[6560-01]

ENVIRONMENTAL PROTECTION AGENCY

[40 CFR Part 413]

[FRL 853-5]

ELECTROPLATING POINT SOURCE CATEGORY

Pretreatment Standards for Existing Sources

AGENCY: Environmental Protection Agency.

ACTION: Proposed rule.

SUMMARY: This regulation limits the concentrations of certain pollutants which may be introduced into publicly owned treatment works by operations in the Electroplating Point Source Category. The purpose is to limit those pollutants which interfere with, pass through, or are otherwise incompatible with the operation of such treatment works. The Federal Water Pollution Control Act requires these standards to be issued. The effect will be to require pretreatment of process waste water by operations in the Electroplating Point Source Category which introduce waste water into publicly owned treatment works.

DATE: Comments due by April 17, 1978.

ADDRESS: Send comments to: Environmental Protection Agency, 401 M Street SW., Washington, D.C. 20460, Attention: Distribution Officer, WH-552.

FOR FURTHER INFORMATION CONTACT:

Harold B. Coughlin, Effluent Guidelines Division, (WH-552) Environmental Protection Agency, 401 M Street SW., Washington, D.C. 20460, 202-426-2560.

SUPPLEMENTARY INFORMATION:

BACKGROUND

On March 28, 1974, EPA promulated a regulation adding Part 413 to Chapter 40 of the Code of Federal Regulations (39 FR 11510). That regulation (the "Phase I regulation") with subsequent amendments (the "Phase II regulation") (40 FR 18130, April 24, 1975) established effluent limitations guidelines for existing sources in five subcategories and standards of performance and pretreatment standards for new sources in one subcategory. Proposed revisions and additions setting forth effluent limitations guidelines based on "best available technology economically achievable" (BAT), pretreatment standards for new and existing sources, and standards of performance for new sources were also published for five subcategories (30 FR 11515, March 28, 1974, and 40 FR 18140, April 24, 1975). The history of rulemaking for the category by the Agency prior to December 1976 is described in greater detail in 41 FR 53018 (December 3, 1976).

On December 3, 1976, the Agency suspended the promulgated effluent limitations guidelines based on "best practicable control technology currently available" (BPT). The effluent limitations guidelines based on "best available technology economically achievable (BAT), new source performance standards, and pretreatment standards for Subpart A of the Electroplating Point Source Category (41 FR 53081) were revoked. The Agency also withdrew its notices of proposed rulemaking for the category (41 FR 53070). The Agency took this action for the purpose of reevaluating the appropriateness of the limitations and standards earlier established in light of new data and further analysis.

On July 12, 1977, the Agency issued interim final pretreatment standards which incorporated additional study and analysis (42 FR 35834 (July 12, 1977)). However, these standards applied to only cyanide, hexavalent chromium and pH and required plants discharging less than 152,000 liters (40,000 gallons) per day to comply only with amenable cyanide standards, and represented only a first step toward adequate control of wastes from this category. The proposed standards set forth below would change the July 12, 1977 standards by requiring all plants to limit hexavalent chromium, lead, cyanide, and cadmium. In addition, plants discharging more than 38,000 liters (10,000 gallons) per day would be required to limit discharges of additional metals. These standards also take into account the additional study and analysis which has been conducted over the past several months.

Pretreatment standards are proposed for pollutants discharged into publicly owned treatment works (POTW) from existing sources which fall within the following subcategories of the Electroplating Point Source Category: Electroplating of Common Metals Subcategory (Subpart A); Electroplating of Precious Metals Subcategory (Subpart B); Anodizing Subcategory (Subpart D); Coatings Subcategory (Subpart E); Chemical Etching and Milling Subcategory (Subpart F); Electroless Plating (Subpart G) and Printed Circuit Boards (Subpart H). The content of the standards is discussed in detail below under Summary of Standards.

LEGAL AUTHORITY

These regulations are proposed for promulgation pursuant to section 307(b) of the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251, 1317(b); 86 Stat. 816 et seq.; Pub. L. 92-500) (the Act), which requires the establishment of pretreatment standards for pollutants introduced into publicly owned treatment works.

SUMMARY OF STANDARDS

These regulations establish "categorical" pretreatment standards, containing specific numerical limitations based on an evaluation of available technologies in a particulr industrial subcategory. The specific numerical limitations are arrived at separately for each subcategory, and are imposed on pollutants which may interfere with, pass through, or otherwise be incompatible with publicly owned treatment works. For plants with a daily flow of 38,000 l (10,000 gal) or more, the proposed standards specifically limit concentrations of all or some of the following metals: lead, cadmium, copper, nickel, total and hexavalent chromium, zinc, and silver. Additionally, these regulations also limit the sum of the individual concentrations of copper, nickel, chrome and zinc (total metals). For plants with a daily process waste water flow of less than 10,000 gallons, limitations on only amenable cyanide, hexavalent chromium, lead and cadmium are proposed in order to limit the closure rate in the industry with minimal environmental consequences.

For the purpose of clarity, the subcategories affected by the present regulations are exempted from 40 CFR Part 128. The provisions of the present regulation overlap considerably with the language of 40 CFR Part 128. 40 CFR Part 128 was proposed on July 19, 1973, (38 FR 19236) and published in final form in November 1973, (38 FR 30982). It limits the discharge of pollutants which pass through or interfere with the operation of publicly owned treatment works, but it does not set numerical limitations or explicitly list particular pollutants to be regulated. The provisions of 40 CFR Part 128 have sometimes been a source of confusion in the past. New general pretreatment regulations have been proposed (42 FR 6476, February 2, 1977) which will revoke and replace 40 CFR Part 128 upon promulgation. Therefore, the general pretreatment requirements set forth in 40 CFR Part 128 are superseded with respect to the subcategories regualted by this regulation. All pretreatment requirements currently applicable to the subcategories listed are included in the regulations set forth below. When the new general pretreatment regulations are promulgated, the standards set forth below will be reviewed for consistency with the new general policies.

OVERVIEW

These proposed pretreatment standards cover all firms performing oper-

ations in the Electroplating Point Source Category that discharge effluent to publicly owned treatment works. These operations include electroplating, anodizing, chromating, phosphating, electroless plating, chemical etching and milling and the manufacture of printed circuit boards. The proposed standards cover both firms performing these processes as their primary line of business and so-called captive operations that perform these processes as part of the manufacture of another product. The plants covered by these regulations are found throughout the United States but are concentrated in heavily industrialized areas.

The standards require limitations on the discharge of pollutants that are toxic to human beings as well as to aquatic organisms. There pollutants include cadmium, lead, chromium, copper, nickel, zinc, silver and cyanide. The Agency has put a high priority ont the elimination of these pollutants from the Nation's waters, primarily because of their toxic nature.

These proposed standards cover a large number of point source discharges that account for a significant amount of toxic substances entering the environment. Rough estimates by the Agency indicate that enforcement of these standards could prevent approximately 40 million pounds per year of toxic pollutants from entering the ambient waters or concentrating in the sludge from municipal treatment systems.

However, this invironmental improvement is not attained without a significant economic impact. Economic analyses by the Agency indicate that many firms whose primary business is metal finishing or printed board manufacturing are vulnerable to adverse economic impact.

The Agency has considered methods of reducing the projected economic impact of these proposed pretreatment standards without compromising the environmental improvement that these regulations would accomplish. For example, plants whose metal finishing process flow is less than 10,000 gallons per day (who tend to be more economically vulnerable) must meet a less stringent level of control than do plants with greater flows. However, cadmium and lead, because of their high toxicity, are controlled for all flows. Reducing the requirements on these smaller flows greatly reduces the projected economic impact of the standards while relaxing controls on less than one percent of the flow to publicly owned treatment works.

Nonetheless, the projected economic impacts of these standards are a matter of major concern to the Agency. It is hoped that the adverse effects of this regulation can be reduced by one-half through the use of Small Business Administration economic injury loans.

The Agency has been working with the Small Business Administration to develop ways to insure that their loan and other financial assistance programs will be available to eligible firms affected by these standards.

The effort to reduce projected impacts on independent metal finishers and printed circuit board makers will continue between proposal and promulgation of these standards. Comments on how this might be accomplished are solicited from the public.

On December 27, 1977, the President signed the Clean Water Act of 1977 (Pub. L. 95-217) which makes significant changes in the Federal water pollution control laws. Included in the amendments are provisions relating to pretreatment (section 54) and these provisions should be examined by persons subject to electroplating or other pretreatment regulations. Some relief from these or other pretreatment regulations may be provided by section 54(a) of the Clean Water Act, amending section 307(b) of the Federal Water Pollution Control Act:

> If, in the case of any toxic pollutant under subsection (a) of this section introduced by a source into a publicly owned treatment works, the treatment by such works removes all or any part of such toxic pollutant and the discharge from such works does not violate that effluent limitation or standard which would be applicable to such toxic pollutant if it were discharged by such source other than through a publicly owned treatment works, and does not prevent sludge use or disposal by such works in accordance with section 405 of this Act, then the pretreatment requirements for the sources actually discharging such toxic pollutant into such publicly owned treatment works may be revised by the owner or operator of such works to reflect the removal of such toxic pollutant by such works.

The list of toxic pollutants specified under subsection (a) section 307 is a list of pollutants reprinted in the House of Representatives Committee Print No. 95-30, which includes virtually all the pollutants controlled by today's proposed pretretment regulations. Named on that list are cadmium, chromium, lead, cyanide, nickel, copper and silver, as examples. In the brief time since the passage of the Clean Water Act of 1977 EPA has not had an opportunity to establish policies or procedures for implementing section 54(a) of the amendments; the Agency plans to publish such information as soon as possible, and probably as part of the final general pretreatment regulations, which were proposed on February 2, 1977 (42 FR 6474, proposing to establish 40 CFR Part 403). However, commenters are encouraged to address the Clean Water Act amendments and the desired means of implementing those changes in the context of these electroplating regulations, in the comments on these proposed standards.

Technical Basis for Standards

The technical analysis upon which these regulations are based included an identification of the principal waste water pollutants generated by this category, a consideration of the extent to which these pollutants interfere with or pass through POTW, and a study of the various pretreatment technologies which are available for controlling the discharge of such pollutants. Information gathered in a technical study of direct and indirect dischargers for this category was used as the primary basis for assessing available pretreatment technologies. Additionally, data gathered earlier in support of the direct discharge limitations under sections 301 and 304 as well as data submitted by industry were used. Appendix A summarizes these data and the analysis used in developing these limitations. The details of these studies are set forth in the "Proposed Development Document for the electroplating Point Source Category." The Agency also relied upon a report entitled "A Survey of Three Exemplary Electroplating Waste Treatment Systems."

Economic Impact Analysis

In establishing the present regulations, the Agency has studied and taken into account the potential economic impact on industry of implementing the standards. The analyses which have been undertaken are described in Appendix A. The details of the economic studies are set forth in a report entitled "Economic Analysis of Proposed Pretreatment Standards for Existing Sources of the Electroplating Point Source Category," December, 1977.

These proposed pretreatment standards for plants discharging to publicly owned treatment works apply to: (1) Independent job shops performing the metal finishing processes covered by these standards as their primary line of business; (2) independent manufacturers of printed circuit boards; and (3) captive establishments performing the processes regulated but as part of the manufacture of some other product.

