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Part II

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Effluent Limitations Guidelines, Pretreatment Standards, and New Source Performance Standards: Metal Products and Machinery; Proposed Rule

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Parts 433, 438 and 464

[FRL–5186–6]

RIN 2040–AB79

Effluent Limitations Guidelines, Pretreatment Standards, and New Source Performance Standards: Metal Products and Machinery

AGENCY: Environmental Protection Agency (EPA).

ACTION: Proposed rule.

SUMMARY: This proposed regulation establishes technology-based limits for the discharge of pollutants into waters of the United States and into publicly owned treatment works by existing and new facilities that manufacture, maintain or rebuild finished metal parts, products or machines.

This proposed regulation will reduce the discharge of toxic pollutants from Metal Products and Machinery (MP&M) facilities by almost a million pounds per year, thereby reducing violations of water quality standards (which were established to protect aquatic life and/or human health) in water bodies across the country. This proposed regulation will also reduce the metals content of municipal sludge, thereby allowing approximately 184 additional POTWs to land apply another 439,000 dry metric tons of sewage sludge rather than incinerating or landfilling the sludge.

As a result of consultations with numerous stakeholders, the preamble solicits comments and data not only on issues raised by EPA, but also on those raised by environmental groups, by state and local governments who will be implementing these regulations, and by industry representatives who will be affected by them. As indicated elsewhere throughout this proposal, the Agency welcomes comment on all options, issues, and proposed decisions and encourages commentors to submit additional data during the comment period (See Section XIX of this preamble). The Agency plans to have additional discussions with interested parties during the comment period to help ensure that the Agency has the views of such parties and the best possible data upon which to base decisions for the final rule. EPA's final rule may be based upon any technologies, rationale or approaches that are a logical outgrowth of this proposal, including any options discussed in this or subsequent documents.

DATES: Comments on the proposal must be received by August 28, 1995. In addition, EPA will conduct a workshop covering this rulemaking, in conjunction with a public hearing on the pretreatment standards portion of the rule. The public hearing and the workshop will be held on June 28, 1995. Persons wishing to present formal comments at the public hearing should have a written copy for submittal.

ADDRESSES: Submit comments in writing, and if possible on a 3.5 inch disk in Word Perfect 5.1 format to: Mr. Steven Geil, Engineering & Analysis Division (4303), U.S. EPA, 401 M Street, SW., Washington, DC 20460.

The public hearing and the workshop will be held starting at 9 a.m. at the Hall of States, room 333, 444 North Capital Street, Washington, DC 20001.

The public record for this rulemaking is available for review at the EPA's Water Docket; 401 M Street, SW., Washington, DC 20460; call between 9 a.m. and 3:30 p.m. Eastern Standard Time for an appointment. The EPA public information regulation (40 CFR part 2) provides that a reasonable fee may be charged for copying. For access to Docket materials, call (202) 260–3027.

FOR FURTHER INFORMATION CONTACT: For additional technical information, contact Mr. Steven Geil at (202) 260–9817. Additional economic information may be obtained by contacting Dr. Lynne G. Tudor at (202) 260–5834. Background documents supporting the proposed regulations are described in the ''Background Documents'' section below. Some of the documents are available from the Office of Water Resource Center, Mail Code RC–4100, US EPA, 401 M Street SW., Washington, DC 20460; telephone (202) 260–7786 for the voice mail publication request line.

SUPPLEMENTARY INFORMATION:

Overview

This preamble describes the scope, purpose, legal authority and background of this rule, the technical and economic bases, and the methodology used by the Agency to develop these effluent limitations guidelines and standards.

Abbreviations, acronyms, and other terms used in the Supplementary Information Section are defined in Appendix A to this notice.

Background Documents

The regulation proposed today is supported by the major documents listed below. (1) EPA's technical conclusions concerning the regulations are detailed in the ''Development Document for Proposed Effluent Limitations Guidelines and Standards for the Metal Products and Machinery Phase I Point Source Category,'' hereafter referred to as the Technical Development Document (EPA 821–R–95–021). (2) The Agency's economic and regulatory flexibility analyses are found in the ''Economic Impact of Proposed Effluent Limitations Guidelines and Standards For The Metal Products And Machinery Industry Phase I,'' hereafter referred to as the Economic Impact Analysis (EPA 821–5–95–022). (3) The industry profile is described in the ''Industry Profile Of The Metal Products And Machinery Industry Phase I,'' (EPA 821–R–95–024). (4) The regulatory impact analysis (including the Agency's assessment of environmental benefits) is detailed in the ''Regulatory Impact Assessment of Proposed Effluent Limitations Guidelines and Standards for the Metal Products and Machinery Industry Phase I,'' hereafter referred to as the Regulatory Impact Assessment (EPA 821–R–95–023). (5) An analysis of the incremental costs and pollutant removals is presented in ''Cost Effectiveness Analysis of Proposed Effluent Limitations Guidelines and Standards for the Metal Products and Machinery Phase I Point Source Category,'' (EPA 821–R–95–025). (6) The statistical support for today's proposal is found in reports on the information screener survey (called the Mini Data Collection Portfolio), the detailed questionnaire (call the Data Collection Portfolio), and the calculation of limits.

Outline: This preamble is organized according to the following outline:

I. Legal Authority

This regulation is being proposed under the authorities of sections 301, 304, 306, 307, 308, and 501 of the Clean Water Act, 33 U.S.C. Sections 1311, 1314, 1316, 1317, 1318, and 1361; and under authority of the Pollution Prevention Act of 1990 (PPA), 42 U.S.C. 13101 et seq., Pub. L. 101-508, November 5, 1990.

II. Background

A. Statutory Requirements of Regulation

The objective of the Clean Water Act (''Act'') is to ''restore and maintain the chemical, physical, and biological integrity of the Nation's waters,'' (section 101(a)). To assist in achieving this objective, EPA is to issue effluent limitations guidelines, pretreatment standards, and new source performance standards for industrial dischargers.

These guidelines and standards are summarized briefly below:

1. Best Practicable Control Technology Currently Available (BPT) (Section 304(b)(1) of the Act)

BPT effluent limitations guidelines are generally based on the average of the best existing performance by plants of various sizes, ages, and unit processes within the category or subcategory for control of pollutants.

In establishing BPT effluent limitations guidelines, EPA considers the total cost of achieving effluent reductions in relation to the effluent reduction benefits, the age of equipment and facilities involved, the processes employed, process changes required, engineering aspects of the control technologies, non-water quality environmental impacts (including energy requirements) and other factors as the EPA Administrator deems appropriate (section 304(b)(1)(B) of the Act). The Agency considers the category or subcategory-wide cost of applying the technology in relation to the effluent reduction benefits. Where existing performance is uniformly inadequate, BPT may be transferred from a different subcategory or category.

2. Best Available Technology Economically Achievable (BAT) (Section 304(b)(2) of the Act)

In general, BAT effluent limitations represent the best existing economically achievable performance of plants in the industrial subcategory or category. The Act establishes BAT as the principal national means of controlling the direct discharge of toxic pollutants and nonconventional pollutants to navigable waters. The factors considered in assessing BAT include the age of equipment and facilities involved, the process employed, potential process changes, and non-water quality environmental impacts (including energy requirements) (section 304(b)(2)(B)). The Agency retains considerable discretion in assigning the weight to be accorded these factors. As with BPT, where existing performance is uniformly inadequate, BAT may be transferred from a different subcategory or category. BAT may include process changes or internal controls, even when these technologies are not common industry practice.

3. Best Conventional Pollutant Control Technology (BCT) (Section 304(b)(4) of the Act)

The 1977 Amendments to the Act established BCT for discharges of conventional pollutants from existing industrial point sources. Section 304(a)(4) designated the following as conventional pollutants: Biochemical oxygen demanding pollutants (BOD), total suspended solids (TSS), fecal coliform, pH, and any additional pollutants defined by the Administrator as conventional. The Administrator designated oil and grease as an

additional conventional pollutant on July 30, 1979 (44 FR 44501).

BCT replaces BAT for the control of conventional pollutants for certain facilities. In addition to other factors specified in section 304(b)(4)(B), the Act requires that BCT limitations be established in light of a two part ''cost-reasonableness'' test. EPA's current methodology for the general development of BCT limitations was issued in 1986 (51 FR 24974; July 9, 1986).

4. New Source Performance Standards (NSPS) (Section 306 of the Act)

NSPS are based on the best available demonstrated treatment technology. New plants have the opportunity to install the best and most efficient production processes and waste water treatment technologies. As a result, NSPS should represent the most stringent numerical values attainable through the application of the best available control technology for all pollutants (i.e., conventional, nonconventional, and toxic pollutants). In establishing NSPS, EPA is directed to take into consideration the cost of achieving the effluent reduction and any non-water quality environmental impacts and energy requirements.

5. Pretreatment Standards for Existing Sources (PSES) (Section 307(b) of the Act)

PSES are designed to prevent the discharge of pollutants that pass through, interfere with, or are otherwise incompatible with the operation of publicly owned treatment works (POTWs). The Act requires pretreatment standards for pollutants that pass through POTWs or interfere with POTWs' treatment processes or sludge disposal methods. The Act requires industry to achieve PSES within three years of promulgation. Pretreatment standards are technology-based and analogous to the BAT effluent limitations guidelines. For the purpose of determining whether to promulgate national category-wide pretreatment standards, EPA generally determines that there is pass-through of a pollutant and thus a need for categorical standards if the nation-wide average percent removal of a pollutant removed by well-operated POTWs achieving secondary treatment is less than the percent removed by the BAT model treatment system.

The General Pretreatment Regulations, which set forth the framework for the implementation of categorical pretreatment standards, are found at 40 CFR Part 403. Those regulations contain a definition of pass-through that addresses localized rather than national instances of pass-through and does not use the percent removal comparison test described above. See 52 FR 1586 (January 14, 1987.)

6. Pretreatment Standards for New Sources (PSNS) (Section 307(b) of the Act)

Like PSES, PSNS are designed to prevent the discharges of pollutants that pass through, interfere with, or are otherwise incompatible with the operation of POTWs. PSNS are to be issued at the same time as NSPS. New indirect dischargers, like the new direct dischargers, have the opportunity to incorporate into their plants the best available demonstrated technologies. The Agency considers the same factors in promulgating PSNS as it considers in promulgating NSPS.

7. Best Management Practices (BMP)

The Agency is not proposing BMPs for MP&M. However, we are soliciting comment on whether BMPs could be promulgated in lieu of numeric limitations for low discharge volume sites. EPA has defined BMPs broadly (40 CFR 122.2) and is considering whether numeric limitations are infeasible for such sites because of the administrative burdens imposed on permitting authorities to develop, implement, and monitor necessary permits. BMP's could also cause pretreatment permitting to be more efficient and less costly for both control authorities and dischargers. The use of BMP's instead of flow monitoring associated with mass-based limits could result in greater efficiencies and cost savings for both control authorities and discharges. Properly implemented, BMP's could provide environmental protection equivalent to mass-based limits at a lower cost. Since some Control Authorities pass their costs along to industrial users in the form of service fees, cost savings to Control Authorities could be passed along to industrial users. BMPs could include any of the in-process pollution prevention or flow reduction technologies discussed in the MP&M public record and pollution prevention bibliography section of the Technical Development Document.

B. Litigation History

Section 304(m) of the Act (33 U.S.C. 1314(m)), added by the Water Quality Act of 1987, requires EPA to establish schedules for (i) reviewing and revising existing effluent limitations guidelines and standards (''effluent guidelines''), and (ii) promulgating new effluent guidelines. On January 2, 1990, EPA published an Effluent Guidelines Plan (55 FR 80), in which schedules were established for developing new and revised effluent guidelines for several industry categories. One of the industries for which the Agency established a schedule was the Machinery Manufacturing and Rebuilding Category (the name was changed to Metal Products and Machinery in 1992).

Natural Resources Defense Council, Inc. (NRDC) and Public Citizen, Inc. challenged the Effluent Guidelines Plan in a suit filed in U.S. District Court for the District of Columbia (*NRDC et al* v. *Reilly*, Civ. No. 89–2980). The plaintiffs charged that EPA's plan did not meet the requirements of section 304(m). A Consent Decree in this litigation was entered by the Court on January 31, 1992. The terms of the Consent Decree are reflected in the Effluent Guidelines Plan published on September 8, 1992 (57 FR 41000). This plan requires, among other things, that EPA propose effluent guidelines for the Metal Products and Machinery (MP&M) category by November, 1994 and take final action on these effluent guidelines by May, 1996. The most recent Effluent Guidelines Plan was published on August 26, 1994 (59 FR 44235). EPA filed a motion with the court on September 28, 1994, requesting an extension of time until March 31, 1995, for the EPA Administrator to sign the proposed regulation and a subsequent four month extension for signature of the final regulation in September 1996.

C. Pollution Prevention Act

The Pollution Prevention Act of 1990 (PPA) (42 U.S.C. 13101 et seq., Pub. L. 101–508, November 5, 1990) makes pollution prevention the national policy of the United States. The PPA identifies an environmental management hierarchy in which pollution ''should be prevented or reduced whenever feasible; pollution that cannot be prevented should be recycled in an environmentally safe manner, whenever feasible; pollution that cannot be prevented or recycled should be treated in an environmentally safe manner whenever feasible; and disposal or release into the environment should be employed only as a last resort * * *'' (42 U.S.C. 13103). In short, preventing pollution before it is created is preferable to trying to manage, treat or dispose of it after it is created. According to the PPA, source reduction reduces the generation and release of hazardous substances, pollutants, wastes, contaminants or residuals at the source, usually within a process. The term source reduction ''* * * includes equipment or technology modifications,

process or procedure modifications, reformulation or redesign of products, substitution of raw materials, and improvements in housekeeping, maintenance, training, or inventory control. The term 'source reduction' does not include any practice which alters the physical, chemical, or biological characteristics or the volume of a hazardous substance, pollutant, or contaminant through a process or activity which itself is not integral to or necessary for the production of a product or the providing of a service.'' In effect, source reduction means reducing the amount of a pollutant that enters a waste stream or that is otherwise released into the environment prior to out-of-process recycling, treatment, or disposal.

The PPA directs the Agency to, among other things, ''* * * review regulations of the Agency prior and subsequent to their proposal to determine their effect on source reduction'' (42 U.S.C. 13103). This directive led the Agency to implement a pilot project called the Source Reduction Review Project that would facilitate the integration of source reduction in the Agency's regulations, including the technology based effluent guidelines and standards. (see Section IV. B. for a more complete discussion of the Source Reduction Review Project.) The MP&M Phase I category effluent guideline was included in the Source Reduction Review Project.

D. Common Sense Initiative

On October 17, 1994, the Administrator established the Common Sense Initiative (CSI) Council in accordance with Federal Advisory Committee Act (U.S.C. App. 2, Section 9(c)) requirements. One of the goals of the CSI is to develop recommendations for optimal multi-media approaches to address environmental problems associated with six industrial sectors including Metal Plating and Finishing, Electronics and Computers, Auto Assembly, and Iron and Steel Manufacturing. The current Clean Water Act MP&M rulemaking studies, which were initiated in 1989, overlap to varying degrees these six CSI pilot industrial sectors.

The following are the six elements of the CSI program, as stated in the ''Advisory Committee Charter.''

1. *Regulation.* Review existing regulations for opportunities to get better environmental results at less cost. Improve new rules through increased coordination.

2. *Pollution Prevention.* Actively promote pollution prevention as the standard business practice and a central ethic of environmental protection.

3. *Recordkeeping and Reporting.* Make it easier to provide, use, and publicly disseminate relevant pollution and environmental information.

4. *Compliance and Enforcement.* Find innovative ways to assist companies that seek to comply and exceed legal requirements while consistently enforcing the law for those that do not achieve compliance.

5. *Permitting.* Improve permitting so that it works more efficiently, encourages innovation, and creates more opportunities for public participation.

6. *Environmental Technology.* Give Industry the incentives and flexibility to develop innovative technologies that meet and exceed environmental standards while cutting costs.

In addition, it is the intent of the Agency to work with the CSI's sector teams and further integrate their consensus recommendations applicable to the MP&M Phase I proposal as they are developed. Even though the MP&M Phase I data collection and analysis efforts were completed before the CSI program was announced, many aspects of the CSI objectives are reflected in the MP&M proposal. As part of the development of this proposal, EPA took advantage of several opportunities to gain the involvement of various stakeholders. For example, a public meeting was held in March of 1994 to present the technology options under consideration by the Agency. We have addressed industry trade associations, the Association of Metropolitan Sewerage Authorities, pretreatment coordinators from the Regions, States, and municipalities, and the Effluent Guidelines Task Force, and we have met with environmental interest group representatives. We have used comments and concerns raised at these meetings to frame solicitations for data and comment on aspects of this regulation ranging from pollution prevention to implementation issues. The MP&M Phase I proposal was based in part on pollution prevention for the largest dischargers, and the technical documents that support the proposal provide guidance on pollution prevention techniques applicable to this industry for use by all facilities. This proposal is performance-based and does not stipulate the use of specific control or treatment technologies. Industry retains the flexibility to develop or select innovative technologies that meet or exceed the performance-based standards proposed today. EPA considered cost effectiveness as part of the overall MP&M Phase I effluent guideline development process. The MP&M Phase II effluent guideline development process will further support the CSI.

E. Consultation (Executive Order 12875)

Executive Order 12875, ''Enhancing the Intergovernmental Partnership'' requires Federal Agencies to consider the impacts of unfunded mandates on state, local, or tribal governments. Agencies, such as the EPA, that can impose unfunded mandates on state, local, or tribal governments are required by Executive Order 12875 to ensure that the Federal government either allocates the funds necessary for compliance or involves the affected agencies in the regulatory development process. The proposed MP&M Phase I regulation establishes effluent limitations guidelines and pretreatment standards that will directly impact the state and local waste water permitting process. The primary impact of the proposed MP&M Phase I regulation on state and local regulatory agencies will be that an increased number of permits will have to be issued. The cost associated with writing additional permits for direct dischargers based on national guidelines may be partially offset by a decrease in the expenses associated with writing individual permits based on local conditions or best professional judgment (BPJ). In general, EPA believes that the cost of individual permits for direct dischargers may be reduced by the MP&M Phase I rule, because fewer resources are required to issue effluent-guideline-based permits than to issue BPJ-based permits.

The proposed MP&M Phase I effluent guidelines will be implemented as part of the National Pollutant Discharge Elimination System (NPDES) and pretreatment permitting processes. An estimated 1,895 direct and 8,706 indirect discharging facilities will require permits under the proposed MP&M Phase I regulation. Although existing effluent guidelines such as metal finishing (40 CFR 433) and electroplating (40 CFR 413) cover some of these facilities (approximately 2,000), EPA expects a substantial net increase in the number of permits state and local regulatory agencies are required to write. The economic impact on industry associated with the additional permits is not expected to adversely affect industries that dominate local economies in a manner that would significantly alter state or local government revenues.

The administrative burden created by the proposed MP&M Phase I effluent guidelines may be partially offset by anticipated savings in the costs associated with writing individual permits. Currently, many permits are written based on BPJ criteria. The development of such permits is often

contentious and can require a significant investment in resources. The proposed MP&M Phase I guidelines are expected to require fewer resources to develop permits than those based on BPJ, since MP&M Phase I includes specific effluent guidelines and pretreatment standards. EPA solicits comments on the administrative burden associated with permits based on BPJ, permits based on effluent guidelines, and the relationship between the two.

The MP&M Phase I regulatory development process was closely coordinated with the public, industry groups, and other interested parties. MP&M regulation development summaries were presented at technical symposia and two public outreach meetings. In addition, comments regarding several implementation issues are included in today's notice (See Section XIX). Based on public comments, concerns will be addressed and, if applicable, incorporated into the final MP&M regulation.

EPA plans to continue the data collection and public outreach programs for MP&M Phase I. Consultation with other governmental activities will also be initiated early in MP&M Phase II regulation development to allow continued, effective compliance with E.O. 12875 requirements.

F. Prior Regulation for Metals Industries

EPA has established effluent guidelines regulations for thirteen industries which may perform operations that are sometimes found in MP&M Phase I facilities. These effluent guidelines are:

- Electroplating (40 CFR Part 413);
- Iron & Steel Manufacturing (40 CFR Part 420);
- Nonferrous Metals Manufacturing (40 CFR Part 421);
- Ferroalloy Manufacturing (40 CFR Part 424);
- Metal Finishing (40 CFR Part 433);
- Battery Manufacturing (40 CFR Part 461);
- Metal Molding & Casting (40 CFR Part 464);
- Coil Coating (40 CFR Part 465);
- Porcelain Enameling (40 CFR Part 466);
- Aluminum Forming (40 CFR Part 467);
- Copper Forming (40 CFR Part 468);
- Electrical & Electronic Components (40 CFR Part 469); and
- Nonferrous Metals Forming & Metal Powders (40 CFR Part 471).

These existing effluent guidelines generally apply to the production of semi-finished products, while the MP&M Phase I category applies to finished metal parts, products, and machines. EPA recognizes that unit operations performed in industries covered by the existing effluent guidelines generate waste water similar to unit operations performed at MP&M Phase I sites. A discussion of how these guidelines are integrated with the regulations proposed today is continued in the following section.

G. Scope of Today's Proposed Rule

The MP&M Phase I category applies to industrial sites engaged in the manufacturing, maintaining or rebuilding of finished metal parts, products or machines. Today's proposed effluent guideline (MP&M Phase I) applies to process waste water discharges from sites performing manufacturing, rebuilding or maintenance on a metal part, product or machine to be used in one of the following industrial sectors:

- Aerospace;
- Aircraft;
- Electronic Equipment;
- Hardware;
- Mobile Industrial Equipment;
- Ordnance; and
- Stationary Industrial Equipment.

MP&M Phase II will be proposed and promulgated approximately three years after the MP&M Phase I schedule. EPA currently intends to cover the following eight industrial sectors in MP&M Phase II:

- Bus and Truck;
- Household Equipment;
- Instruments;
- Motor Vehicle;
- Office Machine;
- Precious and Nonprecious Metals;
- Railroad; and
- Ships and Boats.

EPA has identified these fifteen industrial sectors in the MP&M category; these sectors manufacture, maintain and rebuild products under more than 200 different SIC codes. In order to make the regulation more manageable, EPA has divided it into the two phases discussed above; lists of typical products manufactured within the two MP&M phases are included as appendices to the proposed regulation. Although EPA believes that it has clearly defined what the fifteen sectors are and how they have been divided into two phases for the purposes of regulation, EPA expects that some products will clearly fit within certain industry sectors while others will be more difficult to define. Some examples of how the proposed MP&M Phase I regulation would apply are provided below for clarification.

An example of a clear fit would be a site which manufactures aircraft engines. The site would be considered to be within the aircraft industrial sector of MP&M. Since aircraft is an MP&M Phase I industry, the aircraft engine manufacturer would be covered by MP&M Phase I.

Another example of a clear fit would be a site which manufactures school buses. The site would be considered to be within the bus and truck industrial sector of MP&M. Since bus and truck is an MP&M Phase II industry, the school bus manufacturer would be covered by MP&M Phase II.

An example of a site which produces products which would fall under more than one MP&M Phase I industry would be a site which manufacturers farm tractors and farm conveyors. The site would be considered to be within the mobile industrial equipment and the stationary industrial equipment sectors. Since both mobile industrial equipment and stationary industrial equipment are MP&M Phase I industries, the farm tractor and farm conveyor manufacturer would be covered by MP&M Phase I. Although MP&M Phase I covers seven industrial categories, the proposed rule is not subcategorized by industrial sector (See Section VI). Instead, all seven MP&M Phase I industries are grouped together under one MP&M Phase I category.

An example of a site that produces products within an MP&M Phase I industry and an MP&M Phase II industry would be a site which manufactures hand tools and household cooking equipment. The site would be considered to be within the hardware and household equipment sectors. Since hardware is an MP&M Phase I industry and household equipment is an MP&M Phase II industry, the site has operations in both MP&M phases. As discussed further below, EPA proposes to apply the MP&M Phase I rule to sites with operations in both MP&M Phase I and MP&M Phase II. As a result, all of the site's operations (including those performed to manufacture the cooking equipment) would be covered under MP&M Phase I. The coverage of sites that might be assigned to either Phase I or II is discussed further below.

An example of a site which manufactures products which could be difficult to assign to a specific MP&M industrial sector would be a car door handle manufacturing site. If a car door handle were considered a piece of hardware, then the site would fit under MP&M Phase I (hardware industrial sector). If, on the other hand, the door handle were considered a motor vehicle part, then the site would fit under MP&M Phase II (motor vehicle industrial sector). In cases where

products could be viewed under different industrial sectors, EPA proposes that the industrial sector(s) which most accurately matches the market into which the product is sold be assigned. In addition, if a metal part has a specific use in one of the fifteen MP&M industrial sectors, then the sector in which it is intended to be used is the industrial sector that should be assigned to that site. In this example, the car door handle has no other uses than operating the door of a car, and this site would be considered a motor vehicle site (MP&M Phase II).

Another example of a site which produces products which could be difficult to assign to a specific MP&M industrial sector would be a site which manufactures pistons for use in internal combustion engines, stationary generators, automotive engines, aircraft engines, truck engines, etc. Since the pistons are used in a wide variety of industrial applications and are not produced for use in a specific MP&M industry, the piston manufacture should be considered to be making a fabricated metal product and be covered under MP&M Phase I (hardware).

EPA is soliciting comment from any industrial site which has the potential to be covered by MP&M but is uncertain as to their appropriate industrial sector and phase (MP&M Phase I or MP&M Phase II) classification. These sites are requested to supply information about what operations they are performing, what products they are manufacturing, and to what industries they are selling their products.

As discussed above, some MP&M sites will have operations in both MP&M Phase I and Phase II industries. EPA proposes to apply the MP&M Phase I regulation to combined waste water discharges when a site is manufacturing, rebuilding or maintaining finished metal products in both Phase I and Phase II sectors.

For example, a site manufacturing aircraft components and discharging process waste water in the process is included in the aircraft sector and thus its waste water discharges would be regulated by MP&M Phase I effluent guidelines. Another site which manufactures components that are used in aircraft and ships and generates waste water in the process which is combined and discharged would also be regulated by the MP&M Phase I effluent guidelines for the combined discharge. This proposal should alleviate burdens on the permit writers and allow the site to achieve compliance more cost effectively, since they will have to comply with one set of limits.

EPA's data collection and analysis of MP&M sites included MP&M Phase I and Phase II overlap sites and processing of both Phase I and II parts at these sites. Many of these sites use the same equipment to manufacture, maintain, and rebuild goods for both Phase I and Phase II sectors, making it impossible to separate the two phases, and in many cases impossible to distinguish among the sectors, for these sites.

Typical MP&M unit operations include any one or more of the following: abrasive blasting, abrasive jet machining, acid treatment, adhesive bonding, alkaline treatment, anodizing, assembly, barrel finishing, brazing, burnishing, calibration, chemical conversion coating, chemical machining, corrosion preventive coating, disassembly, electrical discharge machining, electrochemical machining, electrolytic cleaning, electroplating, electron beam machining, electropolishing, floor cleaning, grinding, heat treating, hot-dip coating, impact deformation, laminating, laser beam machining, machining, metal spraying, painting, plating, plasma arc machining, polishing, pressure deformation, rinsing, salt bath descaling, soldering, solvent degreasing, sputtering, stripping, testing, thermal cutting, thermal infusion, ultrasonic machining, vacuum metalizing, welding and numerous sub-operations within those listed above. In addition to waste water that is generated from these operations, these operations also frequently have associated rinses and water-discharging air pollution control devices which are also included under the scope of today's proposed regulation.

Waste water from noncontact, nondestructive testing is also included under the scope of today's proposed regulation. A common source of ''testing'' waste water is photographic waste from nondestructive X-ray examination of parts.

Many MP&M sites will also have operations covered by one of the existing metal processing effluent guidelines listed above in Section II.D. In general, with the exception of the metal finishing regulations, the existing effluent guideline will continue to apply to those operations judged to be covered by it. MP&M will provide the basis for establishing permit limitations for the unit operations which at present are not covered, covered by the metal finishing effluent guidelines regulation, or covered by best professional judgment. EPA is proposing to require that the MP&M Phase I effluent guidelines regulation replace the metal finishing regulation for sites with operations in an MP&M Phase I industrial sector. Both MP&M and metal finishing apply to the same types of unit operations. EPA has included the metal finishing sites in its data collection and study of the MP&M industry and has estimated the costs and impacts on these sites to comply with the proposed MP&M regulation. EPA anticipates that today's proposed limitations will impose more stringent requirements on waste water discharges from MP&M/metal finishing sites without undue economic impacts (see Section XIV), and therefore is proposing that MP&M replace metal finishing regulations for sites satisfying the MP&M Phase I criteria. Today's proposal does not apply to surface finishing job shops and independent circuit board manufacturers as defined in this regulation; they will continue to be covered by 40 CFR Part 413 and 40 CFR Part 433.

''Surface finishing job shops'' defined in the proposed MP&M regulation are identical to ''job shops'' defined in the metal finishing category (40 CFR 433). Indirectly discharging job shops which were considered existing for the metal finishing category (existing prior to August 31, 1982) and independent printed circuit board manufacturers will continue to be covered by the electroplating category (40 CFR 413). Indirectly discharging jobs shops which were considered new sources for the metal finishing category and directly discharging job shops will continue to be covered by the metal finishing category.

III. Summary of Proposed Regulations

A. BPT

EPA is proposing to establish concentration-based BPT limitations which reflect the best practicable technology performance. EPA proposes to require permit writers to convert the concentration-based limitations into mass-based limitations based on MP&M flow guidance in the MP&M Phase I Technical Development Document. This document provides guidance to permit writers on identifying sites with pollution prevention and water conservation technologies equivalent to those listed above (e.g., electrodialysis, reverse osmosis). EPA recognizes that there are many different pollution prevention and water conservation technologies that may achieve the same performance as those listed above; therefore, the Agency has provided permit writers guidance on assessing these technologies.

EPA recommends that, for sites with pollution prevention and water

conservation technologies in place that are equivalent to those included as the basis for BPT, permit writers use historical flow as a basis for converting the concentration-based limitations to mass-based. For sites without these types of technologies in place, EPA recommends that permit writers do not use historical flow, but use other tools listed in the development document (e.g., measuring production through unit operations, measuring the concentration of total dissolved solids (TDS) in rinse waters) to convert the concentration-based limitations to mass-based. This approach encourages sites to implement good water use practices and investigate and install pollution prevention and water conservation technologies. By recommending use of historical flow only when sites have pollution prevention and water conservation technologies in place, EPA expects that permits based on BPT will reflect pollution prevention and water conservation technologies. If mass-based limitations have not been developed as required, the source shall achieve discharges not exceeding the concentration limitations listed in the regulation.

The technology basis for BPT is end-of-pipe treatment using chemical precipitation and sedimentation (commonly referred to as lime and settle technology), used in conjunction with flow reduction and pollution prevention technologies. EPA has also included the following as a basis for BPT limits: oil-water separation through chemical emulsion breaking and either skimming or coalescing; cyanide destruction through alkaline chlorination; chemical reduction of hexavalent chromium; chemical reduction of chelated metals; and contract hauling of organic solvent-bearing waste waters. The technology basis of BPT is to apply these preliminary treatment technologies when necessary based on waste water characteristics.

The following in-process pollution prevention and water conservation technologies were included as a basis for BPT:

—Flow reduction using flow restrictors, conductivity meters, and/or timed rinses, for all flowing rinses, plus countercurrent cascade rinsing for all flowing rinses;
—Flow reduction using bath maintenance for all other process water-discharging operations;
—Centrifugation and 100 percent recycling of painting water curtains;
—Centrifugation and pasteurization to extend the life of water-soluble machining coolants, reducing discharge volume by 80 percent; and
—In-process metals recovery with ion exchange followed by electrolytic recovery of the cation regenerants for selected electroplating rinses. This includes first stage drag-out rinsing with electrolytic metal recovery.

The discharge limitations included in today's proposal are based on the technology discussed above. However, it is important to note that these technologies are not mandated under effluent guidelines and pretreatment standards. Sites which would be covered by this proposed rule would be required to meet the discharge limitations but would not be required to use the technology basis discussed above.

B. BCT

EPA is proposing to establish BCT limitations equivalent to BPT limitations.

C. BAT

EPA is proposing to establish BAT limitations equivalent to BPT limitations.

D. NSPS

EPA is proposing to establish NSPS equivalent to BAT limitations.

E. PSES

EPA is proposing to establish PSES equivalent to BAT limitations. Facilities with an annual discharge volume less than 1,000,000 gallons are proposed to be exempt from PSES. For a site operating 250 days per year, 1,000,000 gallons per year translates into an average discharge flow rate of 4,000 gallons per day.

F. PSNS

EPA is proposing to establish PSNS equivalent to BAT.

IV. Overview of the Industry

A. Industry Description

As discussed above, the MP&M Phase I Category covers sites that generate waste water while manufacturing, maintaining or rebuilding finished metal parts, metal products, and machinery EPA within 7 industrial sectors. See the discussion under Section II.G. of this notice for the scope of today's proposed rule.

MP&M sites perform a wide variety of process unit operations on metal parts. For a given MP&M site, the specific unit operations performed and the sequence of operations depend on many factors, including the activity (i.e., manufacturing, rebuilding, or maintenance), industrial sector, and type of product processed. MP&M sites that repair, rebuild, or maintain products often perform preliminary operations that may not be performed at manufacturing facilities (e.g., disassembly, cleaning, or degreasing to remove dirt and oil accumulated during use of the product). Sites that manufacture products required to meet very strict performance specifications (e.g., aerospace or electronic components) often perform unit operations such as gold electroplating or magnetic flux testing that may not be performed when manufacturing other products.

EPA identified 47 unit operations as typical operations performed at MP&M Phase I sites. The following general types of unit operations are included in Phase I of the MP&M Category:

- Metal shaping operations;
- Surface preparation operations;
- Metal deposition operations;
- Organic deposition operations;
- Surface finishing operations; and
- Assembly operations.

Metal shaping operations (e.g., machining, grinding, impact and pressure deformation) are mechanical operations that alter the form of raw materials into intermediate and final product forms. Surface preparation operations (e.g., alkaline treatment, barrel finishing and etching) are chemical and mechanical operations that remove unwanted materials from or alter the chemical or physical properties of the surface prior to subsequent MP&M operations. Metal deposition operations (e.g., electroplating, metal spraying) apply a metal coating to the part surface by chemical or physical means. Organic deposition operations (e.g., painting, corrosion preventive coating) apply an organic material to the part by chemical or physical means. Metal and organic deposition operations may be performed for reasons such as protecting the surface from wear or corrosion, altering the electrical properties of the surface, or altering the appearance of the surface. Surface finishing operations (e.g., chromate conversion coating, anodizing, sealing) protect and seal the surface of the treated part from wear or corrosion by chemical means. Assembly operations (e.g., welding, soldering, testing, assembly) are performed to complete the manufacturing, rebuilding, or maintenance process.

Revenues at Phase I MP&M sites range from less than $10,000 to more than $50 million (in 1989 dollars) annually. Phase I MP&M sites range in size from less than 10 employees and waste water discharge flows of less than 100 gallons per year to sites with tens of thousands of employees and waste water discharge

flows exceeding 100 million gallons per year. Table 1 presents information on the waste water discharge flow ranges for Phase I MP&M sites based on responses to EPA's survey (See Section V.B. below).

TABLE 1.—ESTIMATED DISTRIBUTION OF SITES BY BASELINE RANGE OF FLOW

Flow range (gal/yr/site)	Estimated number of sites	Estimated total flow in range (millions of gal/year)	Estimated total load in range (millions of lbs/year)	Estimated percent of total sites	Estimated percent of total flow	Estimated percent of total load
0–10,000	3,216	4.6	3.5	30	<1	1
10,000–1,000,000	5,109	800	150	48	3	8
Greater than 1,000,000	2,276	22,000	1,500	22	97	91
Totals	10,601	23,000	1,600	100	100	100

Source: 1989 Data Collection Portfolio.

As shown in Table 1, sites discharging more than 1,000,000 gallons per year (approximately 22% of the total Phase I sites) account for approximately 97% of the total waste water discharge and 91% of the pollutant load from the industry. For a site operating 250 days per year, 1,000,000 gallons per year translates into an average discharge flow rate of 4,000 gallons per day. In contrast, sites discharging less than 10,000 gallons per year (approximately 30% of the total Phase I sites) account for less than one percent of the overall waste water discharge flow and approximately one percent of the pollutant load for the industry. For a site operating 250 days per year, 10,000 gallons per year translates into an average discharge flow rate of 40 gallons per day.

This regulation applies to process wastewater discharges from plants or portions of plants within the MP&M Phase I industries that manufacture, maintain, or rebuild finished metal parts, products or machines from any basis metal. A ''plant or portion of a plant'' is defined to include all activities or facilities located in a single building or on a contiguous parcel of property that are engaged in performing an MP&M-related industrial function. For instance, if an entity operates a chrome plating operation and, on a non-adjoining parcel of property and within the same fence line, operates a runway or vehicle maintenance shop, discharges resulting from these different activities would not be considered discharges from a single plant.

EPA seeks comments on how to define which parcels of property within the same fence line on a mixed use property are contiguous. For example, should properties be divided into a system of grids with all discharges from sites within a single sector considered contiguous? Should discharges from a single building be treated as a plant or portion of a plant for purposes of determining the volume of discharge subject to regulation? Another option would be for permit writers to make the determination case-by-case based on some degree of proximity between industrial operations and a practical application of the requirements for MP&M Phase I industries (with due consideration to the amount of MP&M Phase I wastestream and its concentration in the overall wastestream discharged to the treatment works), the degree to which functions are related, and such other factors as EPA considers relevant to the determination.

This definition is relevant in the determination of the amount of wastewater generated by a plant and the applicability of the provisions for small volume indirect dischargers. It is particularly important in the case of federal, state, and local government agencies or entities that perform highly varied function, more than one of which may be an MP&M Phase I or II activity located in separate areas of the same facility. For instance, one of the military services may operate an airfield, a metal plating facility, and a motor pool. While each of these facilities would be considered a plant, it would be illogical to consider the entire mixed use facility to be a single plant and to calculate its discharges collectively.

Unlike the typical industrial plant, such as an aircraft or electronic equipment manufacturing plant with one primary manufacturing activity, the majority of military installations are mixed use facilities and more like municipalities with several small industries as well as other operations within their boundaries; they support a unique and wide variety of functions and activities, including residential housing, schools, churches, recreational parks, shopping centers, industrial operations, training ranges, airports, gas stations, utility plants, police and fire departments, and hospitals. Installations also include a variety of tenant activities, including contractor and other Department of Defense federal agency activities. Finally, the geographic size of many military installations (for example, over 300 square miles at Fort Hood, TX and over 1.1 million acres at the China Lake Naval Air Warfare Center, CA) makes it difficult to treat them as a single plant. Treating military installations or other mixed use facilities as multiple plants or portions of plants allows them to take advantage of any less stringent requirements for small volume indirect dischargers without significantly increasing the threat to human health or the environment. EPA seeks information from other facilities that believe they would fall within this mixed use facility category.

B. Estimation of Number of MP&M Phase I Sites

Between 1986 and 1989, EPA conducted a preliminary study of the MP&M industry. For this study, EPA identified over 200 SIC codes pertaining to sites that would be included in the MP&M category (including Phase I and Phase II). Using information from Dun & Bradstreet, EPA estimated that there were 970,000 sites within these SIC codes, including 278,000 with more than nine employees. This estimate did not quantify the number of water-discharging MP&M sites. The basis for these estimates and a discussion of how EPA identified the SIC codes included in the MP&M category are presented in the *Preliminary Data Summary For The Machinery Manufacturing and Rebuilding Industry* (EPA 440/1–89/106, October 1989).

As discussed above, to make the regulatory process for such a large number of sites more manageable, EPA decided to divide the MP&M category into two segments and to develop effluent guidelines regulations in phases. This is also described in EPA's regulatory plan published on January 2, 1990 (55 FR 80). The industrial sectors

in each phase are listed in Section II.G. Based on the Dun & Bradstreet estimates, Phase I sectors included approximately 195,000 sites. EPA used the information collected from Dun & Bradstreet to conduct a screener survey of Phase I manufacturing, rebuilding, and maintenance sites and Phase II manufacturing sites. This survey is described in Section V.B. The results of this survey indicated that there were approximately 80,000 MP&M Phase I sites. The difference between the two estimates (195,000 sites versus 80,000 sites) was caused primarily by sites misclassified by Dun & Bradstreet and sites that had gone out of business. Approximately 20,000 of the MP&M Phase I sites were identified by the screener survey as water-discharging sites.

EPA used the data collected by the screener survey to conduct a detailed survey of water-discharging MP&M Phase I sites. This questionnaire is described in Section V.B. This survey requested detailed information on unit operations and water use practices. The results of this survey indicated that there were an estimated 10,601 MP&M Phase I water-discharging sites. The difference between the two estimates of water-discharging sites was primarily caused by sites that had misinterpreted questions on the screener survey.

C. Source Reduction Review Project

Section 6604 of the PPA directs the Administrator to set up an office for the purpose, among other things, of reviewing for the EPA Administrator the impact that Agency regulations would have on source reduction (See 42 U.S.C. 13103). This office is to ''consider'' the effect of Agency programs on source reduction efforts and to ''review'' EPA's regulations prior and subsequent to their proposal to determine their effect on source reduction.

The Source Reduction Review Project (SRRP) is a pilot program of the EPA to promote a source reduction approach in designing environmental regulations. The project's goal is to ensure that source reduction measures and implications of rules to other regulatory programs are fully considered during development of regulations. To the extent practicable and consistent with existing law, and considering cost-effectiveness as appropriate, the Agency will emphasize source reduction as the basis of its rules. Where source reduction cannot be implemented, the Agency will consider recycling, then treatment and if necessary disposal technologies and practices as the basis of its rules. Even in cases where EPA cannot base its rule on source reduction practices, the Agency may encourage the regulated community to consider using source reduction measures to comply with rules by providing information and economic incentives. To investigate opportunities for source reduction, EPA will consider source reduction in every phase of rule development: data collection, site visits, bench-scale technology testing, economic and technical analysis, multi-media impacts and agency and public reporting.

Since initial data collection for MP&M preceded the PPA, the Agency did not collect much information about source reduction in the industry survey. Since the survey, the Agency has considered and evaluated opportunities for source reduction. In addition, the Office of Water has coordinated this rule with efforts by the Office of Air and Radiation to develop regulations for halogenated solvents, chromium electroplating, and others.

The primary sources of waste waters generated by this industry are water-based lubricants used in the metal working (machining or deformation operations) or process solutions and rinses associated with surface treatment operations (cleaning, chemical etching or surface finishing). These waste waters afford considerable opportunities for pollution prevention and water conservation. As described in Section VII of this preamble, EPA has studied and observed a number of pollution-preventing and/or waste water conserving practices at a wide range of metal products and machinery facilities. This information is included in the Technical Development Document for MP&M Phase I. Because of the pollution prevention opportunities demonstrated by this industry, the Agency has included this rule in the SRRP. Some of the research on waste water treatment described in the next section focuses on waste water treatment that also allows for product recovery.

The SRRP designation for the MP&M effluent guidelines has prompted EPA to look more closely at what some of the likely outcomes would be of applying the identified candidate BAT technologies. The Agency has looked beyond the usual estimation of the cost expected to be incurred by the industry to comply with this rule and the pollutants expected to be removed from the waste water stream. EPA also has estimated the savings that might be realized due to the water conservation and product recovery practices that are part of the best available technology. For example, EPA estimated the savings in water cost through flow reduction, as well as the reduction in costs for end-of-pipe treatment associated with flow reduction. EPA also estimated the cost savings from recovery of metals through electrolytic recovery, and savings in virgin coolant from reduction of coolant discharge through centrifugation and pasteurization.

