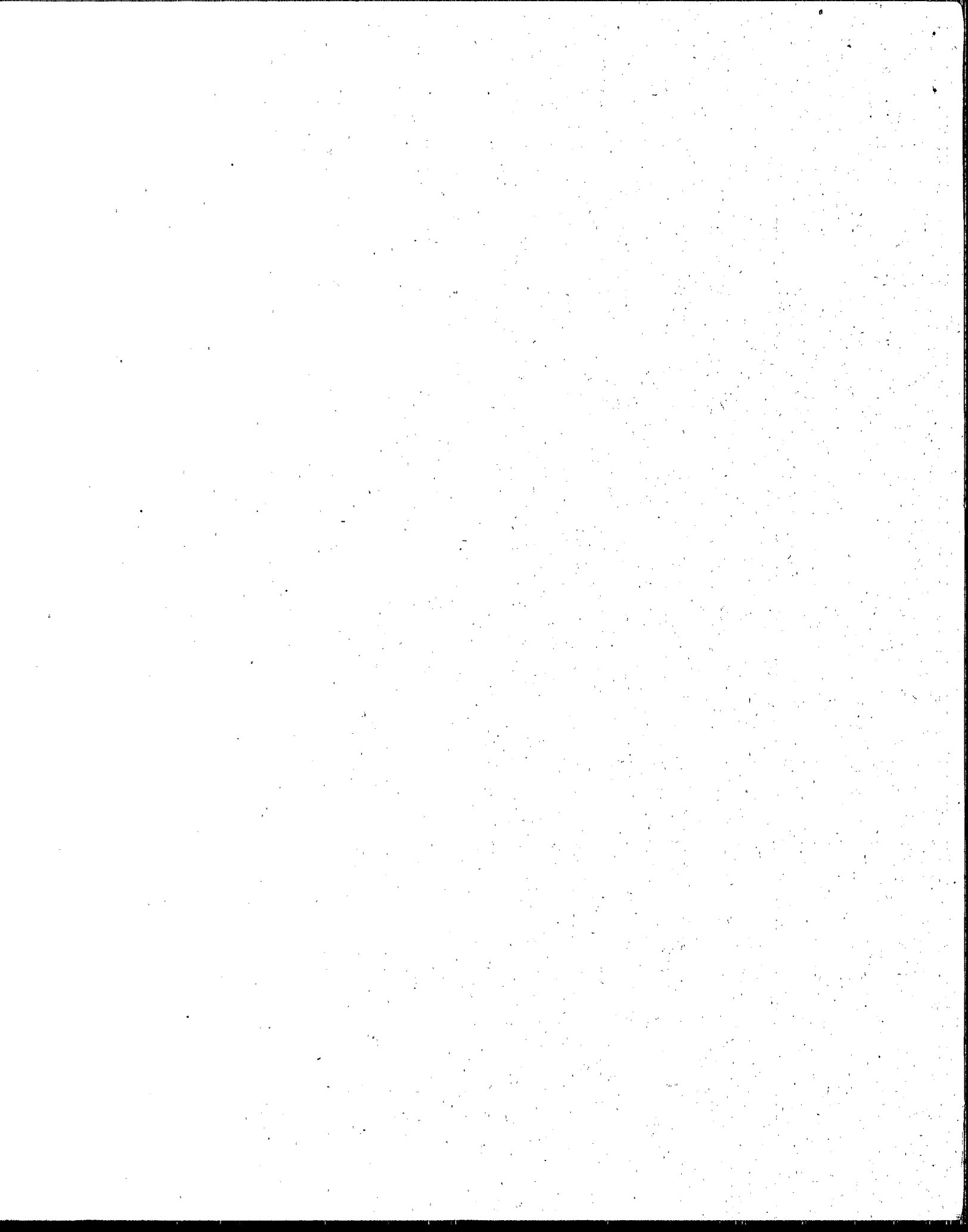
United States
Environmental Protection
Agency

Office of Water
Mail Code 4303
Washington, DC 20460

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December 1994



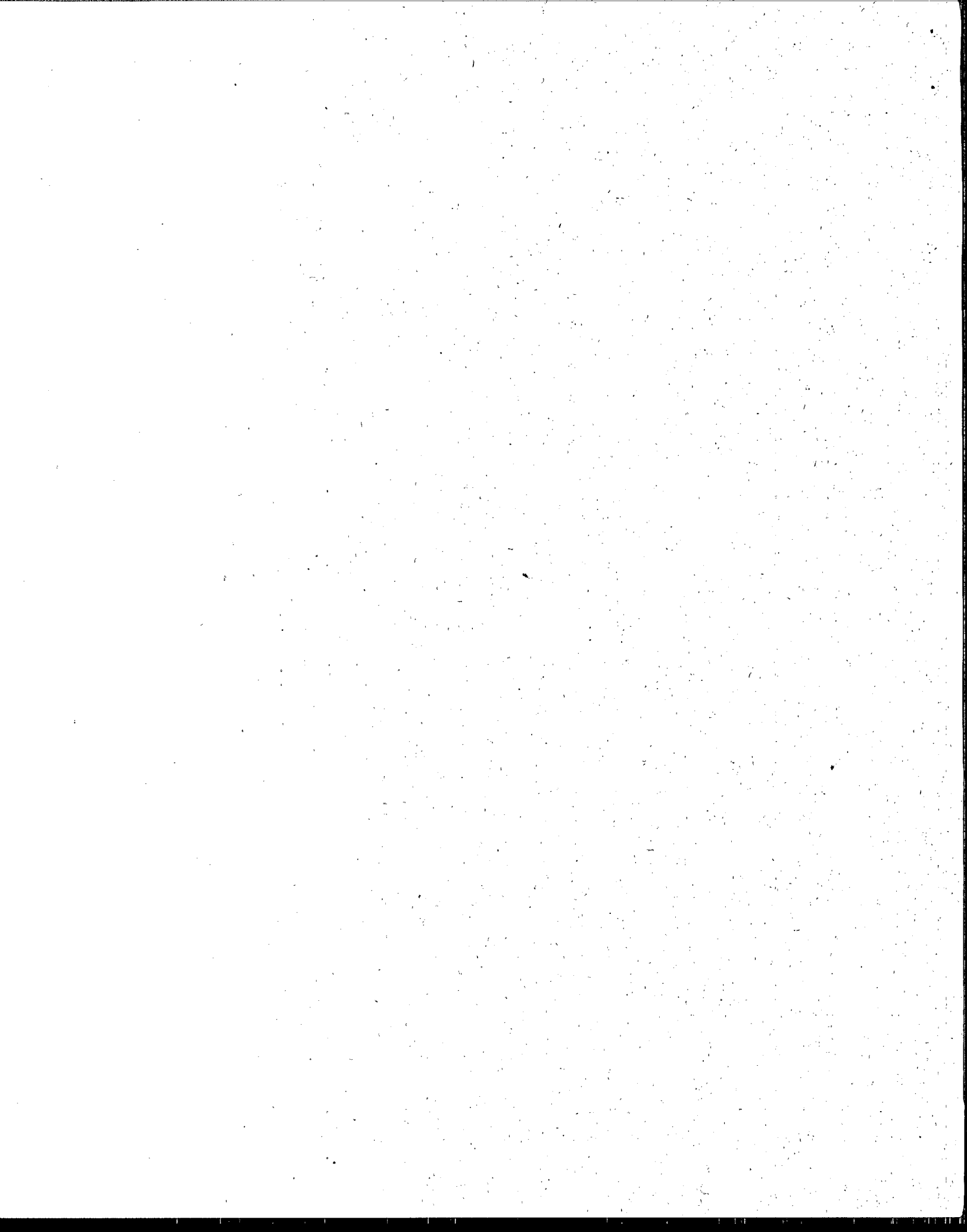
Preliminary Data Summary for the Metal Finishing Industry





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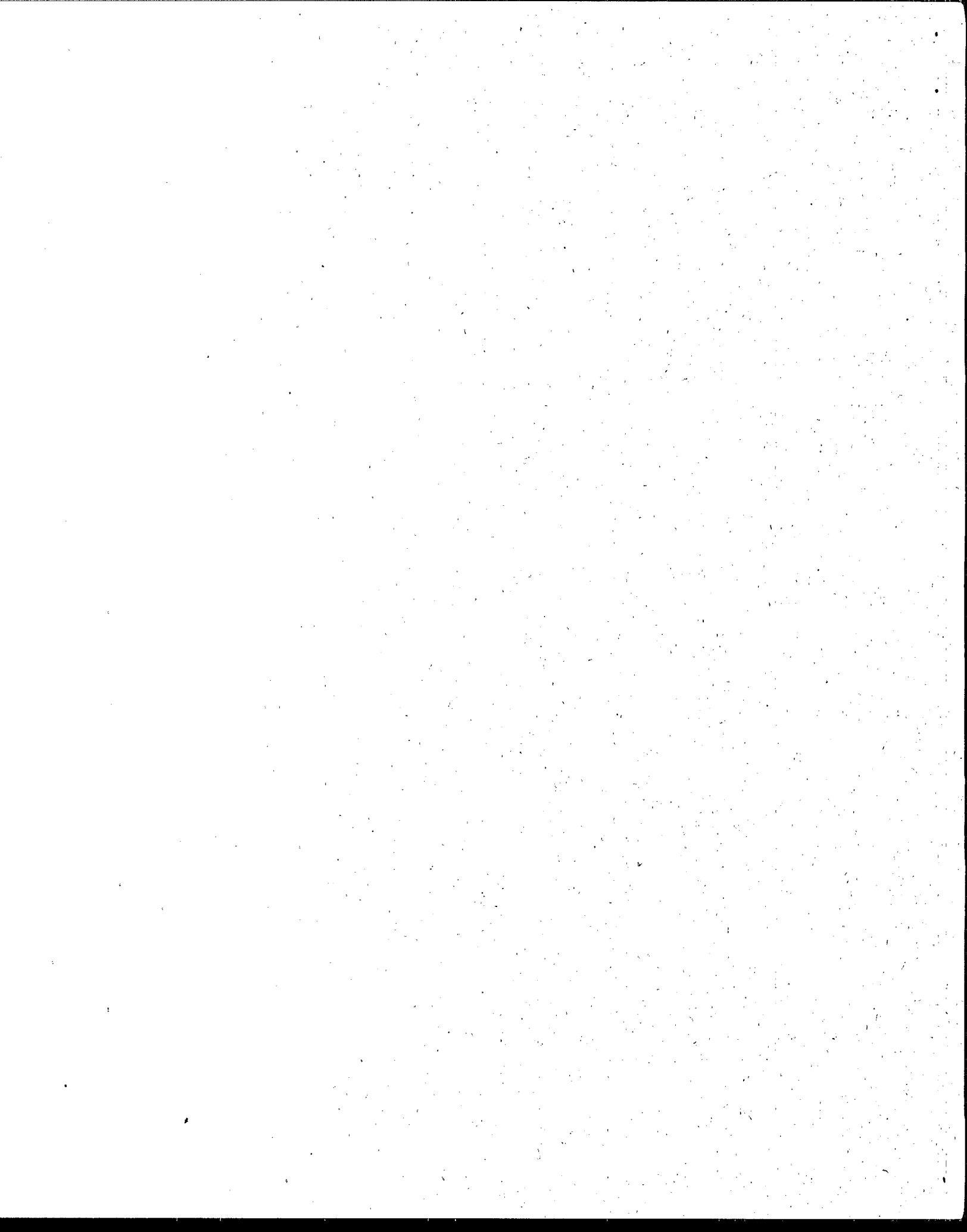
PRELIMINARY DATA SUMMARY

of the

METAL FINISHING INDUSTRY

Engineering and Analysis Division
Office of Water
United States Environmental Protection Agency
401 M Street, SW
Washington, DC 20460

October 1994



PREFACE

This Preliminary Data Summary was prepared by the Engineering and Analysis Division of the U.S. Environmental Protection Agency (EPA). This study fulfills an obligation of EPA under the Consent Decree in NRDC v EPA, No. 89-2980 (D.C. Cir.).