The total investment required to bring the three sectors of the industry into compliance is estimated to be 460.7 million dollars (134.3 million dollars for the job shops, 20.8 million dollars for the printed circuit board makers and 305.6 million dollars for the captive operations). The total annualized compliance cost for the three sectors is estimated to be 128.9 million dollars (37.7 million dollars for the job shops, 5.7 million dollars for the printed circuit board makers and 85.5 million dollars for the captive operations). The above costs, which make

allowance for treatment in place, are the increment between the existing level of compliance in the industry and that required by these pretreatment standards. Thus, these costs include the cost to comply with the July 12, 1977, Interim Final Pretreatment Standards for the Electroplating Point Source Category plus any additional costs necessary to comply with these proposed regulations.

Independent metal-finishing job shops and printed circuit board makers may suffer significant adverse economic impact as a result of these standards. It is estimated that as many as 584 metal-finishing job shops representing 12,500 jobs may close as a result of these proposed standards. This represents 19 percent of the firms and jobs in this sector of the industry. It is estimated that as many as 55 printed circuit board makers representing 3135 jobs may close as a result of these standards. This represents 14 percent of the firms and 13 percent of the jobs in this sector of the industry.

Thus, a total of approximately 639 independent firms representing approximately 15,636 jobs may close as a result of these standards. This represents 19 percent of the independent firms and approximately 18 percent of the jobs. These estimated impacts are drastically reduced when the effect of federal financial assistance programs to small business is considered. For example, analyses performed for the Environmental Protection Agency show that existing Small Business Administration (SBA) loan programs could reduce impacts on the job shops to 8 percent of the firms and jobs. Thus, SBA loan programs could possibly reduce estimated closures by 370 and estimated job losses by 8000. The Environmental Protection Agency is working closely with the Small Business Administration to insure that these loans and other federal financial assistance are made available to eligible firms.

Captive establishments are anticipated to have much lower adverse economic impacts than is the case for the independent establishments. No plants are expected to close as a result of the standards but it is estimated that 67 establishments may close down their metal-finishing operations and purchase metal-finishing services from job shops. This represents 322 metal finishing jobs among the 2.3 million jobs in establishments on municipal waste treatment systems with captive metal-finishing operations.

Environmental Considerations

The Electroplating Point Source Category consists of an estimated 9,400 firms discharging effluent from metal finishing processes either directly to the Nation's waters or indirectly through publicly owned treatment works (POTW). Of these, an estimated 6,600 discharge approximately one billion gallons a day of metal finishing process water to publicly owned treatment works and are covered by these proposed pretreatment standards.

The pollutants discharged by these plants include the following substances that are toxic to human beings and aquatic organisms: Cadmium, lead, chromium (both hexavalent and trivalent), copper, nickel, zinc, silver, and cyanide. These pollutants are only partially treated by municipal treatment systems and pass through to the Nation's waters to varying degrees. The fraction of these pollutants that does not pass through the municipal system will concentrate in the municipal sludge where it may hamper the use of the sludge as fertilizer and soil conditioner. These pollutants can also interfere with the efficient operation of the publicly owned treatment works.

Rough calculations by the Agency indicate that the metal finishing operations covered by these standards are responsible for approximately 40 million pounds of these pollutants entering the environment each year. These standards will prevent essentially all of these pollutants from entering the environment.

The Nation's water quality will be improved by these standards. Cities that have promulgated and enforced similar regulations on metal finishers in the past report substantial reductions in toxic pollutants.

Environmental considerations are discussed in more detail in Appendix A, Technical Summary and Basis for Regulations under section (2)(ii), "Origins and Characteristics of Wastewater Pollutants."

Availability of Documents

The EPA technical and economic reports mentioned above are available for inspection at the EPA Public Information Reference Unit, Room 2922 (EPA Library), Waterside Mall, 401 M Street SW., Washington, D.C. 20460, at all EPA Regional Offices and at State Water Pollution Control Offices.

Copies of the supplemental EPA reports described are being sent to persons or institutions affected by the regulation or who have placed themselves on a mailing list for this purpose (see EPA's Advance Notice of Public Review Procedures, 38 FR 21202, August 6, 1973). A limited number of additional copies are available. Persons wishing to obtain a copy may write the Environmental Protection Agency, Effluent Guidelines Division, Washington, D.C. 20460, Attention: Distribution Officer, WH-552.

When this regulation is promulgated in final rather than proposed form, revised copies of the technical documentation will be available from the Superintendant of Documents, Government Printing Office, Washington, D.C. 20402. Copies of the economic analysis document will be available through the National Technical Information Service, Springfield, Va. 22151.

Public Participation

Numerous agencies and groups have participated at various stages in the development of pretreatment regulations for existing sources in this industry. Comments were solicited when proposed pretreatment standards were issued on March 28, 1974 (Phase I) and on April 24, 1975 (Phase II). Many agencies and groups were also consulted in the course of developing the proposed regulations. Similar opportunities for public participation were also provided in the related development of Phase I and Phase II regulations based upon best practicable control technology currently available. Furthermore, a public hearing on pretreatment standards for the electroplating industry was held on June 10, 1974. On December 3, 1976, the Agency announced that the regulations which had been previously proposed or promulgated would be reevaluated. Since that time the Agency has reconsidered the formulation of pretreatment standards and other regulations in light of all comments which have been received. The Agency has also continued to consult with, and receive comments from, interested agencies and groups. Furthermore, at the request of the National Association of Metal Finishers, the Agency has released split samples for duplicate analysis as well as additional data on the electroplating plants that were selected for sampling and study as a basis for reevaluating the regulations. A summary of public participation in this rulemaking, public comments, and the Agency's response to major issues which have been raised is contained in Appendix B of this preamble.

Compliance Schedule

Section 301 of the Act anticipates that pretreatment standards for existing sources would be established and compliance would be required before July 1, 1977, while section 307(b) specifies "a time for compliance not to exceed three years from the date of promulgation" of the standard. Because the pretreatment standards are only now being promulgated, the Agency believes that the compliance deadline as set forth in section 307(b) should apply. The time for compliance with these categorical pretreatment standards will thus be three years from the date of promulgation. States or local governments may wish to adopt now or after promulgation the substantive pretreatment standards proposed today and make these standards part of the state laws or local ordinances.

The job shop sector of the Electroplating Point Source Category is quite vulnerable to adverse economic impact from these proposed pretreatment standards. The Agency is seeking ways to mitigate the economic consequences of this regulation without compromising environmental and public health considerations. For example, the Agency is working with the Small Business Administration in an attempt to mitigate these projected economic impacts. The Agency has also proposed in this regulation that compliance be achieved in most cases within three years after promulgation, even though the economic impact analysis is based on compliance within one year. Preliminary analyses indicate that this might reduce the projected economic impact by spreading the cost burden over three years. This will allow more time for raising or accumulating capital through cash flow or retained earnings.

Opportunity for Public Comment

Interested persons are encouraged to submit written comments. Comments should be submitted in triplicate to the Environmental Protection Agency, 401 M St. SW., Washington, D.C. 20460, Attention: Distribution Officer, WH-552. Comments on all aspects of the regulation are solicited. In the event comments are in the nature of criticisms as to the adequacy of data which are available, comments should identify and if possible, provide any additional data which may be available and should indicate why such data suggest amendment or modification of the regulation. In the event comments address the approach taken by the Agency in establishing pretreatment standards, EPA solicits suggestions as to what alternative approach should be taken and why and how this alternative better satisfies the detailed requirements of section 307(b) of the Act. The Agency particularly solicits comments on other technologies for treating metal finishing effluents. All comments received on or before April 17, 1978, will be considered.

The Agency particularly solicits comments on the following specific issues:

(1) The proposed pretreatment standards place limitations on the allowable concentrations of individual metals. In addition, the proposed pretreatment standards include limitations on "total metals" which is defined to be the sum of the concentrations of copper, nickel, chromium and zinc. This differs from earlier standards which limited only individual metals concentrations. Commenters are urged to comment on the use of combined specific metal and total metal limitations as a pretreatment standard. In addition, EPA data indicate that limitations on total suspended solids and pH can be an adequate surrogate for specific and total metals concentrations in some instances. Comments on the use of Total Suspended Solids and pH as a surrogate for the metals are solicited along with any data relating them to each other.

(2) The economic impact of these proposed pretreatment standards can be greatly reduced if financial assistance through the Small Business Administration is available to those potential closures that meet SBA loan criteria. Because of the potential importance of SBA programs to compliance by the industry, EPA has been working closely with SBA to improve the effectiveness of federal financial assistance programs, especially with regard to the Electroplating Point Source Category. As part of this effort, EPA is soliciting comments on the effectiveness of these financial assistance programs. More specifically, EPA would like comments on the following:

1. How can EPA and SBA better coordinate their programs?

2. What problems have been encountered by firms attempting to finance pollution control equipment through SBA?

3. Do firms generally know about Small Business Administration financial assistance programs?

4. Does the paperwork associated with SBA pollution abatement loans significantly deter eligible firms from applying?

5. Does the time to process a loan application significantly deter firms from doing so?

(3) These proposed pretreatment standards differ depending on whether a plant discharges more than 10,000 gallons per day of electroplating process waste water. Plants with flows of less than 10,000 gallons per day must meet limitations on amenable cyanide, hexavalent chromium, lead and cadmium. Plants with flows of greater than 10,000 gallons per day must meet these limitations plus additional limits on total cyanide, pH and other metals. The Agency is concerned that plants with flows of greater than 10,000 gallons per day will attempt to avoid the more stringent standard applicable to them by reducing their water flow to below 10,000 gallons per day. This would bypass the intent of the standard. Therefore, the Environmental Proection Agency solicits comments on the ability of electroplating facilities to reduce their process waste water use. Any comments should include data, if possible.

(4) These proposed pretreatment standards are concentration standards except for pH. The proposed regulations prohibit dilution as a means of complying with these regulations. The Agency solicits comments on the practicality of enforcing this prohibition, particularly in the context of local pretreatment enforcement programs. In addition there is a danger that concentration-based standards will penalize those firms that conserve water. A water conserving firm while discharging lower absolute amounts of a given pollutant could violate concentration-based limitations that are achieved by a similar firm that uses more water. Therefore, the Envionmental Protection Agency solicits comments in the extent to which these concentration-based standards penalize firms who have better than average water usage.

(5) Do the data and analyses used by EPA support the Agency's preliminary conclusions with respect to the potentially adverse economic consequences foreseen and the availability of existing pollution control technology to meet the limitations proposed? Comments are also solicited on the extent to which the regulated pollutants pass through, interfere with, or are otherwise incompatible with the operation of publicly owned treatment works.

(6) These standards will often be met using technologies that create a sludge which must be disposed of in an environmentally sound manner. The Agency solicits comments on the proper disposal of this sludge. The Agency also solicits additional data on the costs of sludge disposal and invites comment on the 12 cent gallon cost which was used as an average cost for this regulation.