V. Data Gathering Efforts

A. Databases

In developing the MP&M effluent guidelines, EPA evaluated the following data sources:

- EPA/EAD databases from development of effluent guidelines for other metals industries;
- The Office of Research and Development (ORD) Risk Reduction Engineering Laboratory (RREL) treatability database;
- The Fate of Priority Pollutants in Publicly Owned Treatment Works (50 POTW Study) database;
- The Domestic Sewage Study; and
- The Toxics Release Inventory (TRI) database.

These data sources and their uses for the development of the MP&M Phase I effluent guidelines are discussed below.

EPA has promulgated effluent guidelines for 13 metals industries (See Section II.F. above). In developing these effluent guidelines, EPA collected waste water samples to characterize the unit operations and treatment systems at sites in these industries. Many of the sampled unit operations and treatment systems are operated at MP&M sites; therefore, EPA evaluated these data for transfer to the MP&M effluent guidelines development effort.

For the MP&M Phase I pollutant loading and waste water characterization efforts, EPA reviewed the data collected for unit operations performed at both MP&M sites and at sites in other metals industries. EPA reviewed the Technical Development Documents (TDDs), sampling episode reports (SERs), and supporting record materials for the other metals industries to identify available data. EPA transferred data for unit operations that met the following two criteria:

- The unit operation was performed at MP&M Phase I sites; and
- EPA had not collected data for the unit operation from MP&M sites.

EPA keypunched the data into a database, which was combined with the data collected from the MP&M sampling program.

For the MP&M technology effectiveness assessment effort, EPA reviewed data collected to characterize treatment systems sampled for the development of effluent guidelines for

other metals industries. For several previous effluent guidelines, EPA used treatment data from metals industries to develop the Combined Metals Data Base (CMDB), which served as the basis for developing limits for these industries. EPA also developed a separate database used as the basis for limits for the Metal Finishing category. EPA used the CMDB and Metal Finishing data as a guide in identifying well-designed and well-operated MP&M treatment systems. EPA did not use these data in developing the MP&M technology effectiveness concentrations, since sufficient data were collected from MP&M Phase I sites to develop technology effectiveness concentrations.

EPA's Office of Research and Development (ORD) developed the Risk Reduction Engineering Laboratory (RREL) treatability database to provide data on the removal and destruction of chemicals in various types of media, including water, soil, debris, sludge, and sediment. This database contains treatability data from publicly owned treatment works (POTWs) for various pollutants. This database includes physical and chemical data for each pollutant, the types of treatment used to treat the specific pollutants, the type of waste water treated, the size of the POTW, and the treatment concentrations achieved. EPA used this database to assess removal by POTWs of MP&M pollutants of concern.

In September, 1982, EPA published the *Fate of Priority Pollutants in Publicly Owned Treatment Works* (EPA 440/1–82/303), referred to as the 50 POTW Study. The purpose of this study was to generate, compile, and report data on the occurrence and fate of the 129 priority pollutants in 50 POTWs. The report presents all of the data collected, the results of preliminary evaluations of these data, and the results of calculations to determine:

- The quantity of priority pollutants in the influent to POTWs;
- The quantity of priority pollutants discharged from the POTWs;
- The quantity of priority pollutants in the effluent from intermediate process streams; and
- The quantity of priority pollutants in the POTW sludge streams.

EPA used the data from this study to assess removal by POTWs of MP&M pollutants of concern.

In February, 1986, EPA issued *The Report to Congress on the Discharge of Hazardous Wastes to Publicly Owned Treatment Works* (EPA 530-SW-86-004), referred to as the Domestic Sewage Study (DSS). This report, which was based in part on the 50 POTW Study, revealed a significant number of sites discharging pollutants to POTWs which are a threat to the treatment capability of the POTW. These pollutants were not regulated by national effluent regulations. Some of the major areas identified were in the metals industries areas, particularly an area called ''equipment manufacturing and assembly.'' This category included sites which manufacture such products as office machines, household appliances, scientific equipment, and industrial machine tools and equipment. The DSS estimated that the ''equipment manufacturing and assembly'' category discharges 7,715 metric tons per year of priority hazardous organic pollutants which are presently unregulated. Data on priority hazardous metals discharges were unavailable for this category. Further review of the DSS revealed other categories which were related to metals industries, namely the motor vehicle category, which includes servicing of new and used cars and engine and parts rebuilding; and the transportation services category, which includes railroad operations, truck service and repair, and aircraft servicing and repair. EPA used the information in the DSS in development of the Preliminary Data Summary (PDS) for the MP&M category.

The Toxics Release Inventory (TRI) database contains specific toxic chemical release and transfer information from manufacturing facilities throughout the United States. This database was established under the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA), which Congress passed to promote planning for chemical emergencies and to provide information to the public about the presence and release of toxic and hazardous chemicals. Each year, manufacturing facilities meeting certain activity thresholds must report the estimated releases and transfers of listed toxic chemicals to EPA and to the state or tribal entity in whose jurisdiction the facility is located. The TRI list includes more than 300 chemicals in 20 chemical categories.

EPA considered use of the TRI database for development of the MP&M effluent guidelines. However, EPA did not use TRI data on waste water discharges from MP&M sites because sufficient data were not available for effluent guidelines development. For example, in development of the MP&M effluent guidelines, production data were used that could be linked directly to pollutant loadings. This information was used to normalize pollutant loadings to production. The linked production and pollutant loadings data are not available in the TRI database. EPA also did not use the data on waste water discharges because many MP&M Phase I sites do not meet the reporting thresholds for the TRI database.

B. Survey Questionnaires

EPA surveyed the metal products and machinery industry through two survey instruments pursuant to Section 308 of the Act. The first survey was titled ''1989 Machinery Manufacturing and Rebuilding Mini Data Collection Portfolio'' (OMB No. 2040-0148) or MDCP. The MDCP was sent to a random sample of 8,342 MP&M facilities, stratified within sector by Standard Industrial Classification (SIC) code. Facilities were classified by SIC code strata based on Dun & Bradstreet data. The sample size determination for each strata was based on the use of a coefficient of variation (CV) minimization procedure. The basic goal of the CV procedure was to minimize the number of facilities needed for the survey, subject to the condition that the separate strata variances would not be too large. The CV minimization procedure is described in the ''Data Base Summary Report for the Metal Products and Machinery Mini Data Collection Portfolio.'' A name and address list of sites was purchased from Dun & Bradstreet. This list included more than twice the number of sites specified by the CV procedure (for a total of approximately 22,110 sites). Within each SIC code, Dun & Bradstreet randomly selected the requested number of sites from the Dun & Bradstreet data base.

EPA reviewed the Sites listed for each SIC code and deleted sites from the mailing list for the following three reasons: (1) Sites had SIC codes which were inconsistent with company names, (2) sites were corporate headquarters, or (3) sites had insufficient mailing addresses. After this review, EPA randomly selected sites to receive the MDCP.

The purpose of the MDCP was to characterize the industry, help in the selection of sites to receive a more detailed questionnaire, and to estimate the number of MP&M sites in the country. To characterize sites engaged in MP&M activities, the MDCP requested the following site-specific information:

- Name and address;
- Contact person;
- Parent company;
- Industrial sectors in which the site manufactures, rebuilds or maintains machines or metal components;
- SIC codes corresponding to products at the site;

- Number of employees;
- Annual revenues;
- Unit operations performed at the site;
- Process water use and waste water discharge for each unit operation performed at the site; and
- Base metals on which each unit operation is preformed.

EPA sent the MDCP to randomly selected MP&M Phase I sites engaged in manufacturing, rebuilding, or maintenance operations. The MDCP was also sent to selected MP&M Phase II manufacturing sites to characterize the interfaces between MP&M phases. The MDCP was not sent to sites with SIC codes indicating that the sites were engaged in MP&M Phase II rebuilding or maintenance operations.

The MDCP survey estimated that approximately 80,000 sites were engaged in Phase I sector activities. The majority of these sites were engaged only in Phase I sectors, since the majority of the MDCPs were sent to sites within Phase I sectors. The remainder of the sites were phase overlapped sites (engaged in industrial sectors in both Phase I and II) or Phase II only sites. Some of the smaller sites could have been misclassified as to their industrial sector based on the results of the MDCP, because the sites did not know their SIC code. Uncertainty as to SIC code is one of the reasons that EPA is not proposing to define the MP&M Phase I applicability in terms of SIC codes. Less than half of all engaged sites were estimated to be water users, and less than one-fourth were estimated to be water dischargers. Sites with operations in both Phase I and II (''overlap sites'') were more likely to use water than sites engaged only in Phase I activities (50% vs. 35%). This may be partly because overlap sites were on average larger with respect to number of employees and revenues than sites engaged in Phase I activities only. In general, larger sites were more likely to use water than smaller sites. Nonconfidential information from the MDCPs is included in the MP&M public record.

The second questionnaire, entitled ''1989 Machinery Manufacturing and Rebuilding Data Collection Portfolio (DCP)'' (OMB No. 2040–0148), was designed to collect detailed technical and financial information from water-using MP&M sites. Eight hundred ninety-six questionnaires were mailed in January 1991. Because a number of questionnaires were returned undelivered, an additional 124 questionnaires were mailed in January and February 1991, for a total of 1,020. EPA assumed that the undelivered DCP questionnaires represented sites that had gone out of business since the MDCP survey.

The DCP was divided into six parts:

- General information;
- Process information;
- Water supply;
- Waste water treatment and discharge;
- Process and hazardous wastes; and
- Financial and economic information.

The general information was requested to identify the site, to characterize the site by certain parameters (including number of employees, age, and location), and to confirm that the site was engaged in MP&M activities.

The process information requested included details on products, production levels, unit operations, activity, water use for unit operations, waste water discharge from unit operations, miscellaneous waste water sources, pollution prevention or water conservation practices, and air pollution control for unit operations.

The water supply section requested the site to specify the source of water, average intake flow, average intake operating hours, and the percentage of water used for MP&M operations.

EPA requested detailed information on the waste water treatment systems used and the discharge volumes (including residuals), including a block diagram of the waste water treatment system; self-sampling monitoring data; and capital and operating cost data (including treatment chemical usage).

The fifth section of the questionnaire requested detailed information on the types, amounts and composition of solid/hazardous wastes generated during production to evaluate the types and amounts of pollutants currently discharged, the amount of pollutants that are contract-hauled off-site, and the cost of hauling pollutants.

The sixth section requested information on the site's finances and corporate structure.

EPA selected sites to receive the DCP based on the responses obtained by the MDCP and other factors. Three population groups formed the basis of the survey of this industry.

1. Water-discharging Phase I and overlap MDCP sites;

2. Water-using Phase I and overlap MDCP sites that do not discharge process water; and

3. Key water-discharging MP&M Phase I and overlap sites that did not receive the MDCP (discussed further below).

EPA sent DCP's to all 860 Phase I and overlap water-discharging MDCP sites to characterize the potential variations in unit operations performed and water use practices among sites in the MP&M industry.

In addition, a random sample of 50 MDCP recipients that use but do not discharge process water was selected by EPA to receive the DCP in order to provide information on potential zero-discharge unit operations. EPA selected these sites to obtain information on water-use practices from sites that use but do not discharge process water, and to determine if ''zero-discharge'' practices employed at those sites may be used at other MP&M sites. An additional 24 MDCP recipients that use but do not discharge process water were selected by EPA. These sites were selected to provide information on specific unit operations expected at each site.

Eighty-six sites that did not receive the MDCP were selected by EPA to receive the DCP. These sites represent key MP&M companies that were not selected as DCP recipients based on the MDCP responses. EPA's intent in selecting these sites was to characterize leading companies in the MP&M category. The key companies were identified from the Dun & Bradstreet company listings, the Thomas Register, and MP&M site visits. These key companies reported annual revenues of $50 million or more or were recognized by the EPA to be leading companies in their particular sector. Each company was contacted to identify sites within the company that were engaged in MP&M activities and used process water to perform MP&M unit operations. The one or two sites believed to perform the most water-using MP&M unit operations from each key company were selected to receive the DCP. Non-confidential information contained in the DCPs are included in the public record.

C. Waste Water Sampling and Site Visits

EPA visited 98 MP&M sites between 1986 and 1993 to collect information about MP&M unit operations, water use practices, pollution prevention and treatment technologies and waste disposal methods, and to evaluate sites for potential inclusion in the MP&M sampling program. In general, EPA selected sites for visits to encompass the range of sectors, unit operations, in-process source reduction and recycling practices, and treatment operations within the MP&M industry. EPA's site visits encompassed sites in both Phase I and II but focused primarily on Phase I sites. EPA also performed site visits at military installations, government owned and operated sites, and government owned contractor operated sites. In addition, EPA visited four job shop electroplating sites that performed

in-process source reduction and recycling technologies.

EPA selected sites from information contained in the MDCPs and DCPs, and also through contacts with EPA regional personnel, state environmental agency personnel, local pretreatment coordinators, and pollution prevention and technical assistance providers. These personnel helped EPA identify MP&M sites believed to be operating in-process source reduction and recycling technologies or end-of-pipe waste water treatment technologies.

To ensure that EPA selected sites that encompassed the range of sectors and unit operations within the MP&M industry, the Agency used the following general criteria as part of the basis for selecting sites for visits:

1. The site performed MP&M unit operations in an industrial sector in which sites had not previously been visited.
2. The site performed MP&M unit operations that had not been observed during previous site visits.
3. The site had water use practices that were believed to be representative of the site's industrial sector.
4. The site operated in-process source reduction, recycling, or end-of-pipe treatment technologies considered in the development of the MP&M technology options.

EPA visited sites of various sizes, with waste water flows ranging from less than 200 gallons/day to more than 1,000,000 gallons/day.

EPA collected detailed information from the sites visited such as unit operations performed and the types of metals processed through these operations, purpose of the unit operation and any waste water associated with it, and in-process source reduction and water conservation practices as well as whether these source reduction practices caused any cross-media impacts. Also collected during the site visits were information on the end-of-pipe treatment technologies and, if the facility was a candidate for sampling, the logistics of collecting samples. All nonconfidential information collected during site visits are included in the public record.

The Agency conducted waste water sampling at 27 sites between 1986 and 1993. EPA sampled at least two sites in each of the seven MP&M Phase I sectors, as well as several sites in Phase II sectors. EPA also sampled waste water at one job shop electroplating site to characterize surface treatment operations and end-of-pipe treatment systems that were comparable to MP&M unit operation and treatment systems. EPA selected sites for sampling for reasons such as the following:

- The site performed MP&M unit operations that had not been sampled at other sites;
- The site processed metals through MP&M unit operations for which the metal/unit operation combination had not been sampled at other sites;
- The site performed in-process source reduction recycling, or end-of-pipe treatment technologies that were considered for technology option development; or
- The site performed unit operations in a sector in which samples had not previously been collected.

EPA sampled sites with waste water flows ranging from less than 200 gallons/day to greater than 600,000 gallons/day.

During sampling, EPA collected samples of both raw (untreated) waste water and treated waste water, frequently across individual unit treatment operations, to characterize the performance of the entire treatment system. In addition, EPA gathered flow data corresponding to each sample, and design and operating parameters for source reduction, recycling and treatment technologies. EPA also collected samples of unit operations to determine pollutant loadings at the unit operation level as well as flow and production data corresponding to each sample. All data collected during the sampling episodes are included in the sampling reports which are in the rulemaking record.

D. EPA Bench Scale Treatability Studies (Terpene Study)

Terpenes are a broad classification of 10, 15, 20 or 30 carbon-atom compounds and derivatives produced from citrus fruits, wood turpentine, and wood pulp byproducts. Increasingly, these compounds are being used in industrial cleaning formulations designed for printed circuit board defluxing and metal degreasing operations. The popularity of these terpene-based cleaners is based primarily on their ability to replace the usage of suspected ozone-depleting chemicals such as 1,1,1-trichloroethane and 1,1,2-trichloro-1,2,2-trifluoroethane (e.g., CFC-113).

In general, the use of terpene-based cleaners in these applications is considered environmentally preferable to chlorinated solvents. However, studies conducted by EPA's Office of Toxic Substances (OTS) indicate that substitution of chlorinated solvents with terpene-based cleaners will result in increased discharges of these chemicals to waste water from these industrial operations. The OTS studies also identified potential aquatic toxicity concerns associated with several specific terpene compounds. These concerns, combined with the fact that most industrial facilities engaged in printed circuit board defluxing and metal cleaning operations discharge their waste water into public sewers, created the need to better understand the fate of terpene compounds in a typical municipal waste water treatment system.

EPA's Risk Reduction Engineering Laboratory (RREL) conducted a study to quantify the fate of specific terpene compounds in the activated sludge waste water treatment process. The study was conducted using pilot-scale equipment at EPA's Test and Evaluation (T&E) Facility in Cincinnati, Ohio. The specific goal of the research was to establish the percentage of the terpene mass entering a typical activated sludge process that is (1) biodegraded, (2) partitioned to waste sludge, (3) volatilized to air, and/or (4) passed through the treatment process unchanged.

This study on the fate of specific terpene compounds in the activated sludge waste water treatment process produced the following conclusions:

- The primary fate of d-limonene and terpinolene in a typical municipal waste water treatment process (primary clarifier/activated sludge) is biodegradation followed by sorption onto primary clarifier solids and volatilization.
- The activated sludge process typically produces d-limonene and terpinolene effluent concentrations below 10 μg/L, corresponding to influent concentrations as high as 10,000 μg/L.

EPA's terpene study was conducted to determine the treatability of terpene in municipal waste water treatment systems. The results of the study indicate that the primary removal mechanism for the terpenes studied in the activated sludge process is biodegradation. EPA studied terpenes because they represent one broad class of compounds in use as replacements for ozone depleting chlorinated solvents. A wide variety of non-terpene compounds are also being used as solvent substitutes, but these compounds were not examined in this study.

VI. Industry Subcategorization

EPA is not proposing to subcategorize the MP&M Phase I category. EPA considered a number of potential subcategorization schemes as described below, but concluded that no basis exists for creating subcategories and the only way to establish a categorical regulation that could be implemented to ensure the most effective treatment and removal of waste water pollutants was

to not subcategorize this industrial category.

The subcategorization factors considered were based on subcategorization factors required by the Clean Water Act, as well as factors that have been used as a basis for subcategorization in other metals industry regulations. These factors include:

- unit operation;
- activity;
- raw materials;
- products;
- size of site;
- location;
- age;
- economic impacts;
- total energy requirements;
- air pollution control methods; and
- solid waste generation and disposal.

EPA considered subcategorizing the MP&M Phase I category by unit operation. EPA identified 47 unit operations, subsets of which are typically performed at MP&M sites. These unit operations can use differing amounts of water, generate different pollutant loadings, and can be performed in different combinations; however, the resulting waste waters exhibit general characteristics that allow the waste waters to be treated by the technologies on which this proposed rule is based (See Section IX.). Subcategorization by unit operation is technically feasible, but would result in approximately 47 subcategories with facilities operating under numerous subcategories. This would result in a very complex and unmanageable regulatory structure. The waste water characteristics for a given unit operation are expected to be similar across the other subcategorization factors listed above. As a result, EPA is not proposing to subcategorize by unit operation.

EPA also considered subcategorizing this industry by activity; i.e., manufacturing, rebuilding, and maintenance. Manufacturing is defined as the series of unit operations necessary to produce metal products, generally performed in a production environment. Rebuilding is defined as the series of unit operations necessary to disassemble used metal products into components, replace one or more components or subassemblies or restore them to original function, and reassemble the metal product. Rebuilding is generally performed in a production environment. Maintenance is defined as the series of unit operations, on original or replacement components, required to keep metal products in operating condition. Maintenance is generally performed in a non-production environment.

Based on the results of the DCP survey, the estimated percentages of water discharging Phase I sites performing each activity are listed below:

	Percent
Manufacturing only	71
Rebuilding only	1
Maintenance only	8
Manufacturing and rebuilding	13
Manufacturing and maintenance	2
Rebuilding and maintenance	2
Manufacturing, rebuilding & maintenance	3

With the exception of the initial cleaning steps for rebuilding and maintenance (discussed below), waste water characteristics do not vary across activity. Results of analyses of the DCP database indicate that the production-normalized flow (volume of waste water discharged per unit of production) for each unit operation does not depend on the activity. Additionally, for sites performing multiple activities, the same unit operations are often used for multiple activities (e.g., a machining process may be used to both manufacture and rebuild parts). Information collected during site visits at MP&M Phase I sites supports these conclusions.

The initial cleaning steps associated with rebuilding and maintenance may have unique waste water characteristics because of the presence of oil, grease, and grime not present in cleaning during manufacturing. These pollutants are present in waste waters generated by other operations at manufacturing, rebuilding, and maintenance sites (e.g., machining and grinding), and a technology used to remove these pollutants (oil-water separation) is included in the technology options considered for MP&M Phase I. Based on analytical data collected at rebuilding sites, the waste waters from initial cleaning require additional preliminary treatment capacity for oil-water separation, but do not impact the overall treatability of waste water from rebuilding sites. The impact of the oil and grime in the initial cleaning steps was accounted for in the development of compliance cost estimates and pollutant loading estimates. Because the initial cleaning steps do not impact waste water treatability, sites performing these cleaning steps can achieve the same effluent concentrations as sites that don't perform these steps.

Subcategorization by raw material may be appropriate when sites process similar types of raw materials, and these raw materials dictate a site's overall waste water characteristics. Raw materials at MP&M sites consist of base metals processed (e.g., bar stock, sheet stock, ingots, formed parts) and applied materials (e.g., paint, corrosion preventive coatings, metal applied during electroplating, electroless plating, and metal spraying).

Data from the DCP database and site visits indicate that the waste water discharge rates from unit operations are not dependent on the base metal processed or material applied. The base metal or material applied affects the site's waste water characteristics; however, EPA accounted for this in calculating technology effectiveness concentrations and pollutant loading estimates.

Based on the DCP results it is estimated that more than half of the MP&M Phase I sites process more than one type of base metal or metal applied. The estimated percentages of sites by the number of metal types processed are as follows:

	Percent
Zero metal types	<1
One metal type	43
Two metal types	32
Three metal types	15
Four metal types	4
Five or more metal types	6

The metal types processed at MP&M sites are diverse, and sites periodically change metal types. At sites processing multiple metal types, individual unit operations frequently process more than one metal type (e.g., a machining operation can process nickel, aluminum, and iron parts). Additionally, not all metal types processed at a site are processed through all unit operations. For example, a site may process aluminum and iron base metals. Anodizing is performed on the aluminum, and electroplating on the iron. Both metals share the same alkaline and acid treatments. Subcategorizing by base metal type would place the anodizing operation in the aluminum subcategory, the electroplating operation in the iron subcategory, and the alkaline and acid treatments in both subcategories. While this subcategorization scheme is possible, the Agency did not select this approach because the waste water discharge rates from unit operations are not dependent on metal type. Also, EPA considered the effect of metal type on waste water characteristics in calculating technology effectiveness concentrations and pollutant loadings.

EPA considered subcategorizing the MP&M category by industrial sector (e.g., aerospace, aircraft, electronic

equipment, hardware, mobile industrial equipment, ordnance, and stationary industrial equipment). However, waste water characteristics, unit operations, and raw materials used to produce products within a given sector are not always the same from site to site, and they are not always different from sector to sector. Within each sector, sites can perform a variety of unit operations on a variety of raw materials. For example, a site in the aerospace sector may primarily machine aluminum missile components and not perform any surface treatment other than alkaline cleaning. Another site in that sector may electroplate iron parts for missiles and perform little or no machining. Waste water characteristics from these sites may differ because of the different unit operations performed and different raw materials used.

Based on the analytical data collected for this rule, EPA has found no statistically significant difference in industrial waste water discharge among industrial sectors for cadmium, chromium, copper, cyanide, lead, nickel, oil & grease, silver, TSS and zinc. The analytical data are available in the public record for this rulemaking.

Most MP&M unit operations are not unique to a particular sector and are performed across all sectors. Major waste water-generating unit operations (e.g., alkaline treatment, acid treatment, machining, electroplating) are performed in all sectors. The unit operations that are rarely performed (e.g., abrasive jet machining) are not performed in all sectors, but are also not limited to a single sector. Based on the information obtained from engineering site visits and sampling episodes, these unit operations do not affect the overall treatability of waste waters generated at sites performing these unit operations. Therefore, the raw waste waters are expected to have similar treatability across the MP&M Phase I sectors.

EPA considered subcategorization of the MP&M Phase I category on the basis of site size. Three parameters were identified as relative measures of MP&M site size: number of employees, production, and waste water discharge flow rate.

Raw materials, unit operations, and waste water characteristics are independent of the number of site employees. A review of the DCP database shows that production-normalized flows do not depend on the number of employees. A correlation between the number of employees and waste water generation can be difficult to develop due to variations in staff. Fluctuations can occur for many reasons, including shift differences, clerical and administrative support, maintenance workers, efficiency of site operations, degree of automation, and market fluctuations. For these reasons, EPA did not subcategorize by number of employees.

EPA did not subcategorize by site production, since the production through an MP&M Phase I site does not reflect the production through process waste water-generating unit operations. For example, two sites may each process 100 tons of steel annually. One site may process all of the steel through an electroplating line, while the other may perform dry assembly for 95 tons, and process five tons through a machining operation. If production through the entire site were used for subcategorization, these two sites would be placed in the same subcategory while their waste water characteristics would be different.

EPA did not subcategorize by site waste water discharge flow rate because the waste water characteristics for a site are independent of the overall waste water discharge flow rate from a site. Waste water characteristics are primarily a function of the raw materials and unit operations at a site, and not the site's waste water discharge flow. For example, a site performing one machining operation on steel and discharging 100 gallons per year (gpy) of waste water would have similar waste water characteristics as a site with 1,000 machining operations on steel discharging 100,000 gpy, provided the sites have similar water use practices. A review of the DCP database shows that water use practices, as measured by production-normalized flow rates, do not depend on the overall waste water discharge flow rate from a site. The raw materials and unit operations also do not vary by site discharge flow rate.

For sites discharging to publicly owned treatment works (POTWs), EPA divided the MP&M Phase I population by waste water discharge rate to facilitate implementation (see Section III.E).

EPA also considered subcategorizing MP&M facilities on the basis of economic characteristics of these facilities. If a group of facilities with common economic characteristics, such as revenue size, was in a much better or worse financial condition than others, then it might be appropriate to subcategorize based on economics. However, analyses of the financial conditions of facilities showed no significant pattern of variation across possible subcategories.

While any group of facilities is likely to differ from any other group of facilities, the relevant issue is whether these differences were random differences due to the normal variation characteristic of all MP&M businesses, or whether these differences were systematically and predictably related to some shared economic characteristic. Linear regression and logistic regression were used to test for systematic variations in the financial condition and performance of subcategories of facilities grouped according to the following kinds of economic characteristics:

- Primary Line of Business: Facilities were assigned to MP&M sectors according to the sector in which they earned most of their revenues. The financial condition and performance of facilities across sectors did not vary in a statistically significant way.
- Customer Type: Responding facilities indicated the percentage of revenues they earned from three customer types, government, domestic non-government and foreign customers. When facilities were grouped according to their dependence on each of these customer types, statistical analyses found no significant differences in the financial condition or performance of the various groups.
- MP&M Activity: Responding facilities indicated the percentage of revenues they earned from each of three categories of activities (manufacturing, repairing and rebuilding). Facility financial performance and condition did not vary systematically with variations in dependence on the three categories of activities.
- Revenue Size: Facilities subcategorized by revenue size did not differ in financial condition or performance in a statistically significant way.

Appendix D of the Industry Profile of the Metal Products and Machinery Industry Phase I documents the methodology and findings in detail. This document is in the MP&M public record. Based on these analyses, EPA found no reasonable economic basis for subcategorizing MP&M facilities.

EPA is directed by the Clean Water Act to consider geographic location as a potential factor in subcategorizing an industrial category. The MP&M sites are generally located all over the country, however, almost two-thirds are located east of the Mississippi, with pockets of sites in Texas and California. EPA generally found that the sites located in California had installed more water conservation equipment and were generally more sensitive to water consumption concerns than the sites located in the rest of the country. EPA expects this is due to the nearly decade long drought suffered by California

during the 1980's, as well as local regulations that are often stricter than other areas of the country. However, EPA did not find this limited water conservation a sufficient basis for subcategorization.

Other factors that EPA is directed to consider by the Clean Water Act include total energy requirements, non-water quality considerations, and age of facilities. Energy requirements vary widely throughout the MP&M Phase I category; however, EPA did not subcategorize by this factor because the energy requirements are not directly related to waste water characteristics. Energy costs resulting from this regulation were accounted for in the economic impact assessment for this regulation. Non-water quality considerations include solid waste and air pollution generation. EPA did not subcategorize by these factors because solid waste and air pollution characteristics and generation rates depend on the raw materials processed and unit operations performed at MP&M sites, and are not directly related to waste water characteristics. The non-water quality impacts and costs of solid waste and air pollution control associated with this regulation were considered in the economic analysis and regulatory impact analysis for this regulation.

EPA did not subcategorize by age of facility because site age does not account for differences in raw waste water characteristics. The percentage of sites by the decade in which they were built is listed below. This information is based on the DCP respondents that reported the date in which their facility was built:

	Percent
Before 1920	4
1920 through 1929	3
1930 through 1939	2
1940 through 1949	8
1950 through 1959	8
1960 through 1969	13
1970 through 1979	40
1980 through 1989	21
1990*	1

* The DCP was mailed on January 2, 1991.

The majority of the sites have been built since 1960. The DCP respondents reported a wide range of ages; however, based on information in the DCPs and from site visits, MP&M Phase I sites continually modernize to remain competitive. For example, several sites visited that were built before 1960 had recently installed either new electroplating lines with in-process pollution control technologies or in-process pollution control technologies on existing electroplating lines. Another site which was initially built before 1940 had recently installed a new heat treating process. This type of modernization is typical in the MP&M Phase I industry. Modernization of production processes and pollution control equipment produces similar wastes among all sites of various ages that are performing similar types of operations; therefore, site age does not account for differences in the raw waste water characteristics and was not selected as a basis for subcategorization.

VII. Water Use and Waste Water Characteristics

A. Waste Water Sources and Characteristics

The unit operations included in the MP&M category can be classified by water use practices into those that typically use process water and discharge process waste water, unit operations that typically either do not use process water or use process water but do not discharge waste water, and miscellaneous operations reported in DCP responses by fewer than five MP&M sites.

Process waste water includes any water that, during manufacturing or processing, comes into direct contact with or results from the production or use of any raw materials, intermediate products, finished products, by-products, or waste products. Process waste water includes waste water from wet air pollution control devices. Non-contact cooling water is not considered a process waste water. Non-aqueous wastes used as processing liquids, such as spent solvents or quench oil, are also not considered process waste waters.

As discussed below, waste waters from the operations that use process water have different characteristics depending on the unit operation from which they are derived. First, oil-bearing waste waters are typically metal shaping coolants and lubricants, surface preparation solutions used to remove oil and dirt from components, and associated rinses. Some examples of oil-bearing waste waters are: machining and grinding coolants and lubricants; pressure and impact deformation lubricants; dye penetrant and magnetic flux testing; and alkaline cleaning solutions and rinses used to remove oil and dirt. These waste waters typically require preliminary treatment to remove oil. Chemical emulsion breaking followed by oil skimming is typically used for this treatment. Membrane separation technologies are also used for oil removal.

Second, hexavalent chromium-bearing waste water typically consists of concentrated surface preparation or metal deposition solutions, sealants, and associated rinses. Some examples of hexavalent chromium-bearing waste waters are: chromic acid treatment solutions and rinses; chromate conversion coating solutions and rinses; and chromium electroplating solutions and rinses. These waste waters typically require preliminary treatment to reduce the hexavalent chromium to trivalent chromium for subsequent chemical precipitation and settling. Sodium metabisulfite is typically used for this reduction.

Third, process waste waters that contain cyanide are typically generated by surface preparation or metal deposition solutions and their associated rinses. Two examples of cyanide-bearing waste waters are: cyanide-bearing alkaline treatment solutions and rinses (typically used as a surface treatment step prior to electroplating with cyanide solutions) and cyanide-bearing electroplating solutions and rinses. These waste waters typically require preliminary treatment to destroy cyanide and facilitate subsequent chemical precipitation and settling. Sodium hypochlorite is typically used for this treatment.

Fourth, process waste waters that contain complexed metals are typically concentrated surface preparation or metal deposition solutions and their associated rinses. Complexed metal-bearing waste waters are usually generated at MP&M sites by electroless plating operations and their rinses. These waste waters require preliminary treatment to break the complexes for subsequent chemical precipitation and settling.

Finally, virtually all of the MP&M process waste waters contain some metallic pollutants. The most concentrated metal bearing waste waters include metal shaping solutions, surface preparation solutions, metal deposition solutions, and surface finishing solutions. Chemical precipitation (usually with either lime or sodium hydroxide) and settling is typically used for metals removal. Coagulants and flocculants may be added to assist chemical precipitation and settling.

B. Pollution Prevention, Recycle, Reuse and Water Conservation Practices

The data gathered to support this rule indicate that a number of pollution prevention and water conservation practices exist in the MP&M industries. Some of these pollution prevention, recycling, and water conservation practices were determined to be broadly applicable to the MP&M category, and

these were included in the technology options (see Section III.A.).

A large number of additional pollution prevention practices were site specific and could not be used as the basis for a national standard. However, EPA considers it important to make this site specific pollution prevention information available for possible use by MP&M sites. Therefore, the Technical Development Document contains a bibliography of the pollution prevention practices identified during the development of this rule. EPA's proposed flow guidance also discusses the applicability of the more prevalent pollution practices identified in this category.

VIII. Approach for Estimating Costs and Pollution Reductions Achieved by Waste Water Control Technology

EPA estimated industry-wide compliance costs and pollutant loadings using model sites based on DCP respondents and a computerized design and cost model for the MP&M technology options. Industry-wide costs and pollutant loadings were estimated for three technology options based on technologies designed for 396 model sites. Statistically calculated weights were used to scale those results to the estimated 10,601 MP&M Phase I sites nationwide which are expected to incur costs under the regulation.

The 396 model sites were a subset of the 860 sites which indicated that they were water dischargers on their MDCP survey response. Six hundred seventy five of these sites returned the subsequent DCP and their responses were entered into the DCP database. Of these 675 sites in the DCP database, 396 were chosen to be model sites for the following reasons:

- The site generated revenue from a Phase I sector, as determined from the economic section of the DCP (for some sites, an economic sector was not identified; therefore, the sector identified in the technical section of the DCP was used); and
- The site supplied sufficient economic and technical data to estimate compliance costs and pollutant loadings of the MP&M technology options.

Each of the 396 sites selected was assessed to determine the unit operations, waste water characteristics and treatment technologies currently in place at the sites.

Based on the information provided by the sites in their DCP responses, follow-up letters, and phone calls, each waste water stream was classified by the type of unit operation (e.g., machining, electroplating, acid treatment, etc.) and base metal type (e.g., steel, aluminum, zinc, etc.). The following additional DCP data were used to characterize process waste water streams: waste water discharge flow rate, production rate, operating schedule, and discharge destination. Many of the 396 sites provided these data for all waste water streams generated on site. For sites that did not provide complete data, the missing data were either estimated based on technical considerations specific to the site, or were statistically imputed. The concentration of each pollutant in each waste water stream was modelled from field sampling of waste water discharges from the unit operation/metal type combinations at other MP&M sites. DCP responses were used to identify the following information about end-of-pipe technologies in place at MP&M sites: the types of treatment units in place; the unit operations discharging process waste water to each treatment unit; and the operating schedule of each treatment unit.

A computerized design and cost model was developed to estimate compliance costs and pollutant loadings for the MP&M technology options, taking into account each site's level of treatment in place. The model was programmed with technology-specific modules which calculated the costs for various combinations of technologies as required by the technology options and the model site waste water stream characteristics. Design and cost data were based on MP&M site data, literature data, and vendor data.

Technology-specific cost modules were developed for the in-process pollution prevention and water use reduction technologies and end-of-pipe treatment technologies discussed in Section IX below. The model provided the following types of information for each technology designed for a model site:

- Capital costs;
- Operating and maintenance costs;
- Electricity used and associated cost;
- Sludge generation and associated disposal costs;
- Waste oil generation and associated disposal costs;
- Water use reduction and associated cost credit;
- Metal reclaimed and associated cost credit;
- Chemical usage reduction and associated cost credit;
- Effluent flow rate; and
- Effluent pollutant concentrations.

If contract hauling of waste water for off-site treatment and disposal was less costly than on-site treatment, EPA estimated costs assuming the model site would contract haul the waste water. EPA made this assessment on a technology-specific basis.

After estimation of capital and operating and maintenance costs, the total capital investment (TCI), total annualized cost (TAC), and monitoring costs were calculated. Sites that reported being regulated by categorical limitations and standards were assumed to currently incur some monitoring cost.

IX. Best Practicable Control Technology Currently Available

A. Need for BPT Regulation

The MP&M Phase I regulation is estimated to potentially apply to 10,601 facilities nationwide. Although there are a number of metal processing categorical effluent guidelines that also apply to some operations performed at MP&M sites, these other effluent guidelines only affect approximately 2,000 MP&M Phase I sites. Thus, a large number of MP&M Phase I facilities do not have any effluent limitations guidelines. EPA estimates that 1,895 MP&M sites that are direct dischargers currently discharge substantial quantities of pollutants into the surface waters of the United States, including 18 million pounds per year of oil and grease, 2.6 million pounds per year of total suspended solids, 0.56 million pounds per year of priority pollutants, and 0.6 million pounds per year of nonconventional metal pollutants. EPA estimates that the proposed BPT limitations will reduce these quantities to 150,000 pounds per year of oil and grease, 360,000 pounds per year of total suspended solids, 40,000 pounds per year of priority metal pollutants, and 130,000 pounds per year of nonconventional metal pollutants.

B. BPT Technology Options and Selection

EPA considered three regulatory options on which to base BPT limitations.

1. *Option 1: Lime and Settle Treatment.* Option 1 consists of preliminary treatment for specific pollutants and end-of-pipe treatment with chemical precipitation (usually accomplished by raising the pH with an alkaline chemical such as lime or caustic to produce insoluble metal hydroxides) followed by clarification. This treatment, which is also commonly referred to as lime and settle treatment, has been widely used throughout the metals industry and is well documented to be effective for removing metal pollutants. As with a number of previously promulgated regulations, EPA has established BPT on the basis

that all process waste waters, except solvent bearing waste waters, will be treated through lime and settle end-of-pipe treatment.

All of the regulatory options considered for the MP&M category are based on a commingled treatment of process waste waters through lime and settle with preliminary treatment when needed for specific waste streams. Preliminary treatment is performed to remove oil and grease through emulsion breaking and oil skimming; to destroy cyanide using sodium hypochlorite; to reduce hexavalent chromium to the trivalent form of chromium which can subsequently be precipitated as chromium hydroxide; or to break metal complexes by chemical reduction. EPA has also included the contract hauling of any waste waters associated with organic solvent degreasing as part of the Option 1 technology.

Through sampling episodes and site visits, EPA has determined that some waste waters, usually alkaline cleaning waste waters and water-based metal working fluids (e.g., machining and grinding coolants, deformation lubricants), may contain significant amounts of oil and grease. These waste waters require preliminary treatment to remove oil and grease and organic pollutants. Chemical emulsion breaking followed by either skimming or coalescing is an effective technology for removing these pollutants.

EPA has identified MP&M waste waters that may contain significant amounts of cyanide, such as plating and cleaning waste waters. These waste waters require preliminary treatment to destroy the cyanide. This is typically performed using alkaline chlorination with sodium hypochlorite or chlorine gas. EPA has also identified hexavalent chromium-bearing waste waters, usually generated by anodizing, conversion coating, acid treatment, and electroplating operations and rinses. These waste waters require chemical reduction of the hexavalent chromium to trivalent chromium. Sodium metabisulfite or gaseous sulphur dioxide are typically used as reducing agents. Several surface treatment waste waters typically contain significant amounts of chelated metals. These chelated metals require chemical reduction to break down the chelated metals prior to lime and settle. Sodium borohydride, hydrazine, and sodium hydrosulfite can be used as reducing agents. These preliminary treatment technologies are more effective and less costly on segregated waste waters, prior to adding waste waters that do not contain the pollutants being treated with the preliminary treatment technologies. Thus, EPA includes these preliminary treatment steps whenever it refers to lime and settle treatment.

2. *Option 2: In-process Flow Control, Pollution Prevention, and Lime and Settle Treatment.* Option 2 builds on Option 1 by adding in-process pollution prevention, recycling, and water conservation methods which allow for recovery and reuse of materials. Techniques or technologies, such as centrifugation or skimming for metal working fluids, or ion exchange for electroplating rinses, can save money for companies by allowing materials to be used over a longer period before they need to be disposed. These techniques and technologies also can be used to recover metal or metal treatment solutions. Using these techniques along with water conservation also leads to the generation of less pollution and results in more effective treatment of the waste water that is generated. As has been demonstrated by numerous industrial treatment systems, the treatment of metal bearing waste waters is relatively independent of influent concentration. For example, the well-operated lime and settle treatment system can achieve the same effluent concentration with an influent stream of 1,000 gallons per minute (gpm) and 10 parts per million (ppm) as it can achieve with an influent stream which is 500 gpm and 20 ppm. In fact, within a broad range of influent concentrations, the more highly concentrated waste water influent, when treated down to the technology effectiveness concentrations of a lime and settle treatment system, results in better pollutant removals and less mass of pollutant in the discharge. In addition, the cost of a treatment system is largely dependent on the size, which in turn is largely dependent on flow. As a result, the lower the flow of water to the treatment system the less costly the system. Option 2 in-process technologies include:

- Flow reduction using flow restrictors, conductivity meters, and/or timed rinses, for all flowing rinses, plus countercurrent cascade rinsing for all flowing rinses;
- Flow reduction using bath maintenance for all other process water-discharging operations;
- Centrifugation and 100 percent recycling of painting water curtains;
- Centrifugation and pasteurization to extend the life of water-soluble machining coolants reducing discharge volume by 80%; and
- In-process metals recovery using ion exchange followed by electrolytic recovery of the cation regenerant for selected electroplating rinses. This includes first-stage drag-out rinsing with electrolytic metal recovery.

The flow reduction practices included in Option 2 are widely used by MP&M sites and are also included as part of the regulatory basis for a number of effluent guidelines regulations in the metals industry.

3. *Option 3: Advanced End-of-Pipe Treatment.* Option 3 includes all of the Option 2 technologies plus advanced end-of-pipe treatment. Advanced end-of-pipe treatment could be either reverse osmosis or ion exchange to remove suspended and dissolved solids yielding a treated waste water that can be partially recycled as process water. This technology is not widely used but has been demonstrated by some MP&M sites, particularly in instances where the water supply is contaminated and requires clean-up before it can be used. For the purposes of modelling the cost of compliance and resulting pollutant removals, Option 3 technology is expected to achieve a sufficiently clean treated waste water such that 90 percent of the treated waste water can be recycled back to the facility to be reused in the processing area.

Selected Option. EPA proposes to establish BPT effluent limitations guidelines based on Option 2 technologies. Lime and settle treatment used in conjunction with flow reduction and pollution prevention technologies represents the best technology widely practiced by MP&M sites. EPA proposes to require permit writers to convert the concentration-based effluent limitations guidelines into mass-based permit limitations based on MP&M flow guidance from the Technical Development Document. This document provides guidance to permit writers on identifying sites with pollution prevention and water conservation technologies equivalent to those included in Option 2 (e.g., electrodialysis, reverse osmosis). EPA recognizes that there are many different pollution prevention and water conservation technologies that may achieve the same performance as those included in Option 2; therefore, the Agency has provided permit writers guidance on assessing these technologies.

EPA recommends that, for sites with pollution prevention and water conservation technologies in place that are equivalent to those included as the basis for BPT, permit writers use historical flow as a basis for converting the concentration-based limitations to mass-based. For sites without these types of technologies in place, EPA recommends that permit writers do not use historical flow, but use other tools listed in the Technical Development Document (e.g., measuring production

through unit operations, measuring the concentration of total dissolved solids (TDS) in rinse waters) to convert the concentration-based limitations to mass-based. This approach encourages sites to implement good water use practices and investigate and install pollution prevention and water conservation technologies. By recommending use of historical flow only when sites have pollution prevention and water conservation technologies in place, EPA expects that permits based on BPT will reflect pollution prevention and water conservation technologies. If mass-based limitations have not been developed as required, the source shall achieve discharges not exceeding the concentration limitations listed in the regulation.