ACKNOWLEDGEMENTS

Preparation of this Preliminary Data Summary was directed by Baldwin M. Jarrett, Project Officer, of the Engineering and Analysis Division.

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The Engineering and Analysis Division (EAD) of the U.S. Environmental Protection Agency (EPA) has conducted a preliminary study to determine the applicability, usage, and utility of the metal finishing regulation. Unlike other studies and reviews of existing guidelines and standards, a review of metal finishing must consider the impact of the promulgation of a new regulation for metal products and machinery which will control wastewater discharges from the same and similar processes as presently controlled by metal finishing and electroplating guidelines and standards. This study summarizes the preliminary data collection for the MP&M rulemaking. This study identifies the interface, potential interference, and applicability overlaps and gaps between the Metal Finishing (40 CFR Part 433), Electroplating (40 CFR Part 413), and future Metal Products and Machinery (MP&M) guidelines.

EAD reviewed existing data and information from a variety of sources, including development documents, data summaries, and documents in the rulemaking records for related categories. EPA also conducted a survey of pretreatment coordinators on the utility of the metal finishing effluent guidelines and standards.

This study offers options to accommodate the MP&M rule considering the inherent overlap between this rule and existing metal finishing rules and how the existing rules can be improved to make them more practicable by permit authorities.

2.0

SUMMARY

The Engineering and Analysis Division (EAD) of the U.S. Environmental Protection Agency (EPA) conducted a preliminary study of the metal finishing industry in response to section 304 (m) of the Water Quality Act of 1987 and an obligation of EPA under the Consent Decree in NRDC v EPA, No 89-2980 (D.C. Cir).

The study includes a summary of the regulatory authority, history, and background of two existing regulations, Electroplating (40 CFR Part 413) and Metal Finishing (40 CFR Part 433), and a new to be proposed regulation for Metal Products and Machinery (MP&M). All three of these regulations limit the discharge of process wastewater pollutants from the same or similar metal finishing unit operations or processes. The study identifies the applicability of each regulation and the overlap of 40 CFR Part 433 with the MP&M rule.

The study summarizes the practicability of the existing rules based on comments by permitting authorities and suggestions by these authorities as to how the rule could be improved. Suggested options are offered to accommodate the MP&M rule.

The study should provide sufficient information for the Agency to decide if an in depth study and review of Metal Finishing (40 CFR Part 433) and Electroplating (40 CFR Part 413) is warranted.

3.0

HISTORY OF THE REGULATIONS

INTRODUCTION

This section presents a summary of regulatory authority and the history and background of the Metal Finishing, Electroplating, and Metal Products and Machinery categories.

3.1 Statute and Consent Decrees

The Federal Water Pollution Control Act Amendments of 1972 established a comprehensive program to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters" (Section 101(a)). Under this statute, existing industrial dischargers are required to achieve compliance with "effluent limitations requiring the application of the best practicable control technology currently available (BPT)" (Section 301(b)(1)(A)). These dischargers were also required to later achieve "effluent limitations requiring the application of the best available technology economically achievable (BAT)...which will result in reasonable further progress toward the national goal of eliminating the discharge of all pollutants" (Section 301(b)(2)(A)). New industrial direct dischargers are required to comply with new source performance standards (NSPS), based on best available demonstrated technology, and new and existing dischargers to publicly-owned treatment works (POTWs) are subject to pretreatment standards under Sections 307(b) and (c) of the Act. The requirements for direct dischargers are incorporated into National Pollutant Discharge Elimination System (NPDES) permits issued under Section 402 of the Act, and pretreatment standards are made enforceable directly against dischargers to POTWs (indirect dischargers).

Although Section 402(a)(1) of the 1972 Act authorized the setting of requirements for direct dischargers on a case-by-case basis, Congress intended that control requirements be based on regulations promulgated by the EPA Administrator that consider the degree of effluent reduction attainable through the application of BPT and BAT. Sections 304(c) and 306 of the Act required promulgation of regulations for NSPS, and Sections 304(f), 307(b), and 307(c) required promulgation of regulations for pretreatment standards. In addition to these regulations for designated industry categories, Section 307 (a) of the Act required the Administrator to develop a list of toxic pollutants and promulgate effluent standards applicable to all dischargers of toxic pollutants. When the effluent regulations were not promulgated by the dates contained in the 1972 Act, the Natural Resources Defense Council and several other environmental groups sued the Agency. In settlement of this lawsuit, a consent decree was issued by the Court (June, 1976) which required the development of a program to adhere for promulgating effluent regulations for 21 point source categories for 65 "priority" pollutants and classes of pollutants (Natural Resources Defense Council, Inc., et. al v. Train, 8 ERC 2120 (D.D.C. 1976), modified March 9, 1979). The 1977 amendments to sections 301 and 307 of the Clean Water Act codified many of these provisions of the consent decree. The 21 point source categories listed in the consent decree (Table 3-1) included two which are relevant to this metal finishing study: the Machinery and Mechanical Products Manufacturing Category (the M&MP category), and the Electroplating Category.

When the Settlement Agreement was modified in 1979 by including a specific promulgation date schedule, ten industrial categories were separated from M&MP. A detailed analysis was conducted to separate the M&MP category into individual categories. (Table 3-2) During the period 1977 to 1984 effluent guidelines and standards were promulgated for these ten industrial categories from M&MP and, as discussed below, regulations were promulgated for electroplating/metal finishing.

Section 304(m), added by the Water Quality Act of 1987, established a new process for planning the development of limitations guidelines and standards under the Act. Section 304(m) directs EPA to publish biennial plans for the review and revision of promulgated effluent guidelines and standards. On May 7, 1992 (57 FR 19748) the Metal Finishing industry was identified as an industry for which additional information should be collected under the Section 304 (m) directive (see 55 FR 97).

3.2 Regulatory Overview

This section presents a regulatory overview of the Electroplating, Metal Finishing, and Metal Products and Machinery point source categories. It includes a description of the historical background of the categories, a summary of the rulemakings, Settlement Agreements, and Consent Decrees that affected the development of these categories.

3.2.1 Electroplating and Metal Finishing Point Source Categories

This section presents an overview of the electroplating/metal finishing industry, a general description of the structure of the electroplating and metal finishing regulations, a brief summary of the rulemakings, Settlement Agreements, and Consent Decrees that affected the development of these categories, and a discussion of the applicability of each category. Data collection efforts that led to the development of electroplating and metal finishing standards are summarized in Section 3.3.1.

During the regulatory development process, approximately 13,500 plants were estimated to be in the electroplating/metal finishing industry. Many of these plants discharge wastewater from several metal finishing operations other than, and in addition to, electroplating. The electroplating standards (40 CFR Part 413) are concentration-based standards, but include equivalent production-based alternative standards for facilities that choose to limit wastewater discharges. The metal finishing standards (40 CFR Part 433) are concentration based standards, and do not include production-based alternative standards. The electroplating standards (Part 413) apply to facilities that perform one or more of the following six electroplating unit or core operations:

electroplating, electroless plating, anodizing, coating etching and chemical milling, and printed circuit board manufacturing, plus related operations (cleaning operations, anodizing, coloring, acid pickling, stripping, and sealing) when performed at a facility performing one or more of the core operations if each related operation is followed by a rinse. The metal finishing guidelines and standards apply to facilities that perform one or more of the six core electroplating operations (Part 433) and to any of 40 additional metal finishing operations (Table 3-3) which discharge

wastewater, i.e. guidelines and standards are applicable to the 40 operations only if the facility performs one or more core operations.

The electroplating point source category standards limits the concentrations or mass of certain pollutants which interfere with, pass through, or are otherwise incompatible with the operation of publicly owned treatment works (POTWs). The electroplating regulations (40 CFR Part 413) apply only to pretreatment standards for existing job shops (facilities which own less than 50% of the material being finished) and to independent circuit board manufacturers (facilities which manufacture printed circuit boards principally for sale to other companies). These existing job shops and circuit board manufacturers are specifically excluded from metal finishing standards (40 CFR Part 433).

On March 28, 1974, (39 FR 11510) EPA promulgated a final rule adding Part 413 to Chapter 40 of the Code of Federal Regulations. That regulation, (the "Phase I electroplating regulation") established effluent limitations guidelines for the electroplating subpart of the electroplating point source category. On April 25, 1975, the Agency amended Part 413 by revising and expanding the coverage of Subpart A Electroplating and by adding five new subcategories (phase II electroplating regulation), thereby forming the core operations for the electroplating category.

The National Association of Metal Finishers (NAMF) and others filed petitions in The Court of Appeals for the Third Circuit for review of the first electroplating subcategory (Part 413, Subpart A) on June 24, 1974. After review of the petitioners' objections and the technical record, EPA, on December 3, 1976, suspended implementation of and revoked some provisions of the first subpart. EPA based this decision on the results of analyses indicating that the regulation would impose too stringent a standard on small electroplating firms. Similar suits filed by members of the industry on July 23, 1975 with respect to the five new subcategories were also stayed by stipulation.

On July 12, 1977, EPA promulgated interim final electroplating regulations that established pretreatment standards for existing sources (PSES) that discharge to POTWs (42 FR 35834). These standards applied to discharges of cyanide and hexavalent chromium, and controlled effluent pH. On February 14, 1978, EPA published a proposed pretreatment regulation for these pollutant parameters and for cadmium, copper, lead, nickel, silver, and zinc (43 FR 6560). The controls for these additional metals applied only to facilities discharging more than 10,000 gallons of wastewater per day.

In response to industry petitions for reconsideration of the interim final standards for cyanide and chromium, EPA indefinitely suspended all interim final electroplating standards on May 14, 1979 (44 FR 27993). The Agency cited the need to fully review the industry petition as the primary reason for suspension of these standards. In this same notice, the Agency announced its intention to promulgate final regulations for Part 413 before February 1980.

Concurrent with the activities discussed above, EPA was involved in litigation with the NRDC and several other environmental groups over the promulgation of effluent guidelines

for electroplating and other point source categories. The petitioners contended that EPA did not promulgate effluent guidelines and standards required by the dates contained in the 1972 Clean Water Act as discussed in Section 3.1. As a result of this lawsuit, EPA entered into a court-approved Settlement Agreement that required the development of a schedule for promulgating effluent regulations and standards for 21 point source categories, including electroplating. These categories are listed in Table 3-1.

On September 7, 1979 EPA promulgated a final rule establishing PSES for the electroplating category Part 413 (44 FR 52590). This final rule was subsequently corrected by notices dated October 1, 1979, March 25, 1980, and August 19, 1980. In addition, amendments to the final rule were proposed on July 3, 1980. After promulgation, petitions to review the final rule were filed by NAMF and others. On March 7, 1980, EPA entered into a Settlement Agreement with the petitioners in an effort to resolve the issues without further litigation. The Agreement provided that EPA would publish proposed amendments arising out of the settlement. It further provided that if the final amendments did not differ significantly from those proposed, the petitioners would dismiss their petitions for review.