A copy of all public comments will be available for inspection and copying at the EPA Public Information Reference Unit, Room 2922, (EPA Library), Waterside Mall, 401 M Street, SW., Washington, D.C. 20460. A copy of the technical studies and economic studies referred to above, and certain supplementary materials will be maintained at this location for public review and copying. The EPA information regulation, 40 CFR Part 2, provides that a reasonable fee may be charged for copying.

An opportunity for public hearing will be provided shortly after the close of the comment period. The place and time will be announced in a later notice.

Small Business Administration Financial Assistance

The analysis of the economic impact of these proposed pretreatment standards indicated that Small Business Administration financial assistance could significantly reduce the adverse impact of these standads. EPA estimates that the projected firm closure rates for metal finishing job shops of 19 percent could possibly be reduced to 8 percent by the use of available SBA loan programs by firms that meet applicable criteria. This would prevent the closing of 370 firms and loss of

eight thousand jobs. The Agency has been working with the Small Business Administration to insure that these benefits of fewer firm closures will be realized. The intent of this work has been to make sure that all firms that must comply with these pretreatment standards and are eligible for SBAA assistance are able to do so without undue delay.

There are two SBA programs that may be important sources of funding for the Electroplating Point Source Category. They are the Small Business Administration's Economic Injury Loan Program and SBA guaranteed Pollution Control Revenue Bonds.

Section 8 of the FWPCA authorizes the Small Business Administration through its economic disaster loan program, to make loans to assist any small business concern in effecting additions to or alterations in equipment, facilities, or methods of operation so as to meet water pollution control requirements under the Federal Water Pollution Control Act, if the concern is likely to suffer a substantial economic injury without such assistance. This program is open to all firms of 250 or fewer employees and for larger firms in some categories. Thus, this program is open to essentially all independent job shops in the Electroplating Point Source Category. Loans can be made either directly by SBA or through a bank using an SBA guarantee of up to ninety percent of the loans. The interest on direct loans depends on the cost of money to the federal government and is currently set at 6⅝ percent. Borrowers can have up to thirty years to pay. SBA loans made through banks are at somewhat higher interest rates and are currently at 9½ percent with up to 30 years to pay.

Analyses by the Environmental Protection Agency indicate that many firms in the Electroplating Point Source Category would be eligible for direct and indirect SBA loans. For further details on this Federal loan program write or telephone any of the following individuals at EPA Headquarters and in the ten EPA Regional offices:

Coordinator—Sheldon Sacks, Environmental Protection Agency, Financial Assistance Coordinator, Office of Analysis and Evaluation (WH-586), 401 M Street SW., Washington, D.C. 20460, telephone 202-426-2504.

Region I—Ted Landry, Environmental Protection Agency, J. F. Kennedy Federal Office Building, Room 2203, Boston, Mass. 02203, telephone 617-223-5061.

Region II—Stuart Roth, Environmental Protection Agency, 26 Federal Plaza. New York, N.Y. 10007, telephone 212-264-4726.

Region III—Matthew Miller, Environmental Protection Agency, Curtis Building, 6th and Walnut Streets, Philadelphia, Pa. 19106, telephone 215-597-9814.

Region IV—John Hurlebaus, Environmental Protection Agency, 345 Courtland Street, NE., Atlanta, Ga. 30308, telephone 404-881-4793.

Region V—Gene Pinkstaff and Merle Tellekson, Environmental Protection Agency, 230 South Dearborn Street, Chicago, Ill., 60604, telephone 312-353-2311.

Region VI—Richard Duty and Tom Rike, Environmental Protection Agency, 1st International Building, 1201 Elm Street, Dallas, Tex. 75270, telephone 214-749-1267 or 749-2658.

Region VII—Al Callier, Environmental Protection Agency, 1735 Baltimore Street, Kansas City, Mo., 64108, telephone 816-758-2725.

Region VIII—William H. Hormberg, Environmental Protection Agency, 1860 Lincoln Street, Denver, Colo. 80203, telephone 303-327-4579.

Region IX—Stan Leibowitz and Ray Seid, Environmental Protection Agency, 215 Fremont Street, San Francisco, Calif. 94105, telephone 415-556-3450.

Region X—Dan Bodien, Environmental Protection Agency, 1200 6th Avenue, Seattle, Wash. 98101, telephone 206-442-1270.

Headquarters—Mr. Don Nantkes, Legal Counsel, Environmental Protection Agency, 401 M Street, SW., Washington, D.C. 20460, telephone 202-755-0775.

Interested persons may also contact the Assistant Regional Directors for Finance and Investment in the Small Business Administration regional offices for more details on federal loan assistance programs. For further information, write or telephone any of the following individuals:

Region I—Leonard E. Chadwick, Assistant Regional Director for Finance and Investment, Small Business Administration, 150 Causeway Street, Boston, Mass. 02203, telephone 617-223-3891.

Region II—John Axiotakis, Assistant Regional Director for Finance and Investment, Small Business Administration, 26 Federal Plaza, New York, N.Y. 10007, telephone 212-264-1482.

Region III—Dave Malone, Assistant Regional Director for Finance and Investment, Small Business Administration, 1 Bala Cynwyd Plaza, Bala Cynwyd, Pa. 19004, telephone 215-596-5962.

Region IV—Merrit Scoggins, Assistant Regional Director for Finance and Investment, Small Business Administration, 1401 Peachtree Street NE., Atlanta, Ga. 30309, telephone 404-257-4940.

Region V—Larry Cherry, Assistant Regional Director for Finance and Investment, Small Business Administration, 219 South Dearborn Street, Chicago, Ill. 60604, telephone 312-353-4533.

Region VI—Don Beaver, Assistant Regional Director for Finance and Investment, Small Business Administration, 1720 Regal Row, Dallas, Tex. 75202, telephone 214-749-1265.

Region VII—Dick Whitley, Assistant Regional Director for Finance and Investment, Small Business Administration, 911 Walnut Street, Kansas City, Mo. 64106, telephone 816-758-3927.

Region VIII—James Chuculate, Assistant Regional Director for Finance and Investment, Small Business Administration, 1405 Curtis Street, Denver, Colo. 80202, telephone 303-327-3988.

Region IX—Charles Hertzberg, Assistant Regional Director for Finance and Investment, Small Business Administration, 450 Golden Gate Avenue, San Francisco, Calif. 94102, telephone 415-556-7782.

Region X—Rodney Gauche, Regional Director for Finance and Investment, Small Business Administration, 710 2d Avenue, Seattle, Wash. 98104, telephone 206-399-5679.

In addition, the Small Business Investment Act, as amended by Pub. L. 94-305, authorizes SBA to guarantee the payments on qualified contracts entered into by eligible small businesses to acquire needed pollution facilities when the financing is provided through taxable and tax-exempt revenue or pollution bonds. This program is open to all eligible small businesses including some electroplating and metal finishing firms. Bond financing with SBA's guarantee of the payments makes available long term (20-25 years), low interest (usually 5% to 7%) financing to small businesses on the same basis which is available to larger national or international companies. For further details on this program write to SBA, Pollution Control Financing Division, Office of Community Development, 1441 L Street NW., Washington, D.C. 20416.

Certification of Inflation Impact Analysis

Executive Orders 11821 and 11949, and OMB Circular A-107 require that major proposals for legislation and promulgation of regulations and rules by agencies of the executive branch be accompanied by a statement certifying that the inflationary impact of the proposal has been evaluated. It is hereby certified that the inflationary impact of these standards has been evaluated in the economic impact analysis.

Dated January 24, 1978.

Douglas M. Costle,
Administrator.

Appendix A—Technical Summary and Basis for Regulations

This Appendix summarizes the basis for proposed pretreatment standards for existing sources in the electroplating point source category.

(1) *General methodology.* The pretreatment standards set forth herein were developed in the following manner: The point source category was first studied for the purpose of determining whether separate standards were appropriate for different segments within the category. The raw waste characteristics for each such segment were then identified. This included an analysis of the source, flow and volume of water used in the process employed, the sources of waste and waste waters in the operation and the constituents of all waste water.

The compitability of each raw waste characteristic with municipal treatment works was then considered. Waste water constituents posing pass-through or interference problems for POTW were identified.

The control and treatment technologies existing within each segment were identified. This included identification of each distinct control and treatment technology, including both in-plant and end-of-process technologies, which exist or are capable of being designed for each segment. It also included identification of the effluent level resulting from the application of each of the technologies in terms of the amount of constituents and the chemical, physical, and biological characteristics of pollutants. The problems, limitations, and reliability of each treatment and control technology were also identified. In addition, the nonwater quality environmental impact, such as the effects of the application of such technologies upon other pollution problems, including air, solid waste, noise, and radiation were identified. The energy requirements of each control and treatment technology were determined as well as the cost of the application of such technologies.

The information, as outlined above, was then evaluated in order to determine what levels of technology reflected the application of appropriate pretreatment technologies. In identifying such technologies, various factor were considered. These included the total cost of application of technology, the age of equipment and facilities involved, the process employed, the engineering aspects of the application of various types of control techniques, process changes, nonwater quality environmental impact (including energy requirements) and other factors.

The data upon which the above analysis was performed included EPA permit applications, EPA sampling and inspections, consultant reports, and industry submissions.

(2) *Summary of technical analyses.*– (i) *Categorization.* Previous regulations for the electroplating point source category were subcategorized on the basis of process considerations. Electroplating was separated from electroplating-related metal finishing processes because electroplating always requires the action of an electrical current to deposit a metallic coating on the basis material. Electroplating-related metal finishing processes may not require a current and may or may not deposit a metallic coat on the basis material. The processes of anodizing, coating, chemical etching and milling are sufficiently different so as to warrant separate subcategories. Anodizing, usually performed on aluminum, converts the surface of the object to the metal oxide. Coatings refer principally to the conversion coatings of chromating and phosphating. Each of these processes chemically forms a thin protective coat on the treated object. An electrical current may or may not be applied. Chemical etching and milling involve the dissolution of the basis material.

In restudying the industry for the purpose of establishing pretreatment regulations, it was decided that printed circuit board manufacturing and electroless plating also warrant separate subcategorization because of the unique mixture of electrolytic and electroless plating operations found in these processes. Additionally, these processes produce pollutants which may render normal waste treatment techniques ineffective if proper safeguards are ignored. Finally, the foregoing subcategorization is consistent with the existing structure of the industry, each subcategory tending to be oriented toward individual processes or identifiable markets which do not overlap significantly.

(ii) *Origins and Characteristics of Waste Water Pollutants.* Waste water from this industry comes from pretreatment and post treatment operations as well as the actual metal finishing and electroplating steps. The known significant pollutants and pollutant properties from these operations include pH, total suspended solids, cyanide, chromium, copper, nickel, zinc, cadmium, lead, aluminum, and various precious metals and organic compounds. The present study indicates that many of these pollutants may occur together and that their individual concentrations may exceed 100 mg/l.

Waste water results from the following operations in this industry: (1) Rinsing to remove films of processing solution from the surface of work pieces at the site of each operation, (2) rinsing away spills, (3) washing the air that passes through ventilation ducts so as to remove spray from the air before it is exhausted, (4) dumping of spent solutions, (5) washing of equipment, and (6) discharging cooling water used in heat exchangers to cool solutions in metal finishing processes. Approximately 90 percent of the water consumed is in rinsing. That used as cooling water is usually recycled for rinsing. Plating solutions that are dumped may be slowly trickled into the rinse waters prior to treatment.