EPA did not select Option 1 as it does not reflect the average of the best technology performance in the industry. EPA did not select Option 3 technology as the basis for BPT because the costs do not justify the removals achieved.

C. Calculation of BPT Limitations

EPA visited 98 sites and sampled waste waters from 27 MP&M Phase I sites. In addition to sampling to characterize the process waste waters, EPA sampled 23 lime and settle treatment systems. EPA reviewed the treatment data gathered and identified data considered appropriate for calculating BPT limitations for the MP&M Phase I industry. EPA identified data from well-designed and well-operated treatment systems and focused on data for specific pollutants processed and treated on site. The data editing procedures used for this assessment consisted of four major steps:

1. Assessment of the performance of the entire treatment system;
2. Identification of process upsets during sampling that impacted the treatment effectiveness of the system;
3. Identification of pollutants not present in the raw waste water at sufficient concentrations to evaluate treatment effectiveness; and
4. Identification of treatment chemicals used in the treatment system.

The evaluation criteria used for each of these steps are described below. Data that failed one or more of the evaluation criteria were excluded from calculation of the BPT limitations.

1. *Assessment of Treatment System Performance.* EPA assessed the performance of the entire treatment system during sampling. Data for systems identified as not being well-designed or well-operated were excluded from use in calculating BPT limitations. EPA first identified the metals processed on site, as well as if the site performed unit operations likely to generate oil and grease and cyanide. EPA focused on these pollutants because the treatment trains used as a basis for the limitations are designed to treat and remove these pollutants. EPA then performed the following technical analyses of the treatment systems:

—Based on the pollutants processed or treated on site, EPA excluded data from systems that were not operated at the proper pH for removal of the pollutants.
—EPA excluded data from lime and settle systems that did not have solids removal indicative of effective treatment. In general, EPA identified as having poor solids removal systems that did not achieve 90% removal of total suspended solids (TSS) and had effluent TSS concentrations greater than 50 milligrams per liter. Site-specific exceptions were made to this rule depending on influent concentrations of TSS.
—EPA excluded data from lime and settle systems at which the concentration of most of the metals present in the influent stream did not decrease, indicating poor treatment.

2. *Identification of Process Upsets Occurring During Sampling.* EPA reviewed the sampling episode reports for each of the sampled sites, and identified any process upsets that resulted in poor treatment during one or more days of the sampling episode. EPA excluded the data affected by the process upsets.

3. *Identification of Pollutants Not Present in the Raw Waste water at Sufficient Concentrations to Evaluate Removal.* EPA excluded data for pollutants that were not detected in the treatment influent streams at a site, or were detected at concentrations less than 0.1 milligram per liter. EPA also excluded data for pollutants that were not processed on site. EPA reviewed the water use practices for the sampled sites and excluded data from sites that may have been diluting the raw waste water and reducing the concentration of pollutants processed on site. Because the MP&M Phase I effluent guidelines include water conservation practices and pollution prevention technologies, EPA reviewed the data to ensure that the BPT limitations were based on sites that had these practices and technologies in place.

4. *Identification of Waste water Treatment Chemicals.* EPA identified treatment chemicals used in each of the sampled treatment systems to determine if the removal of the metals used as treatment chemicals were consistent with removal of other metals on site, indicating a well-designed and well-operated system. If a metal was used as a treatment chemical, and the site treated the metal to a concentration consistent with other metals removed on site, the metal was included in calculation of the BPT limitations. If the metal was used as a treatment chemical and was not removed to a concentration consistent with other metals removed on site, the treatment chemical was excluded from calculation of the limitations. The data remaining after these data editing procedures were used to calculate the BPT limitations.

A detailed description of the statistical methodology used for the calculation of limitations is described in the Technical Development Document. A summary of the methodology follows.

The calculation of the BPT daily maximum limitations for pollutants was performed by the following steps. The arithmetic long-term mean concentration was calculated for each facility representing BPT treatment technology, and the median of the means was determined. A modified delta-lognormal distribution was fit to daily concentration data from each facility that had enough detected concentration values for parameter estimation. This is the same distributional model used by EPA in the final rulemakings for the Organic Chemicals, Plastics and Synthetic Fibers (OCPSF) and Pesticides Manufacturing categories and the proposed rulemaking for the Pulp and Paper category. Variability factors were then computed for each facility distribution, and the average variability factor was determined. Finally, the daily maximum limitation was calculated by multiplying the median long-term mean by the average variability factor. The monthly maximum limitation was calculated similarly except that the variability factor corresponding to the 95th percentile of the distribution of monthly averages was used instead of the 99th percentile of daily concentration measurements.

The daily variability factor is a statistical entity defined as the ratio of the estimated 99th percentile of the distribution of daily values divided by the expected value, or mean, of the distribution. Similarly, the monthly variability factor is defined as the estimated 95th percentile of the distribution of four-day averages divided by the expected value of the monthly averages.

The modified delta-lognormal distribution models the data as a mixture of non-detect observations and measured values. This distribution was selected because the data for most analytes consisted of a mixture of measured values and non-detects. The modified delta-lognormal distribution assumes that all non-detects have a

value equal to the detection limit and that the detected values follow a lognormal distribution.

Table 2 presents the proposed daily and monthly limitations. In Table 2, the term ''T'', as in ''cyanide(T)'', shall mean total. The values calculated by the above procedures were rounded off to the next highest tenths place for metals, to the next highest hundredths place for cyanide, and to the next highest unit place for TSS and oil and grease.

EPA identified 24 metal types processed at MP&M Phase I sites. Because EPA did not have sufficient data to set limits for all of these metal types, EPA is regulating aluminum and iron as indicator metals for removal of non-regulated metals that may be processed at MP&M sites. Aluminum is most effectively removed in lime and settle systems at a pH between 7.5 and 8 standard units, while iron is most effectively removed at a pH of approximately 10.5 standard units. Most metals that may be present in MP&M waste waters are effectively removed in this pH range. Therefore, removal of aluminum and iron will indicate effective removal of other metal types. Although iron and aluminum can be used as water treatment chemicals, EPA believes that regulation of these pollutants will control discharges of non-regulated metals that are processed at MP&M sites.

EPA is proposing a pH range limit in order to assure that the pH of the waste water is within the neutral range.

EPA is also proposing to use oil and grease as an indicator for monitoring for organic pollutants that have the potential to be present in MP&M waste waters. EPA is using oil and grease as an indicator since most of the organic pollutants detected in MP&M waste waters during the MP&M sampling program are more soluble in oil than in water, and as such would partition to the oil layer. Thus, removal of oil and grease will result in significant removal of these pollutants. Data for oil-water separation systems collected during the MP&M sampling program show removals between 63 and 90 percent for organic pollutants across the oil-water separation systems. These data support the conclusion that the organic pollutants will partition to the oil layer. In addition, most of the organic pollutants detected in MP&M waste waters are insoluble in water, further supporting that these pollutants will partition to the oil layer.

EPA considered establishing limitations for Total Toxic Organics (TTO), which would reflect the sum of concentrations achieved for several specific organic pollutants identified during the MP&M sampling program. However, because of the diversity in the types of cleaners, coolants, paints, etc., used in the MP&M industry, as well as the current industry trends in identifying substitutes for organic solvent degreasing, EPA did not have sufficient analytical data to identify and regulate all organic pollutants in use at MP&M sites. Therefore, EPA rejected TTO as an approach to controlling organic pollutant discharges. EPA believes that use of oil and grease as an indicator will provide regulatory control of organic pollutants while allowing the flexibility to control organic pollutants that are used by MP&M sites but not identified during the MP&M sampling program.

EPA also considered establishing limitations for lead, since lead is known to have several adverse human health effects. Although lead was analyzed for in nearly all samples collected during the development of the MP&M Phase I rule, lead was rarely found at treatable concentrations in the influent to the treatment systems sampled. As discussed above, treatable concentration was defined as 0.1 milligram per liter in the raw waste water prior to treatment. The majority of lead data were non-detects or detects at very low concentrations. Since lead was rarely found at treatable concentrations in the raw waste water, prior to treatment, EPA decided not to propose a limit for lead. EPA is soliciting additional data and comments on the possibility of setting a limit for lead in the final rule (see Section XIX).

TABLE 2.—PROPOSED EFFLUENT CONCENTRATION LIMITATIONS

[Milligrams per liter (mg/l)]

Pollutant or pollutant parameter	Maximum for any 1 day	Monthly average shall not exceed
Aluminum (T)	1.4	1.0
Cadmium(T)	0.7	0.3
Chromium(T)	0.3	0.2
Copper(T)	1.3	0.6
Iron(T)	2.4	1.3
Nickel(T)	1.1	0.5
Zinc(T)	0.8	0.4
Cyanide(T)	0.03	0.02
Oil & Grease	35	17
TSS	73	36
pH	(1)	(1)

1 Within 6.0 to 9.0.

D. Applicability of BPT

The Agency is proposing BPT limitations guidelines for the MP&M Phase I category to apply to all MP&M process waste waters that are generated by sites performing manufacturing, rebuilding or maintenance of metal parts, products, or machinery in one of the seven industrial sectors (i.e., aerospace, aircraft, electronic equipment, hardware, mobile industrial equipment, ordnance and stationary industrial equipment).

E. BPT Pollutant Removals, Costs, and Economic Impacts

EPA estimates that the proposed BPT limitations will remove annually an estimated 20 million pounds of conventional pollutants (TSS and oil and grease), 1 million pounds of metals and cyanide, and 67,000 pounds of organic pollutants. BPT is estimated to require a capital expenditure of $63 million (in 1994$), which will require an annualized cost of $18 million. In addition, as a result of this regulation, EPA estimates that 18 sites may close with an accompanying job loss of 158 full time employees (FTEs). EPA estimates that compliance activities may generate annual labor requirements which could more than offset these job losses. EPA believes that the effluent reduction benefits achieved by this proposed BPT justify the costs and that all statutory factors have been satisfied. (See further discussion of costs and benefits below).

X. Best Conventional Pollutant Control Technology

A. July 9, 1986 BCT Methodology

The BCT methodology, promulgated in 1986 (51 FR 24974), discusses the Agency's consideration of costs in establishing BCT effluent limitations guidelines. EPA evaluates the reasonableness of BCT candidate technologies (those that are technologically feasible) by applying a two-part cost test:

(1) The POTW test; and

(2) The industry cost-effectiveness test.

In the POTW test, EPA calculates the cost per pound of conventional pollutant removed by industrial dischargers in upgrading from BPT to a BCT candidate technology and then compares this cost to the cost per pound of conventional pollutant removed in upgrading POTWs from secondary treatment. The upgrade cost to industry must be less than the POTW benchmark of $0.25 per pound (in 1976 dollars).

In the industry cost-effectiveness test, the ratio of the incremental BPT to BCT cost divided by the BPT cost for the industry must be less than 1.29 (i.e., the cost increase must be less than 29 percent).

B. BCT Options Identified

For today's proposed rule, EPA considered whether or not to establish BCT effluent limitation guidelines for MP&M sites that would attain incremental levels of effluent reduction beyond BPT for TSS. The only technology option identified to attain further TSS reduction is the addition of multimedia filtration to existing BPT systems.

EPA applied the BCT cost test to use of multimedia filtration technology as a means to reduce TSS loadings. The MP&M sites were split into three flow categories: low flow (generally less than 10,000 gallons per year (gpy)); medium flow (between 10,000 gpy and 1,000,000 gpy); and high flow (greater than 1,000,000 gpy). For each of these three flow categories, a representative site was chosen for which EPA had estimated the costs of installing the Option 2 technologies discussed under BPT (See Section IX.B. above). The Agency evaluated the costs of installing a polishing multimedia filter to remove an estimated additional 45 percent of the TSS discharged after lime and settle treatment. This estimated removal reflects the reduced TSS concentrations seen when filters are used in the MP&M industry. The cost per pound of the high flow case was $28/lb of TSS (in 1976 dollars), the cost per pound removed of the medium flow case was $131/lb and the cost of the low flow case was $813/lb of TSS (in 1976 dollars). All of these cases individually as well as combined exceed the $0.25/lb (in 1976 dollars) POTW cost test value. Because these costs exceed the POTW benchmark, the first part of the cost test fails; therefore, the second part of the test was unnecessary. It was therefore determined that multi-media filtration does not pass the cost test for BCT regulations development. In light of the above, BCT limitations for MP&M are proposed to be set equal to BPT limitations.

Therefore, EPA is proposing to establish BCT limitations on the basis of Option 2 technology, equivalent to BPT.

XI. Best Available Technology Economically Achievable

A. Need for BAT Regulation

The need for BAT regulation is the same as the need for BPT regulation (see Section IX.A.).

B. BAT Technology Options and Selection

The factors considered in establishing the best available technology economically achievable (BAT) level of control include: the age of process equipment and facilities, the processes employed, process changes, the engineering aspects of applying various types of control techniques, the costs of applying the control technology, economic impacts imposed by the regulation, non-water quality environmental impacts such as energy requirements, air pollution and solid waste generation, and other such factors as the Administrator deems appropriate (sec

tion 304(b)(2)(B) of the Act). In general, the BAT technology level represents the best existing economically achievable performance among plants with shared characteristics. In making the determination about economic achievability, the Agency takes into consideration factors such as plant closures and product line closures. Where existing waste water treatment performance is uniformly inadequate, BAT technology may be transferred from a different subcategory or industrial category. BAT may also include process changes or internal plant controls which are not common industry practice.

EPA is today proposing BAT effluent limitations guidelines for all parameters listed in Table 2 except TSS and pH. Oil and grease is an indicator for 2-methylnaphthalene, 2-propanone, N-octadecane, and N-tetradecane.

The three regulatory options which EPA considered for BAT are identical to the three options discussed under BPT. Like BPT, EPA is proposing BAT on the basis of Option 2. This technology represents the best available technology economically achievable. Option 1 was rejected because it does not include the pollution prevention and water conservation technologies which are widely demonstrated at MP&M sites. Option 3 was rejected because the costs do not justify the removals achieved.

EPA did not include the application of filters, discussed under BCT, as a BAT option. Data collected during sampling at MP&M facilities demonstrated no additional removals of many metal pollutants resulting from the use of filters as compared to concentrations of the same metals after the lime and settle treatment included in Option 2. Thus, although filtration is demonstrated to be effective in achieving additional removals of suspended solids, and as such was considered for the basis of BCT, multimedia or sand filtration does not reflect the best available technology performance for priority and nonconventional pollutants.

C. Calculation of BAT Limitations

The calculation of the BAT limitations were performed by using the same methodology used for calculating BPT limitations (see Section IX.C.)

D. Applicability of BAT

The applicability of BAT is the same as that for BPT.

E. BAT Pollutant Removals, Costs, and Economic Impacts

The pollutant removals for BAT are the same as those for BPT except that BAT does not cover TSS (see Section IX.E.). The estimated cost of BAT is the same as BPT (see Section IX.E.). The economic impacts of BAT are the same as BPT (see Section IX.E.). EPA believes that the effluent reduction benefits achieved by this proposed BAT justify the costs and that all statutory factors have been satisfied. (See further discussion of costs and benefits below.)

XII. Pretreatment Standards for Existing Sources

A. Need for Pretreatment Standards

Indirect dischargers in the MP&M Phase I category, like the direct dischargers, use raw materials that contain many priority pollutant and nonconventional metal pollutants. As in the case of direct dischargers, they may be expected to discharge many of these pollutants to POTWs at significant mass or concentration levels, or both. EPA estimates that indirect dischargers annually discharge approximately 12 million pounds of priority and nonconventional metals, and 2.4 million pounds of priority and nonconventional organic pollutants.

EPA determines which pollutants to regulate in PSES on the basis of whether or not they pass through, interfere with, or are incompatible with the operation of POTWs (including interference with sludge practices). The Agency evaluates pollutant pass through by comparing the pollutant percentage removed by well operated POTWs achieving secondary treatment with the percentage removed by BAT technology applied by direct dischargers. A pollutant is deemed to pass through POTWs when the average percentage removed nationwide by well-operated POTWs (those meeting secondary treatment requirement) is less than the percentage removed by directly discharging MP&M sites applying BAT for that pollutant.

To evaluate the need for PSES, EPA followed the procedures established by the Organic Chemicals, Plastics and Synthetic Fibers (OCPSF) regulation to determine the degree to which well-operated POTWs are capable of removing pollutants. Prior to promulgation of the OCPSF effluent guidelines, EPA conducted a study of

well-operated POTWs that use secondary (biological) treatment (the ''50–POTW Study''). The 50–POTW study determined the extent to which priority pollutants are removed by POTWs. The principal means by which the Agency evaluated pollutant pass-through was to compare the pollutant percentage removed by POTWs with the percentage removed to comply with BAT limitations.

Because some of the data collected for evaluating POTW removals included influent levels of priority pollutants that were close to the detection limit, the POTW data were edited to eliminate influent values less than 10 times the nominal method detection limit (MDL) and the corresponding effluent values, except in cases where none of the influent concentrations exceeded 10 times the MDL. In the latter case, where there were no influent data exceeding 10 times the MDL, the data were edited to eliminate influent values less than twice the MDL and the corresponding effluent values. These editing rules were used to allow for the possibility that low POTW removals simply reflected the low influent levels.

EPA then averaged the remaining influent data and also averaged the remaining effluent data for the POTWs. The percent removal achieved for each priority pollutant was determined from these averaged influent and effluent levels. This percent removal was then compared to the percent removal achieved by BAT treatment technology. Based on this analysis, EPA determined that four nonconventional organic pollutants, seven priority metal pollutants, five nonconventional metal pollutants, cyanide, and chemical oxygen demand pass through POTWs. POTW removals for ten of the nonconventional organic pollutants were calculated using a data base developed by EPA's Risk Reduction Engineering Laboratory (RREL) and data transferred from other pollutants based on physical similarities (e.g., straight-chained hydrocarbons, ketones, etc.).

B. PSES Technology Options and Selection

Indirect discharging MP&M sites generate waste waters with similar pollutant characteristics to direct discharging facilities. Hence, the same treatment technologies discussed previously for BPT and BAT are considered applicable to PSES. However, as described below, the application of the technology options has resulted in the addition of a new option that applies to indirect dischargers.

EPA is today proposing PSES for all parameters listed in Table 2 except TSS and pH. EPA is proposing PSES for oil and grease as an indicator for monitoring for organic pollutants which have the potential to be present.

The Agency considered the following five options in developing PSES for MP&M Phase I.

1. *Option 1: Lime and Settle Treatment.* This option is equivalent to BPT Option 1.

2. *Option 1a: Tiered PSES for ''Low'' Flow and ''Large'' Flow Sites.* This option would establish a tiered PSES requirement depending on the annual discharge volume at a given MP&M site. For ''low'' flow sites, sites with a discharge volume of less than 1,000,000 gallons per year (gpy), PSES would require that sites comply with concentration standards based on Option 1. For a site operating 250 days per year, 1,000,000 gallons per year translates into an average discharge flow rate of 4,000 gallons per day. For ''large'' flow sites, sites with a discharge volume of 1,000,000 gpy or greater, PSES would require that mass-based standards be imposed based on Option 2 (i.e. the conversion of Option 1 concentration-based standards using an appropriate flow which reflects good pollution prevention and water conservation practices such as those included in BPT Option 2). The flow basis would be determined by the Control Authority using site-specific factors and flow guidance (see the Technical Development Document for a detailed presentation of flow guidance aimed at water conservation and good housekeeping practices). If mass-based limitations have not been developed as required, the source would have to achieve discharges not exceeding the concentration limitations listed in the regulation. The technology basis for PSES for large flow sites is the same as BPT Option 2.

3. *Option 2a: In-process Flow Reduction and Pollution Prevention and Lime and Settle Treatment for ''Large'' Flow sites.* This option would require that mass-based standards be imposed based on Option 2 for sites with a discharge volume of 1,000,000 gpy or greater. Sites with a discharge volume of less than 1,000,000 gpy would not be subject to PSES requirements. For a site operating 250 days per year, 1,000,000 gallons per year translates into an average discharge flow rate of 4,000 gallons per day.

In order to fully implement the mass-based permits, it is important for Control Authorities to issue permits in a timely manner. Dischargers are reminded of their responsibilities under the General Pretreatment Regulations (40 CFR 403) to provide, among other things, Baseline Monitoring Reports. The Agency expects Control Authorities to place a priority on issuing needed mass-based permits, and those permits should be issued within a year after the Baseline Monitoring Report deadline. Control Authorities that do not meet these permitting timelines may not be in compliance with their pretreatment programs under 40 CFR 123.45.

4. *Option 2: In-Process Flow Reduction & Pollution Prevention and Lime and Settle Treatment.* This option is equivalent to BPT Option 2.

5. *Option 3: Advanced End-of-Pipe Treatment.* This option is equivalent to BPT Option 3.

Selected Option: EPA is proposing Option 2a technologies as the basis for the proposed PSES for MP&M Phase I. Option 2a is economically achievable (see Section XIV) and greatly reduces pollutants discharged into the environment. Compared to Option 2, which would require that all MP&M indirect dischargers be controlled by mass standards, Option 2a achieves significant pollutant reduction without imposing undue administrative burden on the Control Authorities. Whereas Option 2 would require an estimated 8,706 facilities to have permits or similar control mechanisms written incorporating the proposed standards into a mass-based permit, Option 2a reduces this burden, requiring only an estimated 1,998 facilities to have mass-based permits, the rest of the facilities would not be subject to PSES requirements. EPA believes this approach would allow Control Authorities to focus their efforts on the facilities discharging the vast majority of the pollutants, rather than dissipating their limited resources on sites contributing much less to the overall problem. An indication of relative pollutant loadings by size of facility is provided in Table 26 below. The low flow sites could also be expected to reduce their discharges of pollutants, but they would do so by meeting local limits. EPA has consulted with representatives from EPA Regions, States and Municipalities, the majority of whom favor this approach to regulating the MP&M industry.

C. Calculation of PSES

The proposed pretreatment standards for existing sources in the MP&M Phase I category are presented in today's proposed rule. The pretreatment standards are shown for cyanide and priority and nonconventional metal pollutants.

An oil and grease standard is proposed as an indicator for specific organic pollutants. The specific organic pollutants for which oil and grease is an indicator are 2-methylnaphthalene, 2-propanone, N-octadecane, and N-tetradecane. EPA identified these pollutants in MP&M waste water and determined that these pollutants will pass through a POTW. These pollutants are more likely to partition to the oily phase than the water phase, thus EPA believes that the treatment and removal of oil and grease in waste water will also result in significant removals of these pollutants. EPA's sampling results show higher percent removals are achieved through oil and grease treatment (BAT technology) than at a well-operated secondary POTW. EPA considered and rejected establishing a pretreatment standard for Total Toxic Organics (TTO) which would reflect the sum of concentrations achieved for several organic pollutants. The reason EPA rejected TTO as an approach to controlling organic pollutant discharges is that EPA knows that the industry is in the midst of a significant shift in the solvents it is using. Accordingly, EPA has no reason to believe that regulation of the specific list of organics identified as of today would reflect the organics that will be present in waste water when this regulation is promulgated. EPA is planning to continue to study the sources and concentrations of organic pollutants in MP&M waste water, particularly as sites switch from ozone-depleting solvents to aqueous-based cleaners. Accordingly, EPA may propose a different approach to controlling organic pollutant discharges for both Phase I and Phase II in conjunction with the MP&M Phase II rulemaking.

As with BAT proposed standards, the pretreatment standards are expressed in terms of concentration-based standards. As described above, EPA is proposing that MP&M sites be required to comply with a mass-based permit if their annual discharge volume equals or exceeds 1,000,000 gallons. The proposed PSES would require dischargers to meet ''maximum for any one day'' and ''maximum monthly average'' standards. The proposed PSES limitations for cyanide, priority and nonconventional metal pollutants, and oil and grease are identical to those limits established for these pollutants under proposed BAT Option 2.

Considering the large number of indirect dischargers which have the potential to be covered by this proposed regulation, an important issue to the affected industry and to permit writers is the potentially enormous administrative burden. Therefore, in developing this proposal, EPA has looked for means of reducing the administrative burden, reducing monitoring requirements, and reducing reporting requirements. The proposed exemption of existing indirect discharges discharging less than one million gallons per year is one means by which EPA is proposing to reduce the administrative burden.

D. Applicability of PSES Limitations

The Agency is proposing PSES under the MP&M Phase I category to apply to all MP&M process waste waters that are generated by sites performing manufacturing, rebuilding, or maintenance of metal parts, products, or machinery in one of the seven industrial sectors (i.e., aerospace, aircraft, electronic equipment, hardware, mobile industrial equipment, ordnance and stationary industrial equipment). The Combined Wastestream Formula will apply to sites which have operations covered by MP&M Phase I, existing effluent guidelines, or not covered by existing regulations.

E. Removal Credits

As described previously, many industrial facilities discharge large quantities of pollutants to POTWs where their wastes mix with waste water from other sources, domestic wastes from private residences and run-off from various sources prior to treatment and discharge by the POTW. Industrial discharges frequently contain pollutants that are generally not removed as effectively by waste water treatment at the POTWs as by the industries themselves.

The introduction of pollutants to a POTW from industrial discharges poses several problems. These include potential interference with the POTW's operation or pass-through of pollutants if inadequately treated. As discussed, Congress, in section 307(b) of the Act, directed EPA to establish pretreatment standards to prevent these potential problems. Congress also recognized that, in certain instances, POTWs could provide some or all of the treatment of an industrial user's wastestream that would be required pursuant to the pretreatment standard. Consequently, Congress established a discretionary program for POTWs to grant ''removal credits'' to their indirect dischargers. The credit, in the form of a less stringent pretreatment standard, allows an increased amount of pollutants to flow from the indirect discharger's facility to the POTW.

Section 307(b) of the CWA establishes a three-part test for obtaining removal credit authority for a given pollutant. Removal credits may be authorized only if (1) The POTW ''removes all or any part of such toxic pollutant,'' (2) the POTW's ultimate discharge would ''not violate that effluent limitation, or standard which would be applicable to that toxic pollutant if it were discharged'' directly rather than through a POTW and (3) the POTW's discharge would ''not prevent sludge use and disposal by such [POTW] in accordance with section [405]. * * *'' Section 307(b).

EPA has promulgated removal credit regulations in 40 CFR part 403.7. The United States Court of Appeals for the Third Circuit has interpreted the statute to require EPA to promulgate comprehensive sewage sludge regulations before any removal credits could be authorized. *NRDC* v. *EPA*, 790 F.2d 289, 292 (3rd Cir. 1986) *cert. denied*. 479 U.S. 1084 (1987). Congress made this explicit in the Water Quality Act of 1987 which provided that EPA could not authorize any removal credits until it issued the sewage sludge use and disposal regulations required by section 405(d)(2)(a)(ii).

Section 405 of the CWA requires EPA to promulgate regulations which establish standards for sewage sludge when used or disposed for various purposes. These standards must include sewage sludge management standards as well as numerical limits for pollutants which may be present in sewage sludge in concentrations which may adversely affect public health and the environment. Section 405 requires EPA to develop these standards in two phases. On February 19, 1993, EPA promulgated the Round One sewage sludge regulations establishing standards, including numerical pollutant limits, for the use and disposal of sewage sludge. 58 FR 9248. EPA established pollutant limits for ten metals when sewage sludge is applied to land, for three metals when it is disposed of at surface disposal sites and for seven metals and total hydrocarbons, a surrogate for organic pollutant emissions, when sewage sludge is incinerated. These requirements are codified at 40 CFR part 503.

The Phase One regulations partially fulfilled the Agency's commitment under the terms of a consent decree that settled a citizens suit to compel issuance of the sludge regulations. *Gearhart, et al.* v. *Reilly*, Civil No. 89–6266–JO (D.Ore). Under the terms of that decree, EPA must propose and take final action on Round Two sewage sludge regulations by December 15, 2001.

At the same time EPA promulgated the Round One regulations, EPA also amended its pretreatment regulations to provide that removal credits would be available for certain pollutants regulated in the sewage sludge regulations. *See* 58 FR at 9386. The amendments to part 403 provide that removal credits may be made potentially available for the following pollutants:

(1) If a POTW applies its sewage sludge to the land for beneficial uses, disposes of it on surface disposal sites or incinerates it, removal credits may be available, depending on which use or disposal method is selected (so long as the POTW complies with the requirements in part 503). When sewage sludge is applied to land, removal credits may be available for ten metals. When sewage sludge is disposed of on a surface disposal site, removal credits may be available for three metals. When the sewage sludge is incinerated, removal credits may be available for seven metals and for 57 organic pollutants. *See* 40 CFR 403.7(a)(3)(iv)(A).

(2) In addition, when sewage sludge is used on land or disposed of on a surface disposal site or incinerated, removal credits may also be available for additional pollutants so long as the concentration of the pollutant in sludge does not exceed a concentration level established in part 403. When sewage sludge is applied to land, removal credits may be available for two additional metals and 14 organic pollutants. When the sewage sludge is disposed of on a surface disposal site, removal credits may be available for seven additional metals and 13 organic pollutants. When the sewage sludge is incinerated, removal credits may be available for three other metals. *See* 40 CFR 403.7(a)(3)(iv)(B).

(3) When a POTW disposes of its sewage sludge in a municipal solid waste landfill that meets the criteria of 40 CFR part 258 (MSWLF), removal credits may be available for any pollutant in sewage sludge. *See* 40 CFR 403.7(a)(3)(iv)(C).

Thus, given compliance with the requirements of EPA's removal credit regulations,[1] following promulgation of the pretreatment standards being proposed here, removal credits may be authorized for any pollutant subject to pretreatment standards if the applying POTW disposes of its sewage sludge in a MSWLF that meets the requirements of 40 CFR part 258. If the POTW uses or disposes of its sewage sludge by land application, surface disposal or incineration, removal credits may be available for the following metal pollutants (depending on the method of use or disposal): arsenic, cadmium, chromium, copper, iron, lead, mercury, molybdenum, nickel and zinc. Given compliance with section 403.7, removal credits may be available for the following organic pollutants (depending on the method of use or disposal) if the POTW uses or disposes of its sewage sludge: benzene, 1,1-dichloroethane, 1,2-dibromoethane, ethylbenzene, methylene chloride, toluene, tetrachloroethene, 1,1,1-trichloroethane, 1,1,2-trichloroethane and trans-1,2-dichloroethene.

Some facilities may be interested in obtaining removal credit authorization for other pollutants being considered for regulation in this rulemaking for which removal credit authorization would not otherwise be available under part 403. As discussed in the sewage sludge regulations (58 FR 9382–83), EPA has concluded that removal credits should *not* be authorized for pollutants other than the pollutants specifically regulated by the final part 503 regulation. The Agency has determined that the CWA, as amended, removal credit eligibility is limited to those pollutants regulated specifically in Part 503 and to pollutants that the Agency determines do not threaten human health and the environment when used or disposed of in sewage sludge. When read together, sections 307(b) and 405 permit removal credits only when it can be determined that the increased concentrations or amounts allowed by the removal credit will not affect sewage sludge use or disposal adversely. EPA determined that a categorical pretreatment standard pollutant is eligible for removal credits only when EPA has either established a specific numerical limit for that pollutant or has evaluated it and concluded that it does not threaten public health or the environment. 58 FR 9382–83.

Consequently, in the case of a pollutant for which EPA did not perform a risk analysis in developing the Phase One sewage sludge regulations, removal credit for pollutants will only be available when the Agency determines either a safe level for the pollutant in sewage sludge or that regulation of the pollutant is unnecessary to protect public health and the environment from the reasonably anticipated adverse effects of such a pollutant.[2] Therefore, any person seeking to add additional categorical pollutants to the list for which removal credits are now available would need to submit information to the Agency to support such a determination. The basis for such a determination may include information showing the absence of risks for the pollutant (generally established through an environmental pathway risk assessment such as EPA used for Phase One) or data establishing the pollutant's presence in sewage sludge at low levels relative to risk levels or both. Parties, however, may submit whatever information they conclude is sufficient to establish either the absence of any potential for harm from the presence of the pollutant in sewage sludge or data demonstrating a ''safe'' level for the pollutant in sludge. Following submission of such a demonstration, EPA will review the data and determine whether or not it should propose to amend the list of pollutants for which removal credits would be available.

EPA has already begun the process of evaluating a number of pollutants for adverse potential to human health and the environment when present in sewage sludge. In May, 1993, pursuant to the terms of the consent decree in the *Gearhart* case, the Agency notified the United States District Court for the District of Oregon that, based on the information then available at that time, it intended to propose 31 pollutants for regulation in Round Two sewage sludge regulations. These are acetic acid (2, 4, -dichlorophenoxy), aluminum, antimony, asbestos, barium, beryllium, boron, butanone (2-), carbon disulfide, cresol (p-), cyanides (soluble salts and complexes), dioxins/dibenzofurans (all monochloro to octochloro congeners), endsulfan-II, fluoride, manganese, methylene chloride, nitrate, nitrite, pentachloronitrobenzene, phenol, phthalate (bis-2-ethylhexyl), polychlorinated biphenyls (co-planar), propanone (2-), silver, thallium, tin, titanium, toluene, trichlorophenoxyacetic acid (2, 4, 5-), trichlorphenoxypropionic acid ([2- (2, 4, 5-)], and vanadium.

The Round Two regulations are not scheduled for proposal until December, 1999 and promulgation in December 2001. However, given the necessary

[1] Under Section 403.7, a POTW is authorized to give removal credits only under certain conditions. These include applying for, and obtaining, approval from the Regional Administrator (or Director of a State NPDES program with an approved pretreatment program), a showing of consistent pollutant removal and an approved pretreatment program. *See* 40 CFR 403.7(a)(3) (i), (ii), and (iii).

[2] In the Round One sewage sludge regulation, EPA concluded, on the basis of risk assessments, that certain pollutants (*see* Appendix G to Part 403) did not pose an unreasonable risk to human health and the environment and did not require the establishment of sewage sludge pollutant limits. As discussed above, so long as the concentration of these pollutant in sewage sludge are lower than a prescribed level, removal credits are authorized for such pollutants.

factual showing, as detailed above, EPA could conclude before the contemplated proposal and promulgation dates that regulation of some of these pollutants is not necessary. In those circumstances, EPA could propose that removal credits should be authorized for such pollutants before promulgation of the Round Two sewage sludge regulations. However, because of the Agency's commitment to promulgation of effluent limitations and guidelines under the consent decree with NRDC, it may not be possible to complete review of removal credit authorization requests by the time EPA must promulgate these guidelines and standards.

EPA's proposal to establish pretreatment standards for oil and grease as an indicator for organic pollutants means that oil and grease is not subject to removal credits.

F. Compliance Date

EPA is proposing to establish a three-year deadline for compliance with PSES. Design and construction of systems adequate for compliance with PSES will be a substantial undertaking for many MP&M sites. In addition, Control Authorities will need the time to develop the mass-permits for their industrial users with annual discharge volumes greater than 1,000,000 gallons.

G. PSES Pollutant Removals, Costs and Economic Impacts

EPA estimates that the proposed PSES regulation will result in the removal of 14 million pounds per year of pollutants including 9.1 million pounds of priority and nonconventional metal pollutants and 2.1 million pounds of priority and nonconventional organic pollutants and cyanide. PSES is estimated to result in capital costs of approximately $ 351 million and annualized costs of $ 142 million (in 1994 dollars). EPA projects that 7 sites may be closed as a result of PSES, and job losses will affect 540 full-time employees (FTEs). However, EPA estimates that compliance activities may generate annual labor requirements which could more than offset these job losses.

XIII. New Source Performance Standards (NSPS) and Pretreatment Standards for New Sources (PSNS)

Section 307(c) of the Act calls for EPA to promulgate pretreatment standards for new sources (PSNS) at the same time that it promulgates new source performance standards (NSPS). New facilities have the opportunity to incorporate the best available demonstrated technologies including process changes, in-plant controls, and end-of-pipe treatment technologies.

The same technologies discussed previously for BAT and PSES are available as the basis for NSPS and PSNS. Option 2 was the selected option for BAT and for large flow PSES, and the only higher technology option identified by EPA was Option 3. Option 3 includes advanced end-of-pipe treatment with significant reuse of process water. Since new sites have the potential to install pollution prevention and pollution control technologies more cost effectively then existing sources, Option 3 was considered for NSPS and PSNS. However, EPA did not select Option 3 technology as the basis for NSPS and PSNS because the costs do not justify the removals achieved. Therefore, EPA is proposing NSPS and PSNS for MP&M Phase I are based on the proposed Option 2 BAT technologies identified above. All NSPS and PSNS limits are expected to be mass-based. If mass-based limitations have not been developed as required, the source shall achieve discharges not exceeding the concentration limitations listed in the regulation.

XIV. Economic Considerations

A. Introduction

EPA's economic impact assessment is set forth in the report titled ''Economic Impact Analysis Of Proposed Effluent Limitations Guidelines And Standards For The Metal Products And Machinery Industry, Phase I'' (hereinafter ''EIA''). This report estimates the expected economic effect of compliance with the proposed regulatory options in terms of facility closures and associated losses in employment. Firm-level impacts, local community impacts, international trade effects, labor requirements of compliance, and effects on new Metal Products and Machinery Industry (MP&M) facilities are also presented in this report. A Regulatory Flexibility Analysis detailing the small business impacts for this industry is also included in the EIA. In addition, EPA conducted an analysis of the cost-effectiveness of the regulatory options. The report, ''Cost-Effectiveness Analysis of Proposed Effluent Limitations Guidelines and Standards of Performance for the Metal Products and Machinery Industry, Phase I'' is included in the record of this rule-making. EPA also prepared a background analysis of the economic conditions in the MP&M industry, ''Industry Profile Of the Metal Products and Machinery Industry, Phase I.'' The following discussion summarizes material from the Economic Impact Analysis, Cost-Effectiveness Analysis, and Industry Profile reports. The reader is referred to these reports for the full details of these analyses.

Analysis of the economic impacts of effluent guidelines for the MP&M industry relies heavily on the responses to the questionnaire distributed to MP&M facilities by EPA under the authority of Section 308 of the Clean Water Act (the DCP). As discussed above, EPA sent the questionnaire, requesting both technical and economic information, to 1,020 MP&M industry facilities (See Section V.A.2 for details). After detailed data cleaning and validation activities, the responses for 396 facilities, representing 10,601 water-discharging facilities in the MP&M industry population, were used in the industry impact analysis. EPA analyzed the economic impacts of the regulatory options applicable to MP&M Phase I facilities on the basis of data for the 396 sample facilities. The impacts assessed for these sample facilities were extrapolated to the level of the MP&M industry population using facility sample weights that are based on the sample design for the Section 308 survey. Unless otherwise indicated, the remainder of this discussion reports the estimated economic impacts for the MP&M industry population.

B. Overview of the Facilities Potentially Subject to Regulation

From secondary source data (Department of Commerce), EPA estimates that approximately 90,000 establishments or facilities participated in the MP&M Phase I business sectors as of 1987. Thus, the estimated 10,601 water-discharging facilities (from Section 308 Survey data) that would potentially be affected by this regulation represent about 11 percent of the total facilities in the MP&M Phase I business sectors. Of the 10,601 water-discharging facilities, EPA estimates that 8,706 facilities are indirect dischargers (i.e., they discharge effluent to a POTW) and would thus be subject to Pretreatment Standards for Existing Sources (PSES). The remaining 1,895 facilities are estimated to be direct dischargers (i.e., they discharge effluent directly to a waterway under a NPDES permit) and will thus be subject to Best Available Technology Economically Achievable (BAT) and Best Practicable Control Technology Currently Available (BPT) requirements as herein proposed.

The MP&M facilities that are expected to be subject to this regulation contribute significantly to the U.S. economy. Table 3, below, summarizes important economic data for the estimated 10,601 water-discharging facilities that are potentially subject to regulation and on which the economic

impact analysis for this regulation is based.

TABLE 3.—SUMMARY DATA FOR 1989 FOR FACILITIES SUBJECT TO REGULATION IN MP&M PHASE I SECTORS ESTIMATED REVENUE, VALUE ADDED AND PAYROLL IN MILLIONS OF 1989 DOLLARS

Sector	Facilities	Employment	Revenue	Value added	Payroll
Hardware	4,197	379,000	44,327	9,463	5,845
Aircraft	856	552,000	96,715	24,858	15,148
Electronic Equipment	1,280	700,000	155,101	80,502	12,503
Stationary Industrial Equipment	2,769	419,000	52,918	12,815	6,306
Ordnance	190	131,000	21,666	7,059	4,006
Aerospace	545	580,000	54,430	19,454	9,660
Mobile Industrial Equipment	764	275,000	65,914	14,101	8,151
All Phase I Sectors	10,601	3,036,000	491,071	168,252	61,620
Total U.S. Manufacturing	.....	19,492,000	2,793,000	1,308,000	533,000
Phase I Facilities as a Percent of Total U.S. Manufacturing	.....	15.58%	17.58%	12.86%	11.56%

Source: U.S. Environmental Protection Agency, Section 308 Survey Data, 1989, and Statistical Abstract of the United States, 1992, Department of Commerce.

These data show that the 10,601 facilities potentially subject to regulation employed over 3,000,000 persons in 1989 or approximately 16 percent of the total U.S. manufacturing employment of 19.5 million in 1989.[3] Total revenues for the 10,601 facilities are estimated at $491 billion or about 18 percent of the total shipments for U.S. manufacturing in 1989 of $2,793 billion. A more meaningful measure of the value of production activity in these facilities is provided by value added,[4] which is estimated to amount to about $168 billion or approximately 13 percent of the total value added of $1,308 billion for U.S. manufacturing in 1989. The estimated payroll for the 10,601 facilities is about $62 billion or approximately 12 percent of the total of $533 billion for U.S. manufacturing in 1989.

Table 3 also shows these economic activity data for the seven MP&M Phase I business sectors. On the basis of number of facilities, the Hardware, Stationary Industrial Equipment, and Electronic Equipment sectors are the largest sectors subject to regulation. These three sectors account for over 75 percent of the total of 10,601 facilities expected to be subject to regulation. However, on the basis of employment and dollar measures of economic activity, the Hardware sector is less dominant. A ranking on both employment and value added shows that Electronic Equipment is the largest sector in terms of economic contribution followed by Aircraft, Aerospace, Stationary Industrial Equipment, Mobile Industrial Equipment, Hardware, and Ordnance.

C. Overview of Options Considered for Proposal and Selection of the Proposed Options

In developing the regulatory proposals presented herein, EPA defined and evaluated a number of PSES regulatory options for indirect dischargers and BAT/BPT options for direct dischargers. The following discussion defines the options that were considered for proposal and outlines the rationale for the regulatory proposals.

1. PSES Options for Indirect Dischargers

As discussed previously in Sections IX, XI, and XII, EPA initially evaluated three PSES regulatory options for indirect dischargers:

Option 1: Lime and Settle Treatment. Under this option, Pretreatment Standards for Existing Sources (PSES) would be established on the basis of the application of lime and settle treatment without any pollution prevention and flow controls imposed. The implementation of this option would likely result in concentration-based standards imposed on facilities by Control Authorities.

Option 2: In-Process Flow Reduction and Pollution Prevention and Lime and Settle Treatment. This option would establish PSES on the basis that all facilities should comply with mass-based standards that are the based on the Lime and Settle technology and associated concentration limits as specified for Option 1. However, the mass-based standards would be calculated from a flow volume that reflects good pollution prevention and water conservation practices. Thus, this option embodies a requirement for pollution prevention and water conservation in conjunction with the Lime and Settle Treatment process. The flow basis would be determined by the relevant Control Authority using site-specific factors and flow guidance.

Option 3: Advanced End-of-Pipe Treatment. This option would establish PSES based on the same technology and mass-based limit specifications as set forth for in Option 2 *plus* additional end-of-pipe treatment through reverse osmosis or ion exchange to achieve additional removals and produce a treated wastewater that can be recycled back to the facility for reuse as process waters.