On January 28, 1981, EPA published amendments to Part 413 regulations. Most of these amendments arose from the NAMF Settlement Agreement. The major changes incorporated by the 1981 amendments to Part 413 Electroplating included:

- 1) Revision of the daily maximum limitation for total cyanide from 0.8 to 1.9 mg/l
- 2) Revision of 30-day average limits to 4-day average limits
- 3) Adoption of the concept of integrated and non-integrated facilities
- 4) Extension of compliance dates
- 5) Recognition of the development of additional pretreatment standards to be called "Metal Finishing" which would regulate processes currently falling under electroplating as well as many other metal finishing processes. However, EPA stated that in light of the potentially severe economic impact of these anticipated regulations on the job shop and the independent printed circuit board manufacturers, the Agency would not impose more stringent pretreatment standards for that segment of the industry for several years.

Facilities were further subdivided, based on discharge status, as follow:

- Integrated facility: A facility that, prior to treatment, combines electroplating waste streams with waste streams not covered by the electroplating category; and
- Non-integrated facility: A facility that has significant wastewater discharges only from operations addressed by the electroplating category.

In theory, job shops can be integrated; in actuality, however, approximately 97% of all job shops are non-integrated shops.

As a result of the Settlement Agreement, the applicability of the metal finishing standards was defined as follows: with the exception of existing job shop electroplaters and independent printed circuit board manufacturers, all facilities that perform at least one of the six electroplating core operations would be required to comply with the Part 433 metal finishing standards. Existing (as of August 31, 1982) job shop electroplaters and independent printed circuit board manufacturers remained in Part 413 the electroplating category. Most Part 413 electroplaters were shifted to the metal finishing category. Facilities that did not perform one of the six basic electroplating unit operations were not regulated by the electroplating or metal finishing standards. Compliance dates for the Part 413 standards were based on the promulgation date of the final metal finishing regulations and on the discharge status (integrated or non-integrated) of the particular facility.

In Part 413, the final electroplating standards require plants discharging more than 10,000 gallons per day of regulated wastewater to meet more stringent standards than plants with smaller flows. This reduced the projected economic impact of the standards and relaxed controls on less than 3% of the flow to POTWs. The final Part 413 electroplating regulations limit discharges of cadmium, chromium, copper, cyanide, lead, nickel, silver, and zinc to POTWs. Control of copper, nickel, silver, and zinc was less stringent for smaller plants because of the lower toxicity of these metals. Cadmium, lead, and cyanide were controlled equally for all flows.

After resolution of the applicability of the metal finishing and electroplating standards by the Settlement Agreement, EPA proceeded with development of the metal finishing regulation for direct and indirect dischargers. On July 15, 1983 EPA promulgated a final rule adding Part 433, the Metal Finishing Effluent Guidelines and Standards, to Chapter 40 of the Code of Federal Regulations (48 FR 32462). The metal finishing effluent limitations guidelines and standards control the concentration of cadmium, copper, lead, nickel, silver, zinc, cyanide, total suspended solids (TSS), and oil and grease that may be discharged to waters of the United States or to POTWs. Operations similar to electroplating/metal finishing processes which are excluded from the Metal Finishing regulation and the Electroplating regulation are those facilities which perform metallic platemaking and gravure cylinder preparation within or for printing and publishing facilities.

Also, another categorical effluent guideline or standard may also be effective and applicable to wastewater discharges from metal finishing operations. In these situations, the more specific limitations apply to those metal finishing wastestreams which appear to be covered by both standards. The following regulations take precedence over the Metal Finishing regulation:

- Nonferrous Smelting and Refining (40 CFR Part 421)
- Coil Coating (40 CFR Part 465)
- Porcelain Enameling (40 CFR Part 466)
- Battery Manufacturing (40 CFR Part 461)
- Iron and Steel Manufacturing (40 CFR Part 420)
- Metal Casting Foundries (40 CFR Part 464)
- Aluminum Forming (40 CFR Part 467)
- Copper Forming (40 CFR Part 468)

- Plastic Molding and Forming (40 CFR Part 463)
- Electrical and Electronic Components (40 CFR Part 469)
- Nonferrous Forming (40 CFR Part 471)

For example, if a plant performs a phosphate coating operation (a metal finishing core process) in preparation for painting and also performs cleaning, pickling, immersion coating, and chemical coating as part of a porcelain enameling process, then the Metal Finishing standards apply to the discharge from the cleaning and phosphate coating operation, while the Porcelain Enameling standards apply to the discharge from application of the porcelain enamel and also the preparatory operations of cleaning, pickling, immersion plating, and chemical coating operations. Normally, the metal preparation operations (cleaning, pickling, immersion plating, and chemical coating) would be subject to the Metal Finishing regulation. However, because the Porcelain Enameling regulation specifically include those operations performed in preparation for the porcelain enameling operation, the Porcelain Enameling regulation takes precedence for those wastestreams.

3.2.2 Metal Products and Machinery Point Source Category

This section presents an overview and historical background of the Metal Products and Machinery (MP&M) Point Source Category. The MP&M category, broadly defined, covers facilities that perform wastewater generating processes on metal machinery and metal parts, including manufacture, assembly, rebuilding, repair, and maintenance. Regulatory development for the MP&M category is an ongoing effort.

The MP&M category resulted from a 1976 Settlement Agreement with the NRDC discussed in Section 3.1, and the 1986 report to Congress on the discharge of hazardous wastes to POTWs. Analysis of these sources revealed a significant gap in national effluent regulatory coverage in the metals industries area.

The 1976 Settlement Agreement required the development of a schedule for promulgating effluent guidelines and standards for 21 point source categories. These categories are listed in Table 3-1. Two categories are relevant: the Electroplating Point Source Category as discussed in Section 3.2 and the Machinery and Mechanical Products (M&MP) Point Source Category.

In 1979, when the Settlement Agreement was modified to include a specific promulgation schedule, M&MP was divided into ten industrial categories based on process operations, water use and economic indicator data, and Standard Industrial Classification (SIC) codes. These ten categories are listed in Table 3-2. Between 1979 and 1984, these ten categories were analyzed and regulations were promulgated as appropriate.

A 1986 analysis of the regulatory coverage of these ten categories concluded that more than 89,000 facilities performing process operations on metal products were not fully regulated by existing guidelines and standards. The 1986 analysis showed that three regulations were promulgated for metal manufacturing (iron and steel, nonferrous metals manufacturing, and ferroalloy metals manufacturing); that five regulations were promulgated for metal forming (iron

and steel, metal molding and casting, aluminum forming, copper forming, and nonferrous metals forming categories); and that although four regulations had been promulgated for the component finishing of mill products (coil coating, porcelain enameling, battery manufacturing, and electrical and electronic component manufacturing), the coverage was incomplete. This left a large area of the metals industry unregulated.

Another 1986 analysis, The Report to Congress on the Discharge of Hazardous Wastes to Publicly Owned Treatment Works (EPA 530-SW-86-004), referred to as the Domestic Sewage Study or DSS, concluded that a significant number of facilities discharging to POTWs discharge pollutants that threaten the treatment capability of POTWs. The DSS also concluded that the discharge of these pollutants was not regulated by national effluent guidelines and standards. Some of the major areas identified by this analysis were in equipment manufacturing and assembly areas of the metals industry.

Based on a review of the regulatory coverage for metals industries and the findings of the DSS, the Agency performed a preliminary data survey of the unregulated areas of the metals industries. The result of this analysis was the recommendation for a new point source category, Machinery Manufacturing and Rebuilding (MM&R). The category was listed as a study area to be reviewed for regulation under the directive of Section 304(m) of the 1987 Amendments to the Clean Water Act.

The Preliminary Data Summary for the Machinery Manufacturing and Rebuilding Effluent Guidelines Category (MM&R PDS) was completed in September 1989. The MM&R PDS presented: results of a review of existing information to define the category and to identify the population of the category; and results of a preliminary data collection effort to quantify the significance of the environmental problems caused by MM&R.

The MM&R PDS concluded that the MM&R category should include any facility that performs one or more of 45 defined major unit operations on "machinery" that is manufactured, rebuilt, or maintained. "Machinery" was broadly defined, to include any metal product or part of a metal product. These unit operations are listed in Table 3-4. The MM&R PDS estimated that 970,000 facilities are involved in MM&R activities and may potentially be unregulated by national effluent limitations or standards. An estimated 692,000 of these facilities (71%) are small businesses with fewer than ten employees. Based on preliminary sampling data, the MM&R PDS estimated that MM&R facilities discharge approximately 186 million pounds of pollutants per year. Although some of the indirect dischargers were regulated under local effluent standards and some were regulated in whole or in part by existing effluent limitations for industrial categories (e.g. metal finishing or electroplating), these categories were not defined to cover and did not cover all MM&R facilities. As example, the electroplating and metal finishing regulations do not apply to facilities that do not perform one of the six core electroplating unit operations. Section 3.2.1 provides further information on the applicability of the metal finishing and electroplating categories.

The MM&R PDS recognized that MM&R facilities are highly diversified in terms of number of employees, type of product, water use, water discharge, operating practices, and

other parameters. For this reason, the regulatory approach recommended in the MM&R PDS was based on a common factor in all MM&R facilities: the MM&R unit operations. The preliminary assumption used for the development of the regulatory approach to MM&R was that every facility generates the same types of pollutants from a particular unit operation, and that the pollutants are generated in varying quantities based on the amount of product produced. The MM&R PDS therefore recommended collection of sufficient technical information to develop a conventional mass-based effluent regulation. The MM&R PDS also recommended consideration be given to an alternative regulatory approach of best management practices (BMPs) for facilities with limited financial and personnel resources. Data and information collection efforts for the MM&R project are further discussed in Section 3.3.2.

In 1990, EPA announced its intention to promulgate effluent guidelines for the MM&R category by 1995 (EPA Effluent Guidelines Plan, Federal Register, Volume 55, No. 1, January 2, 1990). Because the potential regulated community was extremely large and diverse, the Agency elected to promulgate effluent guidelines for MM&R in two phases. MM&R Phase I includes seven of the 15 industrial sectors covered by MM&R: Aircraft, Aerospace, Electronic Equipment, Hardware, Ordnance, Mobile Industrial Equipment, and Stationary Industrial Equipment. The Agency deferred promulgation of effluent guidelines for MM&R Phase II until 1999. MM&R Phase II includes the eight industrial sectors not covered by Phase I: Bus and Truck, Household Equipment, Instruments, Motor Vehicles, Office Machines, Railroad, Ships and Boats, and Precious and Nonprecious Metals. The decision to develop effluent guidelines for the seven Phase I sectors was based on amounts and types of wastewater discharges, the likely economic impact of regulations, and the extent to which facilities in each of the two phases is currently regulated. An estimate of Phase I facilities represents only about 20% of all MM&R facilities, however they generate an estimated 52% of the total estimated discharges of toxic and nonconventional pollutants from the category.

In the Agency's next effluent guidelines plan (EPA Effluent Guidelines Plan, Federal Register, Volume 57, No. 89, May 7, 1992) the schedule for the promulgation of final effluent guidelines for the MM&R category Phase I was revised to May 1996. In addition, the title of the MM&R category was changed to Metal Products and Machinery (MP&M). This name change did not affect the coverage of the category, but was intended to clarify the coverage.