Many or the pollutants which are generated pose significant interference or pass through problems at POTW. The problems are as follows:

Cadmium

Cadmium is not destroyed when introduced into a POTW, and will either pass through to the POTW effluent or be incorporated into the POTW sludge. It can interfere with the POTW treatment process and can also limit the usefulness of municipal sludge. It causes toxic effects in a wide variety of organisms, including aquatic species and humans.

Threshold concentrations for inhibition by cadmium in a POTW are 10–100 mg/l for activated sludge processes and 0.02 mg/l for anaerobic digestion processes. Other metals, including zinc and magnesium, are synergistic for cadmium inhibition.

In a recent study of 189 POTW's, 75 percent of the primary plants, 57 percent of the trickling filter plants, 66 percent of the activated sludge plants and 62 percent of the biological plants allowed over 90 percent of the influent cadmium to pass through to the POTW effluent. Only 2 of the 189 POTW's allowed less than 20 percent pass through, and none less than 10 percent pass through. POTW effluent concentrations ranged from 0.001 to 1.97 mg/l (mean 0.028 mg/l, standard deviation .167 mg/l).

The cadmium which passes through the POTW to the effluent will usually be discharged to ambient surface water. Cadmium is toxic to aquatic organisms at levels typically observed in POTW effluents; for example:

- 96 hr LC-50 for chinook salmon is reported as 0.002 mg/l.
- 96 hr LC-50 for steelhead trout is reported as 0.0009 mg/l.
- Reproductive decrease in flagfish and brook trout at 0.0081 and 0.0034 mg/l, respectively.

Besides providing an environment for aquatic organisms, surface water is often used as a source of drinking water or irrigation water. For states with drinking water or irrigation water standards, the most common cadmium standard is 0.01 mg/l. Chronic ingestion of cadmium via drinking water and from use of contaminated irrigation water has been documented as the cause of itai-itai disease in humans.

Cadmium not passed through the POTW will be retained in the sludge, where it is likely to build up in concentration. Sewage sludge is recognized as being a valuable resource for soil conditioning, with about 25 percent being applied to land (20 percent to cropland, 5 percent to golf courses, etc.). Cadmium contamination of sewage sludge limits its use on land since it increases the level of cadmium in the soil. Moreover, plant uptake results in contaminated crops. Sewage sludge contains 3 to 3000 mg/kg (dry basis) of cadmium (mean=106 mg/kg; median=16 mg/kg). These concentrations, for the most part, are significantly greater than those normally found in soil (0.017–7 mg/kg, with 0.06 mg/kg being a common level). Data show that cadmium can be incorporated into crops, including vegetables and grains, from contaminated soils. Since the crops themselves show no adverse effects from soils with levels up to 100 mg/kg cadmium, these contaminated crops could have a significant impact on human health.

Cadmium may be a factor in the development of such human pathological conditions as kidney disease, testicular tumors, hypertension, arteriosclerosis, growth inhibition, chronic disease of old age, and cancer. Cadmium which enters a POTW will

either be discharged to ambient water, where it becomes a possible drinking water contaminant, or be incorporated into sewage sludge, where it becomes a possible human food contaminant via crop uptake.

Two federal agencies have already recognized the potential adverse human health effects posed by the use of sludge on cropland. The FDA recommends that sludges containing over 20 mg/kg should not be used on agricultural land. The USDA also recommends placing limits on the total cadmium from sludge that may be applied to land.

Pretreatment of electroplating discharges substantially reduces the concentration of cadmium in sludge. In Buffalo, N.Y., for example, pretreatment of electroplating waste resulted in a decrease of cadmium concentrations in the sludge from 100 to 50 mg/kg.

The Agency estimates that if the proposed regulation is promulgatd approximately 200,000 pounds per year of cadmium will be removed from effluent entering POTW.

Chromium

Chromium exists in the environment primarily in two oxidation states, hexavalent chromium and trivalent chromium. Chromium is not destroyed when treated by a POTW (although the oxidation state may change), and will either pass through to the POTW effluent or be incorporated into the POTW sludge. Both oxidation states can cause POTW treatment inhibition and can also limit the usefulness of municipal sludge. Hexavalent and trivalent chromium both cause toxic effects in a wide variety of organisms including aquatic species and humans. Chromium which passes through a POTW becomes a potential drinking and bathing water contaminant. Hexavalent chromium is a known human carcinogen, and is generally the more toxic of the two oxidation states.

Hexavalent chromium threshold concentrations for POTW treatment process inhibition are 1-10 mg/l for activated sludge, 5-50 mg/l for anaerobic digestion, and 0.25 mg/l for nitrification processes. Trivalent chromium threshold concentrations are 50 mg/l for activated sludge and 50-500 mg/l for anaerobic digestion processes. Chromium can also interfere with sludge settling in concentrations as low as 7 mg/l.

The amount of chromium which passes through to the POTW effluent depends on the type of treatment processes used by the POTW. In a recent study of 240 POTW's 56 percent of the primary plants allowed more than 80 percent pass-through to POTW effluent. More advanced treatment results in less pass-through, with median values for trickling filter, activated sludge, and biological treatments all being near about 60 percent pass-through. POTW effluent concentrations ranged from 0.003 to 3.2 mg/l total chromium (mean=0.197, standard deviation=0.48), and from 0.002 to 0.1 mg/l hexavalent chromium (mean=0.017, standard deviation=0.020).

The chromium which passes through the POTW will usually be discharged to ambient surface water. Chromium is toxic to aquatic organisms at levels observed in POTW effluents, for example:

- Trivalent chromium showed a significant impairment in reproduction of *Daphnia magna* at levels of 0.3 to 0.5 mg/l.
- Hexavalent chromium retards growth of chinook salmon at 0.0002 mg/l.
- Hexavalent chromium is chronically toxic at levels as low as 0.010 mg/l, affecting the ability of several aquatic species to grow or reproduce.

Hexavalent chromium is also corrosive, and a potent human skin sensitizer.

Besides providing an environment for aquatic organisms, surface water is often used as a source of drinking water. Because hexavalent chromium can be reduced to trivalent chromium in the environment, and trivalent chromium can possibly be oxidized to hexavalent chromium by chlorine or other agents, the National Interim Primary Drinking Water Standards are based on total chromium, the limit being 0.05 mg/l.

Chromium not passed through the POTW will be retained in the sludge, where it is likely to build up in concentration. Sludge concentrations of total chromium of over 20,000 mg/kg (dry basis) have been observed.

Sewage sludge is recognized as being a valuable resource for soil conditioning, with about 25 percent currently being applied to land (20 percent to cropland, 5 percent to golf courses, etc.). Most crops absorb relatively little chromium, even when it is present in high levels in soils, but hexavalent chromium has been shown to reduce some crop yields in concentrations as low as 200 mg/kg.

Pretreatment of electroplating discharges substantially reduces the concentration of chromium in sludge. In Buffalo, New York, for example, pretreatment of electroplating waste resulted in a decrease in chromium concentrations in sludge from 2,510 to 1,040 mg/kg. A similar reduction occurred in Grand Rapids, Michigan where the chromium concentration in the sludge decreased from 11,000 to 2,700 mg/kg.

The Agency estimates that if the proposed regulation is promulgated approximately 10,000,000 pounds per year of chromium will be removed from effluent entering POTW.

Copper

Copper is not destroyed when treated by a POTW, and will either pass through to the POTW effluent or be retained in the POTW sludge. It can interfere with the POTW treatment processes and can limit the usefulness of municipal sludge. It causes toxic effects in a wide variety of organisms, including aquatic species.

Threshold concentrations for inhibition by copper in a POTW are 1.0 mg/l in activated sludge and anaerobic digestion processes, and 0.005 to 0.5 mg/l for nitrification processes, depending on POTW conditions. In a recent study of 268 POTW's, the median pass through was over 80 percent for primary plants and 40-50 percent for trickling filter, activated sludge and biological treatment plants. POTW effluent concentrations of copper ranged from 0.003 to 1.8 mg/l (mean 0.126, standard deviation 0.242).

The copper which passes through the POTW to the effluent will be discharged to ambient surface water. Copper is toxic to aquatic organisms at levels typically observed in POTW effluents, for example:

- 96-hour TL-50 for the rainbow trout is 0.02 mg/l.
- 96-hour LC-50 for the chinook salmon is 0.031 mg/l.
- 96-hour LC-50 for the fathead minnow is 0.023 mg/l.

Copper which does not pass through the POTW will be retained in the sludge, where it is likely to build up in concentration. The presence of excessive levels of copper in sludge may limit its use on cropland. Sewage sludge contains up to 16,000 mg/kg of copper, with 730 mg/kg as the mean value. These concentrations are significantly greater than those normally found in soil, which usually range from 18 to 80 mg/kg. Copper toxicity may develop in plants from application of sewage sludge contaminated with copper. Yield reductions have been reported as low as 100 mg/kg with legumes being more sensitive than cereals. In one study, copper decreased beet yields by 74 percent at 80 mg/kg and 90 percent at 160 mg/kg.

Pretreatment of electroplating wastes in Buffalo, N.Y., resulted in a decrease in copper concentration in sludge from 1,570 to 330 mg/kg. In Grand Rapids, Mich., the sludge copper concentration decreased from 3,000 to 2,500 mg/kg.

The Agency estimates that if the proposed regulation is promulgated approximately 6,000,000 pounds per year of copper will be removed from effluent entering POTW.

Lead

Lead is not destroyed when treated in a POTW, but will either pass through to the POTW effluent or be retained in the POTW sludge. It can interfere with the POTW treatment process and can also limit the usefulness of municipal sludge. It causes toxic effects in a wide variety of organisms, including aquatic species and humans, particularly children.

Threshold concentrations for lead inhibition of POTW treatment processes are 0.1 mg/l for activated sludge processes and 0.5 mg/l for nitrification processes.

In a recent study of 214 POTW's, median pass through values were over 80 percent for primary plants and over 60 percent for trickling filter, activated sludge, and biological process plants. Lead concentrations in POTW effluents ranged from 0.003 to 1.8 mg/l (mean=0.106, standard deviation=0.222).

The lead which passes through the POTW to the effluent will be discharged to ambient surface water. Lead is toxic to aquatic organisms at levels typically observed in POTW effluents, for example:

- 96-hour LC-50 for the coho salmon is 0.52 mg/l.
- 50 percent reproductive decrease in *Daphina magna* at 0.1 mg/l.
- Chronic detrimental effects on rainbow trout, brook trout, and sticklebacks at concentrations of 0.1 mg/l.

Besides providing an environment for aquatic organisms, surface water is often used as a source of drinking water. The National Interim Primary Drinking Water Regulations limit lead in drinking water to 0.05 mg/l. The major risk of lead in drinking water is to small children, where the water is one of several sources which result in a well documented, serious problem of excess lead levels in the body. According to the above regulations, as a result of the narrow range between the lead exposure of the average American in everyday life and exposure which is considered excessive, (especially in children) it is imperative that lead in water be maintained within strict limits. The estimated maximum safe level of lead intake is 600 μg/day. Potential sources of exposure are diet, water, dust, air, etc. Levels of lead in many urban children indicate overexposure (chronic brain or kidney damage, or acute brain damage), the levels of lead in water should be limited to as low as is practicable.