From its preliminary analysis of these options, EPA initially selected Option 2, In-Process Flow Reduction and Pollution Prevention and Lime and Settle Treatment, as the preferred PSES regulatory option for indirect dischargers. Stated simply, EPA preferred Option 2 because it would apply to all indirect discharging facilities, mass-based standards that embody best available technology based on a combination of treatment systems and pollution prevention measures. Moreover, EPA found that Option 2 would impose relatively modest economic impacts in terms of expected facility closures and employment losses in the MP&M industry and thus concluded that Option 2 would be

[3] Although the MP&M Phase I sectors include non-manufacturing activities and employment, nearly 95 percent of the revenue received by facilities affected by the regulation is estimated to be derived from manufacturing activities. Thus, the comparison of employment and other economic values with totals for the U.S. manufacturing sector provides a relevant basis for understanding the economic significance of the industries and facilities expected to incur costs under the regulation.

[4] Value Added is the difference between the output price of a good or service and the price of all material inputs used in producing the good or service, and is generally considered a better measure than revenue of the value of production that occurs in a given economic activity.

economically achievable. However, upon further analysis and consideration, EPA reached additional findings that weighed against the proposal of Option 2 and caused the Agency to define and evaluate modifications to Option 2 as the basis for a PSES proposal. These findings involved three issues as follows:

Impact on small business. In its Regulatory Flexibility Analysis, EPA found that Option 2 would be expected to disproportionately burden small business-owned facilities in terms of facility closures and financial requirements. In particular, by embodying technology requirements for pollution prevention as well as treatment systems, Option 2 was found to impose greater financial burden on MP&M small business-owned, indirect discharging facilities than would result from the treatment system-only basis of Option 1. As discussed in Section K., Regulatory Flexibility Analysis, below, EPA considered modifications to Option 2 in an effort to mitigate financial and economic burdens on small business-owned facilities. These modifications differentiated among facilities based on the annual volume of facility discharge; however, EPA anticipated that reducing regulatory requirements for small discharge volume facilities would also mitigate the regulatory burden among small business entities.

Cost effectiveness. For indirect discharging facilities with smaller discharge volumes, EPA found that Option 2 would not be cost effective (see Section L, below). That is, for facilities with smaller discharge volumes, Option 2 would not achieve sufficient additional reductions in pollutant discharges beyond those achieved by Option 1 to support its higher cost relative to Option 1. In view of this finding, EPA considered modifications to Option 2 that would be more cost effective for indirect discharging facilities with smaller discharge volumes.

Impact on permitting authorities. EPA was concerned that Option 2, by requiring mass-based permits for all indirect discharging facilities, regardless of discharge volume, would substantially burden the authorities that administer the permit requirements. In particular, as part of the public participation in the regulation development process, the Association of Metropolitan Sewerage Agencies (AMSA) commented that the permit administration requirements of covering small discharge facilities under mass-based limitations would unduly burden permitting authorities. In its analysis of the MP&M Phase I industry, EPA estimated that a large percentage of indirect discharging facilities had relatively small annual discharge: over 75 percent of the estimated 6,700 indirect discharging facilities discharge less than 1 million gallons annually. Thus, EPA acknowledged that Option 2 would require a large number of permits to be written for these smaller discharge volume facilities and could therefore impose a substantial burden on permitting authorities. In response to this concern, EPA undertook a limited analysis of the likely costs to permitting authorities of issuing mass-based and concentration-based permits. This analysis indicated that the cost to permitting authorities of covering smaller discharge volume facilities (less than 1 million gallons per year) could vary considerably among permitting authorities but, in aggregate, might not be excessive: EPA estimated a total annual cost of $1.9 to $3.2 million ($1994) for writing and administering permits for indirect discharging facilities with effluent discharge of less than 1 million gallons per year. Still, in view of the limited nature of EPA's analysis of permitting costs and, moreover, in view of the findings with regard to small business impact and cost effectiveness (which also argued for moderating requirements among smaller facilities), EPA decided to define and evaluate modifications to Option 2 that would reduce the number of mass-based permits needed for implementing the regulation. Because of the conflicting information and findings regarding the burden of permit administration, EPA requests that permitting authorities comment on this issue.

On the basis of these findings, EPA defined and evaluated two additional PSES regulatory options for indirect discharging facilities: Option 1a and Option 2a. EPA found that both options addressed the issues described above and presented superior alternatives to Options 1, 2, or 3, alone, for regulatory proposal. However, with respect to each of the issues noted above—impact on small business, cost effectiveness, and burden on permit writing authorities—EPA found that Option 2a provided a better solution than Option 1a. Accordingly, EPA is proposing Option 2a as the preferred PSES option for indirect discharging facilities. Option 1a and Option 2a, together with the basis of their selection for regulatory proposal, are discussed below:

Option 1a: Tiered PSES for ''Low'' Flow and ''Large'' Flow Sites. This option would establish a tiered PSES requirement and blends elements of Option 1 and Option 2 depending on a site's annual discharge volume. Sites with a discharge volume of less than 1,000,000 gallons per year (''low'' flow sites) would meet the concentration-based standard set forth in Option 1. Sites with a discharge volume of at least 1,000,000 gallons per year (''large'' flow sites) would meet the mass-based standards that embody pollution prevention as well as the Lime and Settle Treatment process as set forth in Option 2.

By adopting the concentration-based requirements of Option 1 for ''low'' flow sites, Option 1a reduces the number of facilities for which mass-based permits would need to be written. In addition, Option 1a reduces the expected compliance costs and financial burdens for the smaller discharge volume facilities, many of which are small businesses. Finally, because of the reduced requirements on smaller discharge volume facilities, Option 1a achieves better cost effectiveness than Option 2.

Option 2a: In-Process Flow Reduction and Pollution Prevention and Lime and Settle Treatment for ''Large'' Flow Sites. This option would establish the same PSES requirements as specified for Option 2. However, these requirements would apply to only ''large'' flow sites—that is, indirect discharge sites with a discharge volume of at least 1,000,000 gallons per year. All such sites would comply with mass-based standards based on the Lime and Settle Treatment process coupled with a requirement for pollution prevention and water conservation as specified for Option 2. ''Low'' flow indirect discharge sites—that is, with a discharge volume of less than 1,000,000 gallons per year—would not be subject to PSES requirements. EPA estimates that, of the 8,706 indirect discharge facilities in the MP&M Phase I industry, 6,708 would qualify as low flow discharge sites and thus would not be subject to the Option 2a PSES requirement.

By exempting low flow discharge sites from PSES regulatory requirements, Option 2a, even more than Option 1a, mitigates the difficulties of Option 2. Specifically, because of the regulation's reduced coverage in terms of number of facilities, Option 2a would substantially reduce the burden on permit-writing authorities. In addition, low flow indirect discharging facilities would bear no costs as a result of regulation, substantially reducing financial burdens and closure impacts among small business-owned facilities. Finally, as discussed below at Section L, EPA found that Option 2a would be expected to achieve substantially better cost effectiveness than the other regulatory

options considered for indirect discharging facilities.

Thus, EPA found that Option 2a addresses the limitations of Option 2 while imposing even fewer economic impacts than Option 2 or Option 1a in terms of facility closures and financial burdens. Moreover, Option 2a embodies best available technology for reducing the industry's effluent discharges. Accordingly, EPA judges that Option 2a presents a balanced regulatory approach for reducing effluent discharges from the MP&M Phase I indirect discharging facilities while not imposing undue burdens on industry or on the permit-writing authorities that will be directly responsible for administering the regulation.

2. BAT/BPT Options for Direct Dischargers

As discussed previously in Sections IX, XI, and XII, EPA evaluated three BAT/BPT regulatory options for direct discharging facilities:

Option 1: Lime and Settle Treatment. Under this option, BAT/BPT would be established on the basis of the application of lime and settle treatment without any pollution prevention and flow controls imposed.

Option 2: In-Process Flow Reduction and Pollution Prevention and Lime and Settle Treatment. Option 2 includes the same technology basis as Option 1, lime and settle treatment, but adds in-process pollution prevention and flow controls.

Option 3: Advanced End-of-Pipe Treatment. Option 3 includes the same treatment technology and in-process pollution prevention and flow controls as set forth in Option 2 *plus* additional end-of-pipe treatment through reverse osmosis or ion exchange to achieve additional removals and produce a treated wastewater that can be recycled back to the facility for reuse as process waters.

Of these options, EPA selected Option 2 as the proposed BPT/BAT regulation for direct existing discharging facilities. Like Option 2a for indirect discharging facilities, Option 2 embodies best available technology for reducing effluent discharges. Moreover, EPA found that Option 2 would impose modest economic impacts in terms of facility closures, employment losses, and financial requirements. As discussed in Section L, below, EPA also found that Option 2 is cost effective. Finally, EPA concluded that Option 2 (in combination with Option 2a for indirect dischargers) would impose a modest and manageable burden among small business-owned, direct discharging facilities.

The following sections summarize the specific analyses and findings leading to EPA's selection of Option 2a for indirect dischargers and Option 2 for direct dischargers as the proposed regulatory alternatives for existing facilities in the MP&M Phase I industries.

D. Economic Impact Methodology

The promulgation of a BAT effluent guideline rests on a finding of economic achievability. As described earlier in Section III of this Preamble, EPA is proposing to establish BAT equal to BPT. BPT effluent limitations do not face the same economic achievability test as BAT. Therefore, the following discussion of economic achievability describes the regulatory approach in terms of BAT economic achievability. The analyses supporting the determination of economic achievability for this proposed regulation include a facility impact analysis, which assesses how facilities are expected to be affected financially by the proposed regulation. Key outputs of the facility impact analysis include expected facility closures in the MP&M industry and the associated losses in employment and value of economic activity in those facilities. The findings from the facility impact analysis provide the basis for the other analyses regarding the economic achievability of the regulation. These include:

- A *firm-level analysis*, which assesses the impact of effluent guidelines on the financial performance and condition of firms owning MP&M facilities subject to regulation;
- A *labor requirements analysis*, which assesses the likely demands for labor that will accompany the activities of facilities to comply with effluent guidelines.
- A *community impact analysis*, which assesses the local employment impact of possible facility closures;
- A *foreign trade analysis*, which assesses the effect of effluent guidelines on the international competitiveness and balance of trade of the MP&M industries.
- A *new source impact analysis*, which assesses the effect of effluent guidelines on the costs and financial viability of new facilities in the MP&M industries; and
- The *Regulatory Flexibility Analysis*, which assesses the economic and financial impacts of effluent guidelines for the MP&M industries on small businesses.

The following section of the preamble addresses the facility impact analysis. This discussion is followed by the other analyses of the economic impact of effluent guidelines for the MP&M industries.

1. Structure of the Facility Impact Analysis

The facility-level impact analysis involves a series of financial analyses to assess the expected occurrence of significant financial impacts as the result of an MP&M effluent guideline. Several considerations define the structure of the facility impact analysis, including: the impact categories analyzed; baseline and post-compliance analyses; assumptions regarding the ability of facilities to pass compliance costs on to customers; and whether facilities were expected to discharge effluent to a publicly owned treatment works (POTW) (i.e., indirect dischargers) or directly to a waterway (i.e., direct dischargers). Each of these considerations is discussed briefly below.

a. Impact Categories Analyzed

Two categories of significant impact are assessed: (1) *facility closure*, which is judged as a severe economic impact, in that all employment and production at the facility are assumed to be terminated; and (2) *financial stress short of closure*, which is judged to be a moderate economic impact. The estimates of facility closures and associated employment and production losses underlie the other analyses required for the assessment of economic achievability. The second impact category, financial stress short of closure, signifies that facilities may experience difficulty in financing the pollution prevention and treatment systems needed for compliance or that, because of compliance, may subsequently experience difficulty in financing other capital needs.

b. Baseline and Post-Compliance Analyses

The facility closure analyses were undertaken on both a pre-compliance, or baseline, basis, and a post-compliance basis. The purpose of the Baseline Analysis is to identify facilities that are currently experiencing or are projected to experience significant financial stress following the period for which the Survey was completed. These facilities are having or are expected to have serious financial difficulties *regardless of the promulgation of effluent guidelines.* Attribution of these financial difficulties to the effluent guidelines rather than to facilities' current financial problems would inaccurately represent the burden of the effluent guidelines. Accordingly, facilities that failed the baseline analysis

were excluded from the subsequent, post-compliance analyses that measure the impact of compliance on financial performance and condition.

The Post-Compliance Analyses differ from the Baseline Analysis by accounting for the capital and operating costs of pollution prevention and discharge treatment systems needed to comply with regulatory options. The post-compliance analyses thus indicate how facility financial performance and condition are likely to be affected by the proposed regulation and provide the basis for identifying whether facilities may be expected to incur a significant financial impact.

c. Pass Through of Compliance Costs to Customers

The analyses of Post-Compliance Closure and Financial Stress Short Of Closure were performed under assumptions of both zero-cost-pass-through and partial-cost-pass-through of compliance costs to customers. The zero-cost-pass-through case provides a conservative assessment of regulatory impacts in that facilities are assumed to pass none of the costs of compliance through to customers. That is, both quantities and prices—and therefore revenues—for each facility's production were assumed to remain constant after compliance *even though costs were increased on the basis of the estimated equipment and operating requirements for effluent guidelines compliance.* Because it is likely that companies would both attempt and be able to recover some of the compliance costs by increasing prices, the no-cost-pass-through case represents an extremely conservative, worst case assessment of the effects of the regulation.

For a more realistic assessment of impacts, EPA also analyzed the impact of regulatory options under an assumption of partial-cost-pass-through. For the partial-cost-pass-through analysis, EPA estimated the ability of firms in each of the MP&M sectors to recover compliance costs from customers. The assessment of cost pass-through potential was based on an econometric analysis of historical pricing and cost trends in the MP&M industries over a fifteen-year period coupled with an analysis of market structure factors that provide additional insight into the likely ability of firms to pass on higher costs to customers. Market structure factors considered in the analysis include: market power based on horizontal and vertical integration; extent of competition from foreign suppliers (both in domestic and export markets); barriers to competition as indicated by higher than normal profitability; and the long term growth trend in the industry. The analysis of pass-through potential yielded a pass-through parameter applicable to each MP&M industry sector indicating the fraction of compliance costs that firms subject to regulation are expected to recover from customers through increased revenues. The partial-cost-pass-through analysis yielded modestly lower impacts in terms of expected facility closures and losses in employment and production.

d. Facility Discharge Status

Whether facilities discharge effluent streams to a publicly owned treatment works (POTW) (i.e., indirect dischargers) or directly to a waterway (i.e., direct dischargers) is relevant to the structure of the economic impact analysis because these facilities and their effluent streams are regulated under different technology standards. Indirect dischargers are subject to Pretreatment Standards for Existing Sources (PSES) while direct dischargers are subject to Best Available Technology Economically Achievable (BAT), Best Practicable Control Technology Currently Available (BPT), and Best Conventional Pollutant Control Technology (BCT) requirements. For this regulation, different sets of regulatory options were considered for indirect and direct dischargers. As discussed above, five PSES regulatory options were considered for indirect dischargers and three BAT/BPT options were considered for direct dischargers. EPA performed the facility impact analyses separately for these two classes of facilities and the regulatory options that were considered for them. In the following discussion, economic impact analysis results are presented separately for the two classes of facilities and are also summed for the proposed options for both facility classes.

2. Data Supporting the Facility Impact Analysis

The most important source of data for the facility impact analysis is the facility-level financial data obtained by the DCP. These data include: three years (1987–89) of income statements and balance sheets at the level of the facility; the composition of revenues by customer type and MP&M business sector; estimated value of facility assets and liabilities in liquidation; borrowing costs; and ownership of the facility business and total revenues of the owning entity (if separate from the facility).

In addition to the DCP data, several secondary sources provided data for the analysis. In most cases, secondary source data were used to characterize a background economic or financial condition, in the economy as a whole or in the particular industries subject to the MP&M effluent guideline. For example, secondary source data were used to define capital market conditions underlying the cost-of-capital analysis. Secondary source data also figured prominently in the analysis of cost pass-through potential for the MP&M sectors. Secondary sources used in the analysis include:[5]

- Department of Commerce economic census and survey data including the *Censuses of Manufacturers, Annual Surveys of Manufacturers,* and international trade data;
- The *Benchmark Input-Output Tables of the United States,* published by the Bureau of Economic Analysis in the Department of Commerce;
- Price index series from the Bureau of Labor Statistics, Department of Labor;
- *U.S. Industrial Outlook,* published by the Department of Commerce;
- Industry trade publications; and
- Financial publications, including the Value Line Investment Survey and Robert Morris Associates annual data summaries.

Other vital data for the analysis of facility impacts include the estimates of capital and operating costs for complying with regulatory options. These cost estimates were developed by EPA from engineering studies of sample MP&M industry facilities. These studies took into account the characteristics of effluent discharges and existing treatment systems at the facilities and estimated the additional pollution prevention and treatment system needs for complying with the alternative regulatory options. The estimated capital costs and annual operating and maintenance costs for pollution prevention and treatment systems provided the basis for assessing how an effluent guideline would be likely to affect the financial performance and condition of MP&M facilities and whether those facilities might be expected to incur significant economic impacts.

3. Methodology for Calculating Facility Impacts

The estimation of facility impacts is based on the following analyses: the Baseline Closure Analysis, the Post-Compliance Closure Analysis, and the Financial Stress Short of Closure Analysis. Each analysis is described briefly in the following section. Table 4,

[5] See the Public Record for a detailed listing of the secondary information sources used in the economic impact analysis.

below, summarizes the methodology for each impact category.

a. Baseline Closure Analysis

The Baseline Facility Closure Analysis is based on two financial tests, both of which must be failed for the facility to be deemed a closure:

1. *After-Tax Cash Flow Test.* This test examines whether a facility has lost money on a cash basis for the three years covered by the DCP. If the facility's cash flow is negative when averaged over the period of analysis, then the facility's management and ownership is presumed to be under pressure to change operations or business practices to eliminate future losses. One possible change is to terminate operations at the facility. Whether it may be financially advantageous to the facility's ownership to terminate facility operations is the subject of the second financial test.

2. *Liquidation Value and Going-Concern Value Comparison Test.* This test examines whether the liquidation value of facility assets exceeds the going concern value of the facility based on a discounted value analysis of the facility's after-tax cash flow. The liquidation value of facility assets was calculated from information provided by facilities in the DCP and reflects the market value of facility assets less expenses associated with closure and liquidation. The financial question underlying this comparison is whether the facility is worth more in liquidation or in its current operation (i.e., as a going concern). If the liquidation value exceeded the going-concern value, then facility ownership is presumed to see a reward for terminating the facility's business and liquidating its assets.

If a facility failed both tests, then the facility was presumed to be in jeopardy of financial failure independent of the application of the MP&M effluent guideline and was excluded from further consideration in the analysis of effluent guideline impacts. Failure of the after-tax cash flow tests means that the facility is incurring a cash loss and is thus under financial pressure to alter its business to prevent future losses. Failure of the liquidation value/going-concern value test means that facility ownership would benefit financially by terminating operations and liquidating facility assets. The combination of these two circumstances leads to the expectation that facility management and ownership may decide to cease business at the facility independent of the application of an MP&M effluent guideline. Facilities failing only one test were carried forward to the post-compliance analysis; because of their more fragile condition, these facilities were more likely to fail that analysis.

b. Post-Compliance Closure Analysis

The Post-Compliance Closure analysis is identical in structure to the Baseline Closure Analysis with the exception that the after-tax cash flow amounts used in the After-Tax Cash Flow test and in the Liquidation Value and Going-Concern Value Comparison test are adjusted to reflect the annual cash outlays for financing and operating the pollution prevention and treatment systems needed to comply with an MP&M effluent guideline. The adjustments to cash flow reflect the annualized costs of purchasing and financing equipment for compliance with the alternative regulatory options and include allowances for the cost of debt and equity financing. In addition, the cash flow adjustments reflect the annual costs incurred by facilities for operating and maintaining the pollution prevention and treatment systems needed for compliance. The capital cost and operating and maintenance costs that underlie these cash flow adjustments were estimated by EPA on the basis of engineering studies of pollution prevention and treatment system needs at sample MP&M facilities for complying with alternative regulatory options.

In the same way as for the Baseline Closure Analysis, a facility was judged likely to close as a result of regulation only if the facility fails both the After-Tax Cash Flow Test and the Liquidation Value and Going-Concern Value Comparison Test. The requirement to fail both tests again rests on the logic that negative cash flow provides the impetus for considering facility closure to avoid future losses and the excess of liquidation value over going concern value provides the reward for doing so.

The analysis of post-compliance facility closures was undertaken for the sample facilities that were not assessed as baseline closures. These results were then extrapolated to the facility population using sample weights. As discussed above, facility closure is considered a severe economic impact as all employment and production from the facility is assumed to be lost as a result of closure. Moreover, for this analysis, none of the production or employment losses were assumed to be offset by possible increases in MP&M production activity at other facilities that remain in production. Thus, the assumption of full loss of employment and production in closing facilities is conservative and overstates possible employment and production impacts.

c. Analysis of Financial Stress Short of Closure

The analysis of Financial Stress Short of Closure identifies facilities whose financial condition is so weak as to imply difficulty in financing the treatment system investments for compliance with an MP&M effluent guideline. This analysis was undertaken only for those facilities that passed the preceding Facility Closure analysis. Facilities that fail the Financial Stress analysis were judged as likely to experience a financial impact that is less severe than closure as the result of efforts to comply with an MP&M effluent guideline. However, they would be expected to incur significant financial stress from undertaking compliance-related investments and/or incurring the operating cost burdens of compliance. Financing assistance might be required from the parent firm or through an equity infusion or other financial restructuring. These facilities or firms are projected to become among the poorer, but still viable, financial performers in an industry. Although they are not projected to fail or otherwise terminate operations directly because of compliance requirements, the deterioration in their financial performance would presumably leave them at greater risk of failure from other factors in their business environment.

The analysis of Financial Stress Short of Closure was based on two tests of financial performance and condition calculated at the facility level. The measures of financial performance and condition—pre-tax return on assets and interest coverage ratio—are among the more important criteria reviewed by creditors and equity investors in determining whether and under what terms to provide financing to a firm. These measures also provide insight into the ability of firms to generate funds for compliance investments from internally generated equity—that is, from after-tax cash flow. The basis for evaluating these measures was by comparison of the facility values with industry norms obtained from secondary sources.

The analyses of pre-tax return on assets (ROA) and interest coverage ratio (ICR) were performed by first calculating ROA and ICR values for facilities independent of the financial effects of complying with an effluent guideline. The ROA and ICR values were then adjusted to reflect the expected changes in facility finances resulting from installing and operating the pollution prevention and treatment systems needed for effluent guidelines compliance. As a result of the

compliance-related outlays, if a facility's ROA *or* ICR fell below industry norms, the facility was judged likely to incur a moderate impact (i.e., financial stress short of closure) as a result of regulatory compliance. The industry norms for evaluating ROA and ICR were developed from data reported in Robert Morris Associates Annual Statement Summaries (RMA).[6] Specifically, facility ROA and ICR values were compared with the lowest quartile (i.e., 25th percentile) value for the respective financial measures as calculated from RMA data for the relevant industries over the period 1985–1992.

TABLE 4.—SUMMARY OF FACILITY IMPACT METHODOLOGY

Impact category	Description	Analysis	Significance of negative finding
1. Baseline Closure	Identifies facilities that are in jeopardy of financial failure regardless of the promulgation of effluent guidelines.	Two tests: 1. After-tax cash flow negative? *and* 2. Liquidation value exceed going concern value?	Facilities failing *both* tests are considered a baseline closure and excluded from subsequent analyses.
2. Post-Compliance Closure	Identifies facilities that are likely to close instead of implementing the pollution prevention and treatment systems needed for effluent guidelines compliance.	Two tests: 1. *Post-compliance* after-tax cash flow negative? *and* 2. Liquidation value exceed post-compliance going concern value?	Facilities failing *both* tests are projected to close as the result of regulation, a severe economic impact.
3. Financial Stress Short of Closure.	Identifies facilities with limited ability to finance the pollution prevention and treatment systems needed for effluent guidelines compliance.	Two tests: 1. Decline in pre-tax ROA to a level that jeopardizes access to financing? *or* 2. Decline in ICR to a level that jeopardizes access to financing?	Facilities failing *either* test are likely to experience financial weakness as the result of regulation, a moderate economic impact.

E. Estimated Facility Economic Impacts

The findings from the facility impact analysis are summarized below.

1. Baseline Closure Analysis

The estimated baseline closures for both indirect and direct discharge facilities are summarized in Table 5. Of the estimated 10,601 discharging facilities, 13.9 percent or 1,471 facilities were assessed as baseline closures from the financial analyses outlined above. The 1,471 baseline closures include 1,413 indirect dischargers, or 16.2 percent of indirect dischargers, and 58 direct dischargers, or 3.1 percent of direct dischargers. The facilities estimated to close in the baseline analysis are in jeopardy of financial failure independent of the promulgation of the MP&M regulation. The estimated baseline closures are removed from the subsequent post-compliance analysis of regulatory impacts.

TABLE 5.—SUMMARY OF BASELINE CLOSURE ANALYSIS

	Total	Indirect dischargers	Direct dischargers
Facilities in Analysis (dischargers only) ...	10,601 100.0%	8,706 82.1%	1,895 17.9%
Baseline Failures (percent failing in class)	1,471 13.9%	1,413 16.2%	58 3.1%
Facilities in Analysis (percent in class)	9,130 86.1%	7,293 83.8%	1,837 96.9%

2. Post-Compliance Impact Analysis

The findings from the Post-Compliance Impact Analyses are summarized below. Findings are presented first for the PSES options considered for indirect discharging facilities, and then for the BAT/BPT options considered for direct discharging facilities. A third section presents aggregate findings for the proposed PSES and BAT/BPT options for both discharger classes. In each discussion, findings in terms of estimated facility closure and lost employment and production are presented for both the highly unlikely zero-cost-pass-through case and the more realistic partial-cost-pass-through case. The expected impacts of compliance in terms of estimated total capital cost and total annual costs are also summarized. In addition, the numbers of facilities expected to incur moderate impacts are discussed.

a. Indirect Dischargers

For indirect discharging facilities, EPA analyzed the impacts of five possible PSES regulatory options—Options 1, 2, 3, 1a, and 2a—as discussed in Section XIV.C., above, and as described in Section XII of the technical discussion. Of the options considered, EPA is proposing Option 2a as the preferred PSES regulatory option. As discussed in Section XII, Option 2a embodies best available technology for reducing the industry's effluent discharges. In addition, EPA estimates that Option 2a will impose very modest economic impacts and is thus economically achievable. The estimated facility-level impacts associated with each of the regulatory options are discussed below and presented in Table 6. The discussion first reviews the impact findings for the three PSES options that EPA initially evaluated for proposal: Options 1, 2, and 3. The discussion then reviews the impact findings for the two PSES options that were subsequently developed: Option 1a and the PSES proposal, Option 2a. As described previously, Option 1a applies the requirements of Option 1 *or* Option 2 to facilities based on whether facilities are ''low'' flow (i.e., discharge volume of less than 1,000,000 gallons per year) or ''large'' flow (i.e., discharge volume of at least 1,000,000 gallons per year), while

[6] RMA provides financial statistics based on bank credit reports from public-reporting and non-public-reporting firms in a variety of industries.

Option 2a applies the requirements of Option 2 to only ''large'' flow facilities.

i. Impacts of Option 1: Lime and Settle Treatment

Zero-Cost-Pass-Through Analysis

Of the 7,293 indirect discharging facilities subject to regulation, EPA estimates that 161 facilities or 2.2 percent could be expected to close as the result of the Option 1 regulation. The employment and shipments losses associated with these facility closures are estimated at 3,001 full-time equivalent (FTE) positions and $370 million, respectively (all amounts in 1994 dollars). The estimated employment and shipments losses amount to 0.14 percent and 0.08 percent, respectively, of the total values for indirect discharging facilities *that pass the baseline closure analysis* and are thus the basis for the post-compliance analysis. The estimates of possible facility closures and associated losses in employment and shipments are probably substantial overestimates because of the assumption of zero-cost-pass-through and because the analysis does not account for the likelihood that non-closing facilities will absorb some of the lost production and employment from closing facilities. In addition to the facility closure impacts, another 42 facilities would be expected to incur financial stress short of closure, a moderate economic impact, under Option 1. EPA estimates that industry would incur capital costs of $276 million for complying with Option 1. The estimated total annualized, after-tax cash cost to industry, which reflects private costs of capital and expected tax treatment of capital outlays and annual expenses, amounts to $202 million.

TABLE 6.—ESTIMATED IMPACTS OF REGULATORY COMPLIANCE, INDIRECT DISCHARGERS

[Dollar values in $000, 1994]

	Options initially considered for proposal			Subsequent options	
	Option 1	Option 2	Option 3	Option 1a	Option 2a
Facilities in Analysis	7,293	7,293	7,293	7,293	1,792
Severe Impacts (closing facilities) Zero-Cost-Pass-Through Analysis (unrealistic worst case)					
Number of Facilities	161	151	227	151	7
Percent of Class	2.20%	2.07%	3.11%	2.07%	0.39%
Employment (FTEs)	3,001	2,354	18,215	2,354	540
Value of Shipments	$369,997	$235,852	$2,350,346	$235,852	$133,678
Moderate Impacts (financial stress short of closure)					
Number of Facilities	42	124	184	54	12
Financial Impacts on Complying Facilities:					
Capital Cost	$275,798	$436,293	$1,174,721	$437,209	$350,853
Total Annual Compliance Cost:					
Tax-adjusted*	$202,115	$213,530	$615,530	$208,639	$142,467
No adjustments†	$271,020	$267,544	$783,691	$259,994	$171,134
Severe Impacts (closing facilities) Partial-Cost-Pass-Through Analysis					
Number of Facilities	91	52	160	82	7
Percent of Class	1.25%	0.72%	2.20%	1.12%	0.39%
Employment (FTEs)	1,714	892	7,710	1,068	540
Value of Shipments	$325,896	$177,109	$858,207	$191,751	$133,678
Moderate Impacts (financial stress short of closure)					
Number of Facilities	0	41	66	12	12
Financial Impacts on Complying Facilities:					
Capital Cost	$279,029	$439,840	$1,195,482	$440,441	$350,853
Total Annual Compliance Cost:					
Tax-adjusted*	$203,647	$215,274	$629,618	$210,171	$142,467
No adjustments†	$272,914	$269,717	$802,156	$261,888	$171,134

*''Tax-adjusted'' compliance costs are an estimate of the annual cash compliance cost *to industry* and reflect private costs of capital and expected tax treatment of capital outlays and annual expenses.

†Compliance costs with ''No adjustments'' are an estimate of the total annual cost of compliance without tax adjustments and with capital costs annualized on the basis of a real social discount rate.

Partial-Cost-Pass-Through Analysis

The more realistic, partial-cost-pass-through analysis shows fewer impacts under Option 1. Among indirect dischargers, 91 facilities or 1.3 percent would be expected to close as a result of such regulation and no additional facilities are expected to incur moderate economic impacts. Employment and shipments losses associated with closing facilities are estimated at 1,714 FTEs (0.08 percent of total for indirect discharging facilities in the post-compliance analysis) and $326 million (0.07 percent of total) respectively. Because additional facilities are expected to come into compliance (instead of closing) under the partial-cost-pass-through analysis, the costs of compliance are estimated to be modestly higher. Total capital costs of compliance are estimated at $279 million and total annualized

compliance costs are estimated at $204 million, tax-adjusted.

ii. Impacts of Option 2: In-Process Flow Reduction and Pollution Prevention and Lime and Settle Treatment

Zero-Cost-Pass-Through Analysis

Under Option 2, EPA estimates that 151 facilities or 2.1 percent could be expected to close as the result of regulation. The employment and shipments losses associated with these facility closures are conservatively estimated at 2,354 FTEs (0.11 percent of total) and $236 million (0.05 percent of total), respectively. In addition to the facility closure impacts, another 124 facilities are expected to incur financial stress short of closure because of regulation. EPA estimates that industry will incur capital costs of $436 million for complying with Option 2. The estimated total annualized, after-tax cash cost to industry, which reflects private costs of capital and expected tax treatment of capital outlays and annual expenses, amounts to $214 million.

Partial-Cost-Pass-Through Analysis

Under the more realistic, partial-cost-pass-through analysis, 52 facilities or 0.7 percent of indirect dischargers passing the baseline analysis are expected to close as a result of regulation and another 41 facilities are expected to incur moderate economic impacts. Employment and shipments losses associated with closing facilities are estimated at 892 FTEs (0.04 percent of total) and $177 million (0.04 percent of total) respectively. Total capital costs of compliance are estimated at $440 million and total annualized compliance costs are estimated at $215 million, tax-adjusted.

iii. Impacts of Option 3: Advanced End-of-Pipe Treatment

Zero-Cost-Pass-Through Analysis

Impacts under Option 3 are estimated to be markedly higher than those for Options 1 or 2. Under Option 3, EPA estimates that 227 facilities or 3.1 percent could be expected to close as the result of regulation. The employment and shipments losses associated with these facility closures are conservatively estimated at 18,215 FTEs (0.87 percent of total) and $2,350 million (0.52 percent of total), respectively. In addition to the facility closure impacts, another 184 facilities are expected to incur financial stress short of closure because of regulation, again considerably higher than for the other options considered. Compliance costs are also considerably higher for Option 3. EPA estimates that industry will incur capital costs of $1,175 million for complying with Option 3. The estimated total annualized, after-tax cash cost to industry, which reflects private costs of capital and expected tax treatment of capital outlays and annual expenses, amounts to $616 million.

Partial-Cost-Pass-Through Analysis

Although impacts are moderated under the more realistic partial-cost-pass-through analysis (in relation to the zero-cost-pass-through analysis), they still remain considerably higher than the impacts estimated for the other options. Among indirect dischargers, 160 facilities or 2.2 percent of facilities passing the baseline analysis are expected to close as a result of regulation and another 66 facilities are expected to incur moderate economic impacts. Employment and shipments losses associated with closing facilities are estimated at 7,710 FTEs and $858 million respectively. Total capital costs of compliance are estimated at $1,195 million and total annualized compliance costs are estimated at $630 million, tax-adjusted.

iv. Impacts of Option 1a: Tiered PSES for ''Low'' Flow and ''Large'' Flow Sites

Zero-Cost-Pass-Through Analysis

Under Option 1a, which applies the limitations of Option 1 or Option 2 based on facility discharge volume, EPA estimates that 151 facilities or 2.1 percent could be expected to close as the result of regulation. The employment and shipments losses associated with these facility closures are conservatively estimated at 2,354 FTEs (0.11 percent of total) and $236 million (0.05 percent of total), respectively. All these values are the same as estimated for Option 2. Under Option 1a, 54 facilities are expected to incur financial stress short of closure, a moderate economic impact. EPA estimates that industry will incur capital costs of $437 million for complying with Option 1a, or very slightly greater than for Option 2. However, the estimated total annualized, after-tax cash cost to industry, which reflects private costs of capital and expected tax treatment of capital outlays and annual expenses, amounts to $209 million, which is about $5 million less than estimated for Option 2.

Partial-Cost-Pass-Through Analysis

The more realistic, partial-cost-pass-through analysis again shows fewer impacts than the zero-cost-pass-through analysis. Among indirect dischargers, 82 facilities or 1.1 percent are expected to close as a result of regulation and only 12 facilities are expected to incur moderate economic impacts. Employment and shipments losses associated with closing facilities are estimated at 1,068 FTEs (0.05 percent of total) and $192 million (0.04 percent of total), respectively. Total capital costs of compliance are estimated at $440 million and total annualized compliance costs are estimated at $210 million, tax-adjusted.

v. Impacts of Option 2a: In-Process Flow Reduction and Pollution Prevention and Lime and Settle Treatment for ''Large'' Flow Sites

Zero-Cost-Pass-Through Analysis

Among the five PSES options that EPA analyzed, the proposed Option 2a, which applies the limitations of Option 2 to large flow facilities and exempts low flow facilities from regulation, achieves the lowest impacts in terms of facility closures, employment losses, and financial burdens. Under Option 2a, EPA estimates that a minimal number of facilities—7—would be expected to close as the result of regulation. These 7 facilities represent 0.1 percent of the 7,293 indirect discharge facilities found to pass the baseline closure analysis and 0.4 percent of the 1,792 indirect discharge facilities that both have a discharge volume of at least 1,000,000 gallons per year and pass the baseline closure analysis. The employment and shipments losses associated with these facility closures are conservatively estimated at 540 FTEs (0.03 percent of total) and $134 million (0.03 percent of total), respectively. In addition to the facility closure impacts, 12 facilities are expected to incur financial stress short of closure because of regulation. EPA estimates that industry will incur capital costs of $351 million to comply with Option 2a. The estimated total annualized, after-tax cash cost to industry, which reflects private costs of capital and expected tax treatment of capital outlays and annual expenses, amounts to $142 million.

Partial-Cost-Pass-Through Analysis

The estimated impacts of Option 2a under the partial-cost-pass-through case are the same as the already modest values estimated for the zero-cost-pass-through case. The estimated closure and financial impact values remain the lowest among the five PSES options analyzed for indirect discharging facilities.

b. Direct Dischargers

For direct discharging facilities, EPA analyzed the impacts of three possible

BAT/BPT regulatory options—Options 1, 2, and 3—as previously described. Of these options, EPA is proposing Option 2 because, as discussed above, it represents the performance achievable with the best available technology and, in view of its comparatively modest economic impacts, is economically achievable. The estimated facility-level impacts associated with each of the regulatory options are discussed below and presented in Table 7. For direct dischargers, EPA estimated the same level of facility closure and compliance cost impacts under both the zero-cost-pass-through and partial-cost-pass-through analyses. Thus, these results for these two cases are not presented separately. The estimated moderate impacts—that is, financial stress short of closure—did vary between the two cost pass-through cases and these differences are noted in the summary table and accompanying discussion.

i. Impacts of Option 1: Lime and Settle Treatment

Of the 1,837 direct discharging facilities subject to regulation, EPA estimates that 18 facilities or 1.0 percent could be expected to close as the result of regulation. The employment and shipments losses associated with these facility closures are estimated at 158 FTEs (0.03 percent of total employment for direct discharging facilities passing the baseline closure analysis) and $6 million (0.01 percent of total shipments for direct discharging facilities passing the baseline closure analysis), respectively. As noted above, the estimates of possible facility closures and associated losses in employment and shipments overstate likely impacts because the analysis does not account for the likelihood that non-closing facilities will absorb some of the lost production and employment from closing facilities. Under the zero-cost-pass-through analysis, an additional 6 facilities are expected to incur financial stress short of closure because of regulation, a moderate economic impact; no facilities are estimated to incur moderate economic impacts under the partial-cost-pass-through case. EPA estimates that industry will incur capital costs of $47 million for complying with Option 1. The estimated total annualized, after-tax cash cost to industry, which reflects private costs of capital and expected treatment of capital outlays and annual expenses, amounts to $16 million.

TABLE 7.—ESTIMATED IMPACTS OF REGULATORY COMPLIANCE, DIRECT DISCHARGERS

[Dollar values in $000, 1994]

	Option 1	Option 2	Option 3
Facilities in Analysis	1,837	1,837	1,837
Severe Impacts (closing facilities) Zero-Cost-Pass-Through and Partial-Cost-Pass-Through Analyses (same results)			
Number of Facilities	18	18	90
Percent of Class	0.96%	0.96%	4.92%
Employment (FTEs)	158	158	7,339
Value of Shipments	$6,161	$6,161	$883,577
Moderate Impacts (financial stress short of closure)			
Zero-Cost-Pass-Through			
Number of Facilities	6	0	0
Partial-Cost-Pass-Through			
Number of Facilities	0	0	0
Financial Impacts on Complying Facilities Zero-Cost-Pass-Through and Partial-Cost-Pass-Through Analyses (same results)			
Capital Cost	$47,363	$63,269	$127,369
Total Annual Compliance Cost:			
Tax-adjusted*	$16,297	$18,136	$63,979
No adjustments†	$18,181	$19,137	$80,523

*''Tax-adjusted'' compliance costs are an estimate of the annual cash compliance cost *to industry* and reflect private costs of capital and expected tax treatment of capital outlays and annual expenses.

† Compliance costs with ''No adjustments'' are an estimate of the total annual cost of compliance without tax adjustments and with capital costs annualized on the basis of a real social discount rate.

ii. Impacts of Option 2: In-Process Flow Reduction and Pollution Prevention and Lime and Settle Treatment

Under the proposed Option 2, EPA estimated the same level of facility closures and associated impacts as for Option 1; however, moderate facility impacts are modestly lower and compliance costs are modestly higher. Closing facilities are estimated at 18 facilities or 1.0 percent of direct dischargers passing the baseline analysis. Associated employment and shipments losses are again estimated at 158 FTEs (0.03 percent of total) and $6 million (0.01 percent of total), respectively. In both the zero-cost-pass-through and partial-cost-pass-through analyses, no additional facilities were assessed as likely to incur financial stress short of closure. EPA estimates that industry will incur capital costs of $63 million for complying with Option 2. The estimated total annualized, after-tax cash cost to industry, which reflects private costs of capital and expected tax treatment of capital outlays and annual expenses, amounts to $18 million.

iii. Impacts of Option 3: Advanced End-of-Pipe Treatment

In a similar way as for indirect dischargers, impacts under Option 3 for direct dischargers are estimated to be markedly higher than those for Options 1 and 2. Under Option 3, EPA estimates that 90 facilities or 4.9 percent of direct

dischargers passing the baseline analysis could be expected to close as the result of regulation. The employment and shipments losses associated with these facility closures are conservatively estimated at 7,339 FTEs (1.24 percent of total) and $884 million (1.26 percent of total), respectively. In both the zero-cost-pass-through and partial-cost-pass-through analyses, no additional facilities were assessed as likely to incur financial stress short of closure, the same result as estimated for Option 2. Compliance costs are estimated to be considerably higher for Option 3 than for Options 1 and 2. EPA estimates that industry will incur capital costs of $127 million for complying with Option 3. The estimated total annualized, after-tax cash cost to industry, which reflects private costs of capital and expected tax treatment of capital outlays and annual expenses, amounts to $64 million.

c. Aggregate Impacts for the Combined Regulatory Proposal for Existing Facilities: Option 2a for Indirect Discharging Facilities and Option 2 for Direct Discharging Facilities

Aggregate impacts for both indirect and direct discharging facilities are summarized in Table 8, below, for the proposed regulatory options applicable to existing facilities: Option 2a for indirect dischargers (PSES) and Option 2 for direct dischargers (BAT/BPT).

Overall, 3,629 facilities passed the Baseline Closure analysis (1,837 direct discharging facilities and 1,792—large flow—indirect discharging facilities) and thus are expected to be subject to regulation. Of this population, 25 facilities or 0.7 percent are expected to close as a result of regulation in both the zero-cost-pass through and partial-cost-pass-through analyses.[7] The total associated employment impact amounts to 698 FTEs (0.03 percent of the total employment in facilities passing the baseline analysis and thus potentially subject to regulation) and the associated value of lost shipments amounts to $140 million (0.03 percent of the total shipments in facilities passing the baseline analysis and thus potentially subject to regulation).[8] In addition to the estimated closure impacts, a modest 12 facilities are expected to encounter financial stress short of closure as a result of the proposed regulation. Summed over both indirect and direct discharging facilities, the total capital costs of compliance amount to $414 million. Total annualized costs of compliance are estimated at $161 million, when calculated on an after-tax basis using private costs of capital.

TABLE 8.—ESTIMATED AGGREGATE IMPACTS OF REGULATORY COMPLIANCE-PROPOSED REGULATORY OPTIONS 2A AND 2 FOR INDIRECT AND DIRECT DISCHARGERS

[Dollar values in $000, 1994]

	Option 2a (indirect dischargers)	Option 2 (direct dischargers)	Sum for both classes of facilities
Facilities in Analysis	1,792	1,837	3,629
Severe Impacts (closing facilities) Zero-Cost-Pass-Through and Partial-Cost-Pass-Through Analysis			
Number of Facilities	7	18	25
Percent of Class	0.39%	0.96%	0.69%
Employment (FTEs)	540	158	698
Value of Shipments	$133,678	$6,161	$139,839
Moderate Impacts (financial stress short of closure)			
Number of Facilities	12	0	12
Financial Impacts in Complying Facilities:			
Capital Cost	$350,853	$63,269	$414,122
Total Annual Compliance Cost:			
Tax-adjusted	$142,467	$18,136	$160,602
No adjustments†	$171,134	$19,137	$190,270

*''Tax-adjusted'' compliance costs are an estimate of the annual cash compliance cost to industry and reflect private costs of capital and expected tax treatment of capital outlays and annual expenses.