Regulatory development of effluent limitations guidelines and standards for the MP&M category is ongoing, and the results of further data collection efforts for the category are summarized in Section 3.3.3.

3.3 Data and Information Gathering

This section summarizes data collection efforts for the electroplating, metal finishing, and MP&M categories. The section includes descriptions of the literature studies, federal and state contacts, industry contacts, and trade association contacts that constitute the data collection effort for the electroplating, metal finishing, and MP&M rulemakings. This section also includes a brief summary of information made available in the administrative record for the

electroplating and metal finishing categories when these guidelines and standards were promulgated.

3.3.1 Electroplating and Metal Finishing Point Source Categories

Literature Review

EPA reviewed published information relevant to electroplating and metal finishing manufacturing processes, water use, waste treatment, and pollutant characteristics. This literature review included more than 200 sources of published information in periodicals, books, reports, papers, and promotional materials. Detailed bibliographies of the literature sources used can be found in the Development Document for Existing Source Pretreatment Standards for the Electroplating Point Source Category and in the Development Document for Effluent Guidelines and Standards for the Metal Finishing Point Source Category.

Federal and State Agency Contacts

EPA contacted all EPA regional offices and more than 10 state and territorial environmental agencies to obtain permits and monitoring data on plants performing electroplating and metal finishing unit operations.

Plating Materials Suppliers and Manufacturers

EPA visited or contacted at least 40 plating materials manufacturers and suppliers to collect information on the chemistry of plating baths and the pollutional aspects of chemicals used in the electroplating and metal finishing industry.

Trade Association Contacts

EPA attended pollution abatement meetings and seminars of several trade associations. EPA also attended the American Electroplaters' Society Intensive Training Course in Electroplating and Surface Finishing and a seminar on advanced wastewater treatment. EPA jointly sponsored EPA/American Electroplaters' Society Conferences on Advanced Pollution Control for the Metal Finishing Industry. In addition, EPA met with several trade associations, including The Institute of Printed Circuits, The National Association of Metal Finishers, The Continuous Coil Anodizing Association, The Association of Home Appliance Manufacturers, and The National Association of Manufacturers, to discuss the objectives and content of the electroplating standards and the metal finishing guidelines and standards.

Plant Surveys and Evaluations

EPA used a number of sources to identify prospective companies to establish databases for the metal finishing and electroplating categories. Among these sources were prior environmental studies performed on this industry, state and local agencies, and trade associations. EPA collected data from electroplating and metal finishing plants through written questionnaires,

telephone surveys, engineering plant visits, and wastewater sampling episodes. Telephone surveys were generally used to select facilities for written questionnaires, plant visits, or wastewater sampling episodes.

Under authority of Section 308 of the Clean Water Act, EPA sent several different questionnaires, or data collection portfolios (dcps), to facilities that perform electroplating/metal finishing unit operations. In addition, data from the 1975 Printed Circuit Board and Electroless Plating Study, the 1975 Electroplating Advanced Treatment Study, the 1976 Electroplating Pretreatment Study, and the 1976 Surface Treatment and Coating Study contributed to the databases for the metal finishing and electroplating standards. Selected data from studies of the copper and copper alloy manufacturing category, the aluminum and aluminum alloy manufacturing category, and the iron and steel manufacturing category were used to determine the characteristics of oily wastewater and to evaluate the performance of oily wastewater treatment technologies.

Beginning in 1974, EPA collected data from a total of 215 electroplating (Part 413) facilities by sending three separate dcps. These dcps are identified in the electroplating record by the name of the three EPA contractors: Batelle, Yost/Safranek, and Hamilton Standard. These dcps contain information about general plant characteristics, unit operations performed, waste disposal methods, and wastewater treatment methods.

To collect data for the metal finishing guidelines and standards (Part 433), EPA sent three dcps to various industries within the metal finishing category. The first of these dcps, sent in 1978, obtained data from 339 of the 1,422 plants. The data included information on raw materials consumed, specific operations used, composition of effluent streams, and wastewater treatment processes. The second dcp, sent in 1978-1979, obtained data from 365 of the 900 plants originally contacted in the mechanical and electrical products industries. This data included general plant characteristics, unit operations performed (including specific information on "plating type" operations), wastewater treatment, and waste transport. The third dcp, the best available technology (BAT)/electroplating dcp, sent in 1978, obtained data from 1,190 of 1,883 companies believed to be engaged in electroplating operations. This dcp collected information on general plant characteristics (both technical and economic information), production history, manufacturing processes, wastewater treatment, and wastewater treatment costs. During the metal finishing rulemaking, a total of 269 facilities were visited.

Plant Sampling

EPA collected wastewater samples at more than 200 electroplating/metal finishing facilities to characterize pollutant loads from process wastewater and to evaluate wastewater treatment effectiveness. The criteria used to select plants for sampling episodes included:

- A large percentage of the plant's effluent discharge should result from relevant manufacturing operations;

- The physical layout of the plant should facilitate sampling of the wastewater;
- The plant must have wastewater treatment and control technology in place; and
- The mix of plants sampled should be representative of the discharge status and geographic distribution of plants in the industry.

Self Monitoring Data

EPA requested and received long-term self-monitoring data from more than 50 plants. The data were used to evaluate treatment effectiveness and effluent variability for metal finishing and electroplating facilities.

Administrative Record

As part of the regulatory development process, EPA maintained administrative records for the electroplating and metal finishing rulemakings. The electroplating and metal finishing administrative records include general information regarding the history and development of the electroplating pretreatment standards and metal finishing guidelines and standards, the technical and economic information collected, documents supporting the technical analyses of plant data, documents supporting the economic and environmental analyses of regulatory action, and data sources for the electroplating and metal finishing development documents.

3.3.2 Metal Products and Machinery Category

This section presents a summary of the data collection efforts for the Metal Products and Machinery (MP&M) Point Source Category. As described in section 3.2.2, this category was formerly called the Machinery Manufacturing and Rebuilding (MM&R) Category. This section includes a summary of the data collected through the preliminary data summary (PDS), the mini-data collection portfolio (mdcp), the data collection portfolio (dcp), engineering plant visits, and wastewater sampling episodes for this category. Data collection for the MP&M category is an ongoing effort. Proposed effluent guidelines and standards for Phase I of the MP&M category are scheduled for November 1994.

Preliminary Data Summary

The preliminary data summary for the MP&M category included the review of existing data relevant to the MM&R category and the collection of new data.

EPA began data collection for the PDS by reviewing existing databases for the metals industries areas. This review included data for metal manufacturing categories (the iron and steel, nonferrous metals manufacturing, and ferroalloy categories), metal forming categories

(the metal molding and casting, aluminum forming, copper forming, and nonferrous forming categories), and component finishing categories (the coil coating, porcelain enameling, electroplating, metal finishing, and electrical and electronic components categories). Review of the data was used to estimate analytical, flow, and production data for MP&M unit operations and to provide process descriptions. In addition, EPA reviewed the domestic sewage study (DSS) to estimate pollutant loading and project size.

EPA collected new data for the PDS from engineering plant visits, wastewater sampling episodes, telephone surveys, data collection portfolios (dcps), trade association contacts, and informal contacts with industry and control authorities. To collect process and water use information, EPA performed engineering site visits at 21 facilities. To obtain analytical, flow, and production data, EPA collected wastewater samples at 7 industrial facilities. To estimate the size of the potential regulated community and the geographic distribution of facilities, EPA contacted 9 trade associations, conducted voluntary telephone surveys, reviewed Bureau of Census publications, and consulted various industrial directories.

Data Collection Portfolios

EPA sent two written questionnaires, or data collection portfolios (dcps), to MP&M facilities. The first of these, the mini data collection portfolio (mdcp), was sent in August, 1990 to 8,342 facilities believed to be engaged in MP&M operations. EPA used information purchased from Dun & Bradstreet to identify facilities to receive the mdcp. The facilities chosen to receive the mdcp were statistically selected to provide a representative sample of the category. The mdcp was a short (2 page) questionnaire that collected information on business sectors, plant size, unit operations performed, water use and discharge, and metal types processed. In response to the mdcp, EPA received technical information from 3,597 sites that are engaged in MP&M operations.

The second questionnaire, the data collection portfolio (dcp), was sent to 1,020 sites in January 1991. Sites were selected to receive the dcp based on one of four conditions: 1) randomly selected from a list of sites reporting no discharge of process wastewater; 2) specifically selected from no discharge sites because of certain unit operations or wastewater treatment; 3) randomly selected from known wastewater dischargers with historical data on their wastewater discharges or (4) a site did not receive an mdcp, but was known, based on a telephone survey, to be a large water-using MP&M facility. The dcp was an in-depth questionnaire that collected detailed technical and economic information on business sectors, plant size, process water use and discharge, metal types processed, wastewater flow, plant production, discharge status, waste minimization techniques, pollutant generation, wastewater control and treatment, and air pollution control. In response to the dcp, EPA received technical information from 792 MP&M sites.

Plant Visits and Sampling

As part of the regulatory development process for MP&M, EPA has performed engineering plant visits at 89 sites. The engineering plant visits were performed to collect further

technical information from MP&M sites and to select sites for wastewater sampling. EPA sampled 24 MP&M facilities. EPA will use analytical data from these sites to characterize pollutant loads from MP&M process wastewater and to evaluate wastewater treatment effectiveness. The criteria used to select plants for sampling episodes includes:

- A large percentage of the plant's effluent discharge should result from relevant manufacturing operations;
- The physical layout of the plant should facilitate sampling of the wastewater;
- The plant must have pollution prevention and/or wastewater treatment and control technology in place; and
- The mix of plants sampled should be representative of the discharge status and geographic distribution of plants in the industry.

Self Monitoring and Treatment Cost Data

EPA has requested long-term self-monitoring and wastewater treatment cost data from several MP&M plants. This data will be used to evaluate treatment cost, treatment effectiveness and effluent variability for MP&M facilities.

Table 3-1

Point Source Categories Listed in Appendix B
of the 1976 Settlement Agreement

1. Timber Products Processing
2. Steam Electric Power Plants
3. Leather Tanning and Finishing
4. Iron and Steel Manufacturing
5. Petroleum Refining
6. Inorganic Chemicals Manufacturing
7. Textile Mills
8. Organic Chemicals Manufacturing
9. Nonferrous Metals Manufacturing
10. Paving and Roofing Materials (Tars and Asphalt)
11. Paint and Ink Formulation and Printing
12. Soap and Detergent Manufacturing
13. Auto and Other Laundries
14. Plastic and Synthetic Materials Manufacturing
15. Pulp and Paperboard Mills; and Converted Paper Products
16. Rubber Processing
17. Miscellaneous Chemicals
18. MACHINERY AND MECHANICAL PRODUCTS MANUFACTURING*
19. ELECTROPLATING*
20. Ore Mining and Dressing
21. Coal Mining

*Relevant to Metal Finishing Study

Table 3-2

**Industrial Categories Derived from the
Machinery and Mechanical Products Manufacturing Category**

1. Aluminum Forming
2. Battery Manufacturing
3. Coil Coating
4. Copper Forming
5. Foundries (Metal Molding and Casting)
6. Photographic Supplies
7. Plastics Processing
8. Porcelain Enameling
9. Mechanical Products
10. Electrical and Electronic Components

Table 3-3
Metal Finishing Category Unit Operations

Unit	Operations	Unit	Operations
1.	Electroplating*	29.	Ultrasonic Machining
2.	Electroless Plating*	30.	Sintering
3.	Anodizing*	31.	Laminating
4.	Conversion Coating*	32.	Hot Dip Coating
5.	Etching (Chemical Milling)*	33.	Sputtering
6.	Printed Circuit Board Mnftg*	34.	Vapor Plating
7.	Cleaning	35.	Thermal Infusion
8.	Machining	36.	Salt Bath Descaling
9.	Grinding	37.	Solvent Degreasing
10.	Polishing	38.	Paint Stripping
11.	Barrel Finishing (Tumbling)	39.	Painting
12.	Burnishing	40.	Electrostatic Painting
13.	Impact Deformation	41.	Electropainting
14.	Pressure Deformation	42.	Vacuum Metalizing
15.	Shearing	43.	Assembly
16.	Heat Treating	44.	Calibration
17.	Thermal Cutting	45.	Testing
18.	Welding	46.	Mechanical Plating
19.	Brazing		
20.	Soldering		
21.	Flame Spraying		
22.	Sand Blasting		
23.	Other Abrasive Jet Machining		
24.	Electric Discharge Machining		
25.	Electrochemical Machining		
26.	Electron Beam Machining		
27.	Laser Beam Machining		
28.	Plasma Arc Machining		

*Unit operations 1 through 6 are core operations. If a facility does not perform at least one of these six operations, it is not subject to the Metal Finishing regulation.