Lead which does not pass through the POTW will be retained in the sludge, where it is likely to build up in concentration. Municipal sludge is recognized as a valuable resource, with about 25 percent currently being applied to land (20 percent crop uses, 5 percent golf courses, etc.). In a recent two year study of eight cities, the median lead content ranged from 546 mg/kg to 8,466 mg/kg, with a maximum observed content of 11,897 mg/kg. Since the normal range of lead content in soil is from 3 to 70 mg/kg, application of contaminated sewage sludge to the soil will generally increase the soil's lead content.

Data indicate that the application of sludge containing excessive levels of lead to cropland may increase the lead concentration in crops if grown on acid soils. Generally, roots accumulate more lead than do plant tops. For above ground crops, significant impacts on lead concentration can occur when sludge is applied as a surface dressing while crops are growing. In light of the potential human health effects, the FDA has recommended that sludge containing more than 1,000 mg/kg of lead should not be used on agricultural land for crops used directly in the food chain.

Pretreatment of electroplating wastes in Buffalo, N.Y., resulted in a decrease in lead concentrations in sludge from 1,800 to 605 mg/kg.

The Agency estimates that if the proposed regulation is promulgated approximately 200,000 pounds per year of lead will be removed from effluent entering POTW.

Nickel

Nickel is not destroyed when treated in a POTW, but will either pass through to the POTW effluent or be retained in the POTW sludge. It can interfere with POTW treatment processes and can also limit the usefulness of municipal sludge. Nickel causes toxic effects in a wide variety of organisms, including aquatic species and humans. It is a human carcinogen.

Threshold concentrations for POTW treatment process inhibition are 1 to 2.5 mg/l for activated sludge, 2 mg/l for anaerobic digestion, and 0.53 mg/l for nitrification processes.

In a recent study of 190 POTW's, nickel pass through was greater than 90 percent for 82 percent of the primary plants. Median pass through for trickling filter, activated sludge, and biological process plants was greater than 80 percent. POTW effluent concentrations ranged from 0.002 to 40 mg/l (mean=0.410, standard deviation=3.279).

The nickel which passes through the POTW is usually discharged to ambient surface water. Nickel is toxic to aquatic organisms at levels typically observed in POTW effluents, for example:

- 50 percent reproductive impairment of *Daphnia magna* at 0.095 mg/l.
- 3 week LC-50 of 0.130 mg/l for *Daphnia magna*.
- Morphological abnormalities in developing eggs of *Limnaea palustris* at 0.230 mg/l.
- 50 percent growth inhibition of aquatic bacteria at 0.020 mg/l 0.020 mg/l.

Since surface water is often used as a drinking water source, nickel passed through a POTW becomes a possible drinking water contaminant.

Nickel not passed through the POTW will be incorporated into the sludge. Sewage sludge is recognized as being a valuable resource, with 25 percent currently being applied to land (20 percent to cropland, with 5 percent to golf courses, etc.). In a recent two year study of eight cities, four of the cities had median nickel concentrations of over 350 mg/kg, and two were over 1,000 mg/kg. The maximum nickel concentration observed was 4,016 mg/kg.

Nickel toxicity may develop in plants from application of sewage sludge on acid soils. Nickel has caused reduction of yields for a variety of crops including oats, mustard, turnips, and cabbage.

Beets are the most sensitive to nickel toxicity. In one study, nickel decreased the yields of oats by 16 percent at 50 mg/kg, and 70 percent at 100 mg/kg.

Pretreatment of electroplating wastes in Buffalo resulted in a decrease in nickel concentration in sludge from 315 to 115 mg/kg. A similar decrease occurred in Grand Rapids, Mich., where the sludge nickel concentrations went from 3,000 to 1,700 mg/kg.

The Agency estimates that if the proposed regulation is promulgated approximately 12,000,000 pounds per year of nickel will be removed from effluent entering POTW.

Zinc

Zinc is not destroyed when treated by a POTW, but will either pass through to the POTW effluent or be retained in the POTW sludge. It can interfere with treatment processes in the POTW and can also limit the use of municipal sludge. It causes toxic effects in a wide variety of organisms, including aquatic species.

Threshold concentrations for POTW treatment process inhibition are 0.3 mg/l for activated sludge, 5 mg/l for anaerobic digestion, and 0.08 to 0.5 mg/l for nitrification processes. Other metals can cause synergistic effects.

In a recent study of 258 POTW's, the median pass through values were 70–80 percent for primary plants, 50–60 percent for trickling filter and biological process plants, and 30–40 percent for activated sludge process plants. POTW effluent concentrations of zinc ranged from 0.003 to 3.6 mg/l (mean=0.330, standard deviation=0.464).

The zinc which passes through the POTW to the effluent will be discharged to ambient surface water. Zinc is toxic to aquatic organisms in concentrations typically observed in POTW effluents, for example:

- 96-hour LC-50 for the cutthroat trout is 0.090 mg/l.
- 96-hour LC-50 for the chinook salmon is 0.103 mg/l.
- Growth retardation in the minnow at 0.13 mg/l and abnormal swimming behavior at 0.04 mg/l.

The zinc which does not pass through the POTW will be retained in the sludge. Municipal sludge is recognized as a valuable resource, with 20 percent currently being applied to cropland as a soil conditioner. The presence of zinc in sludge may limit its use on cropland. Sewage sludge contains 72 to over 30,000 mg/kg of zinc, with 3,366 mg/kg as the mean value. These concentrations are significantly greater than those normally found in soil, which range from 0 to 195 mg/kg, with 94 mg/kg being a common level. Therefore, application of sewage sludge to soil will generally increase the concentration of zinc in the soil. Zinc can be toxic to plants, depending upon soil pH. Lettuce, tomatoes, turnips, mustard, kale, and beets are especially sensitive to zinc contamination.

Pretreatment of electroplating waste in Buffalo, N.Y., resulted in a decrease in zinc concentrations in sludge from 2,275 to 364 mg/kg. The zinc content in the sludge of Grand Rapids, Mich., also decreased from 7,000 to 5,700 mg/kg as a result of pretreatment.

Cyanide

Cyanides are widely used in the electroplating industry and are among the most toxic of pollutants commonly observed in industrial waste waters. Cyanides can interfere with the treatment processes in a POTW, or pass through to ambient waters. Cyanide also enhances the toxicity of metals commonly found in POTW effluents.

Threshold cyanide concentrations for POTW treatment process inhibition are 0.1–5 mg/l for activated sludge, 4 mg/l for anaerobic digestion, and 0.34 mg/l for nitrification processes.

Cyanide may be destroyed in a POTW, but data indicate that much of it passes through to the POTW effluent. One primary plant showed 100 percent cyanide pass through, and the mean pass through for 14 biological plants was 71 percent. In a recent study of 41 POTW's the effluent concentrations ranged from 0.002 to 100 mg/l (mean=2.518, standard deviation=15.6).

The cyanide which passes through to the POTW effluent will usually be discharged into ambient surface water. There is a considerable amount of data documenting cyanide toxicity to aquatic organisms at levels at or below those typically observed in POTW effluents.

Cyanides are more toxic to fish than to lower aquatic organisms such as midge larve, crustaceans, and mussels. Toxicity to fish is a function of chemical form and concentration, and is influenced by the rate of metabolism (temperature), the level of dissolved oxygen, and pH. In laboratory studies free cyanide concentrations ranging from 0.05 to 0.15 mg/l have been proven to be fatal to sensitive fish species including trout, bluegills, and fathead minnows. Levels above 0.2 mg/l are rapidly fatal for many species. Long term sublethal concentrations of cyanide as low as 0.01 mg/l have been shown to affect the ability of fish to function normally, e.g., reproduce, grow, and move freely.

Cyanide may exist as free cyanide (CN anion), hydrogen cyanide (HCN), or as a complex with metals. In the absence of metals, free cyanide and hydrogen cyanide are in an equilibrium which is highly dependent upon pH. At pH values below 7.0 over 99 percent of the cyanide is present as HCN. At pH values of 8.0, 9.0, and 10.0 the HCN percentage decreases to 93.3 percent, 58 percent and 13 percent, respectively. Since HCN is the most toxic form of cyanide, it is clear that decreasing pH (increasing acidity) results in greater toxicity. Temperature increase also results in increased toxicity (2–3 fold over 10°C), as does reduction in dissolved oxygen content.

Cyanide forms complexes with metal ions present in waste water. All these complexes exist in equilibrium with HCN. Therefore, the concentration of free cyanide present is dependent on the pH of the water and the relative strength of the metal-cyanide complex. The cyanide complexes of zinc, cadmium and copper may dissociate to release free cyanide. Also, where these complexes occur together, synergistic effects have been demonstrated. Zinc, copper, and cadmium cyanide are more toxic than an equal concentration of sodium cyanide.

Another problem associated with cyanide pass through is possible chlorination of cyanide to highly toxic cyanogen chloride, which is subsequently released to the environment. This chlorination reaction may occur as part of the POTW treatment, or subsequently as part of the disinfection treatment for surface drinking water preparation.

Data for Grand Rapids, Mich., show a significant decline in cyanide concentrations downstream from the POTW after pretreatment regulations were enacted. Concentrations fell from 0.06 mg/l before to 0.01 mg/l after pretreatment was required.

Silver

There is no available literature on the incidental removal of silver by POTW. An incidental removal of about 50 percent is assumed as being representative as this is the highest average incidental removal of any metal for which data are available. (Copper has been indicated to have a median incidental removal rate of 49 percent.)

The toxicity of silver to aquatic organisms has long been recognized. Dosages of 0.000001 to 0.5 mg/l of silver have been reported as sufficient to sterilize water. The threshold toxicity level to other lower aquatic organisms has been reported at 30 to 50 ug/l. The toxic threshold of silver nitrate for stickelbacks is reported as 4.8 ug/l as silver.

Bioaccumulation and concentration of silver from sewage sludge has not been studied to any great degree. There is some indication that silver could be bioaccmulated in mushrooms to the extent that there could be an adverse physiological effect on humans if they consumed large quantities of mushrooms grown in silver enriched soil. The effect, however, would tend to be unpleasant rather than fatal. No data has been accumulated on the remainder of the metals.

There is little summary data available on the quantity of silver discharged to POTW. Presumably because of its high intrinsic value there would be a tendency to limit its discharge from a manufacturing facility. Pretreatment requirements will limit the discharge of silver from those establishments that allow or may allow them to discharge freely.

pH

Extremes of pH or rapid pH changes can exert stress conditions or kill biological life outright. At a pH greater than 10, disruption of a biological treatment system is likely. At a low pH, corrosion of sewer pipes may be caused. Furthermore, at a pH below 7.5, only small amounts of metals are converted to hydroxide form. Since soluble metals tend to pass through POTW untreated, whereas metal hydroxides will tend to be removed in primary clarifiers, pH levels have an important indirect effect on the significance of metal pass-through problems.

(iv) Treatment and control technology. Waste water treatment and control technologies have been studied for this industry to determine the best practicable pretreatment technologies. This study showed that although there are differences between subcategories in the types and quantities of wastes generated, the same general treatment technologies are available to this entire industrial segment.