†Compliance costs with ''No adjustments'' are an estimate of the total annual cost of compliance without tax adjustments and with capital costs annualized on the basis of a real social discount rate.

F. Labor Requirements and Possible Employment Benefits of Regulatory Compliance

Firms will need to install and operate compliance systems to comply with an effluent limitations guideline for the MP&M industry. The manufacture, installation, and operation of these systems will require use of labor resources. To the extent that these labor needs translate into employment increases in affected firms, a MP&M rule has the potential to generate employment benefits. If realized, these employment benefits may partially offset the employment losses that are expected to occur in facilities impacted by the rule. The employment effects that would occur in the manufacture, installation, and operation of treatment systems are termed the ''direct'' employment benefits of the rule. Because these employment effects are directly attributable to the MP&M rule, they are conceptually parallel to the employment losses that were estimated for the facilities that are expected to incur significant impacts as a result of the MP&M rule.

In addition to direct employment benefits, the MP&M rule may generate other employment benefits through two mechanisms. First, employment effects

[7] The impact analysis results for Option 2a/2 are the same throughout for both the zero-cost-pass-through and partial-cost-pass-through cases.

[8] An analysis of possible employment increases that may partially offset these losses is presented in the next section.

may occur in the industries that are linked to the industries that manufacture and install compliance equipment; these effects are termed ''indirect'' employment benefits. For example, a firm that manufactures the pumps, piping and other hardware that comprise a treatment system will purchase intermediate goods and services from other firms and sectors of the economy. Thus, increased economic activity in the firm that manufacturers the treatment system components has the potential to increase activity and employment in these linked firms and sectors. Second, the increased payments to labor in the directly and indirectly affected industries will lead to increased purchases from consumer-oriented service and retail businesses, which in turn lead to additional labor demand and employment benefits in those businesses. These effects are termed ''induced'' employment benefits.

In view of these possible employment benefits, EPA estimated the labor requirements associated with compliance with the proposed MP&M Phase I regulatory option: Option 2a for indirect dischargers and Option 2 for direct dischargers. Labor requirements—and thus the possible employment benefits— were estimated in two steps. EPA first estimated the direct employment effects associated with the manufacture, installation, and operation of compliance equipment. Second, EPA considered the additional employment effects that might occur through the indirect and induced effect mechanisms outlined above.

1. Direct Labor Requirements of Complying With the Proposed Regulation

EPA separately analyzed each component of the direct labor requirements: manufacturing, installing, and operating compliance equipment. The analysis is based on the compliance cost estimates developed for the economic impact analysis of the MP&M regulation. Compliance requirements and associated costs were estimated for each facility in the Survey that was assessed as incurring costs. For the labor requirements analysis, compliance costs and their associated labor requirements were considered only for those facilities that were not assessed as a baseline or compliance related closure. That is, the analysis considered the labor requirement effects associated only with those facilities that, upon compliance with the rule, would be likely to continue MP&M production activities.

EPA estimated the direct labor requirements for manufacturing and installing compliance equipment based on the cost of the equipment and its installation, and labor's expected share of cost in manufacturing and installing the equipment. The labor input was estimated in dollars based on information contained in the National Input-Output Tables assembled by the Bureau of Economic Analysis in the Department of Commerce. In particular, the direct requirements matrix identifies the value of each input, including labor, that is required to produce a one dollar value of output for a subject industry. The industries in the input-output tables that were used as the basis for this analysis are: the Heating, Plumbing, and Fabricated Structural Metal Products Industry (Bureau of Economic Analysis industry classification 40) for compliance equipment manufacturing; and the Repair and Maintenance Construction Industry (Bureau of Economic Analysis industry classification 12) for compliance equipment installation. The dollar value of labor's contribution was converted to a full-time employment equivalent based on a yearly labor cost of $56,244 in 1994 dollars (including benefits and payroll taxes). Because compliance equipment purchase and installation are considered one-time outlays, the labor requirements for these activities were annualized over a 15-year period at the seven percent social discount rate.

For the analysis of the labor required to operate compliance equipment, EPA used the estimates of annual labor hours that were developed as the basis for assessing the annual operating and maintenance costs of the MP&M regulatory options.

From these analyses, EPA estimated an annual direct labor requirement of 1,594 full-time equivalent positions (FTEs) for complying with the combined regulatory proposal for existing facilities: Option 2a for indirect dischargers and Option 2 for direct dischargers (Option 2a/2). Of this total, the annualized labor requirements for manufacturing and installing compliance equipment are 187 and 85 FTEs, respectively. Compliance equipment operation is estimated to require 1,322 FTEs annually. The corresponding annual estimated payments to labor is $89,664,000 (1994 dollars) (see Table 9).

TABLE 9.—ANALYSIS OF POSSIBLE EMPLOYMENT GENERATION EFFECTS OF PROPOSED REGULATORY OPTIONS FOR THE MP&M INDUSTRY

[All dollar amounts in thousands of 1994 dollars]

	Total weighted expenditures	Labor cost share of production value [1]	Labor cost component		Direct labor requirements [3]	
			One-time basis	Annual basis [2]	One-time basis	Annual basis
Option 2a for Indirect Dischargers and Option 2 for Direct Dischargers						
Direct Labor Effects From Compliance Equipment:						
Manufacturing	$308,981	31.02%	$95,833	$10,522	1,704	187
Installation	$102,994	42.23%	$43,497	$4,776	773	85
Operation	.....	.....	.....	$74,367	.....	1,322
Total Direct Labor Effects	.....	.....	.....	$89,664	.....	1,594

[1] Source: U.S. Department of Commerce, *The 1982 Benchmark Input-Output Accounts of the United States,* December 1991. The labor cost share of production value for compliance equipment manufacturing is based on the input-output composition of the Heating, Plumbing, and Fabricated Structural Metal Products Industry (Bureau of Economic Analysis industry classification 40). The labor share of production value for compliance equipment installation is based on information for the Repair and Maintenance Construction Industry (Bureau of Economic Analysis industry classification 12).

[2] Annualized over 15 years at the social discount rate of 7 percent.

[3] Number of jobs calculated on the basis of an average hourly labor cost of $24.00 ($1989) and 2,000 hours per labor-year. The annual labor cost of $48,000 ($1989) was brought forward as $56,244 for 1994.

2. Indirect and Induced Labor Requirements of Complying With the MP&M Rule

In addition to its direct labor effects, an MP&M effluent guideline may also generate labor requirements through the indirect and induced effect mechanisms described above. EPA assessed the indirect and induced employment effects of the proposed regulatory options by use of multipliers that relate aggregate economic effects, including indirect and induced effects, to direct economic effects. Using a range of multipliers from previous studies of the aggregate employment effects of general water treatment and pollution control expenditures, EPA estimated that the total labor requirement effect would range from 3,900 to 6,400 FTEs for the proposed Option 2a/2 . The lower end of this range reflects the use of lower multiplier values and conservative assumptions regarding effects on economic activity in industries linked to the MP&M industry. The higher end of the range reflects the higher multiplier values and assumes full incurrence of indirect economic effects in industries linked to the MP&M industry.

G. Community Impacts

EPA expects that the employment losses resulting from MP&M facility closures will not have a significant impact on the national economy. However, employment losses may be significant at the local level if facility closures are concentrated regionally or if they occur in smaller communities. Therefore, EPA examined the community level employment impacts that may result from the proposed regulatory options for the MP&M industry. Community impacts were assessed by estimating the expected change in employment in communities with MP&M facilities that are affected by regulation. Possible community employment effects include the lost employment in facilities that are expected to close because of regulation, and related employment losses in other businesses in the affected community. These employment losses are considered significant if they are expected to exceed one percent of the pre-regulation level of employment in the affected communities. For such comparisons, a community is generally defined as the area in which employees may reasonably commute to work—typically a Metropolitan Statistical Area (MSA), or county if the affected community is not contained within a MSA.

To understand the significance of community employment impacts from the proposed regulation, Option 2a/2, EPA performed two analyses of expected community employment impacts. First, EPA examined the community employment impacts based on the known location of the sample facility closures estimated to result from each of the proposed regulatory options. Because the location of these sample facilities is known, it is possible to compare the expected employment loss from closure, including losses in related businesses, with the pre-regulation employment in the affected community, defined as either the MSA or the county in which the sample facility closure is located. This analysis directly tests the significance of employment losses in the communities in which the estimated closing sample facilities are located.

Second, EPA examined the significance of expected facility closures taking into account the employment losses from the closing facilities in the underlying facility population that are represented by the sample facility closures. Because the locations of these non-sample closing facilities are not known, it was not possible to measure the significance of the associated employment losses in specific communities. Instead, EPA distributed these employment losses among states and assessed their significance at the state level, taking into account the estimated job losses in both MP&M facilities and in related businesses.

In addition to these analyses of the impact of employment losses, EPA also considered the effect of possible employment gains as discussed in the preceding section at the state level. Specifically, EPA distributed the possible employment gains among states and calculated a net potential employment impact by state taking into account the expected effect of both facility closures and labor demands from compliance-related outlays.

1. Assessment of Community Impacts for Estimated Sample Facility Closures

To assess the significance of facility closures and associated employment losses in specific communities, EPA compared the employment loss from estimated sample facility closures, including losses in related businesses, to the pre-regulation level of employment in the communities in which the sample facilities are located.

For the proposed Option 2a/2 (Option 2a for indirect dischargers and Option 2 for direct dischargers), the facility closure analysis indicated that three sample facilities would be expected to close as a result of regulation. Two of the three sample facilities are located in California: 1 in Merced County, 1 in the Los Angeles-Long Beach MSA. The third facility is located in Virginia, in the Norfolk-Virginia Beach-Newport News MSA. The total of employment losses in these sample facilities amounts to 168 FTEs, or an average of 56 FTEs per closing sample facility (see Table 10).

TABLE 10.—COMMUNITY EMPLOYMENT IMPACTS IN ESTIMATED SAMPLE CLOSING FACILITIES

MSA or county	Pre-regulation employment	Facilities affected		MP&M state multiplier	Total employment loss in MSA	
		Number	Empl. (FTEs)		FTEs	As % of pre-regulation employment
Los Angeles-Long Beach	4,173,000	1	97	2.72	264	0.01%
Merced County	64,617	1	62	2.72	169	0.26%
Norfolk-Virginia Beach-Newport News	594,463	1	9	2.27	20	0.00%

Source: U.S. Environmental Protection Agency.

In addition to the primary employment losses (i.e., those that occur in the estimated MP&M facility closures), employment losses may also occur through the secondary impact mechanism. Such secondary employment losses may occur in: (1) Industries that are economically linked to MP&M industries and (2) consumer businesses whose employment is affected by changes in the earnings and expenditures of the employees in the directly and indirectly affected industries. To assess these secondary employment losses, EPA calculated

state-specific, composite MP&M employment multipliers that are based on the estimated relationship of employment in MP&M industry sectors to total state employment, and the composition of employment within a state among the seven MP&M Phase I sectors. These state-specific composite employment multipliers were calculated from Regional Input-Output Modeling System (RIMS) multipliers developed by the Bureau of Economic Analysis (BEA) within the Department of Commerce.

To calculate the expected total employment loss (i.e., considering both primary and secondary employment impacts) in the communities in which estimated sample facility closures are located, EPA multiplied the employment loss in the estimated sample facility closures by the composite multiplier for the particular state. The total losses by MSA ranged from 20 to 264 FTEs. To assess the significance of these losses, EPA compared the estimated total employment loss with the pre-regulation employment in the community, based on 1990 Census data. For the two facilities that are located in an MSA, the pre-regulation employment is the 1990 employment for the MSA. For the facility that is not located within a MSA, the pre-regulation employment is the 1990 civilian employment for the county in which the facility is located. This comparison indicated that none of the estimated sample facility closures would be expected to have a significant impact on total community employment. The largest of the percentage impacts is estimated for Merced County, California and amounts to 0.26 percent. The estimated impact in the Los Angeles-Long Beach MSA amounts to only 0.01 percent, while the impact in the Norfolk-Virginia Beach-Newport News MSA rounds to zero when calculated to the nearest hundredth of a percent (see Table 10).

2. Assessment of State-Level Employment Impacts

To capture the effect of employment losses in the non-sample facilities that are represented by the estimated sample facility closures, EPA performed a second analysis in which the employment loss in these non-sample facilities was distributed among states in proportion to pre-regulation levels of MP&M industry employment. Because the community locations of these non-sample, represented facilities is not known, it is not possible to analyze the impact of these employment losses in specific communities as defined by MSAs or counties.

In addition to the 168 FTE losses in the 3 sample facility closures, EPA estimated that another 530 FTE employment losses and 22 facility closures would occur in the underlying population that is represented by the sample facilities. EPA distributed these losses among states in proportion to each state's estimated MP&M Phase I sector employment as calculated from Department of Commerce employment data. To estimate the total employment loss by state (i.e., both primary and secondary losses), EPA multiplied the primary losses for each state by the state's composite employment impact multiplier as developed from BEA state- and industry-specific multipliers. The estimated loss by state averaged 36 FTEs and ranged from a low of zero to a high of 621; 32 states and the District of Columbia had a total estimated loss of less than 25 FTEs. Table 11 summarizes the estimated facility closures and associated primary and total employment losses for the 9 states in which the total employment loss is estimated to exceed 50 FTEs. To evaluate the significance of the estimated total employment loss by state, EPA compared the employment loss values with estimated total civilian employment for each state, as reported by the Department of Commerce for 1991.

From these calculations, the estimated total employment loss as a percent of total state employment rounds to zero when calculated to the nearest hundredth of a percent for all 50 states and the District of Columbia. The maximum estimated employment loss as a percentage of total state employment amounts to less than one-half of one-hundredth of one percent of total state employment (Table 12 lists the estimated employment loss results for the 10 states with the highest percentage impacts). Thus, on the basis of the findings from this and the preceding analysis, EPA expects that the proposed regulation for the MP&M industry will not cause significant employment impacts at the local level.

TABLE 11.—ESTIMATED FACILITY CLOSURES AND TOTAL EMPLOYMENT LOSSES FOR STATES WITH LARGEST TOTAL LOSS

State	Estimated total facility closures	Employment losses in facilities (FTEs)	Total employment loss (FTEs)
California	4.9	228	621
Ohio	1.6	38	116
Illinois	1.6	38	116
Pennsylvania	1.3	31	89
Texas	1.3	32	89
Michigan	1.1	27	74
New York	1.2	30	64
Wisconsin	0.8	20	53
Indiana	0.7	17	52

Loss in all other states is less than 50 FTEs.
Source: U.S. Environmental Protection Agency.

TABLE 12.—TOTAL EMPLOYMENT LOSS BY STATE, 10 STATES WITH HIGHEST PERCENTAGE LOSS

State	Estimated total facility closures	Employment loss in facilities (FTEs)	Total employment loss (FTEs)	Total state employment (1990)	Loss as a percent of total
California	4.9	228	621	13,714,000	0.005%
Ohio	1.6	38	116	5,094,000	0.002%
Wisconsin	0.8	20	53	2,453,000	0.002%
Connecticut	0.6	15	35	1,679,000	0.002%
Illinois	1.6	38	116	5,598,000	0.002%

TABLE 12.—TOTAL EMPLOYMENT LOSS BY STATE, 10 STATES WITH HIGHEST PERCENTAGE LOSS—Continued

State	Estimated total facility closures	Employment loss in facilities (FTEs)	Total employment loss (FTEs)	Total state employment (1990)	Loss as a percent of total
Indiana	0.7	17	52	2,632,000	0.002%
Michigan	1.1	27	74	4,125,000	0.002%
Pennsylvania	1.3	31	89	5,524,000	0.002%
Massachusetts	0.7	17	45	2,847,000	0.002%
New Hampshire	0.1	3	9	589,000	0.001%

Total percentage employment loss for all states rounds to zero at the nearest hundredth of a percent.
Source: U.S. Environmental Protection Agency.

3. Assessment of State-Level Employment Impacts Including Possible Employment Gains

As a final part of the analysis of community level employment impacts, EPA considered total state-level employment effects taking into account possible employment gains. Possible labor gains, as discussed in the previous section, were distributed by state in proportion to MP&M employment by state, and state-level employment multipliers were applied to these gains to estimate the total potential state-level employment gain. The multipliers used for this analysis were selected to correspond to the industries in which primary labor effects are expected to occur. These values were subtracted from the total employment loss values calculated in the preceding section to calculate a net employment loss by state, taking into account the possible employment gains from compliance-related activities.

The estimated employment gain values range from a low of zero for the District of Columbia, which has a very low estimated employment in MP&M industry activity, to a high of 552 for California, the state with the largest estimated MP&M industry employment. The average possible gain by state amounted to 81 FTEs. These values were subtracted from the estimated total loss values calculated in the preceding section to yield an estimated net employment loss by state for the proposed regulation. For all states but California, which has an estimated net employment loss of 69 FTEs, the estimated potential gain exceeds the estimated loss from facility closures (Table 13 summarizes these values for the 10 states with the highest estimated loss from facility closures). Thus, the potential employment gains associated with compliance activities could substantially offset the local employment losses expected to result from facility closures.

TABLE 13.—EMPLOYMENT LOSS AND POSSIBLE GAIN BY STATE, 10 STATES WITH HIGHEST ESTIMATED LOSS FROM FACILITY CLOSURES

State	Total loss from facility closures	Employment gain, primary impact only	Total gain with multiplier	Net employment loss
California	621	209	552	69
Ohio	116	115	345	(229)
Illinois	116	113	344	(228)
Pennsylvania	89	93	265	(176)
Texas	89	97	261	(171)
Michigan	74	82	222	(148)
New York	64	90	187	(124)
Wisconsin	53	59	155	(102)
Indiana	52	51	153	(101)
Massachusetts	45	52	130	(86)

Source: U.S. Environmental Protection Agency.

H. Impacts on Firms Owning MP&M Facilities

The assessment of economic achievability of the MP&M regulation is based primarily on the facility-level impact analysis. However, because the impacts at the level of the firm may exceed those assessed at the level of the facility, particularly when a firm owns more than one facility that will be subject to regulation, EPA also conducted a firm-level impact analysis for the MP&M regulation. The firm-level analysis estimates the impact of regulatory compliance on firms owning facilities subject to MP&M effluent guidelines.

Secondary financial sources and DCP responses provided income statement and balance sheet data for 255 firms that own 290 of the 396 sampled facilities. Sufficient data were not available to analyze compliance impacts on the parent firms of the remaining 106 facilities.

EPA conducted the firm-level impact analysis under the zero-cost-pass-through scenario. Because the DCP sample was not designed as a random sample of firms, but was instead directed toward estimating national characteristics of facilities, the DCP sample data used in this analysis is not sample weighted. The findings apply only to the firms that own sample facilities and do not represent national estimates of firm-level impacts.

EPA assessed firm-level impacts on the basis of changes in measures of profitability and interest coverage, as calculated from firm financial statements. These measures, Pre-Tax Return on Assets (ROA) and Interest Coverage Ratio (ICR), are the same as those used in the facility-level Analysis of Financial Stress Short of Closure. When applied at the level of the firm, these measures indicate the firm's ability to attract the capital needed for expansion in the normal course of business or for pollution control

investments associated with effluent guidelines compliance. EPA used the same thresholds of minimum financial performance for these two measures in the facility-level Financial Stress Short of Closure analysis. These thresholds are based on a weighted average of the first quartile values for ROA and ICR for the relevant MP&M industries as reported in the Robert Morris Associates publication *Annual Statement Studies.*

In the same way as for the facility closure analysis, EPA performed the firm-level analysis in two steps: (1) a baseline analysis, which evaluates the firm's financial condition independent of the costs of regulatory compliance; and (2) a post-compliance analysis, which accounts for the effects of compliance costs on the firm-level financial measures. In the baseline analysis, firms whose ROA or ICR were below the industry standards were considered financially weak independent of regulation and were eliminated from further analysis. Firms that pass both of the thresholds were subjected to a post-compliance test, in which their financial measures were changed to reflect the impact of the MP&M effluent guideline. Firms that failed either threshold post-compliance but pass both pre-compliance are expected to incur significant financial stress as a result of compliance with the regulation.

The firms consist of both single and multiple facility firms. In the case of single facility firms, the impact on each firm's ROA and ICR is identical to the impact calculated on the basis of the responding facility's financial statements and estimated compliance costs, alone. The impacts for single facility firms correspond to those calculated in the facility level analysis.

Analysis of firm impacts for multiple facility firms, however, involves aggregating and extrapolating financial and compliance cost data for sample facilities to the level of the firm. If all of a firm's revenues come from activities subject to the MP&M regulation, the impact of regulation on that firm will clearly be greater than the impact on a firm that participates minimally in activities subject to the MP&M regulation, all other things being equal. Similarly, a firm whose production is heavily concentrated in foreign facilities would also experience less significant impacts than firms primarily producing in the U.S. (i.e., with more facilities subject to the MP&M effluent guideline).

The analysis of firm-level impacts for multiple facility firms is made difficult because compliance-related information is available only for the sample facilities owned by these firms. That is, information is not available for the non-sample facilities owned by a firm in terms of whether or not those facilities would be subject to the MP&M regulation and, if so, the costs that they would incur to achieve compliance with the proposed regulation. Lacking this information, the firm-level analysis estimated impacts based on two scenarios that cover the full range of possible regulatory applicability to the non-sample facilities owned by a firm. The first scenario is based on the minimum applicability of the regulation and assumes that the sampled facilities are the only facilities that engage in activities subject to regulation in a firm. In this scenario, the firm level impact of the regulation is calculated by adjusting the firm-level financial measures for the compliance costs incurred by the firm's sampled facility(ies).

The second scenario is based on the maximum applicability of the regulation and assumes that all of a firm's activities are subject to regulation, whether associated with a sampled facility or not. In this scenario, EPA calculated a firm-level impact by extrapolating the estimated costs of compliance for the firm's sample facility(ies) to the level of the firm assuming that all of the firm's revenues are subject to regulation. Specifically, the compliance costs for the sample facility (or the sum of costs over facilities, for those firms owning more than one sample facility) were scaled upward by the ratio of firm revenue to the sum of sampled facility revenues. This method presumes a uniform relationship between compliance costs and revenue over all the facilities owned by a firm. EPA then used these estimated firm-level compliance costs under the scenario in which all revenue is subject to regulation to adjust the pre-compliance measures of financial performance.

Of the 255 firms analyzed, 73 firms, or slightly less than 29 percent, failed one or both of the firm financial tests pre-compliance and therefore failed the baseline firm-level impact analysis. These firms are assessed as being financially weak based on current circumstances and independent of the effects of the MP&M regulation. Of these 73 firms, 39 own facilities that were projected to close under the facility-level baseline closure test.

Of the 182 firms that pass the baseline firm financial test, only one failed either test under Option 2a/2, even under the conservative zero-cost-pass-through assumption (see Table 14). The single adversely affected firm is a single facility firm and accounts for less than 0.0001 percent of revenues earned by all 255 sampled firms in the firm-level impact analysis. These results are independent of the assumptions about the share of firm revenue subject to regulation. The minimum and maximum impact scenarios yielded identical results, in terms of financial test failures. From this analysis, EPA finds that firm-level impacts are not likely to be significant.

TABLE 14.—SUMMARY OF FIRM IMPACT ANALYSIS RESULTS

Number of Firms in Analysis	255
Baseline Failures	73
Incremental Post-Compliance Failures	1

Source: U.S. Environmental Protection Agency.

I. Foreign Trade Impacts

Products of the MP&M industry are traded internationally. Therefore, changes in domestic production resulting from effluent regulations may affect the balance of trade. In particular, some of the production from facilities estimated to close because of regulation may be replaced by foreign producers, thus changing the U.S. foreign trade balance. The foreign trade analysis examines the trade balance effects of Option 2a/2 under the zero-cost-pass-through assumption. This assumption is conservative in the sense that it projects the most post-compliance closures. Even under this assumption, EPA estimates that the MP&M industry will experience less than a 0.01 percent loss in its trade balance. Therefore, EPA finds that the proposed effluent guidelines will not have a significant adverse impact on the international trade status of the MP&M Phase I industry.

The foreign trade impact analysis identifies three scenarios that span the likely range of foreign trade responses to post-compliance closures. Each scenario describes a possible outcome of the competition between domestic and foreign producers to replace the production loss from closure of domestic facilities. The three scenarios are as follows:

1. Worst case. In the worst case scenario, all production for domestic consumption and for export by domestic facilities subject to post-compliance closure is replaced by foreign sources. Therefore, the net trade balance deteriorates by the total amount of production lost by post-compliance incremental closures.

2. Best case. In the best case scenario, all production for domestic consumption and for export by facilities subject to closure are replaced in full by production and exports from other

domestic facilities. The net trade balance is unaffected by regulation.

3. Proportional case. Domestic production of facilities subject to closure is replaced both by remaining domestic facilities and by foreign imports in the same proportions as the baseline ratio of imports and exports to the total domestic market. In this scenario, if, in the baseline case, imports accounted for half of the domestic market, then a closing facility's production for domestic sales would be replaced half by imports and half by other domestic producers. This scenario is meant to reflect the historical performance of the MP&M Phase I industries in competing with foreign producers for import and domestic markets.

In the foreign trade impact analysis, EPA assigned each sample facility that is expected to close—and its associated revenue—to one of the three scenarios, depending on the findings from two assessments of the facility's exposure to competition from foreign producers. The first assessment is based on sample facilities' responses to DCP questions concerning the magnitude and source of competition in various markets, including export and domestic markets. The second assessment is based on secondary source data provided by the Department of Commerce and used in the industry profile. This assessment considers the overall competitiveness of the MP&M industries in import and export markets, with respect to foreign competitors.

On the basis of the two assessments, facilities with significant exposure to foreign competition were assigned to the worst case trade impact scenario while facilities with little expected exposure to foreign competition were assigned to the best case trade impact scenario. Facilities with moderate exposure to foreign competition were assigned to the proportional case trade impact scenario.

After assigning each sample facility closure to a trade impact scenario, EPA allocated the export and import market revenues from estimated facility closures between foreign and domestic producers according to the rules for the three trade scenarios. The changes in exports and imports accruing from all incrementally closing facilities were multiplied by their sample weights and summed to yield an estimate of the aggregate impact on imports, exports and the trade balance resulting from promulgation of the effluent guideline.

Table 15 presents the results from the foreign trade impact analysis. As shown in the table, even under the conservative zero-cost-pass-through assumption, the proposed effluent guideline will have a negligible impact on U.S. imports, exports and the trade balance.

On the basis of sample-weighted national estimates, EPA estimates that exports will not be measurably affected by compliance with the proposed regulation, while imports are estimated to increase by approximately $5.3 million, or 0.01 percent of the 1991 imports of the MP&M Phase I industry commodities, according to Department of Commerce data. The net effect on the trade balance is therefore a decline of $5.3 million, or approximately 0.01 percent of the current trade balance in MP&M Phase I industry commodities.

TABLE 15.—MP&M PHASE I EFFLUENT GUIDELINE IMPACTS ON FOREIGN TRADE

[Sample Weighted National Estimates for Option 2a/2 ($ millions)]

	Exports	Imports	Trade balance
Baseline	112,565.1	72,157.1	40,408.0
Post-Compliance Change	0.0	5.3	−5.3
Percent Change From Baseline	0.00%	0.01%	−0.01%

Source: U.S. Environmental Protection Agency and Department of Commerce.

J. Impacts of New Source Performance Standards and Pre-Treatment Standards for New Sources

The proposed regulation includes limitations that will apply to new direct and indirect discharging sources within the MP&M Phase I category. EPA examined the impact of these regulations for new dischargers to determine if they would impose an undue economic and financial burden on new sources seeking to enter the MP&M Phase I industry.

As documented in Part 438.16–17 and Section XIII, EPA proposes to set New Source Performance Standards (NSPS), which apply to new facilities that discharge directly to receiving waters, on the basis of the Best Achievable Technology (BAT) limitations as specified by the proposed Option 2 for existing direct dischargers. Thus, the new source limitations for direct dischargers are the same as those proposed for existing direct discharge facilities.

In addition, EPA proposes to set Pretreatment Standards for New Sources (PSNS), which apply to new indirect discharging facilities (i.e., that will discharge to POTWs), on the basis of the discharge limitations in PSES Option 2, as analyzed for existing indirect discharging facilities. Thus, the new source limitations for indirect discharging facilities will differ from the PSES limitations proposed for existing indirect discharge facilities. Specifically, the proposed PSES option for existing indirect discharge facilities, Option 2a, applies the mass-based limitations of Option 2 to large flow indirect discharge facilities (i.e., facilities discharging at least 1,000,000 gallons per year) but applies no limitations to low flow indirect discharge facilities (i.e., facilities discharging less than 1,000,000 gallons per year). However, for new indirect dischargers, the proposed PSNS limitations will apply the mass-based limitations of Option 2 regardless of the new facility's discharge volume.

In general, EPA estimates that, when new and existing sources face the same discharge limitations, new sources will be able to comply with those limitations at the same or lower costs than those incurred by existing sources. Engineering analysis indicates that the cost of installing pollution control systems during new construction is generally less than the cost of retrofitting existing facilities. Thus, a finding that discharge limitations are economically achievable by existing facilities will also mean that those same discharge limitations will be economically achievable to new facilities.

On the basis of this argument alone, EPA concludes that those elements of the effluent limitations that are the same for both new and existing facilities will be economically achievable. In fact, the new source and existing source limitations are identical except for the limitations applicable to new indirect discharging sources with a discharge volume of less than 1,000,000 gallons per year. As stated above, these new

sources must meet the mass-based limitations of PSES Option 2, while existing, low flow indirect discharging facilities would not be subject to effluent limitations under the proposed guideline. Therefore, the only issue concerning economic achievability of the new source limitations involves the application of the PSES Option 2 limitation to new indirect discharging sources with a discharge volume of less than 1,000,000 gallons per year.

However, in its analysis of regulatory impacts on existing facilities, EPA found that the mass-based limitations of PSES Option 2 would be economically achievable by indirect discharging facilities regardless of discharge volume. For this reason, EPA additionally concludes that the new source limitations applicable to new indirect discharging facilities will also be economically achievable by indirect discharging facilities with flow of less than 1,000,000 gallons per year. Therefore, EPA finds that the proposed NSPS and PSNS limitations will be economically achievable.

EPA notes that an important reason for exempting the low flow class of existing indirect dischargers (less than 1,000,000 gallons per year) from regulatory requirements is to reduce the administrative burden to permit writers that would result from writing mass-based permits for the large number of existing low flow indirect dischargers. EPA estimates that approximately 63 percent of the existing facilities to which the regulation could have applied are low flow indirect dischargers. However, applying the mass-based concentration requirements of Option 2 to new facilities will not impose so great an administrative burden, because new facilities enter gradually over time.

K. Regulatory Flexibility Analysis

In accordance with the requirements of the Regulatory Flexibility Act (Public Law 96-354), the Agency performed a Regulatory Flexibility Analysis of the proposed regulation. The purpose of the Regulatory Flexibility Act is to ensure that, while achieving statutory goals, government regulations do not impose disproportionate impacts on small entities. The Regulatory Flexibility Analysis for the proposed regulation is contained in Chapter 10 of the Economic Impact Analysis report referenced above, ''Economic Impact Analysis Of Proposed Effluent Limitations Guidelines And Standards For The Metal Products And Machinery Industry, Phase I.'' On the basis of the Regulatory Flexibility Analysis and as summarized herein, the Administrator certifies, pursuant to Section 605(b) of the Regulatory Flexibility Act, 5 U.S.C. 605(b), that the proposed regulation will not have a significant economic impact on a substantial number of small entities.

In developing the proposed regulation, EPA sought from the outset to define a regulation that would not unreasonably burden small entities. In particular, EPA considered a number of regulatory alternatives for indirect and direct dischargers, each of which was assessed to have varying degrees of impact on small entities. In selecting the proposed regulation from among these alternatives, EPA balanced several factors, including: the need for additional reduction in effluent discharges from the MP&M industry; the fact that the MP&M industry is largely comprised of small business entities; and the need to achieve additional reduction in effluent discharges without imposing unreasonable burdens on small entities. As a result of these considerations, EPA expressly framed the proposed regulation to reduce impacts on small entities.

Specifically, as discussed in Section XIV. C., above, EPA settled on the proposed regulation for indirect dischargers, Option 2a, after considering and rejecting the initial Option 2. On the basis of the facility impact analyses presented above, EPA determined that Option 2 would be economically achievable by indirect discharging facilities. In accordance with this finding, EPA initially considered adopting the mass-based requirements of Option 2 for all indirect discharging facilities. However, further analysis indicated that Option 2 would place substantial financial burdens on smaller facilities and, moreover, would substantially burden permitting authorities by requiring that mass-based standards be written for all indirect discharging facilities, regardless of size and amount of discharge reduction to be achieved. For these reasons, EPA defined and evaluated two additional options: Option 1a, which applies the Option 2 requirements to large flow facilities and the modestly less stringent Option 1 requirements to low flow facilities; and Option 2a, which applies the requirements of Option 2 to large flow facilities while exempting low flow indirect discharging facilities from regulation. EPA found that both of these additional options would mitigate the burden of regulation on small businesses and permitting authorities. However, EPA found that the latter option, Option 2a, much more substantially reduced the closure impacts and financial burdens among MP&M facilities owned by small business and, as well, the regulatory implementation burden on permitting authorities. After considering other factors that also favored Option 2a—namely, cost effectiveness—EPA decided to propose Option 2a as the PSES option for indirect discharging facilities.

The following sections summarize the analyses underlying the Agency's conclusion that the proposed regulation will not have a significant economic impact on a substantial number of small entities

1. Small Business in the MP&M Industry

EPA analyzed the role of small entities in the MP&M industry and the associated impacts that would be caused by the proposed regulation. These analyses showed that the MP&M industry is largely comprised of small business entities and, accordingly, the regulation is expected to apply to a substantial number of small entities. Specifically, on the basis of Small Business Administration (SBA) firm-employment size criteria, EPA estimates that over 75 percent of the estimated 10,601 water discharging facilities in the MP&M Phase I industries are owned by a small business. With over 75 percent of the facilities to which the regulation is expected to apply defined as small businesses, EPA also examined the employment size distribution of the MP&M facilities to gain provide additional insight into how smaller facilities are likely to be affected by the proposed regulation. From the analysis of the facility employment distribution, EPA estimated that 25 percent of water-discharging facilities have 9 or fewer employees and that 50 percent of water-discharging facilities have 79 or fewer employees.

EPA also found that small facilities play a substantial role in the economic performance and contributions of the MP&M industry. From Department of Commerce data for 1989, EPA estimates that over 97 percent of facilities in the MP&M Phase I industries (including both water-discharging and non-discharging facilities) have fewer than 250 employees. These relatively small facilities account for about 49 percent of total MP&M industry employment, 40 percent of total shipments, and 40 percent of the MP&M industry's tribution to gross domestic product.

2. Impacts of the Proposed Regulation on Small Business

To gauge whether the proposed regulation would have a significant impact on a substantial number of small entities, EPA considered the level of impacts and compliance costs expected

to be imposed on small entities. From these analyses, EPA found that the proposed regulation will impose significant economic impacts (i.e., facility closures) more frequently among small business entities than among MP&M facilities generally. In addition, these analyses indicated that the compliance cost burden (as measured by total annual compliance costs as a percent of facility revenue) is expected to be greater among small business entities than among MP&M facilities generally. However, for both of these measures of small business impact—frequency of facility closures and compliance cost burden—EPA found that the absolute levels of impacts were so slight as to not constitute a significant economic impact on small entities. Moreover, the impact levels under the proposed regulation are much lower than those that would be expected under any of the other options that EPA considered for proposal.

a. Facility Closure Impacts by Business Size

Table 16 summarizes the findings from the facility closure analysis according to business size classification. The first three columns—Option 1, Option 2, and Option 3—combine the results for indirect and direct dischargers for each of those options. The latter two columns reflect the additional options that were developed for indirect dischargers—Option 1a and Option 2a—combined with Option 2 for direct dischargers. Specifically, the rightmost column, which is labeled Option 2a/2, combines results for Option 2a for indirect dischargers and Option 2 for direct dischargers and thus represents the proposed regulatory option. The next column to the left, which is labeled Option 1a/2, combines results for Option 1a for indirect dischargers and Option 2 for direct dischargers and represents the other option that EPA defined as an alternative to the initially selected Option 2 for indirect and direct dischargers.

As shown in the table, all estimated facility closures for Options 1, 2, 1a/2, and 2a/2 occur among small business-owned facilities, as defined on the basis of SBA criteria. Only under Option 3 are closures estimated to occur among facilities not owned by small businesses. The analysis according to facility employment size gives similar results with estimated facility closures occurring more frequently in the 1–9 and 10–79 employee size classes.

TABLE 16.—FACILITY CLOSURE IMPACTS BY BUSINESS SIZE

Facility classifications	Regulatory option				
	Initial options			Subsequent options	
	Option 1	Option 2	Option 3	Option 1a/2	Option 2a/2
Total Estimated Facility Closures	178	169	317	169	25
(as percent of facilities in impact analysis)	2.0%	1.8%	3.5%	1.8%	0.3%
Closures By SBA Firm-Size Criteria:					
Small Business-Owned	178	169	248	169	25
(as percent of class†)	2.6%	2.5%	3.6%	2.5%	0.4%
Other (not Small Business-Owned)	0	0	69	0	0
(as percent of class)	0.0%	0.0%	3.1%	0.0%	0.0%
Closures By Facility Employment Class:					
1–9 Employees	83	83	83	83	18
(as percent of class)	4.1%	4.1%	4.1%	4.1%	0.9%
10–79 Employees	95	84	132	84	5
(as percent of class)	4.0%	3.5%	5.5%	3.5%	0.2%
80 or more Employees	0	2	102	2	2
(as percent of class)	0.0%	0.1%	2.2%	0.1%	0.1%

†"Class" refers to the indicated sub-group of facilities (e.g., Small Business-Owned Facilities) and "percent of class" means the percentage of that group expected to incur facility closure impacts.

Source: Environmental Protection Agency.

Although closure impacts are concentrated among small entities, the expected level of closures under the proposed option is extremely low for the small entity categorizations analyzed: 0.4 percent of small business-owned facilities; 0.9 percent of facilities with 9 or fewer employees; and 0.2 percent of facilities with 10 to 79 employees. Notably, closures among the small entity categorizations are substantially higher for all the other options analyzed. To illustrate, for small business-owned facilities, the closure rate ranges from 2.5 percent to 3.6 percent for the other four composite options presented in the table. Overall, EPA finds that the rate of expected facility closures among small business entities is well within acceptable bounds.

b. Compliance Cost Impacts by Business Size

EPA also considered the compliance costs likely to be incurred by facilities in complying with the proposed regulation. EPA assessed compliance costs in terms of (1) the total annual compliance costs expected to be imposed on facilities according to business size and (2) total annual compliance cost as a percentage of facility revenue as a measure of the relative burden of compliance costs.

i. Analysis of Total Annual Compliance Costs

Table 17 summarizes total annual compliance costs by business size classification of facility for the alternative regulatory options. Total annual compliance costs are calculated as the annual after-tax cash flow impact on facilities and reflect private costs of capital and the expected tax treatment of capital outlays and operating costs of compliance. This analysis shows that the aggregate compliance costs to small entities are substantially lower under the proposed Option 2a/2 than under all the other options analyzed. At $63.9 million ($1994), the estimated annual compliance cost for small business-owned facilities under the proposed Option 2a/2 is approximately 40 percent less than the cost estimated for either the initially selected Option 2 or the other secondarily defined option, Option 1a/2. The analysis based on facility employment size class further confirms the reduced impact of the proposed Option 2a/2 on small entities:

the total costs of Option 2a/2 among facilities with 9 or fewer employees are only about 9 percent of the costs for Option 2 or Option 1a/2; and the costs for Option 2a/2 among facilities with 10 to 79 employees are about half of the costs for Option 2 or Option 1a/2. That the cost burden of Option 2a/2 on small business entities is so much lower than that estimated for the other options supports EPA's choice of Option 2a/2 as the proposed regulatory option and the finding that Option 2a/2 will not impose a significant economic impact on small entities.

TABLE 17.—TOTAL ANNUAL COMPLIANCE COSTS BY BUSINESS SIZE, ALL DISCHARGERS ($000, 1994)

Facility classification	Regulatory option				
	Initial options			Subsequent options	
	Option 1	Option 2	Option 3	Option 1a/2	Option 2a/2
All Facilities	218,412	231,666	679,509	226,781	160,607
By SBA Firm-Size Criteria:					
Small Business-Owned	91,414	107,062	330,215	105,431	63,906
Other (not Small Business-Owned)	126,998	124,602	349,293	121,349	96,702
By Facility Employment Class:					
1–9 Employees	10,996	11,264	11,781	10,935	974
10–79 Employees	34,449	37,907	87,482	37,294	18,642
80 or more Employees	172,967	182,494	580,245	178,550	140,991

Source: Environmental Protection Agency.

ii. Analysis of Compliance Costs Relative to Facility Revenue

Table 18 summarizes the relative compliance cost burden among facilities by business size classification. For this analysis, the compliance cost burden was assessed as the ratio of total annual compliance cost to facility revenue. Table 18 indicates for each option the average value of compliance costs as a percentage of revenue for facilities by size class, and lists the percentage of facilities in each size class expected to incur compliance costs exceeding 5 percent of revenue. For several previous regulations, EPA judged annual compliance costs that are less than five percent of facility revenue as not likely to impose a significant financial burden on the complying entity.

As shown in Table 18, EPA estimates that compliance costs as a percentage of facility revenue will be higher for small entities than for MP&M facilities generally both for the proposed Option 2a/2 and, as well, for the other options considered. However, among small business-owned facilities, total annual compliance costs are estimated to average only 0.11 percent of revenue for the proposed Option 2a/2. Moreover, in comparing compliance costs with the 5 percent of revenue threshold, EPA found that a very small percentage of small business-owned facilities, only 0.26 percent, are expected to incur total annual compliance costs exceeding 5 percent of revenue under the proposed regulatory option. Accordingly, EPA judges that the proposed regulation's cost burden on small entities would be manageable based on accepted standards of cost severity.

TABLE 18.—TOTAL ANNUAL COMPLIANCE COSTS AS A PERCENTAGE OF FACILITY REVENUE

[All Dischargers, by Business Size Criteria]

Facility size classes	Regulatory option				
	Initial options			Subsequent options	
	Option 1	Option 2	Option 3	Option 1a/2	Option 2a/2
Compliance Costs as a Percentage of Facility Revenue, Average Values by Facility Class					
All Facilities	0.41	0.42	0.65	0.41	0.10
By SBA Firm-Size Criteria:					
Small Business-Owned Facilities	0.51	0.53	0.78	0.51	0.11
Other (not Small Business-Owned)	0.11	0.11	0.26	0.11	0.06
By Facility Employment Class:					
1–9 Employees	1.09	1.12	1.20	1.08	0.10
10–79 Employees	0.41	0.42	0.79	0.42	0.12
80 or more Employees	0.12	0.13	0.36	0.13	0.09
Percentage of Facilities by Class with Compliance Costs Exceeding Five Percent of Revenue					
All Facilities	0.52	0.47	1.35	0.52	0.19
By SBA Firm-Size Criteria:					
Small Business-Owned Facilities	0.69	0.63	1.79	0.69	0.26
Other (not Small Business-Owned)	0.00	0.00	0.00	0.00	0.00
By Facility Employment Class:					
1–9 Employees	1.27	1.27	2.78	1.27	0.00
10–79 Employees	0.94	0.76	2.49	0.93	0.73
80 or more Employees	0.00	0.00	0.17	0.00	0.00

Source: Environmental Protection Agency.