Table 3-4
MP&M Unit Operations

1.	Abrasive Blasting		f.	Planing
a.	Bead		g.	Broaching
b.	Grit		h.	Sawing
c.	Sand		i.	Cutoff
d.	Shot		j.	Shaving
2.	Abrasive Jet Machining (Vapor Blasting)		k.	Shearing
3.	Acid Treatment		l.	Threading
a.	Acid Cleaning		m.	Reaming
b.	Chemical Etching and Bright Dipping		n.	Shaping
c.	Pickling		o.	Slotting
4.	Adhesive Bonding	28.	p.	Hobbing
5.	Alkaline Treatment and Alkaline Cleaning)	29.	q.	Chamfering
6.	Anodizing			Metal Spraying
7.	Assembly			Painting
8.	Barrel Finishing (Tumbling)		a.	Electropainting (Electrophoretic Painting)
9.	Brazing	30.	b.	Electrostatic Painting
10.	Burnishing			Plating
11.	Calibration		a.	Electroplating
12.	Chemical Conversion Coating		b.	Electroless Plating
a.	Chromate Conversion Coating		c.	Immersion Plating
b.	Phosphate Conversion Coating		d.	Mechanical Plating
c.	Complex Oxide Conversion Coating		e.	Vapor Plating
d.	Coloring	31.		Plasma Arc Machining
e.	Passivating	32.		Polishing
13.	Chemical Machining (Chemical Milling)	33.		Pressure Deformation
14.	Corrosion Preventive Coating (Other than conversion coating)		a.	Rolling
15.	Disassembly		b.	Drawing
16.	Electrical Discharge Monitoring		c.	Bending
17.	Electrochemical Cleaning		d.	Embossing
18.	Electrolytic Cleaning		e.	Necking
19.	Electron Beam Machining		f.	Forming
20.	Electropolishing		g.	Crimping
21.	Grinding		h.	Flaring
22.	Heating Treating	34.		Rinsing
a.	Tempering		a.	Countercurrent Cascade
b.	Carburizing		b.	Stagnant Dip
c.	Cyaniding		c.	Recirculating Dip
d.	Nitriding		d.	Spray
e.	Annealing	35.		Salt Bath Descaling
f.	Aging	36.		Soldering
g.	Normalizing	37.		Solvent Degreasing (Solvent Cleaning)
h.	Austenitizing	38.		Sputtering
i.	Austempering	39.		Stripping
j.	Siliconizing		a.	Paint Strip
k.	Martempering		b.	Plating Strip
l.	Malleablizing	40.		Testing
23.	Hot Dip Coating		a.	Dye Penetrant Testing
24.	Impact Deformation		b.	Hydraulic Testing
a.	Peening	41.		Thermal Cutting
b.	Shot Peening	42.		Thermal Infusion
c.	Forging	43.		Ultrasonic Machining
d.	Coining	44.		Vacuum Metalizing
e.	High Energy Forming	45.		Welding
f.	Heading		a.	Gas Welding
g.	Stamping		b.	Resistance Welding
25.	Laminating		c.	Arc Welding
26.	Laser Beam Machining		d.	Cold Welding
27.	Machining		e.	Electron Beam Welding
a.	Turning		f.	Laser Beam Welding
b.	Milling			
c.	Drilling			
d.	Boring			
e.	Tapping			

4.0 DEVELOPMENT OF TECHNICAL AND ECONOMIC ASSESSMENT OF ELECTROPLATING AND METAL FINISHING

INTRODUCTION

This section presents a summary of the wastewater characterization, control and treatment technology, and economic assessment for the electroplating/metal finishing regulations. A summary of the limitations in the effluent guidelines and standards are also presented.

4.1 Wastewater Characterization

The Development Documents and administrative records were reviewed to examine the technical basis for decisions on wastewater characterization in the electroplating/metal finishing industry. Wastewater characterization information was reviewed to determine if all wastewater streams generated at integrated metal finishing plants were characterized for the Metal Finishing regulation.

Pollutant Parameter Questionnaire and Wastewater Characterization Distribution.

Information on the presence of priority pollutants in metal finishing wastewaters was compiled from the "priority pollutant questionnaire" section of the Electroplating Study dcps discussed in Section 3-3, and from literature studies. Literature studies were used to supplement the data because little or no information on the 40 "non-electroplating" metal finishing unit operations (operations 7 to 46 in Table 3-3 and Table 4-1) was included in the Electroplating Study. The data from the pollutant parameter questionnaire section of the dcps and the literature study were used to compile the final Waste Characteristic Distribution table in the Metal Finishing Development Document Table 4-1. The table lists all 46 metal finishing unit operations and correlates them to specific wastewater streams. The waste characterization distribution table may reflect incomplete organic pollutant characterization in wastewater from several of the 40 non-electroplating operations. For example, machining is shown not to contribute toxic organics to the wastewater stream, however recent MP&M sampling data shows the presence of toxic organic pollutants in machining wastewaters. The Metal Finishing Development Document lists the minimum detection limits that were used in the sampling phase of the rulemaking. These detection limits were published in "US EPA Environmental Monitoring and Support Laboratory. Methods for Chemical Analysis of Water and Wastes", and "US EPA Guidelines Establishing Test Procedures for the Analysis of Pollutants, Proposed Regulations" (1979). During the wastewater characterization phase of the rulemaking, pollutant parameters measured below the minimum detectable limit were not considered for regulation.

EPA Method 1620, which was promulgated after the Metal Finishing regulation (1987) and is currently being used for MP&M, achieves lower detection limits than those used for the Metal Finishing regulation. Table 4-2 summarizes some of the changes in detection limits in EPA approved sampling methods since the promulgation of Metal Finishing. Therefore, were the electroplating/metal finishing rulemakings to commence today, these lowered detection limits could have an impact on the pollutant parameters chosen for regulation.

4.2 Control and Treatment Technology

Data from the electroplating/metal finishing administrative records and development documents were reviewed to identify specific data used to analyze treatment effectiveness and select treatment options. These data were reviewed to determine if all wastewater streams generated at integrated metal finishing plants were included in the identification of control and treatment technologies.

For the Metal Finishing regulation, site sampling data and long-term self monitoring data were used to determine treatment effectiveness and variability factors. As an example for the current review of the Metal Finishing regulation, an analysis of control and treatment technology data for the Metal Finishing BAT - precipitation/sedimentation common metals and total suspended solids (TSS) was performed.

Visited Plant Data for BAT (Common Metals and TSS). Sampling analytical data from 36 plants were used to calculate mean treatment influent and effluent concentrations for common metals and TSS. Table 4-3 presents a summary of the sites used to obtain BAT performance data for common metals.

The sites as listed in Table 4-3 represent a cross section of job shop and integrated plants. However, the sampling data reveal that 80 to 90% of the samples were collected from wastewater streams from the six core electroplating operations only. The wastewater streams listed consisted mostly of wastewater from electroplating with some minor exceptions, i.e. **little or no data were used to calculate treatment effectiveness for integrated plants and the non-electroplating wastewaters.**

Long-Term Self Monitoring Data for BAT (Common Metals and TSS). Effluent data were used from 32 plants to determine effluent variability for common metals. The sites represent a cross section of job shops, and integrated plants.

4.3 Economics

A preliminary review of the data used in the EPA report "Economic Impact Analysis of Effluent Standards and Limitations for the Metal Finishing Industry" (6/83) was performed to determine what specific data were used from the electroplating/metal finishing database to assess the economic impact of the regulation on the job shop and captive (not a job shop) sectors.

Job Shop Plant Costing. Cost data from 244 of the 1,190 dcps from the Electroplating Study were used as a financial and economic database and for costing the regulatory impact on the job shop sector. The following information was available from the dcps: flow rate, plant layout, materials finished, hours of operation, finishing processes, amperage, thickness of plate, equipment in place, tooling, piping, and laboratory costs.

Captive Plant Costing. The economic database used to cost the regulatory impact on the job shop sector contained substantial process wastewater flow and economic data for job

shops, but little or no information on the captive sector. To cost the captive sector, EPA selected a sample of 100 indirect discharging captive plants and 100 direct discharging captive plants from the visited plant database (these plants were called "model" plants in the EIA). Limitations in the available data from visited captive plants prevented the creation of a functional relationship on a plant-by-plant basis between visited plant wastewater flow and estimated cost impact of the regulation. This data limitation was resolved by grouping the model plants according to wastewater flow. These wastewater flow groupings were then matched according to water usage with the discharging job shop plants in the Electroplating Study dcp economic database. Costs for direct and indirect discharging captive plants are described below.

Direct Discharging Captives. For direct discharging captive plants, the 100 model plants were grouped according to wastewater flow and linked to the job shop economic database. This economic database consisted of 231 direct discharging plant dcps from the Electroplating Study. The wastewater flow from the 100 direct discharging model plants was focused on the six core electroplating operations.

Indirect Discharging Captives. Of the 100 indirect discharging model plants, 26 model plants had wastewater flow from one or more of the 40 additional metal finishing (non-electroplating) operations in addition to electroplating wastewater flow. For these plants, a baseline cost was determined by grouping sites by wastewater flow rates and correlating this with the economic database from the Electroplating Study. The cost of the integrated wastewater flow was determined by wastewater flow grouping and linking the estimated cost with the economic dcp database.

4.4 Effluent Limitations in the Effluent Guidelines and Standards for 40 CFR Part 413 Electroplating and 40 CFR Part 433 Metal Finishing

4.4.1 Electroplating Point Source Category

This section presents a summary of the pretreatment standards for existing facilities (PSES) in the Electroplating Point Source Category as discussed in the preceding sections.

ELECTROPLATING 40 CFR Part 413 (PSES)

APPLICABILITY

Electroplating operations in which metal is electroplated on any basis material and related metal finishing operations, whether the operations are conducted in conjunction with electroplating, independently, or as part of some other operation. This regulation covers only job shop electroplaters and independent printed circuit board manufacturers existing as of August 31, 1982. Operations excepted from coverage include:

- Electrowinning and electrorefining conducted as a part of nonferrous metal smelting and refining (40 CFR Part 421).