Electroplating wastes are typically treated by a number of sequential control techniques. General practice includes segregation and individual treatment of the wastes containing cyanide and chrome followed by the removal of metals by pH adjustment and clarification or filtration in a common treatment system. Therefore, the present pretreatment limitations for this category are based on the following control techniques: cyanide oxidation, chrome reduction, metal precipitation using pH adjustment and solids removal. The use of these technologies formed the basis of the pretreatment standards which are being established. However, this does not preclude the use of other waste water treatment techniques which provide equivalent or better levels of treatment. These treatment technologies are discussed in detail in the development document.

Chrome Reduction

Reduction of hexavalent chrome to trivalent chrome is widely practiced and is typically done using sulfur dioxide at a pH of approximately two.

Seventh-three plants sampled by the Agency had operating chrome reduction facilities. The number of data points from each plant varied from one to 133. The data from each plant were averaged into a single number so that all plants were considered equally. Approximately 60 percent of these plants already meet the limitations specified by the regulation.

Cyanide Destruction

Cyanide must be treated before treatment for metals removal may take place. If this is not done soluble metal cyanide complexes rather than insoluble metal hydroxides will be formed.

Cyanide destruction is generally done in a two-stage oxidation treatment system using chlorine or hypochlorite. The first stage of the reaction oxidizes cyanide to cyanate, and the second, cyanate to nitrogen and carbon dioxide.

The cyanide limitation set by this regulation is based on two stage treatment and careful separation of iron, nickel, and certain other metal bearing wastes from cyanide waste treatment technologies. This latter segregation practice is standard good housekeeping procedure and is well established within the industry.

Eighty-five plants sampled during this study had cyanide oxidation facilities. The data from each plant were treated in the same manner as the data on chrome reduction. The limitations set by this regulation based on cyanide oxidation are currently achieved by approximately 60 percent of the data base.

pH Adjustment

Control of pH was practiced by all of the plants sampled in this study. Typically, the pH is adjusted by adding an acid, such as hydrochloric or sulfuric, or base (lime or caustic) to the waste stream in an agitated tank; pH control is achieved by mixing sufficient amounts of acid or base to the waste to maintain the pH in the desired range.

Metals Removal

The pH adjustment of electroplating wastes to 8.0 or above causes the dissolved metals to form insoluble metal hydroxides. These compounds can be removed from the waste water by solids separation techniques such as gravitational settling or filtration. Both methods are in general use within the industry and were used by plants sampled by the Agency. A detailed analysis of the performance of these techniques is given in the development document.

The limitations proposed by this regulation are based on the Agency's assessment of the performance of the preceding technologies. In making this assessment, the Agency was careful to exclude data or plants which were diluting untreated or inadequately treated process waste water with nonprocess or sanitary waste. Dilution of this sort is counter to the intent of this regulation and must not be used as an aid in achieving these limitations.

(iv) *Cost estimates for control of waste water pollutants.* Cost information was obtained from industry, engineering firms, equipment suppliers, government sources, and available literature. Whenever possible the Agency used costs based on actual industrial installations or engineering estimates for projected facilities as supplied by contributing companies.

The foregoing cost information was used to estimate the cost of treatment plants for electroplating establishments of various sizes and compositions. Eighty-one model plants were used to characterize the treatment costs associated with this category. These models and a summary of the costing methodology are available for public inspection at the EPA Public Information Reference Unit; Room 2922, (EPA Library), Waterside Mall, 401 M Street SW., Washington, D.C. 20460.

(v) *Energy requirements and nonwater quality environment impacts.* The energy costs related to the implementation of these regulations are generally limited to electricity required for liquid transfer pumps and agitator motors.

The major nonwater quality consideration which may be associated with these pretreatment standards is the generation of metal-bearing solid wastes which must be disposed of by the industrial user. The estimated cost for disposing of these wastes in an environmentally safe manner has been estimated by the Agency to be 12 cents per gallon. This cost has been included in the cost analysis for this regulation. A discussion of the data gathered by the Agency regarding these costs is contained in the development document.

No significant increase in noise, radiation, air pollution or thermal pollution will result from the implementation of these pretreatment standards.

(3) *Economic Summary.* This section summarizes the economic and inflationary impacts of the pretreatment standards for the electroplating point source category. Executive Orders 11821 and 11949, and OMB Circular A-107 require that major proposals for legislation and promulgation of regulations and rules by agencies of the executive branch be accompanied by a statement certifying that the inflationary impact of the proposal has been evaluated. The inflationary impact of these standards has been evaluated in an economic impact analysis, the results of which are summarized below. The details of the economic studies are set forth in a report entitled Economic Analysis of Proposed Pretreatment Standards for Existing Sources of the Electroplating Point Source Category, December 1977.

These proposed pretreatment standards for plants discharging to publicly owned treatment works apply to: (1) independent job shops performing the metal-finishing processes covered by these standards as their primary line of business, (2) independent manufacturers of printed circuit

boards; and (3) captive establishments performing the processes regulated but as part of the manufacture of some other product.

Total investment costs for the metal-finishing job shops to comply with these standards are estimated to be 134.3 million dollars. Annualized compliance costs for this sector are estimated to be 37.7 million dollars per year. Investment costs for the printed circuit board makers are estimated to be 20.8 million dollars. Annualized compliance costs for this sector are estimated to be 5.7 million dollars. Thus, independent firms would have to make investments totaling 155.1 million dollars to comply with these standards. Annualized costs of compliance for independent firms are estimated to be 43.4 million dollars per year.

Total investment costs for captive operations are estimated to be 305.6 million dollars. Annualized compliance costs for this sector are estimated to be 85.5 million dollars per year. Thus, the total investment required to comply with these standards is estimated to be 460.7 million dollars. Total annualized compliance costs are estimated to be 128.9 million dollars per year. The above costs make allowance for treatment in place and are the increment between the existing level of compliance in the industry and that required by these proposed pretreatment standards. Thus, these costs include the cost to comply with the July 12, 1977 Interim Final Pretreatment Standards for the Electroplating Point Source Category as well as the increment over these needed to comply with the proposed standards.

Independent metal finishing job shops and printed circuit board makers may suffer significant adverse economic impact as a result of these standards. It is estimated that 584 metal finishing job shops representing 12,500 jobs may close as a result of these standards. This represents 21 percent of the firms and jobs in this sector of the industry. It is estimated 55 printed circuit board makers representing 3,135 jobs may close as a result of these standards. This represents 14 percent of the firms and 13 percent of the jobs in this sector of the industry.

Thus, a total of approximately 639 independent firms representing approximately 15,636 jobs may close as a result of these standards. This represents 19 percent of the independent firms and 18 percent of the jobs.

These estimated impacts are drastically reduced by Federal financial assistance programs to small business. Analyses performed for the Environmental Protection Agency show that existing Small Business Administration loan programs could reduce the projected impacts on the job shops to eight percent of the firms and jobs. Thus, SBA loan programs could possibly reduce the number of firm closures buy 370 and the number of job losses by 8,000. The Environmental Protection Agency is working closely with the Small Business Administration to insure that these loans are made available to eligible firms.

Captive establishments are anticipated to have much lower adverse economic impacts than is the case for the independent establishments. No plants are expected to close as a result of the standards but it is estimated that 67 plants may close down their metal finishing operations and purchase metal finishing services from job shops. This represents less than a thousand metal finishing jobs among the 2.3 million jobs in establishments with captive metal finishing operations that discharge to municipal systems. These possible captive closures represent one percent of the firms having captive metal finishing operations.

Prices are expected to rise to account for increased compliance costs. The price of the regulated metal finishing services from independent job shops is expected to rise by an average of five percent. The price of printed circuit boards is expected to rise by about four percent. The price of those products produced by firms with captive operations is expected to rise by one percent or less.

Profitability and owners' compensation are expected to drop slightly in the short run but are expected to return to their original levels within a few years of compliance as the industry adjusts to the new abatement requirements.

Summary of Public Participation

The following are the principal agencies and groups consulted in the development of regulations: (1) Effluent Standards and Water Quality Information Advisory Committee (established under section 515 of the Act); (2) all State and U.S. Territory Pollution Control Agencies; (3) Department of Interior; (4) Department of Commerce; (5) Department of Defense; (6) Department of the Treasury; (7) Water Resources Council; (8) Atomic Energy Commission; (9) Office of Management and Budget; (10) National Association of Metal Finishers; (11) Metal Finishers Suppliers Association; (12) American Electroplating Society; (13) Institute of Printed Circuits; (14) Alberts Plating Works, Inc.; (15) American Hot Dip Galvanizers; (16) American Society of Mechanical Engineers; (17) Hudson River Sloop Restoration, Inc.; (18) The Conservation Foundation; (19) Environmental Defense Fund, Inc.; (20) Natural Resources Defense Council; (21) The American Society of Civil Engineers; (22) Water Pollution Control Federation; (23) National Wildlife Federation; (24) American Institute of Chemical Engineers; (25) New England Interstate Water Pollution Control Commission.

A list of those who commented following publication of the Phase I and Phase II regulations was published in the July 12, 1977 interim final pretreatment regulation (FR35834). Those comments were considered by the Agency in proposing the present regulation. Additionally, the following responded with comments following publication of the interim final regulation: U.S. Department of Interior; County Sanitation Districts of Los Angeles County; The Metropolitan Sanitary District of Greater Chicago; East Bay Municipal Utility District; city of Houston, Tex., Office of the Mayor; Slack Associates, Inc.; Roper Eastern; E. I. DuPont deNemours Inc., Dicson Electronics Inc.; Andco Environmental Process, Inc., Varland Metal Services, Inc.; Allen K. Fischkorn, Jr.; The National Association of Metal Finishers.

The major issues raised by commenters following the publication of the interim final regulations are as follows:

(1) One commenter stated that the interim final cyanide limitations are not reflective of alkaline chlorination alone but rather alkalline chlorination plus an alleged cyanide reduction due to metals removal.

The Agency's analysis of cyanide oxidation systems included only plants which also had metals removal technology. On the basis of a preliminary analysis, a significant cyanide reduction does appear to occur as a result of metals removal. The Agency, in studying this effect proposes today to amend the regulation by increasing the amenable cyanide limitation for plants discharging less than 38,000 l (10,000 gal) per day. The Agency solicits comments on the appropriateness of these limitations and the mechanism by which this removal occurs. However, for those firms discharging more than 38,000 l (10,000 gal) per day, the Agency believes that the cyanide analysis reflects the levels of control which can be attained by use of the model waste treatment control technologies.

(2) Several commenters stated that while control of cyanide and chromium is a necessary first step in the control of toxic wastes from this industry, these and other limitations should only be as severe as necessary to meet the water quality standards required for receiving waters.

The basic scheme of the Federal Water Pollution Control Act is to require all discharges to meet uniform technology-based pretreatment standards as a minimum. Water quality standards are primarily relevant to determine whether further reductions in discharges should be imposed to meet the water quality standards of individual bodies of water. The Agency has followed a practice of utilizing technology based limitations in other pretreatment regulations. The Agency invites comments on whether recent amendments to the Federal Water Pollution control Act should affect that policy.