3. Small Business Impact Finding

In view of this analysis and in recognition of the Agency's efforts, as summarized above, to define the proposed option in a way that would reduce impacts to small entities, EPA concluded that the facility closure impacts and compliance cost burdens of the proposed option will not constitute an undue impact on small business entities. Pursuant to Section 605(b) of the Regulatory Flexibility Act, 5 U.S.C. 605(b), the Administrator certifies that the proposed regulation will not have a significant economic impact on a substantial number of small entities.

L. Cost Effectiveness Analysis of MP&M Regulatory Options

In addition to the foregoing analyses, EPA performed a cost-effectiveness analysis of the alternative regulatory options for indirect dischargers (PSES) and direct dischargers (BPT/BAT). This analysis is detailed in ''Cost-Effectiveness Analysis of Proposed Effluent Limitations Guidelines and Standards for the Metal Products and Machinery Industry, Phase I'' (hereinafter ''Cost Effectiveness Report''). Cost-effectiveness analysis is used in the development of effluent limitations guidelines to evaluate the relative efficiency of alternative regulatory options in removing pollutants from the effluent discharges to the nation's waters, and to compare the efficiency of a proposed regulation with that estimated for previous regulations.

The cost effectiveness of a regulatory option is defined as the incremental annual cost (in 1981 constant dollars) per incremental toxic-weighted pollutant removal for that option. This definition embodies the following concepts:

Toxic-weighted removals. Because pollutants differ in their toxicity, the reductions in pollution discharges, or pollutant removals, are adjusted for toxicity by multiplying the estimated removal quantity for each pollutant by a normalizing toxic weight (Toxic Weighting Factors). The toxic weight for each pollutant measures its toxicity relative to copper, with more toxic pollutants having higher toxic weights. The use of toxic weights allow the removals of different pollutants to be expressed on a constant toxicity basis in toxic pounds-equivalent (lb-eq). The removal quantities for the different pollutants may then be summed to yield an aggregate measure of the reduction in toxicity normalized pollutant discharges that is achieved by a given regulatory option. Note that cost-effectiveness analysis does not address the removal of conventional pollutants (oil and grease, biological oxygen demand, and total suspended solids).

Annual costs. The costs used in the cost-effectiveness analysis are the estimated annual costs to industry for complying with the alternative regulatory options. The annual costs include the annual expenses for operating and maintaining compliance equipment and for meeting monitoring requirements, and an annual allowance for the capital outlays for pollution prevention and treatment systems needed for compliance. However, unlike the costs used in the facility impact analysis, the costs used in the cost-effectiveness analysis are calculated on a pre-tax basis and capital costs are annualized using an estimated real opportunity cost of capital to society of 7 percent. Thus, these costs represent the costs incurred by industry on behalf of society for compliance with the proposed regulation. In the facility impact analysis, costs were considered on an after-tax basis and reflected the estimated private after-tax cost of capital to MP&M firms. In addition, the costs used in the cost-effectiveness analysis are calculated in 1981 dollars so that the cost-effectiveness values for regulations applying to different industries and that were developed at different times may be consistently compared.

Incremental calculations. The incremental values that are calculated for a given option are the change in total annual compliance costs and change in removals from the next less stringent option, or the baseline if there is no less stringent option, where regulatory options are ranked by increasing levels of toxic-weighted removals. Thus, the cost-effectiveness values for a given option are relative to another option or, for the least stringent option considered, the baseline.

The question posed in a cost-effectiveness analysis is: what is the cost to industry of the additional toxic-weighted pollutant removals achieved by a given option relative to the next less stringent option or the baseline? The result of the cost-effectiveness calculation represents the unit cost of removing the next pound-equivalent of pollutants and is expressed in constant 1981 dollars per toxic pound-equivalent removed ($/lb-eq). The cost-effectiveness values for a given option may be compared with those of other options being considered for a given regulation and also with those calculated for other industries or regulatory settings. Although not required by the Clean Water Act, cost-effectiveness analysis is a useful tool for evaluating regulatory options for the removal of toxic pollutants.

EPA performed the cost-effectiveness analysis for the MP&M regulation separately for indirect dischargers (subject to PSES) and direct dischargers (subject to BAT/BPT). For each of the regulatory options, the pounds-equivalent removed were calculated by multiplying the estimated pounds removed of each pollutant by its toxic weighting factor and summing the toxic-weighted removals over all toxic (i.e., excluding conventional) pollutants. The estimated annual compliance costs for each option (as reported in Section XIV.D., above) were deflated to 1981 dollars. As discussed above, the cost-effectiveness values were then calculated as the change in compliance cost, in moving to a given option from the next less stringent option, divided by the change in toxic-weighted removals. The following sections summarize the results for the two classes of facilities.

1. Cost-Effectiveness Analysis for Indirect Dischargers

Table 19 summarizes the cost-effectiveness analysis for the PSES regulatory options applicable to indirect dischargers. Annual compliance costs are shown in 1994 dollars and also in 1981 dollars. In addition, pollutant removals are reported on both an unweighted and toxic-weighted basis. The regulatory options are listed in order of increasing stringency on the basis of the estimated toxic-weighted pollutant removals.

As shown in Table 19, Option 2a/2 achieves approximately 12.8 million pounds of toxic pollutant removals, on an unweighted basis and 881,300 pounds-equivalent on a toxic-weighted basis. Because Option 2a/2 is the least stringent option in terms of pollutant removals, the cost-effectiveness of this option is the same as its average cost per pounds-equivalent removed, $127. EPA considers this value to be acceptable when compared to values calculated for previous regulations.

The next more stringent option, Option 1, is estimated to achieve approximately 14.6 million pounds of toxic pollutant removals on an unweighted basis and 988,900 pounds-equivalent on a toxic-weighted basis, which is a 107,100 pounds-equivalent increment over Option 2a/2. With an estimated annual compliance cost of $137 million ($1981), or $65 million more than Option 2a/2, the calculated cost effectiveness for Option 1's removals is $607 per pound-equivalent of pollutant removed. This cost-effectiveness value is higher than the

values calculated for other industrial discharge limitations previously promulgated by EPA.

In moving from Option 1 to Option 1a, toxic-weighted pollutant removals increase by 22,100 pounds-equivalent while costs decrease by $7.2 million. Thus, the cost effectiveness of Option 1a relative to Option 1 is a negative $327 per pound-equivalent of additional pollutant removed. Because Option 1a is estimated to impose lower cost on industry and society than Option 1 while, at the same time, achieving greater toxic-weighted removals, Option 1a may be said to dominate Option 1 from an economic efficiency perspective. That is, within the context of the cost-effectiveness analysis, society would always be better off by choosing the more stringent Option 1a over Option 1 because greater toxic-weighted pollutant removals would be achieved by Option 1a but at a lower total pre-tax cost of compliance.

TABLE 19.—COST EFFECTIVENESS OF REGULATORY OPTIONS FOR THE METAL PRODUCTS AND MACHINERY INDUSTRY

[Indirect Dischargers (PSES)]

Regulatory option	Annual compliance costs		Unweighted pollutant removals (000, lbs)	Weighted pollutant removals		Incremental cost ($000,000, 1981)	Cost effectiveness ($/lb-eq, $1981)
	($000,000, 1994)	($000,000, 1981)		(000, lbs-eq)	Incremental (000, lbs-eq)		
Option 2a	171.1	111.9	12,769.7	881.3	881.3	111.9	127
Option 1	271.0	177.2	14,611.7	988.9	107.6	65.3	607
Option 1a	260.0	170.0	14,872.8	1,011.0	22.1	(7.2)	(327)
Option 2	267.5	174.9	14,878.8	1,011.6	0.6	4.9	8,537
Option 3	783.7	512.3	15,612.1	1,105.4	93.8	337.4	3,596

The cost effectiveness for a regulatory option is defined as the incremental cost per incremental removal in toxic pounds equivalent ($/lb-eq) for that option. The ''increment'' for a given option is the change in costs or removals from the next less stringent option, or the baseline if there is no less stringent option (i.e., Baseline to Option 2a, Option 2a to Option 1, . . .). Regulatory options are ranked by increasing levels of toxic-weighted removals. Cost effectiveness-values are calculated in 1981 dollars to permit consistent comparison of cost-effectiveness values among regulations promulgated at different times.

Source: U.S. Environmental Protection Agency.

Stepping beyond Option 1a to Option 2 is clearly not cost effective for existing indirect dischargers in comparison to values calculated for previous regulations. Stepping from Option 1a to Option 2 yields very little additional toxic-weighted pollutant removals, 600 pounds-equivalent, at an additional estimated cost of $4.9 million. Because the increase in removals is so small, the cost-effectiveness value for moving from Option 1a to Option 2 is extremely high at $8,537 per pound-equivalent of additional pollutant removed. The only difference between Option 1a and Option 2 is that Option 2 applies the mass-based limitations of Option 2 to low-flow indirect dischargers while Option 1a applies the somewhat less stringent, concentration-based limitations of Option 1 to these facilities. Thus, the high cost-effectiveness value of $8,537 stems entirely from the increased stringency of regulatory requirements for these low-flow indirect discharging facilities and demonstrates the poor cost effectiveness of applying the Option 2 requirements to this class of facilities. As noted in Section XIV.C, above, the finding of such a high cost-effectiveness value for Option 2 for low-flow indirect discharging facilities was an important factor in EPA's decision to define and evaluate alternatives to Option 2 for these facilities in developing the PSES regulatory proposal.

Moving from Option 2 to Option 3 was also found to yield a high cost-effectiveness value. Although the incremental removals for this step are relatively substantial at 93,800 pounds-equivalent, the large increase in cost of $337.4 million yields a cost-effectiveness value of $3,596 per pound-equivalent of additional pollutant removed, thus rendering this option unacceptable from the standpoint of cost effectiveness.

On the basis of this analysis, EPA determined that the proposed option, Option 2a, is cost effective. The cost-effectiveness analysis supports the choice of Option 2a as the proposed PSES regulatory option for indirect dischargers.

2. Cost-Effectiveness Analysis for Direct Dischargers

Table 20 summarizes the cost-effectiveness analysis for the BPT/BAT regulatory options applicable to direct dischargers. As before, annual compliance costs are shown in 1994 dollars and also in 1981 dollars; and pollutant removals are reported on both an unweighted and toxic-weighted basis. The regulatory options are listed in order of increasing stringency on the basis of estimated toxic-weighted pollutant removals. The ranking of annual compliance costs matches the ranking of option stringency.

As shown in Table 20, Option 1 is estimated to achieve approximately 1.2 million pounds of toxic pollutant removals on an unweighted basis and 58,200 pounds-equivalent on a toxic-weighted basis. With an estimated annual compliance cost of $11.9 million ($1981), the calculated cost effectiveness for Option 1—s removals is $204 per pound-equivalent of pollutant removed. In moving from Option 1 to Option 2, toxic-weighted pollutant removals increase by 12,500 pounds-equivalent at a cost increase of $0.6 million. Thus, the cost effectiveness of stepping to Option 2 is a comparatively low $50 per pound-equivalent of additional pollutant removed. EPA considers both of these cost-effectiveness values to be acceptable in relation to the values calculated for previous regulations.

TABLE 20.—COST EFFECTIVENESS OF REGULATORY OPTIONS FOR THE METAL PRODUCTS AND MACHINERY INDUSTRY
[Direct Dischargers (BPT/BAT)]

Regulatory option	Annual compliance costs		Unweighted pollutant removals (000, lbs)	Weighted pollutant removals		Incremental cost ($000,000, 1981)	Cost effectiveness ($/lb-eq, $1981)
	($000,000, 1994)	($000,000, 1981)		(000, lbs-eq)	Incremental (000, lbs-eq)		
Option 1	18.2	11.9	1,152.5	58.2	58.2	11.9	204
Option 2	19.1	12.5	1,232.2	70.7	12.5	0.6	50
Option 3	80.5	52.6	1,446.7	133.6	62.9	40.1	638

The cost effectiveness for a regulatory option is defined as the incremental cost per incremental removal in toxic pounds equivalent ($/lb-eq) for that option. The ''increment'' for a given option is the change in costs or removals from the next less stringent option, or the baseline if there is no less stringent option (i.e., Baseline to Option 1, Option 1 to Option 2, . . .). Regulatory options are ranked by increasing levels of toxic-weighted removals. Cost effectiveness-values are calculated in 1981 dollars to permit consistent comparison of cost-effectiveness values among regulations promulgated at different times.

Source: U.S. Environmental Protection Agency.

Option 3's cost effectiveness of $638 per pound-equivalent of additional pollutant removed is substantially poorer than the cost effectiveness of Options 1 and 2. Stepping from Option 2 to Option 3 nearly doubles the total toxic-weighted removals with a substantial increase of 62,900 pounds-equivalent. However, Option 3's annual compliance costs are more than four times those estimated for Option 2 and the resulting additional cost of $40.1 million yields the relatively high cost-effectiveness value of $638 per pound-equivalent.

From this analysis, EPA determined that Option 2 is cost effective, and the cost-effectiveness analysis supports the choice of Option 2 as the proposed BPT/BAT regulatory option for direct dischargers.

EPA also performed the cost-effectiveness analysis with an additional set of weighting factors called Pollutant Weighting Factors, which are a modification of the Toxic Weighting Factors on which the preceding analyses are based. Pollutant Weighting Factors are not related to a benchmark pollutant (i.e., copper) and normalize toxicity on a different scale. This additional analysis can be found in Appendix A of the Cost Effectiveness Report.

XV. Executive Order 12866

A. Introduction

Under Executive Order 12866 [58 Federal Register 51, 735 (October 4, 1993)], the Agency must determine whether the regulatory action is ''significant'' and therefore subject to OMB review and the requirements of the Executive Order. The Order defines ''significant regulatory action'' as one that is likely to result in a rule that may:

(1) have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities;

(2) create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;

(3) materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations or recipients thereof; or

(4) raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order.

Pursuant to the terms of Executive Order 12866, EPA has determined that this rule is a ''significant regulatory action'' because it is expected to impose an annual cost on the economy exceeding $100 million. As such, this action was submitted to OMB for review. Changes made in response to OMB suggestions or recommendations will be documented in the public record.

Because of the finding that the MP&M regulation is a ''significant regulatory action'' within the meaning of Executive Order 12866, the Agency has prepared a Regulatory Impact Assessment (RIA) for the proposed regulatory alternative. The RIA responds to the requirements in Executive Order 12866 to assess both the benefits and costs to society of significant regulatory actions. The RIA is detailed in, ''Regulatory Impact Assessment of Proposed Effluent Guidelines for the Metal Products and Machinery Industry, Phase I,'' (see Section II. for availability of this and other supporting documents).

1. Overview of Benefits Analyzed

The RIA assesses the benefits of proposed regulations to reduce effluent discharges in the MP&M industry. Three broad classes of benefits are considered: human health, ecological, and economic productivity benefits. Each class is comprised of a number of more narrowly defined benefits categories. EPA expects that benefits will accrue to society in all of these categories. Because of data limitations and imperfect understanding of how society values some of these benefit categories, however, EPA was not able to analyze all of these categories with the same level of rigor. At the highest level of analysis, EPA was able to quantify the expected effects for some benefit categories and attach monetary values to them. Benefit categories for which EPA developed dollar estimates include reduction in cancer risk from fish consumption, increased value of recreational fishing opportunities, and reduced costs of managing and disposing of POTW sewage sludges. For other benefit categories, EPA was able to quantify expected effects but not able to estimate monetary values for them. Examples of these benefit categories include change in the frequency with which certain aquatic species are exposed to lethal concentrations of certain pollutants, and change in certain human health risk indicators. Finally, EPA was able to identify and qualitatively describe certain benefit effects but was not able to assess them on either a quantitative or an economic value basis. These benefit categories include but are not limited to: enhanced diversionary uses, improved aesthetic quality of waters near discharge outfalls, enhanced water-dependent recreation other than fishing, and benefits to wildlife and to threatened or endangered species, option and existence values, cultural values, tourism benefits, and biodiversity benefits. Table 21 summarizes the benefit categories discussed above and identifies those that were monetized, those that were quantitatively assessed (but not monetized), and those that are expected to result from the regulation but were neither quantitatively assessed nor monetized.

TABLE 21.—BENEFIT CATEGORIES ASSOCIATED WITH WATER QUALITY IMPROVEMENTS RESULTING FROM THE METAL PRODUCTS AND MACHINERY EFFLUENT GUIDELINE

Benefit category	Quantified and monetized	Quantified and nonmonetized	Nonquantified and nonmonetized
Human Health Benefits:			
Reduced cancer risk due to consumption of chemically-contaminated fish	X		
Reduced cancer risk due to ingestion of chemically-contaminated drinking water		X	
Reduced systemic health hazards (e.g. reproductive, immunological, neurological, circulatory, or respiratory toxicity) from consumption of chemically-contaminated fish.		X	
Reduced systemic health hazards (e.g. reproductive, immunological, neurological, circulatory, or respiratory toxicity) due to ingestion of chemically-contaminated drinking water.		X	
Reduced cancer risk from exposure to unregulated contaminants in chemically-contaminated sewage sludge.			X
Reduced systemic health hazards from exposure to unregulated contaminants in chemically-contaminated sewage sludge.			X
Reduced health hazards from exposure to contaminants in waters used recreationally (e.g., swimming and boating).			
Ecological Benefits:			
Enhanced recreational fishing	X		
Reduced risk to aquatic life		X	
Enhanced in-stream recreation such as swimming, boating, hunting, rafting, subsistence fishing.			X
Improved water enhanced recreation such as hiking, picnicking, birdwatching, photography.			X
Increased aesthetic benefits such as enhancement of adjoining site amenities (e.g. residing, working, traveling, and owning property near the water).			X
Existence value			X
Option value			X
Reduced risk to terrestrial wildlife including endangered species			X
Protection of biodiversity			X
Protection of cultural valuation			X
Reduced non-point source nitrogen contamination of water if sewage sludge is used as a substitute for chemical fertilizer on agricultural land.			X
Satisfaction of a public preference for beneficial use of sewage sludge*			X
Economic Productivity Benefits:			
Reduced sewage sludge disposal costs	X		
Enhanced tourism			X
Improved commercial fisheries yields			X
Addition of fertilizer to crops (nitrogen content of sewage sludge is available as a fertilizer when sludge is land applied)*.			X
Improved crop yield (the organic matter in land-applied sewage sludge increases soil's water retention)*.			X
Reduced management practice and recordkeeping costs for appliers of sewage sludge meeting exceptional quality criteria.			X
Reduced management and disposal costs for ''cleaner'' sewage sludge that does not meet land application criteria.			X
Avoidance of costly siting processes for more controversial sewage sludge disposal methods (e.g., incinerators) because of greater use of land application.			X
Reduced water treatment costs for municipal drinking water, irrigation water, and industrial process and cooling water.			X

*Some double counting between this benefit category and ''reduced sewage sludge disposal costs'' is present.

The monetary assessment of benefits is inevitably incomplete. As mentioned above, monetary values were estimated for only a few of the likely benefit categories. In addition, because of data and measurement limitations, some of the available valuation measures do not fully account for all of the mechanisms by which society is likely to value a given benefit event. As a result, the estimated dollar values that are attached to certain of the estimated benefit events may understate society's willingness-to-pay to achieve those benefit events. For example, reduced sewage sludge disposal costs may understate society's willingness-to-pay for less polluted sewage sludge because public preferences as revealed through political decision-making processes indicate that some communities would be willing to pay for beneficial sewage sludge use (land application) even when it is more costly than other disposal options. As a result, the estimate of the dollar value of benefits to society is a partial, noncomprehensive estimate and, in all likelihood, understates the economic benefits that will accrue from the proposed regulation.

2. Overview of Costs Analyzed

The RIA compares EPA's best estimate of the monetized benefits of the proposed MP&M regulation to the estimated costs to society for achieving those benefits. To assess the economic costs to society of the MP&M regulation, EPA relied foremost on the estimated costs to MP&M facilities for the labor, equipment, material, and other economic resources needed to meet the discharge limitations specified by the proposed regulation. These cost estimates are the same as those used for the zero-cost-pass-through analysis of

facility impacts described in Section XIV of this document (i.e., in which firms must absorb all of the regulatory compliance costs). In the societal cost-benefit analysis, however, accounting for these costs differs from that in the facility impact analysis. In the facility impact analysis, costs and their impacts are considered in terms of their effects on the financial performance of the firms and facilities affected by regulation. To understand the significance of those costs to affected firms and facilities and their likely responses to the proposed regulation, the analyses explicitly considered the expected tax treatment of the annual expenses and capital outlays for compliance. In addition, the annual charges for the capital outlays were calculated using private costs of capital. Thus, the total annual compliance costs reported earlier in this document are the costs *to industry* and are presented on an after-tax basis reflecting private costs of capital. In the analysis of the costs to society, however, these compliance costs are considered on a before-tax basis and the annualization of capital outlays is based on an opportunity cost of capital *to society*. In general, because of the elimination of tax considerations, the estimated compliance costs are greater from the perspective of society than from the perspective of private industry.

In addition to the estimated resource costs to society of regulatory compliance, the estimate of social cost used in this analysis includes two other cost elements: the cost to governments (federal, state, and local) of administering the permitting and compliance monitoring activities under the proposed regulation (as discussed above at Section XIV.C.1); and the costs associated with unemployment that may result from the proposed regulation. The unemployment-related costs include: the cost of administering unemployment programs for workers who are estimated to lose employment (but not the cost of unemployment benefits, which are a transfer payment within society); and an estimate of the amount that workers would be willing to pay to avoid involuntary unemployment. In much the same way that society may value the benefits of avoided adverse health effects stemming from the regulation on the basis of willingness-to-pay, society may also value the incurrence of unemployment as a cost of the regulation using the same willingness-to-pay principle of valuation.

3. Organization of Following Discussion

The following sections of this preamble discuss the estimated benefits and costs to society of the proposed MP&M regulation. The next section, Section B, describes the broad categories of benefits associated with the MP&M rule as well as the estimation of these benefits while Section C summarizes the estimated costs. Section D summarizes the comparison of estimated national benefits and costs for the proposed regulation.

B. Benefits Associated With the Proposed Effluent Guidelines

MP&M industry effluents contain priority and non-conventional metals, organics and conventional pollutants. Discharge of these pollutants into freshwater, estuarine, and marine ecosystems may alter aquatic habitats, affect aquatic life and terrestrial wildlife, and adversely affect human health. Many of these pollutants are human carcinogens, human systemic toxicants, aquatic life toxicants, or all of the above. In addition, many of these pollutants persist in the environment, resist biodegradation, and bioaccumulate in aquatic organisms.

The Agency's analysis of these environmental and human health risk concerns and of the water-related benefits resulting from the proposed effluent guidelines is contained in the ''Environmental Assessment of the Metal Products and Machinery Industry (Phase I)'', hereafter called the Environmental Assessment (see Section II. for availability of this document). This assessment qualitatively and quantitatively evaluates the potential human health benefits and water quality benefits of controlling the discharges of 66 pollutants from the MP&M industry group. (see the Environmental Assessment and the RIA for a discussion of the pollutants).

In this analysis, benefits were assessed by identifying the various ways in which the reduction in discharges from the MP&M industry would be expected to provide benefits. Regulations that improve water quality will generally provide benefits in several broad categories, which are summarized below. Please refer to Table 21 for a list of the different types of benefits that fall under each category.

Human health benefits. Reduced pollutant discharges to the nation's waterways will generate human health benefits by a number of mechanisms. The most important and readily analyzed of the human health benefits stem from reduced risk of illness associated with the consumption of water, fish or other food that is taken from waterways affected by effluent discharges. Human health benefits are typically analyzed by estimating the change in the expected number of adverse human health events in the exposed population resulting from a reduction in effluent discharges. While some health effect mechanisms such as cancer are relatively well understood and thus may be quantified in a benefits analysis, others are less well understood and may not be assessed with the same rigor or at all. For example, this analysis quantitatively examines only two health effect categories: incidence of cancer and a composite indicator of systemic, non-cancer health risk. However, in this analysis, only incidence of cancer is translated into an expected number of avoided adverse health events (i.e., avoided cancer cases) and, on that basis, monetized. Dose-response relationships are not available for other health events that might also be avoided by reduced pollutant exposures. The economic valuation of these health effect events is generally based on estimates of the monetary value that society is willing to pay for their avoidance. Such ''willingness-to-pay'' valuations are generally considered to provide a fairly comprehensive measure of society's valuation of the health-related benefit in that they account for such factors as the costs of health care,[9] loss in income, and pain and suffering (both among affected individuals and family and friends). In some cases, less comprehensive valuations are used that are based only on the estimated costs of health care, remedial treatments, or forgone income.

Ecological benefits. Ecological benefits stem from improvements in habitats or ecosystems that are affected by effluent discharges. For example, spawning grounds for important recreationally or commercially caught fish species may be restored in response to a reduction in MP&M effluent discharges. It is frequently quite difficult, however, to quantify and attach economic values to benefit categories that are referred to as ecological benefits. The difficulty in quantifying benefit categories results from imperfect understanding of the relationship between changes in effluent discharges and the benefit events. In addition, it is often difficult to attach monetary values to these benefit categories because the benefit events do not occur in markets in which prices or costs are readily observed. Ecological benefits may be loosely classified as non-market, use benefits, and non-market, non-use benefits.

[9] Individuals with health insurance, however, would not include the part of medical care cost covered by insurance in their willingness-to-pay to avoid adverse health effects.

Non-market, use *benefits* stem from improvements in ecosystems and habitats that, in turn, lead to enhanced human use and enjoyment of the affected areas. For example, reduced discharges may lead to increased recreational use and enjoyment of affected waterways in such activities as fishing, swimming, boating, hunting or birdwatching. Such uses can be classified as either consumptive or non-consumptive. Consumptive uses can be distinguished from non-consumptive uses in that the former excludes other uses of the same resource. For example, if recreational anglers consume their fish catch, the stock of the natural resource is at least temporarily depleted. With non-consumptive uses, however, the resource base generally remains in the same state before and after use (e.g., birdwatching).[10]

In some cases, it may be possible to quantify and attach partial economic values to such benefit events on the basis of market values (e.g., an increase in tourism activity associated with improved recreational fishing opportunities); in this case, these benefit events might better be classified as economic productivity related events as explained in the next section. These events, however, are often not able to be fully valued using information from economic markets. In this case, they are more appropriately classified as non-market use ecological benefits since economic markets will only capture related expenditures made by recreational users such as food and lodging and will not capture the value placed on the experience itself.

The second broad class of ecological benefits, non-market, non-use benefits, includes benefit events that are not associated with current use of the affected ecosystem or habitat but arise from the realization of the improvement in the affected ecosystem or habitat resulting from reduced effluent discharges. This class of benefits also includes the value that individuals place on the potential for use sometime in the future either by themselves or future generations. As an example of the former, people may attach a value to protecting habitats and species that are otherwise detrimentally affected by effluent discharges even when they do not use or anticipate future use of the affected waterways for recreational or other purposes. The latter can be described as a combination of insurance and speculative value which reflects individuals' wish to protect the option to use and enjoy a resource at some later date. From an ecosystem standpoint, pristine habitats and wildlife refuges are often preserved under the assumption that plant or animal species that may yield pharmaceutical, genetic, or ecosystem benefits yet to be discovered. These benefits may also manifest by other valuation mechanisms, such as: cultural valuation, philanthropy, and bequest valuation. It is often extremely difficult or even impossible to quantify the relationship between changes in discharges and the improvements in societal well-being associated with such valuation mechanisms. That these valuation mechanisms exist, however, is indisputable as evidenced, for example, by society's willingness to contribute to organizations whose mission is to purchase and preserve lands or habitats for the sole purpose of averting development.

Economic productivity benefits. Reduced pollutant discharges may also generate benefits through improvements in economic productivity. For example, economic productivity gains may occur through reduced costs to public sewage systems (publicly owned treatment works or POTWs) for managing and disposing of the sewage sludge that results from treatment of effluent discharges. With less pollutant contamination of industry's discharges to POTWs, the POTWs in turn incur lower costs in managing and disposing of their treatment residuals. Similarly, economic productivity may be enhanced due to reduced treatment costs associated with irrigation water, industrial cooling water and municipal drinking water supplies. Other economic productivity gains may result from improved tourism opportunities in areas that are affected by effluent discharges. In addition, ecological benefits such as improved species survival will be translated into economic productivity benefits such as increases in commercially caught fish populations and yield. When such economic productivity effects can be identified and quantified, they are generally straightforward to value because they often involve market-place events for which prices or unit costs are readily available.

As indicated above, some of these improvements reduce societal costs. As such, these improvements (i.e. reduced treatment and disposal costs) could be described as a reduced cost and be included in the economic cost analysis rather than in the benefits analysis. For this analysis, they are treated as a benefit of the effluent guideline.

1. Qualitative Description of the Benefits

Benefits to human health associated with the proposed rule include reductions in cancer risk and systemic health problems (e.g. reproductive, immunological, neurological, circulatory, or respiratory toxicity) that are caused by consuming chemically-contaminated fish and ingesting chemically-contaminated drinking water. With respect to fish consumption, benefits will accrue to recreational and subsistence fishermen and to their families. In addition, populations served by drinking water intakes located on river reaches to which MP&M facilities discharge will benefit from reduced pollutant concentrations in MP&M wastewater discharges.

Benefits to aquatic life include reduction of priority and non-conventional metals, organics, and conventional pollutants to levels below those considered to negatively affect receiving water's biota. Such impacts include acute and chronic toxicity, sublethal effects on metabolic and reproductive functions, physical destruction of spawning and feeding habitats, and loss of prey organisms. Chemical contamination of aquatic biota may also directly or indirectly impact local terrestrial wildlife. Reductions in such impacts will enhance recreational fishing opportunities in terms of both the quality and abundance of species caught. As a result, more persons may fish a given area and the value of their fishing experience may increase on a per fishing event basis.

Benefits from changes in sewage sludge disposal practices will be realized as publicly owned treatment works (POTWs) are able to dispose of cleaner (i.e. less toxic) sewage sludge by less expensive and more environmentally beneficial methods. For example, cleaner sewage sludge may be applied to agricultural land rather than being incinerated or disposed of in landfills and other land sites. In addition to the direct cost savings that may accrue to POTWS, when sewage sludge is beneficially applied to land, its nitrogen content is available as a valuable fertilizer. In addition, the organic matter in sludge will generally improve the soil structure for plant growth and increase the ability of soil to retain water. As a result, land application of sewage sludge may yield benefits in terms of overall improvements in soil quality and crop yields. Benefits may also accrue through greater flexibility in managing and disposing of POTW sewage sludges and

[10] Even some so-called non-consumptive uses may temporarily deplete the natural resource or reduce the potential value to other users. For example, over-use of the habitat or crowding in such pursuits as bird-watching may diminish the value of the natural resource to other users.

shifts into beneficial reuse of sewage sludge even when the reduction in sludge contamination levels does not yield direct cost savings to POTWs. These latter components of economic benefits from less contamination of POTW sewage sludges are not addressed in this analysis.

2. Quantitative Estimate of Benefits

EPA quantified and monetized human health, aquatic life, recreational fishing, and sewage sludge disposal benefits using a site-specific analysis for baseline conditions and for the conditions that are expected to be achieved by BAT/PSES process changes. Quantified but not monetized benefits include reductions in excursions of health-based water quality toxic effects levels and aquatic life criteria as well as reductions in the frequency with which certain aquatic species are exposed to lethal concentrations of MP&M pollutants. It should be noted that the benefit categories that were able to be quantified and monetized in this analysis represent only a few of the benefits that are likely to be achieved by the proposed regulation (see Table 21).Q

Quantified human health benefits are estimated by:

- Estimating the potential reduction of carcinogenic risk and systemic hazards from fish consumption;
- Estimating the potential reduction of carcinogenic risk and systemic hazards from ingestion of drinking water; and
- Comparing estimated in-stream concentrations to health-based water quality toxic effect levels.

Quantified aquatic life benefits are estimated by:

- Comparing modeled in-stream concentrations to aquatic life water quality criteria or toxic effect values (AWQCs); and
- Comparing in-stream concentrations to estimated lethal threshold concentrations for selected aquatic species.

Quantified recreational fishing benefits are calculated on the basis of the estimated increase in the value per person-day of fishing in a waterbody from which all MP&M AWQC excursions are eliminated. Sewage sludge disposal benefits are calculated on the basis of the incremental quantity of sludge that, as a result of reduced pollutant discharges to POTWs, meets criteria for the generally less expensive disposal methods, namely land application and surface disposal. The methodologies used in these analyses, including all assumptions and limitations, are explained in the Regulatory Impact Analysis.

a. Cancer Risk and Systemic Hazards and Benefits

Aggregate cancer risk, and systemic hazards from drinking contaminated water were estimated for populations served by drinking water intakes on waterbodies to which MP&M facilities discharge. In-stream concentrations of 4 carcinogenic and 33 systemic toxicants were estimated for 396 facilities discharging directly or indirectly to 326 receiving waterways using a model of the instream pollutant mixing and dilution process. In-stream concentrations were estimated for the initial discharge reach and for downstream reaches taking into account the various mechanisms by which pollution concentrations diminish below the initial point of discharge (e.g., dilution, adsorption, volatilization, and hydrolysis). The calculated in-stream concentrations were used to estimate the change in cancer risk and systemic hazards resulting from the proposed and alternative MP&M regulatory options for populations served by drinking water intakes.

In addition, aggregate cancer risk and systemic hazards from consuming contaminated fish were estimated for recreational and subsistence anglers and their families. This analysis relied on the same estimates of instream pollutant concentrations as used for the drinking water health effects analysis. Pollutant contamination of fish flesh was estimated using biological uptake factors. Data on licensed fishing population by state and county, presence of fish advisories, fishing activity rates, and average household size were used to estimate the population of recreational and subsistence anglers and their families that would benefit from reduced contamination of fish. Fish consumption rates for recreational and subsistence anglers were used to estimate the change in cancer risk and systemic hazards among these populations.

For combined recreational and subsistence angler populations, the proposed BAT and PSES options are projected to eliminate approximately 2.7 cancer cases per year from a baseline of about 11.1 cases estimated at the current discharge level, representing a reduction of about 25 percent. For the drinking water population, EPA estimated that reduced pollutant discharges under the proposed BAT and PSES options would reduce cancer risk by approximately 3.0 cancer cases per year. However, EPA has published drinking water criteria for all of the chemicals for which these avoided cancer cases were estimated. As a result, these avoided cancer cases were excluded from the benefits evaluation because it is assumed that public drinking water treatment systems will remove these pollutants from the public water supply.

In addition to the estimated changes in cancer risk in exposed populations, EPA also estimated the change in an indicator of systemic, non-cancer risk of illness. This composite risk indicator, or systemic hazard score, which is based on the change in exposure to pollutants through fish and water consumption relative to pollutant-specific health effects thresholds, yields an additional measure of the human health benefits that are likely to result from the proposed regulation. Specifically, the systemic hazard score is calculated as the sum of the ratios of quantities of pollutants ingested into the human body relative to the daily reference dose for each pollutant. Values above or near one are highly suggestive of a risk of systemic health hazard. The hazard score assumes that the combined effect of ingesting multiple pollutants is proportional to the sum of their effects individually.

The distribution of hazard scores was calculated for drinking water and fish consumption populations on the basis of baseline and post-compliance exposures. For each exposed population category, the change in the distribution from baseline to the post-compliance case provides a measure of the reduced risk of systemic health hazard from reduced MP&M industry discharges. Analytic tractability issues prevented this analysis from being able to be done on a sample-weighted basis. The results are for sample discharge locations only. The results for both the fish and drinking water analysis show movement in populations from higher risk values to lower risk values. In addition, both analyses show substantial increments in the percentage of exposed population that would be exposed to no risk of systemic health hazard associated with discharges by MP&M facilities.

b. Excursions of Health-Based Water Quality Toxic Effect Levels

In addition to the estimated changes in cancer and systemic risk in exposed populations, EPA also estimated the effect of facility discharges of regulated pollutants on pollutant concentrations in affected waterways relative to ambient water criteria for protection of human health. The estimated concentrations were compared, on both a baseline and post-compliance basis, with EPA ambient water quality criteria (AWQCs) for protection of human health through consumption of

organisms and consumption of organisms and water. Pollutant concentrations in excess of these values indicate potential risks to human health. EPA modeling results show that 137 reaches exceed AWQC values at baseline discharge levels. Proposed BAT and PSES options are projected to eliminate concentrations in excess of the criteria on 40 of these reaches, leaving an estimated 97 reaches with concentrations in excess of AWQC values for protection of human health.

The analyses pertaining to change in human health risk described in this and the preceding section ignore the potential for joint effects of more than one pollutant. Each pollutant is dealt with in isolation and the individually estimated effects are added together. The analyses do not account for the possibility that several pollutants may combine in a synergistic fashion to yield more adverse effects to human health than indicated by the simple sum of the individual effects.

c. Aquatic Life Benefits

To assess aquatic life benefits, EPA estimated the effect of facility discharges of regulated pollutants on pollutant concentrations in affected waterways. The estimated concentrations were compared, on both a baseline and post-compliance basis, with EPA ambient water quality criteria (AWQCs) for acute and chronic exposure impacts to aquatic life. Pollutant concentrations in excess of these values indicate potential impacts to aquatic life. EPA modeling results show that 130 reaches exceed AWQC values at baseline discharge levels. Proposed BAT and PSES options are projected to eliminate concentrations in excess of the criteria on 88 of these reaches, leaving an estimated 41 reaches with concentrations in excess of AWQC values for aquatic life.

EPA also analyzed aquatic life benefits on the basis of the change in frequency with which certain aquatic species may be expected to be exposed to lethal concentrations of pollutants discharged by MP&M facilities. As such, this analysis focuses solely on acute (short-term) toxicity and does not consider chronic (long-term) toxicity. This analysis examined the effects of specific pollutants on selected aquatic species with a relatively wide range of sensitivity to MP&M pollutants. Specifically, thirteen MP&M pollutants thought to be among those having the greatest potential to cause risks to aquatic life were analyzed. Species with socioeconomic importance such as trout, bass, and catfish were highlighted, but all species for which data were available, including those of less socioeconomic importance, were evaluated. This analysis uses a species sensitivity distribution rather than a single toxicity threshold concentration in comparison to in-stream pollutant concentrations for the following three reasons:

1. Species sensitivity distributions, which are used by EPA to set water quality criteria, can be used to relate exposure concentrations to the proportion of species whose toxicological effect concentrations (e.g., LC50 , the lethal concentration for fifty percent of a species, or some lower lethal threshold such as an LC10 or LC1) are exceeded. This proportion provides an indication of the percentage of aquatic species that would be directly affected [11] at the exposure concentration. Unlike comparisons to water quality criteria, which usually yield ratios of the exposure concentration to the criterion concentration, the proportion of species that are likely to be directly affected provides a more intuitive indicator of ecological risk. It should be noted, however, that both indicators of ecological risk (water quality criteria and proportion of species impacted) suffer from the inability to account for indirect impacts on aquatic ecosystems, such as those that result from interruption of predator-prey relationships. Therefore, neither approach should be considered to provide absolute measures of ecological risk.

2. The variation in chemical sensitivity over a group of species is known to vary among chemicals (Erickson and Stephan, 1988). For example, consider two chemicals both of which are at lethal effect concentrations for five percent of a habitat's species. A given percentage increase (e.g., doubling) of both pollutants' concentrations will not necessarily lead to the same increase in the proportion of the species that are exposed to lethal effect concentrations. That is, doubling one chemical's concentration might increase the proportion of species affected from five percent to 25 percent while doubling the other chemical's concentration might increase the proportion of species affected from five percent to 50 percent. This diversity of species' response to changes in concentrations of different pollutants is better captured by use of distributions of response over the group of species in the habitat.

3. Because the identities of the tested species comprising the species sensitivity distributions are known, the use of species sensitivity distributions allowed EPA to identify which of the tested species are at risk from exposure to regulated pollutants and which are likely to benefit from reduced discharges.

Using species sensitivity distributions, EPA estimated the proportion of tested species whose lethal threshold concentrations would be exceeded at various exposure concentrations. In interpreting these results, EPA assumed that a greater proportion of species affected signifies a greater risk of lethal effects in the population of species present in a habitat. This analysis found that the proposed regulation will yield significant reductions in the expected frequency with which certain aquatic species may be exposed to lethal concentrations of pollutants. The reduced exposure translates into benefits such as increased species diversity and abundance which would, in turn, enhance recreational and commercial fishing opportunities (see the RIA for additional discussion of this analysis and its findings in terms of benefits to specific species).

d. Recreational Fishing Benefits

As described above, the proposed BAT and PSES options will reduce the number of excursions of aquatic life criteria or toxic effect values. EPA assumes that elimination of criteria excursions for *all* regulated pollutants in a waterbody will achieve water quality that is protective of aquatic life. This improvement in water quality, in turn, generates benefits to recreational anglers by increasing the value of their experience or the number of days they subsequently choose to fish the waterbody. These benefits, however, do not include all of the benefits that are associated with improvements in aquatic life. For example, recreational benefits do not capture the benefit of increased assimilative capacity of a receiving waterbody, improvements in the taste and odor of the instream flow, or improvements to other recreational activities such as swimming and wildlife observation that may be enhanced by improved water quality. Modeling results show that, under the proposed regulatory option, criteria excursions for all pollutants whose discharges are affected by the MP&M regulation are eliminated in 123 discharge locations.

[11] The term ''directly affected'' is used here to reflect impacts from direct exposure to a pollutant, rather than ''indirect'' effects such as those that occur due to the loss of important predator or prey species.

e. Avoided Sewage Sludge Disposal Costs

To estimate the quantity of sewage sludge that will be disposed of using a less expensive method due to the proposed regulatory requirements, EPA calculated baseline and post-compliance sewage sludge quality and compared sewage sludge pollutant concentrations to criteria for land application and surface disposal.[12] POTWs are assumed to choose the least expensive sewage sludge use or disposal option for which the sludge meets pollutant criteria. For many POTWs, the least expensive or ''preferred'' option is generally agricultural application (a type of land application) or surface disposal of sewage sludge. As a result of the proposed regulation, many POTWs are expected to achieve substantial cost savings by disposing of sewage sludge through agricultural application or surface disposal. For POTWs with limited access to agricultural land and surface disposal sites, the cost savings resulting from sewage sludge with lower pollutant concentrations are expected to be less substantial. However, disposal of sewage sludge that meets agricultural application limits through distributing and marketing methods may achieve some cost savings for these facilities. In the baseline, an estimated 5,559 of 6,950 POTWs meet criteria for surface disposal or land application. Of the 5,559 POTWs meeting surface disposal or land application criteria, 5,309 meet the more stringent criteria for beneficial land application while 250 meet only the more lenient surface disposal criteria. Under the proposed regulation, the total of POTWs that are expected to meet criteria for surface disposal or land application increases to 5,743. Of this total that meet criteria for surface disposal or land application, 5,493 POTWs (or an increase of 184 POTWs) are expected to meet criteria for beneficial land application, while 250 POTWs continue to meet criteria for surface disposal.

3. Monetization of Benefits

For this regulation, EPA estimated the monetary value of benefits for three benefit categories: human health benefits from reduced exposure to carcinogens in fish taken from waterways affected by MP&M discharges; enhanced recreational fishing opportunities in waterways affected by MP&M discharges; and reduced costs to POTWs in managing and disposing of sewage sludge that is affected by MP&M discharges.

a. Valuation of Human Health Benefits

EPA estimated the value of a limited set of possible human health benefits from the human health risk assessment discussed above. These benefits are attributed to reductions in cancer risks associated with consuming chemically-contaminated fish. The valuation of benefits is based on estimates of society's willingness-to-pay to avoid the risk of cancer associated with consuming chemically-contaminated fish. Little data, however, is available regarding both dose-response relationships for non-cancer systemic health outcomes and the monetary value of avoiding such health outcomes. As a result, it was not possible to monetize the systemic health effects that might be associated with exposures to pollutants emanating from the MP&M industry such as reproductive, immunological, neurological, or circulatory problems.