- Metal surface preparation and conversion coating conducted as part of coil coating (40 CFR Part 465).
- Metal surface preparation and immersion plating or electroless plating conducted as a part of porcelain enameling (40 CFR Part 466).
- Electrodeposition of active electrode materials, electroimpregnation, and electroforming conducted as a part of battery manufacturing (40 CFR Part 461).
- Metallic platemaking and gravure cylinder reparation conducted within or for printing and publishing facilities, and continuous strip electroplating conducted within iron and steel manufacturing facilities which introduce pollutants into a POTW.

SUBCATEGORIZATION

- Electroplating of Common Metals (Cu, Ni, Cr, Zn, Sn, Pb, Cd, Fe, Al or any combination);
- Electroplating of Precious Metals (Ag, Au, Ir, Pd, Pt, Rh, Ru);
- Anodizing;
- Coatings (chromating, phosphating, immersion plating);
- Chemical Etching and Milling;
- Electroless Plating; and
- Printed Circuit Boards.

REGULATION BASIS

- Concentration-based limitations.
- Optional mass-based limitations for those plants that discharge greater than 38,000 liters per day of electroplating wastewater and which recover process materials and employ water conservation techniques. This limit can be used in place of concentration-based regulations upon prior agreement with POTW.

UNIT OPERATIONS

Electroplating of Common Metals and Electroplating of Precious Metals Subcategories

- Solvent Degreasing;
- Alkaline Cleaning;
- Electrolytic Cleaning;
- Acid Cleaning;
- Salt Bath Descaling;
- Electroplating;
- Chromate Conversion Coating;
- Phosphate Conversion Coating; and
- Coloring.

Electroless Plating

- Alkaline Cleaning;
- Acid Etching;
- Vapor Blasting (plastic surface preparation);
- Honing;
- Solvent Degreasing; and
- Electroless Plating.

Anodizing

- Solvent Degreasing;
- Alkaline Cleaning;
- Alkaline Etching;
- Acid Treatment; and
- Anodizing.

Coatings

- Alkaline Cleaning;
- Acid Cleaning;
- Solvent Degreasing;
- Salt Bath Descaling;
- Polishing;
- Chromate Conversion Coating;
- Phosphate Conversion Coating;
- Coloring; and
- Immersion Plating.

Chemical Milling and Etching

- Solvent Degreasing;
- Alkaline Cleaning;
- Electrolytic Cleaning;
- Acid Cleaning;
- Salt Bath Descaling;
- Masking;
- Acid Dipping;
- Chemical Milling;
- Chemical Etching; and
- Bright Dipping.

Printed Circuit Boards

- Acid Cleaning;
- Alkaline Cleaning;
- Electroless Plating;
- Electroplating; and
- Acid Etching.

TREATMENT EFFECTIVENESS DATA

- On-site sampling; and
- Site-provided information and sampling data.

PRETREATMENT STANDARDS FOR EXISTING SOURCES (PSES)

Pretreatment of Complexed Metal Wastes

- Chemical Precipitation; and
- Sedimentation.

Pretreatment of Hexavalent Chromium Wastes

Chemical Chromium Reduction.

Pretreatment of Cyanide Wastes

Cyanide Oxidation.

Pretreatment of Oily Wastes

- Segregation;
- Gravity Separation;
- Skimming; and
- Emulsion Breaking.

Treatment of Combined Wastestreams

- Chemical Precipitation;
- Flocculation/Coagulation;
- Clarification; and
- Sludge Dewatering.

Presented in Table 4-4 are effluent limitations in the standards (PSES) for Electroplating 40 CFR Part 312.

4.4.2 Metal Finishing Point Source Category

This section presents a summary of the effluent guidelines and standards for the Metal Finishing Point Source Category as discussed in the preceding sections.

APPLICABILITY

All plants which perform any of the following six metal finishing operations on any material:

- Electroplating;
- Electroless Plating;
- Anodizing;
- Coating (chromating, phosphating, coloring);
- Chemical Etching and Milling; or
- Printed Circuit Board Manufacturing.

Except:

- Those plants whose effluent limitations and standards are regulated by:
1) Nonferrous Metal Smelting and Refining; 2) Coil Coating; 3) Porcelain Enameling; 4) Battery Manufacturing; 5) Iron and Steel; 6) Metal Casting Foundries; 7) Aluminum Forming; 8) Copper Forming; 9) Plastic Molding and Forming; 10) Nonferrous Forming; or 11) Electrical and Electronic Components;
- Those plants who conduct metallic platemaking and gravure cylinder preparation conducted within or for publishing and printing facilities; or
- Existing indirect discharging job shops and independent printed circuit board manufacturers which are covered by 40 CFR Part 413 (Electroplating). The term "job shop" is defined as a site which owns not more than 50% (annual area basis) of the materials undergoing metal finishing.

SUBCATEGORIZATION

None.

REGULATION BASIS

Concentration-based limitations.

UNIT OPERATIONS

- 40 operations as listed in Table 3-3

SAMPLING

Samples were collected at approximately 100 electroplating/metal finishers sites.

TREATMENT EFFECTIVENESS DATA

- Raw and effluent concentration data from EPA sampling visits; and
- Long-term self monitoring effluent data submitted by plants in electroplating/metal finishing industry.

BEST PRACTICABLE CONTROL TECHNOLOGY CURRENTLY AVAILABLE (BPT)

Treatment of Complexed Metal Wastes

- Chemical Precipitation; and
- Sedimentation.

Treatment of Hexavalent Chromium Wastes

Chemical Chromium Reduction.

Treatment of Cyanide Wastes

Cyanide Oxidation.

Treatment of Oily Wastes

- Segregation;
- Gravity Separation;
- Skimming; and
- Emulsion Breaking.

Treatment of All Wastes

- Chemical Precipitation;
- Flocculation/Coagulation;
- Clarification; and
- Sludge Dewatering.

BEST AVAILABLE TECHNOLOGY ECONOMICALLY ACHIEVABLE (BAT)

Identical to BPT.

NEW SOURCE PERFORMANCE STANDARDS (NSPS)

- Identical to BPT; and

- Evaporative Recovery, Ion Exchange, and Recovery Rinsing as used for in-process cadmium control.

PRETREATMENT STANDARDS FOR EXISTING SOURCES (PSES)

Identical to BPT.

PRETREATMENT STANDARDS FOR NEW SOURCES (PSNS)

Identical to NSPS except oil, grease, and TSS are not regulated parameters.

Also, presented in Table 4-5 are effluent limitations in the effluent guidelines and standards for Metal Finishing 40 CFR Part 433.

Table 4-1
Metal Finishing Waste Characteristic Distribution

Waste Characteristics*/ Unit Operations	Inorganics				Organics			Zero Discharge
	Common Metals	Precious Metals	Complexed Metals	Chromium (Hexavalent)	Cyanide	Oils	Toxic Organics	
1. Electroplating	x	x		x	x			
2. Electroless Plating	x	x	x	x				
3. Anodizing	x			x				
4. Conversion Coating	x	x		x	x			
5. Etching (Chem.Milling)	x	x	x	x	x			
6. Cleaning	x	x	x	x	x	x	x	
7. Machining	x					x		
8. Grinding	x					x		
9. Polishing	x	x				x		
10. Tumbling	x			x	x	x		
11. Burnishing	x	x			x	x		
12. Impact Deformation	x					x		
13. Pressure Deformation	x					x		
14. Shearing	x					x		
15. Heat Treating	x				x	x		
16. Thermal Cutting	x							
17. Welding	x							
18. Brazing	x							
19. Soldering	x							
20. Flame Spraying	x		x					
21. Sand Blasting	x							
22. Other Abr.Jet Machining	x					x		
23. Elec. Discharge Mach.	x					x		
24. Electrochemical Mach.	x				x		x	x
25. Electron Beam Mach.								x
26. Laser Beam Mach.								x
27. Plasma Arc Mach.								x
28. Ultrasonic Machining								x
29. Sintering								
30. Laminating	x							
31. Hot Dip Coating	x							x
32. Sputtering								x
33. Vapor Plating								x
34. Thermal Infusion								
35. Salt Bath Descaling	x					x		
36. Solvent Degreasing	x					x	x	
37. Paint Stripping	x					x	x	
38. Painting	x						x	
39. Electrostatic Painting	x			x			x	
40. Electroplating	x						x	x
41. Vacuum Metalizing								
42. Assembly	x					x	x	x
43. Calibration								
44. Testing						x		
45. Mechanical Plating	x							
46. Printed Circuit Board Manufacturing	x		x				x	

* The raw wastes for the Metal Finishing category were initially subdivided into two constituent types, inorganic and organic and further subdivided into seven waste types. The major constituents of common metals waste streams include cadmium, chromium, copper, cyanide, lead, nickel, zinc, and tin. The major constituents of precious metals waste stream include gold, silver, palladium, and rhodium. Complex metals of copper, nickel, tin, and zinc are often formed from complexing agents, typically cyanide or ammonia during electroless and immersion plating and cleaning operations with heavily chelated agents. Segregation and separate treatment for the seven types are part of the basis for limitations.

TABLE 4-2**CHANGES IN MINIMUM DETECTION LIMITS FOR SELECTED ANALYTES**

Parameter	Detection Limit Used for Metal Finishing (mg/l)	EPA Method 1620 (mg/l)	% Decrease in Detection Limit
1. Beryllium	0.005	0.0003	94%
2. Cadmium	0.005	0.004	20%
3. Chromium	0.05	0.007	86%
4. Copper	0.02	0.006	70%
5. Lead	0.10	0.042	58%
6. Nickel	0.04	0.015	63%
7. Silver	0.01	0.007	30%
8. Zinc	0.005	0.002	60%
9. Iron	0.03	0.007	77%

TABLE 4-3
METAL FINISHING: BAT VISITED PLANTS

SITE NO.	SIC	Performance Data (Common Metals and TSS)							Treatment Influent Contained Wastewater Streams from Six Electroplating Operations Only	COMMENTS
		Cd*	Cr	Cu	Pb*	Ni	Zn	TSS		
4065	3679	✓		✓	✓			✓	✓	Printed Circuit Board Manufacturer
4069	3679		✓	✓		✓		✓	✓	Printed Circuit Board Manufacturer
4071	3679			✓	✓			✓	✓	Printed Circuit Board Manufacturer
5020	3679			✓		✓		✓	✓	Printed Circuit Board Manufacturer
6051	3728	✓	✓					✓		Raw Wastewater Sample Included Electroplating, Machining, Grinding, Impact Deformation and Pressure Deformation Wastewater.
6074	3421	✓	✓	✓	✓	✓		✓		Raw Wastewater Sample Included Electroplating, Grinding and Burnishing Wastewater.
6083	3964	✓	✓		✓	✓	✓	✓		Raw Wastewater Sample Included Tumbling Wastewater Only. (50% of Total Wastewater - Remaining 50% was Electroplating Wastewater Which was not sampled).
6087	3679	✓	✓	✓	✓	✓	✓	✓	✓	
6101	3484							✓	✓	
6731	3824	✓	✓	✓	✓	✓	✓	✓	✓	
11477	3479		✓					✓	✓	
12061	3315			✓	✓			✓	✓	Job Shop