(3) One commenter stated that some processes, particularly within the coatings subcategory, utilize process chemicals which inevitably generate low but significant concentrations of cyanide complexes which are poorly treated by alkaline chlorination.

To the extent that such processes exist and were not studied by the Agency and that the formation of these complexes is not the result of failure to segregate cyanide-bearing wastes or other poor housekeeping procedures, these processes may be eligible for variances from these limitations because they are fundamentally different from those processes studied

in deriving the limitations. While no variance provision has been published in these proposed regulations, the Agency is considering promulgating a provision similar to that proposed as § 403.6 of the general pretreatment regulations (42 FR 6197, February 2, 1977) prior to or as part of the final Electroplating regulations.

(4) Numerical limitations different than those established by the interim final limitations on cyanide and chromium were proposed by some commenters. The comments focused on the technical feasibility of attaining the limitations and on the analytical methods used in characterizing the performance of the waste treatment control technology.

The standards set forth in the interim final regulations were based on a careful assessment by the Agency of data concerning the levels of control which can be attained by use of available treatment technologies. Data supplied by the commenters as well as data collected by the Agency was used in developing the limitations. Furthermore, the Agency has given careful attention to the possible economic impact of establishing various standards. The formulation of the standards is described in detail in the pretreatment supplement which accompanied those regulations.

Comments regarding the use of unapproved analyical methods for data reported by some laboratories are currently being investigated. If such data were inadvertantly included in the data base and had a significant effect thereon the standards will be corrected when the standards for metals are finalized.

(5) One commenter felt that inadequate consideration was given top the treatment problems associated with the formation of stable iron cyanide complexes which occur when steel plating tanks and anodes are used in electroplating processes.

The Agency believes that low cost alternatives exist which would largely eliminate this problem. Alternative non-complex forming materials of construction, such as plastic or glass fiber, can be used in the construction of new tanks and existing steel tanks can be lined with similar protective coatings. Additionally, steel anodes can either be used in conjunction with another "sacrificial" metal or can be replaced by other materials. The Agency believes that this approach, which minimizes the formation of these compounds, is highly desirable and should be used where possible.

Part 413, Chapter I, Subchapter N, Title 40 of the Code of Federal Regulations is proposed to be amended as follows:

Subpart A—Electroplating of Common Metals Subcategory

SubpartA, § 413.10 is proposed to be amended by adding a second paragraph as follows:

§ 413.10 Applicability; description of the electroplating of common metals subcategory.

* * * No discharger into a POTW shall augment his use of process water or otherwise dilute his discharge as a partial or complete substitute for adequate treatment to achieve compliance with this standard.

Subpart A, § 413.11 is proposed to be amended by adding paragraphs (h) and (i) as follows:

§ 413.11 Specialized definitions.

* * * * *

(h) The Term "total metal" is defined as the sum of the concentration of Copper (Cu), Nickel (Ni), Total Chromium (Cr) and Zinc (Zn).

(i) The term "strong chelating agents" is defined as all compounds which be virtue of their chemical structure and amount present form soluble metal complexes which are not removed by subsequent metals control techniques such as clarification or filtration.

Subpart A, § 413.14 paragraph (b) is revised to read as follows:

§ 413.14 Pretreatment standards for existing sources.

* * * * *

(b) In addition to the general prohibitions set forth in paragraph (a) of this section, the following pretreatment standards establish the concentration or pH of pollutants which may be introduced into a publicly owned treatment works by a source subject to the provisions of this subpart.

(1) For plants discharging less than 38,000 l (10,000 gal) per day of electroplating process waste water the following limitations shall apply:

Pollutant or pollutant property	Pretreatment standard: Maximum for any 1 day	Pretreatment standard: Average of daily values for 30 consecutive days shall not exceed
	mg/l	
CN,A	2.	0.8
Cr,VI	.25	.09
Pb	.8	.4
Cd	1. I45.5	

(2) For plants discharging 38,000 l (10,000 gal) per day or more of electroplating process waste water the following limitations shall apply:

Pollutant or pollutant property	Pretreatment standard: Maximum for any 1 day	Pretreatment standard: Average of daily values for 30 consecutive days shall not exceed
	mg/l	
CN,A	0.20	0.08
CN,T	.64	.24
Cr,VI	.25	.09
Cu	4.6	2.0
Ni	3.6	1.8
Cr, total.	4.2	1.6
Zn	3.4	1.5
Pb	.8	.4
Cd	1.0	.5
Total metals.	7.5	3.9

For plants regulated under paragraph (b)(2) of this section, the following optional alternate limitation may be elected by the plant introducing treated process waste water into a POTW. In the absence of strong chelating agents and after neutralization using calcium oxide (or hydroxide) the following limitations shall apply:

Pollutant or pollutant property	Pretreatment standard: Maximum for any 1 day	Pretreatment standard: Average of daily values for 30 consecutive days shall not exceed
	mg/l	
CN,A	0.20	0.08
CN,T	.64	.24
Cr,VI	.25	.09
Pb	.8	.4
Cd	1.	.5
TSS	15.	10.
pH	Within the range 7.5 to 10.	

Subpart B—Electroplating of Precious Metals Subcategory

Subpart B, § 413.20 is proposed to be amended by adding a second paragraph to read as follows:

§ 413.20 Applicability; description of the electroplating of precious metals on ferrous and non-ferrous materials category.

* * * No discharger into a POTW shall augment his use of process water or otherwise dilute his discharge as a partial or complete substitute for adequate treatment to achieve compliance with this standard.

Subpart B, § 413.21 is proposed to be amended by adding paragraphs (h) and (i) as follows:

§ 413.21 Specialized definitions.

* * * * *

(h) The term "total metal" is defined as the sum of the concentration of Copper (Cu), Nickel (Ni), Total Chromium (Cr) and Zinc (Zn).

(i) The term "strong chelating agents" is defined as all compounds

which by virtue of their chemical structure and amount present form soluble metal complexes which are not removed by conventional metals control techniques such as clarification or filtration.

Subpart B, § 413.24 paragraph (b) is revised to read as follows:

§ 413.24 Pretreatment standards for existing sources.

* * * * *

(b) In addition to the general prohibition set forth in paragraph (a) of this section, the following pretreatment standards establish the concentration or pH of pollutants which may be introduced into a publicly owned treatment works by a source subject to the provisions of this subpart.

(1) For plants discharging less than 38,000 liters (10,000 gal) per day of electroplating process waste water the following limitations shall apply:

Pollutant or pollutant property	Pretreatment standard: Maximum for any 1 day	Pretreatment standard: Average of daily values for 30 consecutive days shall not exceed
	mg/l	
CN,A	2.0	0.8
Cr,VI	0.25	0.09
Pb	.8	0.4
Cd	1.0	0.5

(2) For plants discharging 38,000 liters (10,000 gal) per day or more of electroplating process waste water the following limitations shall apply:

Pollutant or pollutant property	Pretreatment standard: Maximum for any 1 day	Pretreatment standard: Average of daily values for 30 consecutive days shall not exceed
	mg/l	
CN,A	0.20	0.08
CN,T	.64	.24
Cr, VI	.25	.09
Cu	4.6	2.0
Ni	3.6	1.8
Cr, Total	4.2	1.6
Zn	3.4	1.5
Pb	.8	.4
Cd	1.0	.5
Total metals	7.5	3.9
Silver	1.0	.34

(3) For plants regulated under paragraph (b)(2) of this section, the following optional alternate limitation may be elected by the plant intoducing treated process waste water into a POTW. In the absence of strong chelating agents and after neutralization using calcium oxide (or hydroxide) the following limitations shall apply:

Pollutant or pollutant property	Pretreatment standard: Maximum for any 1 day	Pretreatment standard: Average of daily values for 30 consecutive days shall not exceed
	mg/l	
CN,A	0.20	0.08
CN,T	.64	.24
Cr, VI	.25	.09
Pb	.8	.4
Cd	1.0	.5
TSS	15.	10.
pH	Within the range 7.5 to 10	

Subpart D—Anodizing Subcategory

Subpart D, § 413.40 is proposed to be amended by adding a second paragraph to be read as follows:

§ 413.40 Applicability; description of the anodizing subcategory.

* * * No discharger into a POTW shall augment his use of process water or otherwise dilute his discharge as a partial or complete substitute for adequate treatment to achieve compliance with this standard.

Subpart D, § 413.41 is proposed to be amended by adding paragraphs (h) and (i) as follows:

§ 413.41 Specialized definitions.

* * * * *

(h) The term "total metal" is defined as the sum of the concentration of Copper (Cu), Nickel (Ni), Total Chromium (Cr) and Zinc (Zn).

(i) The term "strong chelating agents" is defined as all compounds which by virtue of their chemical structure and amount present form soluble metal complexes which are not removed by conventional metals control techniques such as clarification or filtration.

Subpart D, § 413.44 paragraph (b) is revised to read as follows:

§413.44 Pretreatment standards for existing sources.

* * * * *

(b) In addition to the general prohibitions set forth in paragraph (a) of this section, the following pretreatment standards establish the concentration or pH of pollutants which may be introduced into a publicly owned treatment works by a source subject to the provisions of this subpart.

(1) For plants discharging less than 38,000 liters (10,000 gal.) per day of electoplating process waste water the following limitations shall apply:

Pollutant or pollutant property	Pretreatment standard: Maximum for any 1 day	Pretreatment standard: Average of daily values for 30 consecutive days shall not exceed
	mg/l	
CN,A	0.20	0.08
CN,T	.64	.24
Cr, VI	.25	.09
Pb	.8	.4
Cd	1.0	.5
TSS	15.	10.
pH	Within the range 7.5 to 10	

(2) For plants discharging 38,000 liters (10,000 gal.) per day or more of electroplating process waste water the following limitations shall apply:

Pollutant or pollutant property	Pretreatment standard: Maximum for any 1 day	Pretreatment standard: Average of daily values for 30 consecutive days shall not exceed
	mg/l	
CN, A	2.0	0.8
Cr, VI	.25	.09
Pb	.8	.4
Cd	1.0	.5

(2) For plants discharging 38,000 liters (10,000 gal.) per day or more of electroplating process waste water the following limitations shall apply:

Pollutant or pollutant property	Pretreatment standard: Maximum for any 1 day	Pretreatment standard: Average of daily values for 30 consecutive days shall not exceed
	mg/l	
CN, A	0.20	0.08
CN, T	.64	.24
Cr, VI	.25	.09
Cu	4.6	2.0
Ni	3.6	1.8
Cr, total.	4.2	1.6
Zn	3.4	1.5
Pb	.8	.4
Cd	1.0	.5
Total metals.	7.5	3.9

(3) For plants regulated under paragraph (b)(2) of this section, the following optional alternate limitation may be elected by the plant introducing treated process waste water into a POTW. In the absence of strong chelating agents and after neutralization using calcium oxide (or hydroxide) the following limitations shall apply:

Pollutant or pollutant property	Pretreatment standard: Maximum for any 1 day	Pretreatment standard: Average of daily values for 30 consecutive days shall not exceed
	mg/l	
CN, A	0.20	0.08
CN, T	.64	.24
Cr,VI	.25	.09
Pb	.8	.4
Cd	1.0	.5
TSS	15.	10.
pH	Within the range 7.5 to 10.0	

Subpart E—Coatings Subcategory

Subpart E, § 413.50 is proposed to be amended by adding a second paragraph to read as follows:

§ 413.50 Applicability; description of the coatings subcategory.