To value mortality, EPA used a range of values recommended by EPA's Office of Policy Analysis from a review of studies quantifying individuals' willingness to pay to avoid increased risks to life (Fisher, Chestnut, and Violette, 1989; and Violette and Chestnut, 1986). The reviewed studies used hedonic wage or contingent valuation analyses in labor markets to estimate the amounts that individuals would be willing to pay to avoid slight increases in risk of mortality (i.e., the question analyzed in these studies is: how much more must a worker be paid to accept an occupation with a slightly higher risk of mortality?). The willingness-to-pay values estimated in these studies are associated with small changes in the probability of mortality; to estimate a willingness-to-pay value for avoiding certain or high probability mortality events, they are extrapolated to the value for a 100 percent probability event. The resulting estimates of the value of a ''statistical life saved'' are used in analyses such as this regulatory analysis to value regulatory effects that are expected to reduce the incidence of mortality. From this review, the Office of Policy Analysis recommended a range of $1.6 to $8.5 million (1986 dollars) for valuing an avoided event of premature mortality or a statistical life saved. For this analysis, EPA adjusted the recommended figures to 1994 using the relative change in nominal Gross Domestic Product from 1986 to 1994 (57.2 percent) to account for increases in society's willingness to pay to avoid risk of mortality as national income increases. Updating to 1994 yields a range of $2.5 to $13.4 million. For this analysis, the low-point of the range is used as a ''low'' estimate while the top of the range is used as a ''high'' estimate. For the proposed Option 2a/2, the benefits associated with reduced incidence of cancer from fish consumption are estimated to range from $6.8 million to $36.2 million per year ($1994), depending on the choice of willingness-to-pay value that is used to value the avoided cancer events. Although EPA estimated the change in cancer risk resulting from reduced exposure to MP&M pollutants via the drinking water pathway, these effects were not included in the monetary estimate of benefits because EPA has published drinking water criteria for the four pollutants for which the cancer analysis was completed. Thus, the total estimated value for human health benefits ranges from $6.8 million to $36.2 million per year ($1994).

b. Valuation of Enhanced Recreational Fishing Opportunities

EPA also estimated the value of enhanced recreational fishing opportunities. This valuation provides a limited measure of the value to society of improvements in aquatic habitats that are used for recreational purposes. The estimate of benefits is limited because it focuses on only one mechanism, enhanced recreational fishing, by which society may value improved aquatic habitats; it ignores other recreational effects as well as valuation mechanisms that are separate from recreation.

EPA calculated the value of enhanced recreational fishing opportunities by first estimating the baseline value of those fisheries in which all instances in which AWQCs are exceeded would be eliminated. Second, EPA estimated the value of improving the water quality in these fisheries based on the incremental value to anglers of eliminating all contaminants from a fishery (Lyke, 1992). Estimates of the increase in value of recreational fishing to anglers range from $23.6 million to $84.3 million annually ($1994).

c. Reduced Costs to POTWs in Managing and Disposing of Sewage Sludge

On the basis of the estimated reduced contamination of sewage sludge, EPA estimated that 184 POTWs will be able to select the lower-cost land application methods for sewage sludge disposal. The cost savings associated with the selection of lower cost sewage sludge management and disposal methods are

[12] Industrial sludge'' which results from the operation of treatment systems at MP&M facilities, will increase both in quantity and in level of contamination as a result of the proposed regulation. The cost of managing and disposing of this industrial sludge is included in the estimated costs of regulatory compliance used in the economic and regulatory impact analyses.

estimated to range from $39.1 to $86.0 million annually ($1994).

d. Total Estimated Value of Benefits

For the proposed regulatory option, total benefits for the three categories for which monetary estimates were possible range from $69.6 to $206.5 million annually. As noted above, this benefit estimate is necessarily incomplete because it omits numerous mechanisms by which society is likely to benefit from reduced effluent discharges from the MP&M industry. Examples of benefit categories not reflected in this estimate include: non-cancer related health benefits, other water dependent recreational benefits, existence and option values, and benefits to wildlife and endangered species.

4. Limitations and Uncertainties Associated With Estimating Benefits

The estimation of benefits is inevitably incomplete in that only a small set of the categories by which the proposed regulation is expected to generate benefits are able to be quantified and monetized. Beyond this broad and overriding limitation to the assessment of benefits, the methodologies used to assess the benefit categories that were quantitatively analyzed and for which monetary values were estimated also involve significant simplifications and uncertainties. Whether these simplifications and uncertainties are likely to lead to an understatement or overstatement of the estimated economic values for the benefit categories that were analyzed is uncertain. Several of these simplifications and uncertainties are noted below.

The methodology used to estimate water quality criteria excursions assumes that MP&M facilities are the only source of each of the regulated pollutants in the waterbody; the methodology does not incorporate background contributions either from other upstream sources or, in the case of water quality criteria, contaminated sediments due to previous discharge practices. Furthermore, although the discharge of these contaminants may cease or be minimized, sediment contamination and subsequent accumulation of the regulated pollutants in aquatic organisms may continue for years. Actual water quality improvements, in terms of eliminating excursions above criteria may, therefore, be over- or under-estimated depending on the relative magnitude of background contributions of regulated pollutants.

In this analysis, the estimates of human health and ecological benefits are based on the estimated changes in in-stream concentrations of regulated pollutants. In-stream concentrations under baseline conditions and under the proposed option are modeled for all waterbodies to which MP&M facilities discharge. Certain data underlying these analyses are site specific, including: flow rates under average and low flow conditions, and flow depth. However, other basic assumptions in the model are not site specific, including: chemistry of the water body, mixing processes, longitudinal dispersion, flow geometry, suspension of solids and reaction rates. Where these assumptions differ from actual conditions, modeled results will approximate in-stream concentrations with varying degree of accuracy. The effect of these assumptions on benefit estimates, however, is indeterminate.

In the analysis of benefits associated with consumption of fish taken from affected waterways, EPA estimated the exposed population—that is, the population expected to fish an affected waterway—from county fishing license and fishing activity data. Some data are specific to the counties in which MP&M sample facilities are located; however, for some counties in which MP&M facilities are located, it was necessary to estimate fishing population and activity rates from state-level data or from data for nearby counties or states (see Chapter 9 of the RIA for a detailed description of this methodology). These approaches are necessarily approximations and may lead to an over- or underestimates of the exposed population. The effect of these estimation procedures on the benefits estimate, however, is not known.

A related issue involves the assumption made regarding the number of subsistence fishermen in the exposed population. In this analysis, subsistence fishermen are assumed to account for an additional 5 percent of the fishing population. The magnitude of subsistence fishing in the United States or in individual states, however, is not known. As a result, this estimate may understate or overstate the actual number of subsistence fishermen.

Finally, recreational fishing benefits are based on the assumption that anglers place the same value on reducing concentrations of MP&M pollutants to levels considered protective of aquatic life as they do on eliminating all contaminants from a fishery. While the former level of pollutant reduction is assumed to be protective of aquatic life, some level of contamination would still exist in a fishery. As such, benefits of recreational fishing may be overstated.

EPA acknowledges the unavoidable uncertainty associated with estimating benefits. EPA believes that it has used the best methodology available for estimating benefits. EPA is soliciting comments on the reliability and accuracy of the methods used and suggestions on alternative methods which could be used for the final rule (see Section XIX).

C. Costs To Society

The social costs of regulatory actions are the opportunity costs to society of employing scarce resources in pollution control activity. The social costs of regulation include both monetary and non-monetary outlays made by society. Monetary outlays include private-sector compliance costs, government administrative costs, and other adjustment costs, such as the cost of relocating displaced workers. Non-monetary outlays, some of which can be assigned monetary values, include losses in consumers' and producers' surpluses in affected product markets, discomfort or inconvenience, loss of time, and a slowdown in the rate of innovation.

For this analysis, EPA based its estimate of the cost to society on the following components of social cost: the cost of society's economic resources for achieving compliance with the proposed regulatory option; the cost to governments of administering the proposed regulation; the cost of administering unemployment programs for job losses resulting from regulation; and worker dislocation costs.

1. Resource Cost of Compliance

The chief component of the estimated annual social cost is the cost of complying with the proposed regulation. The portion of this cost that is expected *to be borne directly by the MP&M Phase I industries* amounts to $160.6 million ($1994). This amount is the same as that used for the facility impact analysis and reflects the cost of pollution prevention and treatment systems needed to achieve compliance with the proposed discharge limitations (see Section XIV. D. and E.). In addition, this amount reflects the expected tax treatment of capital outlays and annual expenses and is also based on private costs of capital. However, as discussed in the introduction to this section, the appropriate measure of cost of compliance to society will omit these tax effects and will also reflect the opportunity cost of capital to society or social discount rate. The combined effect of these adjustments is to add an estimated $29.7 million to the estimated private industry cost of the regulation, bringing the cost of compliance to society to $190.3 million ($1994). This

amount may be interpreted as the value of society's productive resources—including labor, equipment, and other material—that is needed annually to achieve the reductions in effluent discharges specified by the proposed regulatory option.

2. Cost of Administering the Proposed Regulation

In addition to the resource costs for achieving effluent discharge reductions, EPA also estimated the cost to all levels of governments for administering the proposed regulation. The main component of this administrative cost category is the cost of labor and material resources for writing permits under the regulation and for compliance monitoring and enforcement activities. EPA estimates that these costs will range from $2.1 to $3.4 million ($1994) annually.

3. Cost of Unemployment

To account for the total social cost of unemployment, EPA estimated the cost of worker dislocation (exclusive of cash benefits) to the individual as well as the additional cost to governments to administer unemployment benefits. The cost of worker dislocation is estimated based on incremental willingness-to-pay to avoid job dislocation in a hedonic wage framework. This framework has been used in the past to impute a trade-off between wages and job security (Topel, 1984, Adams, 1985). Specifically, this estimate approximates a one-time willingness-to-pay to avoid an involuntary episode of unemployment and reflects all monetary and non-monetary impacts of involuntary unemployment incurred by the worker. It does not include any offsets to the cost of unemployment such as unemployment compensation or the value of increased leisure time.

For the MP&M industry, the implied one time statistical cost of an involuntary layoff is estimated at $83,000 to $110,000 ($1994). To calculate the annual cost of employment displacement for the proposed regulatory option, EPA annualized this value over the 15-year analysis period at a social opportunity cost of deferred consumption of three percent and multiplied the resulting annual value by the total number of displaced workers (698 FTEs) estimated in the facility impact analysis. In the labor requirements analysis (see Section XIV.E, above), EPA estimated that the demand for labor for compliance with the proposed regulation would exceed the estimated loss in employment from facility closures. As a result, when the total number of displaced workers is adjusted to account for compliance-related labor demand, the net loss in employment is negative. For this analysis, EPA considered a range of cost for displaced workers with the high end of the range based on the cost of worker displacement considering only the job losses in estimated facility closures and with the low end of the range set at zero. Setting the low end of the range at zero recognizes that labor demands for compliance may equal or exceed job losses but, to be conservative, does not enter a negative cost based on the possible net reduction in unemployment resulting from the regulation. On this basis, EPA estimated that annualized worker displacement costs for the proposed regulation would range from zero to $6.6 million.

Unemployment as the result of regulation may also impose costs to society through the additional administrative burdens placed on the unemployment system (the cost of unemployment benefits per se is not a social cost but instead a transfer payment within society). Administrative costs include the cost of processing unemployment claims, retraining workers, and placing workers in new jobs. Using data from the Interstate Conference of Employment Security Agencies, EPA estimated that the per unemployed worker cost of administering unemployment programs for job losses amounts to approximately $100 per job loss. Multiplying this figure by the 698 job losses and annualizing the result over the 15-year analysis period yields an annual unemployment administration cost of less than $10,000 per year. Again, considering that the net employment loss from the regulation may be negative, EPA used a range of from zero to $10,000 for the additional annual cost of unemployment administration.

Summing across all social costs results in a total social cost estimate of $192.4 to $200.3 million annually ($1994). These social cost estimates do not include losses in consumers' and producers' surpluses resulting from the change in quantity of goods and services sold in affected product markets. However, under the zero-cost-pass-through framework in which compliance costs have been tallied, MP&M industry product prices are assumed not to increase as a result of the proposed regulation. In this case, the estimated resource costs of compliance will approximate the loss in producers' surplus and, with no increase in prices, consumers' surplus will not change.

D. Benefit-Cost Comparison

Because not all of the benefits resulting from the proposed regulatory alternative can be valued in dollar terms, a complete cost-benefit comparison cannot be performed. The social cost of the proposed rule is estimated at $192.4 to $200.3 million annually ($1994). The sum total of benefits that can be valued in dollar terms ranges from $69.6 million to $206.5 million annually ($1994).

As shown in Table 22, combining the estimates of social benefits and social costs yields a net monetizable benefit ranging from negative $130.7 million to positive $14.1 million annually. This assessment of the relationship between costs and benefits is subject to severe limitations on the ability to estimate comprehensively the expected benefits of the proposed regulation. If all of the benefits of regulation could be quantified and monetized, EPA estimates that in all likelihood the benefits of regulation would exceed the social costs.

TABLE 22.—COMPARISON OF NATIONAL ANNUAL MONETIZABLE BENEFITS TO COSTS FOR EFFLUENT LIMITATION GUIDELINES AND STANDARDS FOR THE METAL PRODUCTS AND MACHINERY INDUSTRY, PHASE I

[Millions of 1994 dollars]

Benefit and cost categories	Dollar value
Benefit Categories:	
Human Health Benefits: Fish Consumption	$6.8–$36.2
Human Health Benefits: Water Consumption	0.0–0.0
Recreational Fishing Benefits	23.6–84.3
Avoided Sewage Sludge Disposal Costs	39.1–86.0
Total Estimated Benefits	86.4–208.9
Cost Categories:	

TABLE 22.—COMPARISON OF NATIONAL ANNUAL MONETIZABLE BENEFITS TO COSTS FOR EFFLUENT LIMITATION GUIDELINES AND STANDARDS FOR THE METAL PRODUCTS AND MACHINERY INDUSTRY, PHASE I—Continued

[Millions of 1994 dollars]

Benefit and cost categories	Dollar value
Cost to Industry for the Proposed Regulatory Option	160.6
Adjustments for Tax Code and Use of Social Discount Rate	29.7
Costs of Administering the Proposed Regulation	2.1–3.4
Unemployment Administration and Worker Displacement Costs	0.0–6.6
Total Social Cost	192.4–200.3
Net Benefits (Benefits less Costs)	*($130.7)–$14.1

*For calculating the range of net benefits, the low net benefit value is calculated by subtracting the high value of costs from the low value of benefits. The high net benefit value is calculated by subtracting the low value of costs from the high value of benefits.

Source: U.S. Environmental Protection Agency.

XVI. Water Quality and Other Environmental Benefits of Proposed Rule for the Metal Products and Machinery (MP&M) Industry

The U.S. Environmental Protection Agency (EPA, Agency) evaluated the environmental benefits of controlling the discharges of toxic and nonconventional pollutants from metal products and machinery (MP&M) facilities (Phase 1) to surface waters and publicly-owned treatment works (POTWs) in national analyses of direct and indirect discharges. Discharges of these pollutants into freshwater and estuarine ecosystems may alter aquatic habitats, adversely affect aquatic biota, and adversely impact human health through the consumption of contaminated fish and water. Furthermore, these pollutants may also interfere with POTW operations in terms of inhibition of activated sludge or biological treatment and contamination of sludges, thereby limiting the method of disposal. Many of these pollutants have at least one toxic effect (human health carcinogen and/or systemic toxicant or aquatic toxicant). In addition, many of these pollutants bioaccumulate in aquatic organisms and persist in the environment. Various studies demonstrate the environmental impact of discharges from MP&M facilities on aquatic life, human health, and the quality of receiving waters and sediments. The National Sediment Contaminant Point Source Inventory ranks MP&M as one of the largest ongoing sources of potentially toxic pollutants to sediment (nearly 10 percent of the total load of potential sediment contaminants from point sources). Forty-six (46) direct MP&M facilities are identified by States as being point sources causing water quality problems and are included on their 304(l) Short List. Cases of human health impacts (production worker exposure); aquatic life impacts (lethal and sublethal); a State fish consumption advisory; and contamination of surface waters, ground water, and sediments are also documented.

EPA evaluated the effects of direct wastewater discharges on receiving stream water quality at current levels of treatment and at proposed BAT treatment levels. EPA predicted steady-state in-stream pollutant concentrations after complete immediate mixing with no loss from the system, and compared these levels to EPA-published water quality criteria or to documented toxic effect levels for those chemicals for which EPA has not published water quality criteria. EPA performed this analysis for a representative sample set of 55 direct facilities discharging 61 pollutants to 55 receiving streams. This set of 55 facilities includes 12 facilities that currently are both direct and indirect dischargers, but are projected to become solely indirect dischargers at the proposed option. However, the set of 55 facilities excludes four facilities that EPA's cost model predicts to close based on current economic conditions. EPA then extrapolated the results of this analysis to the entire population of direct MP&M facilities nationwide (approximately 2,035 facilities discharging to 2,035 receiving streams) with each sample facility representing a varying number of additional facilities of the same approximate size engaged in similar activities under similar economic conditions.

In-stream concentrations for two pollutants are projected to exceed human health criteria (developed for consumption of water and organisms) in 6 percent of the receiving streams nationwide at current discharge levels. The proposed BAT regulated discharge levels will reduce the excursions of human health criteria to 2 percent of the receiving streams. The percentage of receiving streams nationwide with in-stream pollutant concentrations projected to exceed chronic aquatic life criteria or toxic effect levels will be reduced from 9 percent at current discharge levels to 4 percent at proposed BAT discharge levels. Thirty-nine (39) pollutants at current and six pollutants at BAT discharge levels are projected to exceed in-stream chronic aquatic life criteria or toxic effect levels. These projected water quality benefits are achieved through a 17 percent reduction in current direct loadings for the 61 evaluated pollutants by the proposed BAT regulatory option. Including loadings of oil and grease and total suspended solids (TSS), current pollutant loadings are reduced 36 percent by the proposed BAT regulatory option. Current pollutant loadings (including all conventional pollutants) are also reduced 36 percent by the proposed BAT regulatory option.

EPA also evaluated the effects of POTW wastewater discharges of 61 pollutants on receiving stream water quality at current and proposed pretreatment levels for a representative sample of 307 indirect discharging MP&M facilities. This set of 307 facilities includes 10 facilities that currently are both direct and indirect dischargers, but are projected to become solely direct dischargers at the proposed option. As with the direct dischargers, the set of 307 facilities excludes 52 facilities that EPA's cost model predicts to close based on current economic conditions. These 307 facilities discharge to 264 POTWs with outfalls located on 249 receiving streams. EPA extrapolated the results to a nationwide population of approximately 7,387 facilities which discharge to 7,016 POTWs on 6,864 receiving streams using the same facility weighting approach described above for the direct dischargers. EPA predicted steady-state in-stream pollutant concentrations after complete immediate mixing with no loss from the system, and compared these levels to EPA-published water quality criteria or to documented toxic

effect levels for those chemicals for which EPA has not published water quality criteria.

EPA projects that in-stream concentrations of five pollutants will exceed human health criteria (developed for consumption of water and organisms) in 7 percent of the receiving streams nationwide at current discharge levels. The proposed pretreatment regulatory option reduces excursions of human health criteria to three pollutants at 5 percent of the receiving streams nationwide. The percentage of receiving streams with in-stream pollutant concentrations projected to exceed chronic aquatic life criteria or toxic effect levels are reduced from 8 percent at current discharge levels to 3 percent at the proposed pretreatment. A total of 19 pollutants at current and ten pollutants at proposed pretreatment levels are projected to exceed in-stream aquatic life criteria or toxic effect levels. Current loadings of the 61 pollutants evaluated for water quality impacts are reduced 32 percent by the proposed pretreatment regulatory options. Including oil and grease and TSS, current pollutant loadings are reduced 50 percent by the proposed pretreatment regulatory options. Including all conventional pollutants, current pollutant loadings are also reduced 50 percent by the proposed pretreatment regulatory options.

EPA also evaluated the potential adverse impacts on POTW operations (inhibition of microbial activity during biological treatment) and contamination of sludge at the 7,016 POTWs that receive wastewater from the national projected population of 7,387 indirect discharging MP&M facilities. Inhibition of POTW operations is estimated by comparing predicted POTW influent concentrations to available inhibition levels. Potential contamination of sludge is estimated by comparing projected pollutant concentrations in POTW sludge to available EPA sludge criteria. EPA evaluated 37 pollutants for potential POTW operation inhibition and nine pollutants for potential sludge contamination. At current discharge levels, EPA projects inhibition problems at 16 percent of the POTWs nationwide caused by 11 different pollutants. At the proposed pretreatment, EPA projects inhibition problems at 15 percent of the POTWs nationwide caused by six pollutants. The Agency projects sludge contamination at 13 percent and 9 percent of the POTWs nationwide at current and proposed pretreatment regulatory option levels, respectively. EPA projects that all nine evaluated pollutants at current and proposed pretreatment levels exceed sludge criteria levels.

For the analysis of contamination of sewage sludge EPA included other industrial discharges in the sewage sludge model. EPA evaluated the benefits of reducing contamination of sludge in its analysis of projected POTW sludge disposal practices at current and proposed pretreatment levels. EPA performed analyses for a representative sample set of 80 POTWs with projected sludge contamination limiting its use for land application, and extrapolated to a nationwide population of 1920 POTWs. Under the proposed pretreatment regulatory option, 184 of the facilities will shift into qualifying for land application of sewage sludge. Land application quality sludge meets ceiling pollutant concentration limits, class B pathogen requirements, and vector attraction reduction requirements. Because costs for land application tend to be lower than those for other disposal methods, this shift away from incineration, co-disposal, and surface disposal results in a cost savings.

The POTW inhibition and sludge values used in this analysis are not, in general, regulatory values. EPA based these values upon engineering and health estimates contained in guidance or guidelines published by EPA and other sources. Therefore, EPA does not intend to base its regulatory approach for proposed pretreatment discharge levels upon the finding that some pollutants interfere with POTWs by impairing their treatment effectiveness or causing them to violate applicable limits for their chosen disposal methods. However, the values used in this analysis help indicate the potential benefits for POTW operations and sludge disposal that may result from the compliance with proposed pretreatment discharge levels.

XVII. Non-Water Quality Environmental Impacts

Sections 304(b) and 306 of the Act require EPA to consider non-water quality environmental impacts (including energy requirements) associated with effluent limitations guidelines and standards. In accordance with these requirements, EPA has considered the potential impact of the proposed regulation on energy consumption, air emissions, and solid waste generation. The Agency has also considered the impacts of other ongoing EPA rulemaking efforts on MP&M Phase I sites.

This regulation was reviewed by EPA personnel responsible for non-water quality environmental programs. While it is difficult to balance environmental impacts across all media and energy use, the Agency has determined that the impacts identified below are justified by the benefits associated with compliance with the limitations and standards.

A. Air Pollution

The Agency believes that the in-process and end-of-pipe technologies included in the technology options for this regulation do not generate air emissions.

The Agency is developing National Emission Standards for Hazardous Air Pollutants (NESHAPs) under section 112 of the Clean Air Act (CAA) to address air emissions of the hazardous air pollutants (HAPs) listed in Title III of the CAA Amendments of 1990. Current and upcoming NESHAPs that may potentially affect MP&M sites are listed below.

- Chromium Emissions from Hard and Decorative Chromium Electroplating and Chromium Anodizing Tanks;
- Halogenated Solvent Cleaning;
- Aerospace Manufacturing; and
- Miscellaneous Metal Parts and Products (Surface Coating).

These NESHAPs will define maximum achievable control technology (MACT). Like effluent guidelines, MACT standards are technology based. The CAA set maximum control requirements on which MACT can be based for new and existing sources.

The use of chlorinated solvents in the MP&M industry can create a source of hazardous emissions. The Agency believes this regulation will not affect the use of chlorinated solvents in the MP&M industry. This regulation neither requires nor discourages the use of aqueous cleaners in lieu of chlorinated solvents.

EPA is addressing emissions of volatile organic compounds (VOCs) from industrial waste water through a Control Techniques Guideline (CTG) for industrial waste water under section 110 of the CAA (Title I of the 1990 CAA Amendments). The MP&M industry is one of several industries that would be covered by the industrial waste water CTG. The industrial waste water CTG will provide guidance to states in recommending reasonably available control technologies (RACT) for VOC emissions from industrial waste water at sites located in areas failing to attain the National Ambient Air Quality Standard for ozone.

B. Solid Waste

Solid waste generation includes hazardous and nonhazardous waste water treatment sludge as well as waste

oil removed in waste water treatment. EPA estimates that compliance with this regulation will result in a decrease in waste water treatment sludge and an increase in waste oil generated at MP&M Phase I sites.

EPA estimates that MP&M Phase I sites generated 33 million gallons of waste water treatment sludge and 8.1 million gallons of waste oil in 1989 from the treatment of waste water. The amount of waste water treatment sludge and waste oil expected to be generated at each of the technology options is presented in Table 23.

TABLE 23.—WASTE TREATMENT SLUDGE AND OIL GENERATION BY OPTION

Option	Waste water treatment sludge generated (million gallons/year)	Waste oil generated (million gallons/year)
Baseline (1989) .	33	8.1
Option 1	31	38
Option 2	21	36
Option 3	21	36

Source: U.S. Environmental Protection Agency.

As shown in Table 23, waste water treatment sludge generation decreased from baseline to Option 1 (which consists of end-of-pipe treatment without in-process flow control). The net decrease is attributed to the fact that Option 1 includes sludge dewatering, which may result in a significant decrease in sludge generation for sites that have chemical precipitation and settling technologies without sludge dewatering in place at baseline. Sludge reduction is not expected at sites which already have sludge dewatering in the baseline. An increase of sludge is expected to occur at sites which do not have treatment in place but are expected to install treatment under the MP&M options.

The sludge reduction from Option 1 to Option 2 is attributed to the water conservation and pollution prevention technologies included in Option 2. EPA expects these technologies to result in sludge reduction for the following reasons:

—In-process metals recovery for electroplating rinses, recycling of coolants, and recycling of paint curtains reduce the mass of metal pollutants in treatment system influent streams, which in turn reduces the amount of sludge generated during metals removal;

—Bath maintenance practices included in Option 2 reduce the mass of metal pollutants discharged to treatment, which in turn reduces the amount of sludge generated during metals removal; and

—Water conservation technologies included in Option 2 reduces the discharge mass of metals present in the source water to a site (e.g., calcium, sodium), which in turn reduces the amount of sludge generated during removal of these metals.

EPA does not expect Option 3 to result in additional sludge generation or reduction over Option 2.

Sludges generated at MP&M sites are often determined to be hazardous under the Resource Conservation and Recovery Act (RCRA) as either a listed or characteristic waste based on the following information:

- If the site performs electroplating operations, and this waste water is mixed with the other waste water treated on site, the resulting sludge is a listed hazardous waste F006 (40 CFR 261.31), or
- If the sludge or waste oil from waste water treatment exceeds the standards for the Toxicity Characteristic Leaching Procedure (i.e. is hazardous), or exhibits other RCRA-defined hazardous characteristics (i.e., reactive, corrosive, or flammable) it is considered a characteristic hazardous waste. (40 CFR 261.24).

Additional federal, state, and local regulations may result in MP&M sludges being classified as hazardous wastes. Determinations on whether a waste is hazardous are made by permitting authorities on a case-by-case basis.

Based on information collected during site visits and sampling episodes, the Agency believes that some of the solid waste generated would not be classified as hazardous. However, for purposes of compliance cost estimation, the Agency assumed that all solid waste generated as a result of the technology options would be hazardous.

The increase in waste oil generation from baseline to Option 1 is attributed to removal of oil from MP&M waste waters prior to discharge to POTWs or surface waters. Option 1 includes oil-water separation for oil-bearing waste waters. This technology removes oil from the waste water. The waste oil is usually either recycled on site or off site, or contract hauled for disposal as either a hazardous or nonhazardous waste. The increase of waste oil generation reflects a transfer of oil from the waste water to a more concentrated waste oil, and does not reflect an increase in overall oil generation at MP&M Phase I sites. For the purpose of compliance cost estimation, EPA assumed that all waste oil was contract hauled for disposal; however, EPA expects that some of the waste oil can be recycled either on site or off site.

The decrease in waste oil generation from Option 1 to Option 2 is attributed to the 80% reduction of coolant discharge using the recycling technology included in the Option 2 technology train. This system recovers and recycles oil-bearing machining coolants at the source, reducing the generation of spent coolant.

EPA does not expect Option 3 to result in additional waste oil generation or reduction over Option 2.

The in-process technologies of ion-exchange/and electrolytic recovery included in both Options 2 and 3 provide the pollution prevention benefits of reclaiming 1.7 million pounds of metal annually. This reuse reduces the solid waste generation at the end-of-pipe for the treatment of waste water from operations using these technologies. In addition, as stated above, the rule is expected to reduce metal contaminants in the sludges generated by POTWs. This is expected to allow POTWs to dispense of the lower metal content sludge by more environmentally beneficial methods (See Section XV).

C. Energy Requirements

EPA estimates that compliance with this regulation will result in a net increase in energy consumption at MP&M Phase I sites. Estimates of increased energy usage by option are presented in Table 24. Option 1 requires the greatest energy usage. The in-process flow control and recycling technologies included in Option 2 reduce the amount of water use. While these technologies require some energy, net energy consumption is reduced under Option 2 since the reduced hydraulic loading reduces the end-of-pipe treatment energy required. This results in an overall decrease in energy requirements from Option 1 to Option 2. The additional end-of-pipe technology included in Option 3 (ion-exchange) increases energy consumption from Option 2 to Option 3.

TABLE 24.—ENERGY REQUIREMENTS BY OPTION

Option	Energy required (million kilowatt hrs/yr)
Baseline (1989)	610
Option 1	810
Option 2	740
Option 3	760

Source: U.S. Environmental Protection Agency.

By comparison, 2,805 billion kilowatt hours of electric power were generated in the United States in 1990. Additional energy requirements for Option 1 (which has the greatest energy

requirements) correspond to approximately 0.007 percent of national requirements. The increase in energy requirements due to the implementation of MP&M technologies will in turn cause an air emissions impact from the electric power generation facilities. The increase in air emissions is expected to be proportional to the increase in energy requirements or approximately 0.007 percent.

XVIII. Regulatory Implementation

A. Upset and Bypass Provisions

A ''bypass'' is an intentional diversion of the streams from any portion of a treatment facility. An ''upset'' is an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the permittee. EPA's regulations concerning bypasses and upsets are set forth at 40 CFR §§ 122.41(m) and (n).

B. Variances and Modifications

The CWA requires application of effluent limitations established pursuant to section 301 or pretreatment standards of section 307 to all direct and indirect dischargers. However, the statute provides for the modification of these national requirements in a limited number of circumstances. Moreover, the Agency has established administrative mechanisms to provide an opportunity for relief from the application of the national effluent limitations guidelines and pretreatment standards for categories of existing sources for toxic, conventional, and nonconventional pollutants.

1. *Fundamentally Different Factor Variances.* EPA will develop effluent limitations or standards different from the otherwise applicable requirements if an individual discharging facility is fundamentally different with respect to factors considered in establishing the limitation of standards applicable to the individual facility. Such a modification is known as a ''fundamentally different factors'' (FDF) variance.

Early on, EPA, by regulation provided for the FDF modifications from the BPT effluent limitations, BAT limitations for toxic and non-conventional pollutants and BCT limitations for conventional pollutant for direct dischargers. For indirect dischargers, EPA provided for modifications from pretreatment standards. FDF variances for toxic pollutants were challenged judicially and ultimately sustained by the Supreme Court. *Chemical Manufacturers Assn* v. *NRDC,* 479 U.S. 116 (1985).

Subsequently, in the Water Quality Act of 1987, Congress added new section 301(n) of the Act explicitly to authorize modifications of the otherwise applicable BAT effluent limitations or categorical pretreatment standards for existing sources if a facility is fundamentally different with respect to the factors specified in section 304 (other than costs) from those considered by EPA in establishing the effluent limitations or pretreatment standard. Section 301(n) also defined the conditions under which EPA may establish alternative requirements. Under Section 301(n), an application for approval of FDF variance must be based solely on 1) information submitted during rulemaking raising the factors that are fundamentally different or 2) information the applicant did not have an opportunity to submit. The alternate limitation or standard must be no less stringent than justified by the difference and must not result in markedly more adverse non-water quality environmental impacts than the national limitation or standard.

EPA regulations at 40 CFR part 125 subpart D, authorizing the Regional Administrators to establish alternative limitations and standards, further detail the substantive criteria used to evaluate FDF variance requests for direct dischargers. Thus, 40 CFR § 125.31(d) identifies six factors (e.g., volume of process waste water, age and size of a discharger's facility) that may be considered in determining if a facility is fundamentally different. The Agency must determine whether, on the basis of one or more of these factors, the facility in question is fundamentally different from the facilities and factors considered by the EPA in developing the nationally applicable effluent guidelines. The regulation also lists four other factors (e.g., infeasibility of installation within the time allowed or a discharger's ability to pay) that may not provide a basis for an FDF variance. In addition, under 40 CFR 125.31(b) (3), a request for limitations less stringent than the national limitation may be approved only if compliance with the national limitations would result in either (a) a removal cost wholly out of proportion to the removal cost considered during development of the national limitations, or (b) a non-water quality environmental impact (including energy requirements) fundamentally more adverse than the impact considered during development of the national limits. EPA regulations provide for an FDF variance for indirect dischargers at 40 CFR 403.13. The conditions for approval of a request to modify applicable pretreatment standards and factors considered are the same as those for direct dischargers.

The legislative history of Section 301(n) underscores the necessity for the FDF variance applicant to establish eligibility for the variance. EPA's regulations at 40 CFR 125.32(b) (1) are explicit in imposing this burden upon the applicant. The applicant must show that the factors relating to the discharge controlled by the applicant's permit which are claimed to be fundamentally different are, in fact, fundamentally different from those factors considered by the EPA in establishing the applicable guidelines. The pretreatment regulation incorporate a similar requirement at 40 CFR 403.13(h) (9).

2. *Economic Variances.* Section 301(c) of the CWA authorizes a variance from the otherwise applicable BAT effluent guidelines for nonconventional pollutants due to economic factors. The request for a variance from effluent limitations developed from BAT guidelines must normally be filed by the discharger during the public notice period for the draft permit. Other filing time periods may apply, as specified in 40 CFR 122.21(1) (2). Specific guidance for this type of variance is available from EPA's Office of Waste Water Management.

3. *Water Quality Variances.* Section 301(g) of the CWA authorizes a variance from BAT effluent guidelines for certain nonconventional pollutants due to localized environment factors. These pollutants include ammonia, chlorine, color, iron, and total phenols.

4. *Permit Modifications.* Even after EPA (or an authorized State) has issued a final permit to a direct discharger, the permit may still be modified under certain conditions. (When a permit modification is under consideration, however, all other permit conditions remain in effect.) A permit modification may be triggered in several circumstances. These could include a regulatory inspection or information submitted by the permittee that reveals the need for modification. Any interested person may request that a permit modification be made. There are two classifications of modifications; major and minor. From a procedural standpoint, they differ primarily with respect to the public notice requirements. Major modifications require public notice while minor modifications do not. Virtually any modification that results in less stringent conditions is treated as a major modifications, with provisions for public notice and comment. Conditions that would necessitate a major modification of a permit are described

in 40 CFR 122.62. Minor modifications are generally non-substantive changes. The conditions for minor modification are described in 40 CFR 122.63.

C. Relationship to NPDES Permits and Monitoring Requirements

The BPT, BAT and NSPS limitations in today's proposed rule would be applied to individual MP&M Phase I plants through NPDES permits issued by EPA or approved State agencies under section 402 of the Act. The preceding section of this preamble discussed the binding effect of this regulation on NPDES permits, except when variances and modifications are expressly authorized. This section adds more detail on the relationship between this regulation and NPDES permits.

One issue is how this regulation will affect the powers of NPDES permit-issuing authorities. EPA has developed the limitations and standards in the proposed rule to cover the typical facility for this point source category. This regulation does not restrict the power of any permitting authority to act in any manner consistent with law or these or any other EPA regulations, guideline, or policy.

Even if a facility is totally without waste water discharge, an NPDES permit may be requested by the facility to provide upset provisions which would not apply to discharge in the absence of a permit.

Another concern is the operation of EPA's NPDES enforcement program, which was an important consideration in developing today's proposal. The Agency emphasizes that although the Clean Water Act is a strict liability statute, EPA can initiate enforcement proceedings at its discretion. EPA has exercised and intends to exercise that discretion in a manner that recognizes and promotes good faith compliance.

D. Best Management Practices

Section 304(e) of the Act authorizes the Administrator to prescribe ''best management practices'' (BMPs). EPA may develop BMPs that apply to all industrial sites or to a designated industrial category and may offer guidance to permit authorities in establishing management practices required by unique circumstances at a given plant. Dikes, curbs, and other control measures are being used at some MP&M sites to contain leaks and spills as part of good ''housekeeping'' practices. However, on a facility-by-facility basis a permit writer may choose to incorporate BMPs into the permit.

XIX. Solicitation of Data and Comments

EPA invites and encourages public participation in this rulemaking. The Agency asks that comments address any perceived deficiencies in the record of this proposal and that suggested revisions or corrections be supported by data where possible.

EPA particularly requests comments and information on the following issues:

1. Oil & Grease as Indicator for Organics. EPA believes that today's proposal of an oil and grease pretreatment standard as a indicator for specific organic pollutants will ensure that there is adequate treatment and removal of the organic pollutants found in MP&M waste water. The organic constituents originate in waste waters such as metal working fluids, corrosion prevention coating solutions, paints and solutions developed to clean the oils from the metal surface. EPA believes that treatment and removal of oil and grease will effectively remove the organics. Nonetheless, EPA's data are incomplete for all organics, and EPA can not predict what products may serve as substitutes for solvents that EPA is in the process of regulating under EPA's ozone depletion policy.

Further, in recognition of the present state of changeover occurring in the industry, it may be premature to set limits based on today's practices. Therefore, EPA at promulgation may defer control of organic waste water pollutants until the MP&M Phase II rule is proposed. EPA requests comments on the establishment of oil and grease as an indicator parameter for specific organics and on the current practices and where industry is moving with respect to solvent cleaners and their substitution in industrial processes. EPA is interested in available information about current substitutions and their effectiveness.

2. Flow Cut-offs and Administrative Burden. EPA divided the population of existing indirect dischargers into two flow categories for the purpose of data analysis and implementation. The existing indirect discharger flow cut-off of 1,000,000 gallons per year was based on a careful review of the data. For a site operating 250 days per year, 1,000,000 gallons per year translates into an average discharge flow rate of 4,000 gallons per day.

This approach is in response to concerns raised by Control Authorities and Regional and state Pretreatment Coordinators regarding the burden that would be imposed on them, if they were required to establish mass-based discharge permits for all MP&M Phase I sites within a three-year period.

EPA requests comments on the proposed indirect discharger flow cut-off which was used to define the two flow categories established for PSES. EPA requests comments on the possibility of a different cut-off at 25,000 gallons per day to define large flow existing indirect discharger sites (25,000 gallons per day equals approximately 6,250,000 gallons per year). The 25,000 gallons per day figure is currently used by the Agency as one definition for a significant industrial user (SIU). EPA requests comments on revising the flow cut-off and requiring mass-based permits for existing sites indirectly discharging more than 25,000 gallons per day. Existing indirect sites discharging less than 25,000 gallons per day could be exempt or covered by concentration based limits. Tables 25 and 26 compare the distribution of total annual flow and pollutant loadings discharged from MP&M Phase I indirect discharging sites using the 25,000 gallons per day (6,250,000 gallons per year) cut off to the distribution using the 1,000,000 gallons per year cut off.

TABLE 25.—ESTIMATED DISTRIBUTION OF INDIRECTLY DISCHARGING SITES BY BASELINE FLOW AND LOAD [a]

Flow Range (gal/yr/site)	Estimated No. of sites	Estimated total flowin range (millions of gal/year)	Estimated total load in range (millions of lbs/year)	Estimated percent of total sites	Estimated percent of total flow	Estimated percent of total load
0-6,250,000	8,065	4,600	550	93	23	38
Greater than 6,250,000	641	15,000	900	7	77	62
Totals	8,706	19,000	1,400	100	100	100

Source: U.S. Environmental Protection Agency.

[a] An estimated 364 MP&M sites discharged both directly and indirectly in the baseline. In order to evaluate indirect and direct discharges separately, the expected post compliance discharge status was used to assign these sites to either direct or indirect for the purpose of this table. The assignment was based on technical factors which are included in the public record.

TABLE 26.—ESTIMATED DISTRIBUTION OF INDIRECTLY DISCHARGING SITES BY BASELINE FLOW AND LOAD [a]

Flow range (gal/yr/site)	Estimated No. of sites	Estimated total flow in range (millions of gal/year)	Estimated total load in range (millions of lbs/year)	Estimated percent of total sites	Estimated percent of total flow	Estimated percent of total load
Less than 1,000,000	6,708	744	138	78	4	10
Greater than 1,000,000	1,998	18,000	1,300	22	96	90
Totals	8,706	19,000	1,400	100	100	100

Source: U.S. Environmental Protection Agency.

[a] An estimated 364 MP&M sites discharged both directly and indirectly in the baseline. In order to evaluate indirect and direct discharges separately, the expected post compliance discharge status was used to assign these sites to either direct or indirect for the purpose of this table. The assignment was based on technical factors which are included in the public record.

EPA also requests comments from Control Authorities and Pretreatment Coordinators regarding the burden alleviated by this proposal. Specifically, how many labor hours are estimated to be saved by the proposed exemption, and how much money would be saved by municipalities.

EPA understands that accurate flow measurement can be difficult and costly, especially at sites with widely varying flow rates and at sites with very low flow rates. Therefore, EPA also solicits comments on the accuracy and cost of available flow monitoring devices.

EPA also solicits comments, particularly from Control Authorities or Pretreatment Coordinators, on whether the proposed approach would be harmful to the environment. Specifically, is there evidence that some of the sites that would be exempt are currently causing problems at POTWs? Secondly, would mass-based requirements alleviate the problem?

3. Exemption of Low Discharge Volume Indirect Sources. EPA is soliciting comments on proposed exemption of existing low discharge volume indirect sources from the MP&M Phase I categorical pretreatment standards.

EPA considered a number of different flow cutoffs that could be used for the proposed exemption The number of sites which discharge less than 1,000,000 gallons per year and their contribution to the waste water discharge flow rate from the MP&M category (only 4%of the total) are provided in Table 26. Instead of the 1,000,000 gallons per year flow cutoff, other flow cutoffs could be used. For a site operating 250 days per year, 1,000,000 gallons per year would translate into 4,000 gallons per day.

As an alternative to exempting existing low discharge volume indirect discharges, EPA could reduce the 40 CFR part 403 requirements on frequency of monitoring and reporting by industrial users and frequency of inspections and testing by the Control Authorities for these sites. If the requirements of 40 CFR part 403 were reduced instead of exempting low volume dischargers, this change could be tied to certain objective criteria (e.g. demonstrated compliance over time). EPA solicits comments on whether monitoring and inspections should be required more frequently in situations of continued non-compliance, planned expansion, etc.

EPA solicits comments and data on the environmental impact the proposed exemption would cause. EPA also solicits comments and data on the burden imposed on Control Authorities by the possible inclusion of these low discharge volume sites under this rule.

Finally, EPA solicits comments on the proposed exemption of low discharge volume indirect dischargers in relation to possible changes to the Clean Water Act that may reflect on the Domestic Sewage Exclusion provided for under RCRA section 1007 [27] (40 CFR 261.4 (a)(1)). In the bill before the last Congress to amend the Clean Water Act, the Agency took the position that the Domestic Sewage Exclusion provisions should be limited and apply only under the following conditions:

1. the source and wastestream are subject to or are scheduled to be subject to a categorical pretreatment standard;

2. the pollutant and source are subject to a technically based local limit developed by a POTW, or a technology based local limit developed by EPA or a State;

3. the waste is generated in de minimis amounts by a household or similar non-commercial entity; or

4. the source and wastestream are covered by a Toxicity Reduction Action Plan (TRAP), as defined by the statute.