TABLE 4-3
METAL FINISHING: BAT VISITED PLANTS
 Continued

14001	3585							✓		Raw Wastewater Sample Included Painting Wastewater Only.
15010	3711		✓		✓		✓	✓	✓	
15070	3632	✓			✓		✓	✓	✓	
19051	3915							✓	✓	
19063	3471	✓		✓	✓	✓		✓	✓	
19068	3479		✓	✓	✓	✓	✓	✓	✓	
20073	3471	✓	✓	✓	✓	✓	✓	✓	✓	
20078	3471		✓	✓	✓	✓	✓	✓	✓	Job Shop
20080	3496	✓	✓		✓		✓	✓	✓	
20083	3429 3634 3079	✓	✓	✓	✓	✓		✓	✓	Job Shop
20086	3429	✓	✓	✓	✓	✓	✓	✓	✓	
21003	3662	✓		✓		✓		✓	✓	
23061	3561							✓	✓	
27044	3911	✓		✓	✓	✓		✓	✓	
31020	3555	✓	✓	✓	✓	✓	✓	✓	✓	
33024	3644	✓	✓	✓			✓	✓	✓	
33065			✓	✓	✓		✓	✓		Raw Wastewater Sample Included Deburring Wastewater Only. (Not Electroplating Operations)
33074	3949 3471							✓	✓	
33692	3714							✓		Raw Wastewater Sample Included Electroplating, Machining, Grinding, Barrel Finishing, Shearing, Heat Treatment, and Testing Wastewaters.
36040	3998	✓	✓	✓	✓	✓	✓	✓	✓	
36041	3822 3471		✓	✓	✓	✓	✓	✓	✓	
36623	3079 3662 3471				✓	✓	✓	✓	✓	Job Shop
40062	3471		✓	✓	✓	✓		✓	✓	Job Shop
44062	3479 3411		✓					✓	✓	Job Shop
% of data from electroplating wastes		82%	80%	91%	87%	89%	88%	83%		

TABLE 4-4
PRETREATMENT STANDARDS FOR EXISTING SOURCES (PSES)
ELECTROPLATING CATEGORY
40 CFR Part 413

Facilities Discharging <38,000 liters (10,000 gallons) per day

<u>Pollutant</u>	<u>Daily Maximum (mg/l)</u>	<u>Maximum 4 Day Average (mg/l)</u>
Cadmium (T)	1.2	0.7
Lead (T)	0.6	0.4
Cyanide, A	5.0	2.7
Total Toxic Organics (TTO) ¹	4.57	--

Facilities Discharging >38,000 liters (10,000 gallons) per day

<u>Pollutant</u>	<u>Daily Maximum (mg/l)</u>	<u>Maximum 4 Day Average (mg/l)</u>
Cadmium (T)	1.2	0.7
Chromium (T)	7.0	4.0
Copper (T)	4.5	2.7
Lead (T)	0.6	0.4
Nickel (T)	4.1	2.6
Zinc (T)	4.2	2.6
Silver (T) ²	1.2	0.7
Total Metals ³	10.5	6.8
Cyanide, T	1.9	1.0
Total Toxic Organics (TTO) ¹	2.13	--

Cyanide, A = Cyanide, amenable to chlorination

Cyanide (T) = Cyanide, Total

(T) = Total

¹No regulation of the maximum 4-day average for TTO.

²The silver pretreatment standard applies only to precious metals plating.

³Total metals is defined as the sum of the concentration of copper, nickel, total chromium, and zinc.

TABLE 4-5
EFFLUENT GUIDELINES AND STANDARDS FOR THE METAL FINISHING CATEGORY
40 CFR Part 433

BEST AVAILABLE TECHNOLOGY ECONOMICALLY ACHIEVABLE (BAT) AND
PRETREATMENT STANDARDS FOR EXISTING SOURCES (PSES)

<u>Pollutant</u>	<u>Daily Maximum (mg/l)</u>	<u>Maximum Monthly Average (mg/l)</u>
Cadmium (T)	0.69	0.26
Chromium (T)	2.77	1.71
Copper (T)	3.38	2.07
Lead (T)	0.69	0.43
Nickel (T)	3.98	2.38
Silver (T)	0.43	0.24
Zinc (T)	2.61	1.48
Cyanide, total	1.20	0.65
Total Toxic Organics	2.13	--
Alternative to total cyanide: Cyanide, amenable to chlorination		
	0.86	0.32

NEW SOURCE PERFORMANCE STANDARDS (NSPS) AND
PRETREATMENT STANDARDS FOR NEW SOURCES (PSNS)

<u>Pollutant</u>	<u>Daily Maximum (mg/l)</u>	<u>Maximum Monthly Average (mg/l)</u>
Cadmium (T)	0.11	0.07
Chromium (T)	2.77	1.71
Copper (T)	3.38	2.07
Lead (T)	0.69	0.43
Nickel (T)	3.98	2.38
Silver (T)	0.43	0.24
Zinc (T)	2.61	1.48
Cyanide, total	1.20	0.65
Total Toxic Organics	2.13	--
Oil and Grease	52.0	26.0
TSS	60.0	31.00
Alternative to total cyanide: Cyanide, amenable to chlorination		
	0.86	0.32

Note: No maximum monthly average TTO concentration regulated.
(T) = total
Oil and grease and TSS are regulated under NSPS not under PSNS.

5.0 PRACTICALITY AND USE

INTRODUCTION

This section presents a summary of the applicability and the practical use of the regulations by permitting authorities and of the overlap between the Electroplating Point Source Category Pretreatment Standards, the Metal Finishing Effluent Guidelines and Standards, and what may be proposed in the future effluent guidelines and standards for the Metal Products and Machinery Point Source Category.

5.1 Applicability and Use

5.1.1 Electroplating/Metal Finishing Industry

The electroplating/metal finishing industry is regulated by two rules, Electroplating (40 CFR Part 413) and Metal Finishing (40 CFR Part 433). Section 3 of this study summarizes the authority under which these rules were promulgated, the history of the development of the rules, the data collection efforts supporting the rules, and definitions and general applicability of each rule. Section 4 of this study summarizes the wastewater characteristics of the industry, control and treatment technology, economic assessment of the rules, and the effluent limitations in the guidelines and standards.

Electroplating (Part 413) regulates only indirect discharges from six electroplating or core operations and related operations followed by a rinse when performed at a job shop or independent circuit board manufacturer. Metal Finishing (Part 433) regulates direct and indirect discharges from the remaining electroplating/metal finishing industry with effluent guidelines and standards for discharges from facilities performing any of the core operations. When a facility performs any of the core operations, any discharge from 40 additional unit operations are also subject to Part 433. Both Part 413 and Part 433 use concentration based effluent limitations.

Guidance for applicability of Part 433 in the development document and preamble to the regulation states, "industries covered by the Metal Finishing Category are generally included in Standard Industrial Classification (SIC) Major Groups 34 through 39..." However, it is also noted that some industries listed in these Major Groups are not included in or exclusively regulated by the Metal Finishing guidelines and standards. An example is Major Group 36 Electrical and Electronic Machinery Equipment and Supplies which is subject to both the Electrical and Electronic Component Category and the Metal Finishing Category guidelines and standards. The Electrical and Electronic Components Category covers processes unique to electronics, and the Metal Finishing Category covers the remaining processes used to manufacture the products in Major Group 36.

As discussed in Section 3.2.1, 40 CFR Part 433.10 (b) states that eleven other categorical effluent guidelines and standards with more specific limitations take precedence over the Metal Finishing regulation. Regardless of the exemptions, exclusions, and precedence for the metal

finishing limitations, at promulgation of the Metal Finishing regulation, EPA estimated that there were approximately 13,500 manufacturing facilities in the United States which would be covered by the Metal Finishing Category. This estimate was based on EPA mailings and industry journal lists of facilities and plants engaged in the manufacturing of a variety of products that are constructed primarily by using metals and perform one of the core unit operations. Also, Permits Division in the Office of Wastewater Enforcement and Compliance (OWEC) presently estimates that about 30,000 Significant Industrial Users (SIU) are subject to pretreatment standards. A SIU is generally an industrial user subject to Categorical Pretreatment Standards or any other industrial user that discharges an average of 25,000 gallons per day or more of process wastewater. OWEC also estimates that about 12,000 SIU determinations were made based on the facility being subject to Categorical Pretreatment Standards.

The use and practicality of the electroplating/metal finishing regulations has been estimated from a number of sources, including data and information collected for the Metal Products and Machinery Point Source Category which is summarized in more detail in the following section. The initial estimate of 13,500 facilities, of which an estimated 85% are indirect dischargers has stood through this current review of metal finishing. No hard data or national database exists, e.g. number of actual permits issued by permitting authorities which incorporate guidelines and standards for effluent limitations, because in general, no notation is made on individual permits as to how or what guidelines and standards were used for the effluent limitations. Extrinsic data and information has come from inquiries from permitting authorities which indicates that for pretreatment standards, the Metal Finishing standards may be the most used and incorporated standards, in whole or in part, of any of the existing standards.

The reasons for this assertion include the definition for applicability of Metal Finishing being related to unit operations performed at a facility and not to SIC codes or other more specific definitions. By convention, permit writers use Metal Finishing standards in permit limitations for a facility when other guidelines and standards are obviously not applicable, but the facility has one or more core operations. Even if the core operations are small in relation to the overall operation and size of the total facility, the presence of a core operation will allow the inclusion of discharges from any of the other 40 unit operations covered by Metal Finishing. The guidelines and standards for Metal Finishing apply to plants which perform any of the core six metal finishing operations on any basis material. By convention, the discharges from the other 40 unit operations are covered by Metal Finishing standards even if there is no discharge from the core operation or operations directly related to the core operation, i.e. cleaning operations, acid pickling, stripping, and sealing.

An indicator of the utility of the Metal Finishing standard and how this rule for electroplating/metal finishing has approached one of the stated goals for the rule, a request for equivalent limits for process lines or unit operations often found together, is an analysis of the data from the second MP&M data collection portfolio (dcp) for Phase I (January 1991). About 75% of the facilities in the DCP which are permitted by using existing guidelines and standards are subject in whole or in part to 40 CFR Part 433 Metal Finishing. About 60% of the facilities permitted by existing guidelines and standards are subject only to Metal Finishing, thereby

approaching the goal of reducing the need for the combined wastestream formula (CWF) [40 CFR 403.6 (e)]. The CWF is a method to calculate alternative pretreatment discharge limitations for mixed effluent from different regulated streams or unregulated and dilution streams as discussed in more detail in Section 5.2.

During the study contacts were established with permitting authorities to provide input on the practicability of the electroplating/metal finishing rule. An example is the National Pretreatment Coordinators Conferences where a voluntary survey was distributed. Responses were received from nine EPA regional offices and 15 state or local pretreatment authorities. Below are some highlights and comments regarding effluent guidelines and standards in general and specific comments regarding Electroplating and Metal Finishing.

About 70% of the respondents experienced situations in which the applicability and definitions of the electroplating/metal finishing rules are inadequate.

- Definitions and applicability should be updated to reflect new processes, chemicals and basic materials;
- Definitions of cleaning, coating and etching in the guidance and development documents need to be clarified;
- The four-day average and 10,000 gallon per day criteria in Electroplating need to be clarified;
- Application and qualification for alternate cyanide and total toxic organics (TTO) need additional explanations.

Major difficulties encountered with the implementation of the Electroplating and Metal Finishing regulations include:

- Vague definitions and applicability allow too much interpretation;
- There is a lack of authority and guidance to limit rinsewater flow.
- There is difficulty in applying the regulation to new processes and materials;
- There is little guidance for overlap with other regulations and when there is precedence to Metal Finishing.