* * * No discharger into a POTW shall augment his use of process water or otherwise dilute his discharge as a partial or complete substitute for adequate treatment to achieve compliance with this standard.

Subpart E, § 413.51 is proposed to be as mended by adding paragraphs (h) and (i) as follows:

§ 413.51 Specialized definitions.

* * * * *

(h) The term "total metal" is defined as the sum of the concentration of Copper (Cu), Nickel (Ni), Total Chromium (Cr) and Zinc (Zn).

(i) The term "strong chelating agents" is defined as all compounds which by virtue of their chemical structure and amount present form soluble metal complexes which are not removed by conventional metals control techniques such as clarification or filtration.

Subpart E, § 413.54 paragraph (b) is revised to read as follows:

§ 413.54 Pretreatment standards for existing sources.

* * * * *

(b) In addition to the general prohibitions set forth in paragraph (a) of this section, the following pretreatment standards establish the concentration or pH of pollutants which may be introduced into a publicly owned treatment works by a source subject to the provisions of this subpart.

(1) For plants discharging less than 38,000 liters (10,000 gal.) per day of electroplating process waste water the following limitations shall apply:

Pollutant or pollutant property	Pretreatment standard	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed
	mg/l	
CN, A	2.0	0.8
Cr, VI	.25	.09
Pb	.8	.4
Cd	1.0	.5

(2) For plants discharging 38,000 liters (10,000 gal.) per day or more of electoplating process waste water the following limitations shall apply:

Pollutant or pollutant property	Pretreatment standard	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed
	mg/l	
Cn, A	0.20	0.08
CN, T	.64	.24
Cr, VI	.25	.09
Cu	4.6	2.0
Ni	3.6	1.8
Cr, Total	4.2	1.6
Zn	3.4	1.5
Pb	.8	.4
Cd	1.0	0.5

Pollutant or pollutant property	Pretreatment standard	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed
	mg/l	
Total metals.	7.5	3.9

(3) For plants regulated under paragraph (b)(2) of this section, the following optional alternate limitation may be elected by the plant introducing treated process waste water into a POTW. In the absence of strong chelating agents and after neutralization using calcium oxide (or hydroxide) the following limitations shall apply:

Pollutant or pollutant property	Pretreatment, standard (mg/l)	
	Maximum for any 1 day	Average of daily values for 30, consecutive days, shall not exceed—
CN,A	0.20	0.08
CN,T	.64	.24
Cr,VI	.25	.09
Pb	.80	.40
Cd	1.00	.50
TSS	15.00	10.00
pH	Within the range 7.5 to 10.0	

Subpart F—Chemical Etching and Milling Subcategory

Subpart F, § 413.60 is proposed to be amended by adding a second paragraph to read as follows:

§ 413.60 Applicability; description of the chemical etching and milling subcategory.

* * * No discharger into a POTW shall augment his use of process water or otherwise dilute his discharge as a partial or complete substitute for adequate treatment to achieve compliance with this standard.

Subpart F, § 413.61 is proposed to be amended by adding paragraphs (h) and (i) as follows:

§ 413.61 Specialized definitions.

* * * * *

(h) The term "total metal" is defined as the sum of the concentration of Copper (Cu), Nickel (Ni), Total Chromium (Cr) and Zinc (Zn).

(i) The term "strong chelating agents" is defined as all compounds which by virtue of their chemical structure and amount present form soluble metal complexes which are not removed by conventional metals control techniques such as clarification or filtration.

Subpart F, § 413.64 paragraph (b) is revised to read as follows:

§ 413.64 Pretreatment standards for existing sources.

* * * * *

(b) In addition to the general prohibitions set forth in paragraph (a) of this section, the following pretreatment standards establish the concentration or pH of pollutants which may be introduced into a publicly owned treatment works by a source subject to the provisions of this subpart.

(1) For plants discharging less than 38,000 liters (10,000 gal) per day of electroplating process waste water the following limitations shall apply;

Pollutant or pollutant property	Pretreatment standard (mg/l)	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
CN,A	2.00	0.80
Cr, VI	.25	.09
Pb	.80	.40
Cd	1.00	.50

(2) For plants discharging less than 38,000 liters (10,000 gal) per day of electroplating process waste water the following limitations shall apply;

Pollutant or pollutant property	Pretreatment standard (mg/l)	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
CN,A	0.20	0.08
CN,T	.64	.24
Cr, VI	.25	.09
Cu	4.60	2.00
Ni	3.60	1.80
Cr, total	4.20	1.60
Zn	3.40	1.50
Pb	.8	.40
Cd	1.0	.50
Toal metals	7.5	3.90

(3) For plants regulated under paragraph (b)(2) of this section, the following optional alternate limitation may be elected by the plant introducing treated process waste water into a POTW. In the absence of strong chelating agents and after neutralization using calcium oxide (or hydroxide) the following limitations shall apply:

Pollutant or pollutant property	Pretreatemnt standard (mg/l)	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
CN,A	0.20	0.08
CN,T	.64	.24
Cr, VI	.25	.09
Pb	.80	.40
Cd	1.00	.50
TSS	15.00	10.00

Pollutant or pollutant property	Pretreatment standard: Maximum for any 1 day	Pretreatment standard: Average of daily values for 30 consecutive days shall not exceed
pH	Within the range 7.5 to 10.0	

Subpart G—Electroless Plating

Subpart G, § 413.70 is proposed to be amended by adding a second paragraph to read as follows:

§ 413.70 Applicability; description of the electroless plating subcategory.

* * * No discharger into a POTW shall augment his use of process water or otherwise dilute his discharge as a partial or complete substitute for adequate treatment to achieve compliance with this standard.

Subpart G, § 413.71 is proposed to be amended by adding paragraphs (i) and (j) to read as follows:

§ 413.71 Specialized definitions.

* * * * *

(i) The term "total metal" is defined as the sum of the concentration of Copper (Cu), Nickel (Ni), Total Chromium (Cr) and Zinc (Zn).

(j) The term "strong chelating agents" is defined as all compounds which by virtue of their chemical structure and amount present form soluble metal complexes which are not removed by conventional metals controls techniques such as clarification or filtration.

Subpart G, § 413.74 paragraph (b) is revised to read as follows:

§ 413.74 Pretreatment standards for existing sources.

* * * * *

(b) In addition to the general prohibitions set forth in paragraph (a) of this section, the following pretreatment standards establish the concentration or pH of pollutants which may be introduced into a publicly owned treatment works by a source subject to the provisions of this subpart.

(1) For plants discharging less than 38,000 1 (10,000 gal) per day of electroplating process waste water the following limitations shall apply:

Pollutant or pollutant property	Pretreatment standard (mg/l): Maximum for any 1 day	Pretreatment standard (mg/l): Average of daily values for 30 consecutive days shall not exceed—
CN, A	2.00	0.80
Cr, VI	.25	.09
Pb	.80	.40
Cd	1.00	.50

(2) For plants discharging 10,000 gallons per day or more of electroplating process waste water the following limitations shall apply:

Pollutant or pollutant property	Pretreatment standard (mg/l): Maximum for any 1 day	Pretreatment standard (mg/l): Average of daily values for 30 consecutive days shall not exceed—
CN, A	0.20	0.08
CN,T	.64	.24
Cr, VI	.25	.09
Cu	4.60	2.00
Ni	3.60	1.80
Cr, total	4.20	1.60
Zn	3.40	1.50
Pb	.80	.40
Cd	1.00	.50
Total metals	7.50	3.90

(3) For plants regulated under paragraph (b)(2) of this section, the following optional alternate limitation may be elected by the plant introducing treated process waste water into a POTW. In the absence of strong chelating agents and after neutralization using calcium oxide (or hydroxide) the following limitations shall apply:

Pollutant or pollutant property	Pretreatment standard (mg/l): Maximum for any 1 day	Pretreatment standard (mg/l): Average of daily values for 30 consecutive days shall not exceed—
CN, A	0.20	0.08
CN,T	.64	.24
Cr, VI	.25	.09
Pb	.80	.40
Cd	1.00	.50
TSS	15.00	10.00
pH	Within the range 7.5 to 10.0	

Subpart H—Printed Circuit Board

Subpart H, § 413.80 is proposed to be amended by adding a second paragraph to read as follows:

§ 413.80 Applicability; description of the printed circuit board subcategory.

* * * No discharger into a POTW shall augment his use of process water or otherwise dilute his discharge as a partial or complete substitute for adequate treatment to achieve compliance with this standard.

Subpart H, § 413.81 is proposed to be amended by adding paragraphs (i) and (j) as follows:

§ 413.81 Specialized definitions.

* * * * *

(i) The term "total metal" is defined as the sum of the concentration of Copper (Cu), Nickel (Ni), Total Chromium (Cr) and Zinc (Zn).

(j) The term "strong chelating agents" is defined as all compounds which by virtue of their chemical structure and amount present form soluble metal complexes which are not removed by conventional metals control techniques such as clarification or filtration.

Subpart H, § 413.84 paragraph (b) is revised to read as follows:

§ 413.84 Pretreatment standards for existing sources.

* * * * *

(b) In addition to the general prohibitions set forth in paragraph (a) of this section, the following pretreatment standards establish the concentration or pH of pollutants which may be introduced into a publicly owned treatment works by a source subject to the provisions of this subpart.

(1) For plants discharging less than 38,000 1 (10,000 gal) per day of electroplating process waste water the following limitations shall apply:

Pollutant or pollutant property	Pretreatment standard (mg/l): Maximum for any 1 day	Pretreatment standard (mg/l): Average of daily values for 30 consecutive days shall not exceed—
CN, A	2.00	0.80
Cr, VI	.25	.09
Pb	.80	.40
Cd	1.00	.50

(2) For plants discharging 38,000 1 (10,000 gal) per day or more of electroplating process waste water the following limitations shall apply:

Pollutant or pollutant property	Pretreatment standard (mg/l): Maximum for any 1 day	Pretreatment standard (mg/l): Average of daily values for 30 consecutive days shall not exceed—
CN, A	0.20	0.08
CN,T	.64	.24
Cr, VI	.25	.09
Cu	4.60	2.00
Ni	3.60	1.80
Cr, total	4.20	1.60
Zn	3.40	1.50
Pb	.80	.40
Cd	1.00	.50
Total metals	7.50	3.90

(3) For plants regulated under paragraph (b)(2) of this section, the following optional alternate limitation may be elected by the plant introducing treated process waste water into a POTW. In the absence of strong chelating agents and after neutralization using calcium oxide (or hydroxide) the following limitations shall apply:

Pollutant or pollutant property	Pretreatment standard (mg/l): Maximum for any 1 day	Pretreatment standard (mg/l): Average of daily values for 30 consecutive days shall not exceed—
CN, A	0.20	0.08
CN,T	.64	.24
Cr, VI	.25	.09
Pb	.80	.40
Cd	1.00	.50
TSS	15.00	10.00
pH	Within the range 7.5 to 10.0	

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