Recommendations for changes in the Electroplating and Metal Finishing regulations include:

- Clarify definitions;
 - average daily flow
 - core electroplating operations
 - monitoring points of regulated process water,
 - integrated facility, or "significant" quantities of process water from non-electroplating manufacturing operations;
- Change four-day average flow to monthly average flow in Electroplating regulations;

- Allow certifications (Toxic Organic Management Plan), instead of monitoring requirements, for industrial users that do not use cyanide, or other regulated pollutants;
- Evaluate TTO listing and remove compounds which have little or no likelihood of being discharged by a metal finishing or electroplating facility;
- Add alternate production-based limitations and/or flow restrictions;
- Address new industrial processes and newer wastewater treatment processes;
- Reconsider subcategorization;
- Revise standards as appropriate to reflect pollution prevention, recycle, and reuse measures widely used in industry.

About 70% of the respondents prefer concentration-based limitations rather than production-based limitations and suggested alternatives to production-based limitations.

- Regulations and/or guidance for acceptable rinsewater rates;
- Concentration-based regulations with flow limitations;
- The problems associated with production-based limitations include:
 - difficulties in obtaining and verifying accurate production and flow data from industry,
 - production-based limitations need to accommodate wide variations in the type of products manufactured, and
 - fluctuations in annual production make it difficult to select a representative year which will be accurate throughout the permit term.

A recent draft report by EPA Region IX, Model IU Performance Study, includes information on the effectiveness and compliance by indirect dischargers including 32 small electroplaters, 78 large electroplaters, 104 existing source metal finishers, and 112 new source metal finishers. Performance measures based on compliance rates were determined for compliance with daily maximum and either the 4-day or monthly average limitations for metals and cyanide. A premise of the study is that all categorical industrial users should be able to perform as well as those who installed and correctly operated the type of model treatment originally selected by EPA as the basis of the categorical standards. "Model industries" in the categories were selected based on facilities having treatment equal to or exceeding the technology base for the standards categorical effluent limitations. Patterns were identified and documented in the study. In particular, the compliance rates for daily-maximum standards always exceeded the compliance rates for average standards. This difference in compliance rates for daily-maximum and monthly average standards results from EPA's policy of applying average standards against any number of samples in a month no matter how few. In reality, there is usually only one sample in a month and almost never as many consecutive samples in a month as were used to define the monthly average standards.

The study found that most model industries complied with their Federal standards (both daily-maximums and averages) 100% of the time. However, the study also recognizes that some industrial users will not perform well (based on compliance rates) even if they are model

industries. Three percent and 15% of the model industries complied less than 67% of the time with their daily-maximum and average standards respectively. Thirty percent and 45% of the model industries complied less than 95% of the time with their daily-maximum and average standards respectively. The principal conclusions in the study is that sewer districts should be able to cause their categorical industrial users to meet these compliance rates.

5.1.2 Metal Products and Machinery

EPA initially estimated in the MP&M PDS that the population of MP&M to be 970,000 sites including both Phase I and Phase II. This estimate has been significantly reduced to the present for both Phase I and Phase II by removing from coverage in Phase II 253,000 rebuilding and maintenance facilities (e.g. motor vehicle repair shops). Review of data from the collection portfolios, discussed in Section 3, caused EPA's estimate of the number of facilities in Phase I and Phase II to be further reduced to slightly over 100,000. However, some facilities reported having products or business that fell into industrial sectors in both Phase I and Phase II. An analysis of "water users" was taken from the dcp response that included facilities that reported being in both Phase I and Phase II industrial sectors and facilities reporting to be only in Phase I. To date, the water users reporting to Phase I or Phase I/II have been considered Phase I sites and these total Phase I sites were reviewed to find approximately 18,500 Phase I sites that discharge water. Refinements to this estimate were made following an analysis of more detailed dcp's and identifying additional sites which would not be regulated by Phase I rules (no process wastewater discharged, contract haul all liquid and solid waste, not engaged in MP&M or out of MP&M business). EPA now estimates that approximately 10,600 sites will be regulated by MP&M Phase I regulations.

Applicability of MP&M has not totally been defined at this time and will be subject to interagency review and concurrence before the proposed regulation is presented to the Administrator for signature. However, some general statements can be made regarding the current thinking about scope and intent of the regulation (such as the above estimate of sites that will be regulated by Phase I MP&M). The SIC Major Groups listed in the dcp's as Phase I and Phase II industrial sectors are similarly included in the general guidance for Metal Finishing. Metal Finishing manufacturing processes are generally included in SIC Major Groups 34 through 39. MP&M Phase I industrial sectors are found in SIC Major Groups 34 through 37. All of the unit operations covered by the Metal Finishing regulations are included in the unit operations to be covered by MP&M. All of the types of metals finished and processed by Metal Finishing unit operations are included in the types of metal in the products and machinery included in MP&M. Analysis of the dcp's estimates that about 3300 sites in Phase I MP&M (of the over 10,000 sites in Phase I) are currently regulated by electroplating/metal finishing regulations.

The primary coverage of MP&M differs from Metal Finishing because there is NO requirement that any of the core electroplating operations be performed at a site for the MP&M rule to be applicable. Therefore, all of the 46 surface treatment operations and wastewater discharges under Metal Finishing would be regulated by MP&M. The data base for cost of treatment and treatment effectiveness for the removal of metals includes a number of sources

including the ongoing data collection for MP&M. The specific MP&M study includes approximately 8000 screener surveys, approximately 1000 detailed questionnaires, 89 site visits, and 24 sampling visits with subsequent chemical analysis of unit operations wastewater, raw wastewater to treatment, treated wastewater, and other process wastewater. The data base for MP&M includes the data base for electroplating/metal finishing. Also, included is the Combined Metals Data Base (CMDB) which is generally usable because it shares a fundamental concept with the rationale used for MP&M: that similar properly designed, operated, and maintained treatment systems will have the same effectiveness in removing metals from raw wastewater streams through a wide range of concentrations regardless of the source of the raw wastewater. The CMDB has been used as the basis for metals removal efficiency for a number of guidelines and standards including: Coil Coating (40 CFR Part 465), Porcelain Enameling (40 CFR Part 466), Battery Manufacturing (40 CFR Part 461), Aluminum Forming (40 CFR Part 467), Copper Forming (40 CFR Part 468), Nonferrous Metals Forming (40 CFR Part 471) and Nonferrous Metals Manufacturing (40 CFR Part 421). Therefore, the treatment effectiveness used for effluent limitations in the guidelines and standards for MP&M should approach the guidelines and standards for electroplating/metal finishing and other metal industries.

The effect of MP&M guidelines and standards should be to close the book on regulations for the metals industry. Effluent guidelines and standards currently apply to mining and milling metallic ores, manufacturing of metal from ore and recycled material, forming of metals as semi-finished or finished products, and with MP&M, closing with major finished metal products.

5.2 Overlap of Metal Finishing and Metal Products and Machinery

NPDES permits for direct discharges and industrial user permits for indirect dischargers are written using effluent limitations guidelines for NPDES permits and pretreatment standards for indirect dischargers. In summary, NPDES permit effluent limitations for a facility with combined wastewater discharges from categorical point sources that are subject to guidelines in two or more subcategories, or two or more point source categories, are calculated using the "building block" concept. Point source categories and subcategories are defined by unit operations and principal process steps with wastewater flows, pollutant concentrations, or production-based limitations. By adding together the effluent limitations for a pollutant regulated in discharges from unit operations or process steps, specific limitation for the combined wastewater discharges can be determined. Pollutants not identified in a wastestream from a category or subcategory and wastestreams from unit operations or processes not identified in the categorical guidelines may be regulated on a case-by-case basis by the permit writer using Best Professional Judgement. A permit writer may have to reduce effluent limitations guidelines with production-based limitations to concentration based limitations to calculate combined waste stream permit limitations; or production-based limitations for the combined wastestream can be calculated by determining the flow for the operations and processes subject to concentration-based limitations and multiplying it by the concentration limitations to obtain production-based limitations to use as a building block.

Indirect dischargers that have combined wastewater discharges are subject to standards as specified by the Combined Wastestream Formula (CWF) according to 40 CFR 403.6 (e). Guidance Manual for the Use of Production-Based Pretreatment Standards and the Combined Wastestream Formula offers specific examples of how limitations are developed for combined wastestreams when a facility has any combination of concentration-based limitations, production-based limitations, regulated, unregulated, and dilute wastestreams. Under 403.12 (b) (4) of the General Pretreatment Regulations, a facility must monitor the flow of regulated process streams and other streams as necessary to allow use of the CWF.

Presently, the CWF is used to calculate effluent limitations for a number of industrial users. Data from the dcp's discussed in Section 3 estimated about 3550 facilities in Phase I MP&M sectors were then regulated in whole or in part by electroplating/metal finishing and of these approximately 1380 were regulated by one other rule, 110 were regulated by two other rules, 6 were regulated by three other rules and 60 were regulated by 4 or more other rules.

The guidelines and standards being developed for MP&M may be inextricable from electroplating/metal finishing guidelines and standards because of the overlap documented in the preceding sections, e.g. the same unit operations and processes are covered, present permits for many facilities that will be subject to MP&M are now subject in whole or in part to guidelines and standards for electroplating/metal finishing. However, definitions and applicability for the Phase I MP&M rule have not been drafted and at least three options appear to be available.

One option is to have the present guidelines and standards for electroplating/metal finishing remain applicable to facilities where these guidelines and standards are presently used. CWF would be used to establish permit effluent limitations for combined wastestreams containing process wastewater not covered, e.g., machining and boring, disassembly, and other unit operations now being considered for inclusion under MP&M. More unit operation process wastewater would be subject to regulation from job shop electroplaters if the shops are included in the industry sectors of MP&M. However, few job shops are in the MP&M sectors. This option would obviously include all facilities in MP&M not performing one of the six electroplating core operations, or about 78% of the estimated facilities in Phase I would be regulated by MP&M and not metal finishing.

A second option is to have the more specific (stringent) limitations apply to those metal finishing wastestreams which appear to be covered by both standards as is the case now for eleven regulations as discussed in Section 3. This option can not be fully addressed until more specific guidelines and standards are proposed for MP&M.

A third option is to have MP&M Phase I include all facilities engaged in manufacturing metal products and machinery whose products fall within the industry group and industry sectors defined as Phase I industry sectors and other facilities that petition to be included in Phase I regardless of how large or small a percentage of the facility's total activity or business income can be attributed to Phase I. The industry sectors are generally defined in the initial description

and definition of the MP&M category and these can be further defined by SIC designation without changing the descriptive general industry sector, eg aerospace, aircraft, hardware, etc. The wastewater discharges from any MP&M unit operation or process listed would be subject to MP&M regulation if the facility is included in Phase I industry sectors, ie the MP&M effluent limitations would supersede otherwise applicable existing effluent limitations guidelines and standards. As with the second option, this option can not be fully addressed until more specific guidelines and standards are proposed for MP&M.

SIC code 3471, Industry Group 347, Coating, Engraving, and Allied Services, Electroplating, Plating, Polishing, Anodizing, and Coloring is not included in the MP&M industry sectors, but cover job shops not in Phase I and Phase II industry sectors. This exclusion based on the original MP&M definitions and applicability may be used to address separately the Electroplating Category (Part 413) and EPA's commitment in the March 7, 1980 Settlement Agreement, discussed in Section 3, to not develop significantly more stringent standards for Part 413 for the next "several" years.