Considering these conditions could be included in future amendments to the Clean Water Act, EPA solicits comments on the impact these amendments could have on proposed exemption of low discharge volume indirect dischargers.

4. Alternative to Mass-Based Compliance. EPA requests comments on an alternate compliance approach for large volume existing indirect dischargers under PSES. EPA is considering an alternate compliance approach for the existing indirect discharging large volume sites (sites defined in this proposal as having an annual discharge volume greater than 1,000,000 gallons). For a site operating 250 days per year, 1,000,000 gallons per year translates into an average discharge flow rate of 4,000 gallons per day. These sites would have to comply with a mass-based permit or choose the alternative of establishing compliance with the pretreatment standards by certifying in writing to the Control Authority that they have installed in-process technologies equivalent to those costed as the basis of the BPT Option 2 technology. The in-process control technologies of Option 2 include:

- Flow reduction using flow restrictors, conductivity meters, and/or timed rinses for all flowing rinses, plus countercurrent cascade rinsing for all flowing rinses;
- Flow reduction using bath maintenance for all other process water-discharging operations;
- Centrifugation and 100 percent recycling of painting water curtains;
- Centrifugation and pasteurization to extend the life of water-soluble machining coolants reducing discharge volume by 80%; and
- In-process metals recovery using ion exchange followed by electrolytic recovery of cation regenerants for selected electroplating rinses. This includes first-stage drag-out rinsing with electrolytic metal recovery.

EPA solicits comments on the list of in-process technologies above: should

additional in-process technologies be added, should any of the in-process technologies listed above not be included, would problems arise with how these technologies are defined, etc. If the alternative compliance approach is included in the final rule, the list of in-process technologies may differ somewhat from the list above based on public comment. EPA may include this approach of an alternate PSES requirement in the final rule and thus requests comments on this approach. EPA's purpose for offering this as an alternate compliance approach is to provide relief to Control Authorities from the burden associated with the development of mass-based permits. EPA is not proposing this alternative compliance approach, since a decision as to whether or not to offer this alternative will rely on comments and additional data as to the utility of such an approach.

Specifically, EPA encourages MP&M sites to offer comments regarding the technical feasibility of the in-process control measures that would be required to be eligible for the alternate compliance approach, as well as an estimate of the burden (in labor hours) associated with submitting a certification.

EPA also solicits comments from Control Authorities and Pretreatment Coordinators on the benefits and savings in time and manpower expected to be achieved whenever a site takes advantage of this alternate compliance approach. Comments should account for any burden associated with maintaining certifications and conducting inspections.

EPA has considered another option of requiring all indirect dischargers to comply with concentration-based permits and mandatory pollution prevention practices. Some Control Authorities have indicated a preference for this type of approach for ease of enforcement and implementation, therefore, EPA seeks comments on this option as well.

5. Cyanide Monitoring Waiver. Although cyanide is essential in many electroplating operations, the Agency is aware that some metal products and machinery plants do not use cyanide. In some existing regulations, this issue has been addressed by allowing plants to only monitor annually for cyanide if the annual waste water sample is below the regulatory long term average and if the plant owner or operator certifies in writing to the POTW authority or permit issuing authority that cyanide is not and will not be used on site. For example, see 40 CFR 467.03. For MP&M, the regulatory long term average for cyanide is 0.02 mg/l.

The Agency is soliciting comments on the possibility of including such a provision to allow plants to not monitor for cyanide. The comments should address the utility of this provision, the amount of unnecessary monitoring avoided, the economic impacts, the environmental impacts, and any other information relevant to the decision. EPA also solicits comments as to what form the certification should take and at what frequency it should be required.

6. Other Pollutant Monitoring Waivers. Similar to the alternate approach for cyanide discussed above, the Agency is also considering allowing sites to opt out from monitoring specific metals if the site can certify that the metal is not used in any way at their site. This may be restricted to metals such as cadmium, chromium and nickel, which are frequently plated onto a base metal or used in the surface treatment of metals. EPA solicits comments on this approach, specifically whether it should be limited to certain metals such as those mentioned, or whether it could apply to all regulated metal pollutants. EPA also solicits comments as to what form the certification should take and at what frequency it should be required.

7. Additional Unit Operations. EPA has identified 47 unit operations which are typically performed at MP&M sites. EPA requests comments on additional operations which may be performed at MP&M sites and which have not been listed in today's notice. Please specify whether these operations have a waste water stream associated with them, what is the estimated volume of the waste water, what is the frequency of the operation, and whether it is similar to any of the 47 operations already identified.

8. Assignment of Industrial Sectors. EPA has discussed the assignment of industrial sector to MP&M plants in today's notice and has provided several examples of how to assign sites to industrial sectors based on the products produced. EPA is soliciting comment from any industrial site which has the potential to be covered by MP&M but is uncertain as to their appropriate industrial sector and phase (MP&M Phase I or MP&M Phase II) classification. Sites are requested to supply information about what operations they are performing, what products they are manufacturing, rebuilding or maintaining, and to what industries they are selling their products or providing their services.

9. Possible Addition of Lead as Regulated Parameter. Lead is a regulated parameter under several existing metals regulations (e.g. metal finishing 40 CFR part 433), but lead was rarely found at treatable concentrations in the raw waste water, prior to treatment, at the sites sampled for MP&M Phase I. As a result, EPA is not proposing a lead limitation. EPA is considering collecting additional data or transferring data from the metal finishing category in order to regulate lead in the final MP&M Phase I regulation. If lead were regulated based on data transferred from the metal finishing rule, then the limits would be similar to those listed in metal finishing. The metal finishing daily maximum limit for lead is 0.69 milligrams per liter, and the monthly average limit for lead is 0.43 milligrams per liter. If lead were regulated based on the collection of additional data, then the MP&M Phase I lead limits could be lower than the lead limits in the metal finishing regulation. EPA is soliciting comments and data on the possibility of adding lead to the list of regulated parameters for MP&M Phase I. EPA is soliciting comments on the use of lead in the MP&M Phase I category (e.g. in what operations is lead used, how much is used, do these operations discharge process waste water, how prevalent are these operations, etc.).

10. Possible Addition of Other Regulated Parameters. The list of parameters which EPA proposes to regulate under MP&M Phase I are shown in Table 2 of this document. EPA is soliciting comments and data on additional parameters that should be considered for regulation. EPA is proposing a total cyanide limit for MP&M Phase I. In other rules such as metal finishing (40 CFR part 433), EPA has set a total cyanide limit and included an alternative amenable cyanide limit. EPA is soliciting comments on whether or not an amenable cyanide limit should be offered as an alternative to the proposed total cyanide limit.

11. Possible Deletion of Regulated Parameters. The list of parameters which EPA proposes to regulate under MP&M Phase I are shown in Table 2 of this document. EPA is soliciting comments and data on parameters that should be deleted from consideration for regulation.

12. Additional Technology Data. In this document, the Agency proposes a new source standard equivalent to BAT, in part because, given the available data, the Agency concludes there is no add-on technology that is cost-effective for the entire Metal Products and Machinery category suitable for a more stringent new source standard. However, the Agency solicits comments

on other technologies and pollution prevention techniques that may be appropriate and cost-effective for new sources in subcategories of the Metal Products and Machinery category.

For each technology or pollution prevention technique, the Agency is particularly interested in receiving data on: (1) Technology performance, including pollutant reduction/elimination and flow reduction/elimination; (2) economics, including initial capital investment, operation and maintenance costs, payback period, waste disposal savings, material input savings, and other savings; (3) overall energy use; (4) sludge generation, including metals recoverability and the ability of sludge to be recycled on or off-site; (5) applicability of a given technique across the whole MP&M Phase I population or across a particular MP&M sector, SIC code, or other industrial sector breakdown; and (6) air quality impacts and emissions. In addition, as some technologies and pollution prevention techniques eliminate or reduce discharges to water, but not to other media, the Agency solicits comments on the environmental impacts and regulatory costs associated with each technology's impact on other environmental media.

Specifically, the Agency solicits information and comments concerning the pollution prevention performance, cross-media environmental impacts, and economic effects associated with the following technologies and pollution prevention techniques, even if the technology can only be applied to a subcategory of the MP&M category:

(1) Ion Exchange;
(2) Electrodialysis / Electrowinning;
(3) Reverse Osmosis;
(4) Evaporation (low pressure, conventional);
(5) Diffusion dialysis;
(6) Conductive polymer films;
(7) Alternatives to electroplating (e.g. powder coating, aqueous soaks, ultrasonics);
(8) Flow-through barrel plating; and
(9) Micro-filtration.

The Agency particularly welcomes comments on technology performance and cost from technology vendors and developers, in addition to comments from industrial users.

13. Technical Assistance. The Agency is soliciting comments on the degree to which technical assistance would help MP&M facilities identify and choose compliance strategies which include pollution prevention technologies and practices that are most cost-effective and protective of the environment.

If commenters believe technical assistance would be valuable, EPA invites comments and data to address the following questions. What would be the most productive source (e.g. EPA, state, or local environmental agencies; departments of commerce or development; universities; non-profit organizations; private trade associations) of technical assistance? What would be the most productive form (e.g. printed material, electronic bulletin boards, telephone hotlines, on-site visits) of technical assistance? Commenters who currently use the technical assistance services provided in most states are requested to respond as to the utility of the services which they use. Would commenters be willing to pay a reasonable fee for such services?

14. Consolidated Reporting and Permitting. EPA understands that MP&M facilities often must comply with several different reporting and permitting requirements for different media (i.e. air, water, and solid waste). These separate requirements could inhibit the development of comprehensive site-wide environmental compliance strategies. For example, some pollution prevention strategies which reduce overall environmental impact can be complicated by having to comply with separate media requirements. The Agency is soliciting comments on the degree to which separate reporting and permitting programs for different media hinder comprehensive site-wide environmental compliance strategies or pollution prevention approaches at MP&M facilities. EPA is soliciting data related to specific examples.

15. Impact of Procurement Practices. EPA is soliciting comments on the degree to which certain government and private procurement practices (product specifications) inhibit MP&M facilities from using pollution prevention technologies and practices, especially in cases where such technologies and practices could yield a cost effective, quality product with less risk to the environment. EPA is soliciting data related to specific examples.

16. Pollution Prevention Planning. Several states require MP&M facilities to develop various types of pollution prevention plans. EPA is soliciting comments from MP&M facilities which are currently required to develop pollution prevention plans as to whether or not the planning requirements were productive in identifying cost-effective pollution prevention practices, whether the permit process inhibited the use of such pollution prevention practices developed in the plans, and how the permit process could be changed to encourage the use of such pollution prevention practices.

17. Financing Pollution Prevention. EPA is soliciting comments as to the degree to which MP&M facilities have encountered difficulty in acquiring capital for pollution prevention projects. EPA is soliciting data related to specific examples.

18. Contiguous Site Definition. EPA seeks comments on how to define which parcels of property within the same fence line on a mixed use property are contiguous. For example, should properties be divided into a system of grids with all discharges from sites within a single sector considered contiguous? Should discharges from a single building be treated as a plant or portion of a plant for purposes of determining the volume of discharge subject to regulation? Another option would be for permit writers to make the determination case-by-case based on some degree of proximity between industrial operations and a practical application of the requirements for MP&M Phase I industries (with due consideration to the amount of MP&M Phase I wastestream and its concentration in the overall wastestream discharged to the treatment works), the degree to which functions are related, and such other factors as EPA considers relevant to the determination.

19. Flow Definition. In this proposal, EPA has defined existing small volume indirect dischargers as existing indirect sites which discharge less than one million gallons per year. EPA is soliciting comments on whether the flow cut off for this exemption should be provided as a daily flow rate. For example, for a site operating 250 days per year, one million gallons discharge per year is equivalent to an average discharge of 4,000 gallons per day.

20. Municipalities. EPA has not examined the potential cost of compliance or environmental benefit from regulating municipal facilities which manufacture, maintains or rebuilds finished metal parts, products or machines within one of the seven industrial sectors in MP&M Phase I. EPA believes most municipal MP&M facilities would be existing indirect dischargers discharging less than one million gallons per year and would therefore be exempt from this regulation. However, EPA is seeking comment from municipalities which would qualify as MP&M Phase I sites and which would not qualify for the low flow exemption. Depending on the comments and data received, EPA could perform additional analyses to specifically cover municipal MP&M facilities, or EPA could specifically

exempt municipal MP&M facilities, especially if regulating such facilities is determined to be an unfunded mandate.

21. Subcategorization. In today's notice, the Agency proposes to treat the Metal Products and Machinery industry as one category with a uniform BAT and new source standard. A single standard provides simplicity and clarity in compliance, permitting, and enforcement and, thus, may reduce compliance and implementation costs.

However, the Agency recognizes that subcategorization may provide additional environmental benefits. Certain treatment technologies, for example, may reduce effluent loadings but may only be economically feasible for a subset of the regulated community. Since, according to available data, such technologies are not applicable to the entire industry category, the Agency has not selected such a technology for either the BAT or new source standards. The Agency solicits comments on how to balance the potential regulatory impacts of subcategorization against the potential environmental benefits of a more stringent BAT or new source standard for a subset of the Metal Products and Machinery category.

22. Innovative Approaches to Reduce Regulatory Burden. The Agency solicits comments on innovative regulatory approaches that offer incentives for users to employ more effective pollution prevention or treatment technologies by reducing their regulatory burden. For example, a more stringent new source standard for a subcategory of the industry could include reduced monitoring or reporting requirements that could offset potentially higher compliance costs. In addition, the Agency could include a program that would offer similar regulatory flexibility to existing users who opt into permit conditions equal to a more stringent new sources standard. Similarly, a voluntary program that allows users to opt to meet more stringent technology standards in return for reduced monitoring and other requirements could be offered to both new and existing users even in the absence of either a more stringent new source standard or BAT standard. The Agency welcomes comments on these and other innovative approaches that could simultaneously improve water quality and ease regulatory burdens.

23. Data Collection. With today's notice, the Agency wishes to communicate to the regulated community its strong interest in providing incentives for incorporating the best technologies into the final rule using approaches that reduce regulatory burdens. The Agency hopes that its consideration of these possible innovative approaches reduces any potential disincentives for collecting and submitting technology cost and performance data. While the Agency retains its authority under section 308(q) of the Act, the Agency hopes that its consideration of innovative and voluntary approaches will maximize voluntary data submissions during the comment period following today's proposal.

24. Benefits Methodology. EPA acknowledges the unavoidable uncertainty associated with estimating benefits. EPA believes that it has used the best methodology available for estimating benefits. EPA is soliciting comments on the reliability and accuracy of the methods used and suggestions on alternative methods which could be used for the final rule.

25. Unfunded Mandates. EPA believes that the proposed regulation represents the most cost effective approach. EPA acknowledges that the proposed regulation may not be the least burdensome, but EPA believes that the additional costs are justified due to the additional pollutant removals achieved. With respect to the Unfunded Mandates Act, EPA is soliciting comments and data on cost effective alternatives which are less burdensome. In addition, EPA solicits comment on how to interpret ''most cost effective'' in the context of the effluent guideline program.

XX. Guidelines for Comment Submission of Analytical Data

EPA requests that commentors to today's proposed rule submit analytical, flow, and production data to supplement data collected by the Agency during the regulatory development process. To ensure that commentor data may be effectively evaluated by the Agency, EPA has developed the following guidelines for submission of data.

A. Types of Data Requested

1. EPA requests paired influent and effluent treatment data for each of the technologies identified in the technology options, as well as any additional technologies applicable to the treatment of MP&M waste waters. This includes end-of-pipe treatment technologies and in process treatment, recycling, water reuse, or metal recovery technologies. Submission of effluent data only is not sufficient for full analysis; the corresponding influent data must be provided.

For submissions of paired influent and effluent treatment data, a minimum of four days of data are required for EPA to assess variability. Submissions of paired influent and effluent treatment data should include: a process diagram of the treatment system; treatment chemical addition rates; sampling point locations; sample collection dates; influent and effluent flow rates for each treatment unit during the sampling period; sludge or waste oil generation rates; a brief discussion of the treatment technology sampled; and a list of unit operations contributing to the sampled wastestream. EPA requests data for systems that are treating only process waste water. Systems treating non-process waste water (e.g., sanitary waste water or non-contact cooling water) will not be evaluated by EPA. In addition to data for the analytes discussed below, data for total suspended solids (TSS) and pH must be included with submissions of treatment data. If available, information on capital cost, annual (operation and maintenance) cost, and treatment capacity should be included for each treatment unit within the system.

2. EPA also requests flow, production, and analytical data from MP&M unit operations, rinses, and wet air pollution control devices. Submissions of analytical data for MP&M unit operations and rinses should include a process diagram of the unit operation; a description of the purpose and performance of the operation; production data associated with the sampling period; flow rates associated with the sampling period (i.e., continuous discharge flow rates, intermittent discharge rates and frequencies, or volume of bath and time of last discharge for stagnant baths); sample type (grab or composite); temperature and pH of each sample; sample collection dates; known process bath constituents; sampling point locations; and, the volume, discharge frequency, and destination of all process waste water, waste oil, or sludge generated by the unit operation.

Associated production data should be provided in the following units: mass of metal removed (for abrasive jet machining, electrical discharge machining, grinding, machining, and plasma arc machining operations), in standard cubic feet of air flow (for wet air pollution control operations), or surface area of parts processed (for all other unit operations). Flow, production, and analytical data should all correspond to the same period of time. When applicable, a description of any pollution prevention technologies used at the site for the unit operations, including cost savings and pollution reduction estimates should be provided.

B. Analytes Requested

EPA considered 342 metal, organic, conventional, and other nonconventional pollutant parameters for regulation under the MP&M Category. Based on analytical data collected by the Agency, 69 pollutant parameters were identified as MP&M ''pollutants of concern''. Complete lists of pollutant parameters considered for regulation and pollutants of concern (as well as the criteria used to identify each of these pollutant parameters) are available in the Technical Development Document for this proposal. The Agency requests analytical data for any of the 69 pollutants of concern and for any other pollutant parameters which commentors believe are of concern in the MP&M industry. TSS and pH data are requested for all samples. For submissions of data including organic pollutants, data for oil and grease (O&G) is requested. Table 27 presents the EPA analytical methods for these pollutants. Commentors should use these methods or equivalent methods for analyses, and should document the method used for all data submissions.

C. Quality Assurance/Quality Control (QA/QC) Requirements

Today's proposed regulations were based on analytical data collected by EPA using rigorous QA/QC checks. These QA/QC checks include procedures specified in each of the analytical methods, as well as procedures used for the MP&M sampling program in accordance with EPA sampling and analysis protocols. The Agency requests that submissions of analytical data include documentation that QA/QC procedures similar to those listed below were observed.

EPA followed the QA/QC procedures specified in the analytical methods listed in Table 27. These QA/QC procedures include sample preservation and the use of method blanks, matrix spikes, matrix spike duplicates, laboratory duplicate samples, and Q standard checks (e.g., continuing calibration blanks). EPA requests that sites provide detection limits for all non-detected pollutants. EPA also requests that composite samples be collected for all flowing waste water streams (except for analyses requiring grab samples, such as oil and grease), sites collect and analyze 10% field duplicate samples to assess sampling variability, and sites provide data for equipment blanks for volatile organic pollutants when automatic compositors are used to collect samples.

TABLE 27.—EPA ANALYTICAL METHODS FOR USE WITH MP&M

Parameter	EPA method	Sample type
Metals	1620	Composite/Grab.
Volatile Organics	1624	Composite/Grab.
Semivolatile Organics	1625	Grab.
pH	150.1	Composite/Grab.
Total Dissolved Solids (TDS)	160.1	Composite/Grab.
Total Suspended Solids (TSS)	160.2	Composite/Grab.
Chloride, Fluoride, and Sulfate	300.0 or 325.2, 340.2, and 375.4	Composite/Grab.
Acidity	305.1	Composite/Grab.
Alkalinity	310.2	Composite/Grab.
Cyanide, Total	335.2	Grab.
Nitrogen, Ammonia	350.1	Composite/Grab.
Nitrogen, Total Kjeldahl	351.2	Composite/Grab.
Phosphorus, Total	365.4	Composite/Grab.
Chemical Oxygen Demand	410.1 or 410.2	Composite/Grab.
Oil and Grease, Total Recoverable	413.2	Grab.
Phenolics, Total Recoverable	420.2	Composite/Grab.

XXI. Unfunded Mandates Reform Act

Section 201 of the Unfunded Mandates Reform Act of 1995 (''Unfunded Mandates Act''), signed into law on March 22, 1995, requires each agency, unless prohibited by law, to assess the effects of federal regulations on State, local, and tribal governments and the private sector. Under Section 202 of the Unfunded Mandates Act, EPA must prepare an unfunded mandate statement to accompany any proposed rule where the estimated costs to State, local, or tribal governments, or to the private sector, will be $100 million or more in any one year. Under Section 205, EPA must select the most cost-effective or least burdensome alternative that achieves the requirements, or explain why this was not possible. Section 203 requires EPA to establish a plan for informing and advising any small governments that may be significantly impacted by the rule.

The unfunded mandate statement under Section 202 must include: (1) a citation of the statutory authority under which the rule is proposed, (2) an assessment of the costs and benefits of the rule and the federal resources available to defray the costs, (3) where feasible, estimates of future compliance costs and disproportionate impacts upon particular geographic or social segments of the nation or industry, (4) where relevant, an estimate of the effect on the national economy, and (5) a description of EPA's prior consultation with State, local, and tribal officials.

Since this proposed rule is estimated to impose costs to the private sector in excess of $100 million, EPA has prepared the following statement with respect to budgetary impacts. EPA does not expect that this rule will impose significant costs on State, local, or tribal governments; although EPA has taken several steps to reduce the administrative burden of this proposed rule.

1. Statutory Authority

The statutory authority for this rulemaking is identified and described in Sections I and II of the preamble. As required by Section 205 of the Unfunded Mandates Act and as discussed in Section IX of the preamble, EPA has chosen to propose a rule that is the most cost-effective alternative for regulation of these sources that meets the statutory requirements under the Clean Water Act. EPA acknowledges that the proposed regulation may not be the least burdensome, but EPA believes that the additional costs are justified due to the additional pollutant removals achieved.

2. Costs and Benefits

The assessment of costs and benefits for this rule, including the assessment of costs and benefits to State, local, and tribal governments, is discussed in the Regulatory Impact Assessment for this proposal and in Section XV of the preamble.

3. Future and Disproportionate Costs

The Unfunded Mandates Act requires that EPA estimate, where accurate estimation is reasonably feasible, future compliance costs imposed by the rule and any disproportionate budgetary effects. EPA's estimates of the future compliance costs of this rule are discussed in the Regulatory Impact Assessment for this proposal and in Section XIV of the preamble.

EPA does not expect that there will be any disproportionate budgetary effects of the proposed rule on any particular areas of the country, particular governments or types of communities. This is because the affected population of MP&M facilities is distributed throughout the country in settings from urban to rural. The estimated annual impact of this proposed rule on the affected industry is $161 million ($1994) as discussed in Section XIV of this preamble. A discussion of community impacts is also included in Section XIV. The annual administrative burden on State and local governments is estimated to be $1.9 to 3.2 million ($1994) as discussed in Section XIV.C. of the preamble and in the Regulatory Impact Assessment. The administrative burden was estimated for State and local governments combined due to the way in which direct and indirect discharge permits are administered. The impact on tribal governments is expected to be zero.

4. Effects on National Economy

The Unfunded Mandates Act requires that the EPA estimate the effect of this rule on the national economy where (1) accurate estimates are feasible and (2) the rule will have a ''material'' effect on the economy. EPA's estimates of the impact of this proposal on the national economy are described in Section XIV of this preamble. The Federal resources which are generally available for financial assistance to States are included in Section 106 of the Clean Water Act.

5. Consultation With Government Officials

The Unfunded Mandates Act requires that EPA describe the extent of the Agency's prior consultation with affected State, local, and tribal officials, summarize the officials' comments or concerns, and summarize EPA's response to those comments or concerns. In addition, Section 203 of the Act requires that EPA develop a plan for informing and advising small governments that may be significantly or uniquely impacted by a proposal.

In the development of this rule, EPA has conducted over a dozen technical presentations to explain the content of the MP&M proposal. Included among these presentations was a public meeting held on February 23, 1994. Also included among these presentations were several meetings with State and local governments. In summary, the comments and concerns raised by government officials had to do with the potential administrative burden of this proposed rule. EPA has addressed these concerns by evaluating the characteristics of the industry in order to determine if the potential administrative burden could be reduced without significantly changing the environmental benefits of the proposed rule. After carefully evaluating the number and size of MP&M facilities, the estimated cost of compliance and the estimated pollutant loadings, EPA decided to exempt existing indirect dischargers which discharge less than one million gallons per year. This addresses the concerns of State and local governments by significantly reducing the administrative burden while continuing to cover the majority of the pollutant loadings from this industry. Small governments are not significantly impacted by this rule as discussed in Sections XIV and XV if this preamble, and therefore no plan is required.

Appendix A To The Preamble—Abbreviation, Acronyms, and Other Terms Used in This Notice

Act—The Clean Water Act

Agency—U.S. Environmental Protection Agency

BAT—Best available technology economically achievable, as defined by section 304(b)(2)(B) of the Act.

BCT—Best conventional pollutant control technology, as defined by section 304(b)(4) of the Act.

BMP—Best management practices, as defined by section 304(e) of the Act.

BPT—Best practicable control technology currently available, as defined by section 304(b)(1) of the Act.

CAA—Clean Air Act (42 U.S.C. 7401 et. seq., as amended *inter alia* by the Clean Air Act Amendments of 1990 (Pub. L. 101–549, 104 stat. 2394).

Clean Water Act—The Federal Water Pollution Control Act Amendments of 1972 (33 U.S.C. 1251 et seq.), as amended by the Clean Water Act of 1977 (Pub. L. 95–217), and the Water Quality Act of 1987 (Pub. L. 100–4).

Conventional Pollutants—Constituents of waste water as determined by section 304(a)(4) of the Act and the regulations thereunder 40 CFR 401.16, including, but not limited to, pollutants classified as biochemical oxygen demand, suspended solids, oil and grease, fecal coliform, and pH.

CTG—Control Techniques Guideline (applicable to NESHAPs)

DCP—Data Collection Portfolio (detailed questionnaire for MP&M)

Direct Discharger—An industrial discharger that introduces waste water to a water of the United States with or without treatment by the discharger.

Effluent Limitation—A maximum amount, per unit of time, production, volume or other unit, of each specific constituent of the effluent from an existing point source that is subject to limitation. Effluent limitations may be expressed as a mass loading or as a concentration in milligrams of pollutant per liter discharged.

End-of-Pipe Treatment (EOP)—Refers to those processes that treat a plant waste stream for pollutant removal prior to discharge.

HAP—Hazardous Air Pollutant

Indirect Discharger—An industrial discharger that introduces waste water into a publicly owned treatment works.

In-Plant Control or Treatment Technologies—Controls or measures applied within the manufacturing process to reduce or eliminate pollutant and hydraulic loadings of raw waste water. Typical in-plant control measures include process modification, instrumentation, recovery of raw materials, solvents, products or by-products, and water recycle.

MDCP—Mini Data Collection Portfolio (screener survey for MP&M)

MP&M—Metal Products and Machinery point source category

NESHAP—National Emission Standards for Hazardous Air Pollutants

MACT—Maximum Achievable Control Technology (applicable to NESHAPs)

Nonconventional Pollutants—Pollutants that have not been designated as either conventional pollutants or priority pollutants.

NPDES—National Pollutant Discharge Elimination system, a Federal Program requiring industry dischargers, including municipalities, to obtain permits to discharge pollutants to the nation's water, under section 402 of the Act.

OCPSF—Organic chemicals, plastics, and synthetic fibers manufacturing

point source category (40 CFR part 414).
POTW—Publicly owned treatment works.
Priority Pollutants—The 126 pollutants listed in 40 CFR part 423, appendix A.
PSES—Pretreatment Standards for existing sources of indirect discharges, under section 307(b) of the Act.
PSNS—Pretreatment standards for new sources of indirect discharges, under sections 307 (b) and (c) of the Act.
RACT—Reasonably Available Control Technology (applicable to NESHAPs)
SIC—Standards Industrial Classification, a numerical categorization scheme used by the U.S. Department of Commerce to denote segments of industry.
Technical Development Document—Development Document for Effluent Limitations Guidelines and Standards for the Metal Products and Machinery Phase I Point Source Category.
VOC—Volatile Organic Compound

List of Subjects

40 CFR Part 433

Environmental protection, Metals, Waste treatment and disposal, Water pollution control.

40 CFR Part 438

Environmental protection, Metals, Water pollution control, Water treatment and disposal.

40 CFR Part 464

Environmental protection, Metals, Waste treatment and disposal, Water pollution control.

Dated: March 31, 1995.

Carol M. Browner,

Administrator.

For the reasons set out in the preamble, title 40, chapter I is proposed to be amended as follows:

PART 433—[AMENDED]

1. The authority citation for part 433 continues to read as follows:

Authority: Secs. 301, 304(b), (c), (e), and (g), 306(b) and (c), 307(b) and (c), 308 and 501 of the Clean Water Act (the Federal Water Pollution Control Act Amendments of 1971, as amended by the Clean Water Act of 1977) (the ''Act''); 33 U.S.C. 1311, 1314(b) (c), (e), and (g), 1316(b) and (c), 1317(b) and (c), 1318, and 1361; 86 Stat. 816, Pub. L. 92–500; 91 Stat. 1567, Pub. L. 95–217.

2. Section 433.10 is amended by adding ''Metal Products and Machinery (40 CFR Part 438)'' to the list in paragraph (b) to read as follows:

§ 433.10 Applicability; description of the metal finishing point source category.

* * * * *

(b) * * *

Metal Products and Machinery (40 CFR Part 438)

* * * * *

3. A new part 438 is proposed to be added as follows:

PART 438—METAL PRODUCTS AND MACHINERY POINT SOURCE CATEGORY

Subpart A—Metal Products and Machinery Phase I Category

Sec.
438.10 Applicability; description of the Metal Products and Machinery Phase I point source category.
438.11 Specialized definitions.
438.12 Monitoring Requirements
438.13 Effluent limitations representing the degree of effluent reduction attainable by applying the best practicable control technology currently available (BPT).
438.14 Effluent limitations representing the degree of effluent reduction attainable by applying the best conventional pollutant control technology (BCT).
438.15 Effluent limitations representing the degree of effluent reduction attainable by applying the best available technology economically achievable (BAT).
438.16 Pretreatment standards for existing sources (PSES).
438.17 New source performance standards (NSPS).
438.18 Pretreatment standards for new sources (PSNS).

Subpart B—Metal Products and Machinery Phase II Category

438.20 [Reserved]

Authority: Secs. 301, 304, 306, 307, 308, and 501 of the Clean Water Act (33 U.S.C. 1311, 1314, 1316, 1317, 1318, and 1361) and 42 U.S.C. 13101 et seq.

Subpart A—Metal Products and Machinery Category

§ 438.10 Applicability; description of the Metal Products and Machinery Phase I point source category.

(a) Except as provided in paragraphs (b), (c), and (d) of this section, the provisions of this subpart apply to process wastewater discharges from plants or portions of plants within the Metal Products and Machinery (hereafter referred to as MP&M) Phase I industries which manufacture, maintain or rebuild finished metal parts, products or machines from any basis metal.

(b) The following existing effluent limitations and standards generally apply to the production of semi-finished products, although wastewater from similar operations is generated within MP&M Phase I. These part 438 limits shall not apply in cases in which one or more of the following regulations specifically applies, nor in cases in which either MP&M Phase I or one of the following regulations could apply to the wastewater discharge from the same operations; in these cases, the following regulations shall apply:

Iron and steel manufacturing (40 CFR Part 420)
Nonferrous metals manufacturing (40 CFR Part 421)
Ferroalloy manufacturing (40 CFR Part 424)
Battery manufacturing (40 CFR Part 461)
Plastic molding and forming (40 CFR Part 463)
Metal molding and casting (40 CFR Part 464)
Coil coating (40 CFR Part 465)
Porcelain enameling (40 CFR Part 466)
Aluminum forming (40 CFR Part 467)
Copper forming (40 CFR Part 468)
Electrical and electronic components (40 CFR Part 469)
Nonferrous metals forming and metal powders (40 CFR Part 471)

(c) This subpart does not apply to plants which manufacture, maintain or rebuild finished metal parts, products or machines only within MP&M Phase II industries.

(d) This subpart does not apply to existing indirect discharging surface finishing job shops and independent printed wiring board manufacturers (which are covered by 40 CFR parts 413 and 433).

§ 438.11 Specialized definitions.

(a) The term *semi-finished* shall mean mill products and other metal products specifically covered by one of the existing regulations listed in § 438.10 (b).

(b) The term *finished* shall mean metal parts, products or machines which are not specifically covered by one of the existing regulations listed in § 438.10 (b).

(c) The term *T*, as in *Cyanide, T*, shall mean total.

(d) The term *surface finishing job shop* shall mean a facility which owns not more than 50% (annual area basis) of the materials undergoing surface finishing operations.

(e) The term *TSS* shall mean total suspended solids.

(f) The term *MP&M Phase I industries* shall mean any one or more of the following seven industries: aircraft, aerospace, electronic equipment, hardware, mobile industrial equipment, ordnance, and stationary industrial equipment. A list of typical products within these seven industries is included in Appendix A of this part. If a plant generates wastewater from operations performed in both MP&M Phase I and MP&M Phase II industries and the wastewater from both phases is discharged to a combined outfall, then the plant is considered MP&M Phase I and the combined outfall is covered by this subpart. If the plant segregates Phase I wastewater from Phase II

wastewater, and discharges these wastewaters to separate outfalls, then only the Phase I wastewater is covered by this subpart.

(g) The term *MP&M Phase II industries* shall mean any one or more of the following eight industries: bus and truck, household equipment, instruments, motor vehicles, office machines, railroad, ships and boats, and precious and non-precious metals. A list of typical products within these eight industries is included in Appendix B of this part.

(h) The term *independent printed wiring board manufacturer* shall mean a facility which manufactures printed wiring boards (also referred to as printed circuit boards) principally for sale to other companies.

(i) The term *plant or portion of a plant* is defined to include an activity, facility, or mixed use facility that is engaged in performing an MP&M-related industrial function and either located in a single building or located on a contiguous parcel of property. For purposes of this definition, mixed use facilities are those that have a mixture of non-related industrial, residential, or office types of activities. Sources or point sources located within the same fence line or property boundary are not necessarily considered contiguous.

(j) the terms *source* and *point source* are defined as process wastewater discharges from plants or portions of plants.

§ 438.12 Monitoring requirements.

Self monitoring for cyanide must be conducted after cyanide treatment and before combining with other streams. Alternatively, samples may be taken of the final effluent, if the plant limitations are adjusted based on the dilution ratio of the cyanide waste stream flow to the effluent flow.

§ 438.13 Effluent limitations representing the degree of effluent reduction attainable by applying the best practicable control technology currently available (BPT).

(a) Except as provided in 40 CFR 125.30 through 125.32, any existing point source subject to this subpart must achieve discharges not exceeding the quantity (mass) of pollutant determined by multiplying the process wastewater discharge flow subject to this subpart times the concentration listed in Table 1 of this part.

(b) No user subject to the provisions of this subpart shall augment the use of process wastewater or otherwise dilute the wastewater as a partial or total substitute for adequate treatment to achieve compliance with this limitation.

§ 438.14 Effluent limitations representing the degree of effluent reduction attainable by applying the best conventional pollutant control technology (BCT).

(a) Except as provided in 40 CFR 125.30 through 125.32, any existing point source subject to this subpart must achieve discharges not exceeding the quantity (mass) of pollutant determined by multiplying the process wastewater discharge flow subject to this subpart times the concentration listed in Table 1 for oil & grease, TSS and pH.

(b) No user subject to the provisions of this subpart shall augment the use of process wastewater or otherwise dilute the wastewater as a partial or total substitute for adequate treatment to achieve compliance with this limitation.

§ 438.15 Effluent limitations representing the degree of effluent reduction attainable by applying the best available technology economically achievable (BAT).

(a) Except as provided in 40 CFR 125.30 through 125.32, any existing point source subject to this subpart must achieve discharges not exceeding the quantity (mass) of pollutant determined by multiplying the process wastewater discharge flow subject to this subpart times the concentration listed in Table 1 for all parameters except TSS and pH.

(b) No user subject to the provisions of this subpart shall augment the use of process wastewater or otherwise dilute the wastewater as a partial or total substitute for adequate treatment to achieve compliance with this limitation.

(c) An existing source subject to this subpart shall comply with the oil & grease standard which serves as an indicator for the organic pollutants which have the potential to be present in the wastewater.

§ 438.16 Pretreatment standards for existing sources (PSES).

Except as provided in 40 CFR 403.7 through 403.13, any existing source subject to this subpart that introduces pollutants into a publicly owned treatment works must comply with 40 CFR part 403 and by [3 years from date the final rule is promulgated] and achieve the following pretreatment standards for existing sources (PSES):

(a) Any source discharging 1,000,000 gallons or more per calendar year of MP&M process wastewater must achieve discharges not exceeding the quantity (mass) of pollutant determined by multiplying the process wastewater discharge flow subject to this subpart times the concentration listed in Table 1 of this part for all parameters except TSS and pH. If mass limitations have not been developed as required, the source shall achieve discharges not exceeding the concentration limitations listed in Table 1 for all parameters except TSS and pH.

(b) Any source discharging less than 1,000,000 gallons per calendar year of MP&M process wastewater is exempt from this subpart.

(c) No user introducing wastewater pollutants into a publicly owned treatment works under the provisions of this subpart shall augment the use of process wastewater or otherwise dilute the wastewater as a partial or total substitute for adequate treatment to achieve compliance with this section.

(d) An existing source subject to this subpart shall comply with the oil & grease standard which serves as an indicator for the organic pollutants which have the potential to be present in the wastewater and which would pass through the publicly owned treatment works. Since oil and grease serves as an indicator for organic pollutants, POTW removal credits under 40 CFR 403.7 are not available for oil and grease.

§ 438.17 New source performance standards (NSPS).

(a) Any new source subject to this subpart must achieve discharges not exceeding the quantity (mass) of pollutant determined by multiplying the process wastewater discharge flow subject to this subpart times the concentration listed in Table 1 of this part.

(b) No user subject to the provisions of this subpart shall augment the use of process wastewater or otherwise dilute the wastewater as a partial or total substitute for adequate treatment to achieve compliance with this limitation.

§ 438.18 Pretreatment standards for new sources (PSNS).

(a) Except as provided in 40 CFR 403.7, any new source subject to this subpart that introduces pollutants into a publicly owned treatment works must comply with 40 CFR part 403 and achieve discharges not exceeding the quantity (mass) of pollutant determined by multiplying the process wastewater discharge flow subject to this subpart times the concentration listed in Table 1 of this part for all parameters except TSS and pH. If mass limitations have not been developed as required, the source shall achieve discharges not exceeding the concentration limitations listed in Table 1 of this part for all parameters except TSS and pH.

(b) No user introducing wastewater pollutants into a publicly owned treatment works under the provisions of this subpart shall augment the use of process wastewater or otherwise dilute the wastewater as a partial or total

substitute for adequate treatment to achieve compliance with this section.

(c) A new source subject to this subpart shall comply with the oil & grease standard which serves as an indicator for the organic pollutants which have the potential to be present in the wastewater and which would pass through the publicly owned treatment works. Since oil and grease serves as an indicator for organic pollutants, POTW removal credits under 40 CFR 403.7 are not available for oil and grease.

Subpart B—Metal Products and Machinery Phase II Category

§ 438.20 [Reserved]

TABLE 1 TO PART 438.—MP&M CONCENTRATION LIMITATIONS

[Milligrams per liter (mg/l)]

Pollutant or pollutant property	Maximum for 1 day	Monthly average shall not exceed
Aluminum (T)	1.4	1.0
Cadmium (T)	0.7	0.3
Chromium (T)	0.3	0.2
Copper (T)	1.3	0.6
Iron (T)	2.4	1.3
Nickel (T)	1.1	0.5
Zinc (T)	0.8	0.4
Cyanide (T)	0.03	0.02
Oil & Grease	35	17
TSS	73	36
pH	(1)	(1)

[1] Within 6.0 to 9.0.

Appendix A to Part 438—Typical Products Within MP&M Phase I Industries

Aerospace

Guided Missiles & Space Vehicle
Guided Missile & Space Vehicle Prop.
Other Space Vehicle & Missile Parts

Aircraft

Aircraft Frames Manufacturing
Aircraft Engines & Engine Parts
Aircraft Parts & Equipment
Airports, Flying Fields, & Services

Electronic Equipment

Telephone & Telegraph Apparatus
Radio & TV Communications Equipment
Communications Equipment
Electron Tubes
Electronic Capacitors
Electronic Coils & Transformers
Connectors for Electronic Applications
Electronic Components
Electric Lamps

Hardware

Cutlery
Hand & Edge Tools
Hand Saws & Saw Blades
Hardware
Screw Machine Products
Bolts, Nuts, Screws, Rivets & Washers
Metal Shipping Barrels, Drums Kegs, Pails
Iron & Steel Forgings
Crowns & Closures
Metal Stampings
Steel Springs
Wire Springs
Miscellaneous Fabricated Wire Products
Fasteners, Buttons, Needles & Pins
Fluid Power Valves & Hose Fittings
Valves & Pipe Fittings
Fabricated Pipe & Fabricated Pipe Fittings
Fabricated Metal Products
Machine Tools, Metal Cutting Types
Machine Tools, Metal Forming Types
Special Dies & Tools, Die Sets, Jigs, Etc.
Machine Tool Accessories & Measuring Devices
Power Driven Hand Tools
Heating Equipment, Except Electric
Industrial Furnaces & Ovens
Fabricated Structural Metal
Fabricated Plate Work (Boiler Shops)
Sheet Metal Work
Architectural & Ornamental Metal Work
Prefabricated Metal Buildings & Components
Miscellaneous Metal Work

Mobile Industrial Equipment

Farm Machinery & Equipment
Garden Tractors & Lawn & Garden Equipment
Construction Machinery & Equipment
Mining Machinery & Equipment, Except Oil Field
Hoist, Industrial Cranes & Monorails
Industrial Trucks, Tractors, Trailers
Tanks & Tank Components

Ordnance

Small Arms Ammunition
Ammunition
Small Arms
Ordnance & Accessories

Stationary Industrial Equipment

Steam, Gas, Hydraulic Turbines, Generator Units
Internal Combustion Engines
Oil Field Machinery & Equipment
Elevators & Moving Stairways
Conveyors & Conveying Equipment
Industrial Patterns
Rolling Mill Machinery & Equipment
Metal Working Machinery
Textile Machinery
Woodworking Machinery
Paper Industries Machinery
Printing Trades Machinery & Equipment
Food Product Machinery
Special Industry Machinery
Pumps & Pumping Equipment
Ball & Roller Bearings
Air & Gas Compressors
Blowers & Exhaust & Ventilation Fans
Packaging Machinery
Speed Changers, High Speed Drivers & Gears
Industrial Process Furnaces & Ovens
Mechanical Power Transmission Equipment
General Industrial Machinery
Automatic Vending Machines
Commercial Laundry Equipment
Refrigeration & Air & Heating Equipment
Measuring & Dispensing Pumps
Service Industry Machines
Fluid Power Cylinders & Actuators
Fluid Power Pumps & Motors
Scales & Balances, Except Laboratory
Industrial Machinery
Welding Apparatus
Transformers
Switchgear & Switchboard Apparatus
Motors & Generators
Relays & Industrial Controls
Electric Industrial Apparatus
Heavy Construction Equipment Rental
Equipment Rental & Leasing

Appendix B to Part 438—Typical Products Within MP&M Phase II Industries

Bus & Truck

Truck & Bus Bodies
Motor Vehicle Parts & Accessories
Truck Trailers
Local & Suburban Transit (Bus & subway)
Local Passenger. Trans. (Lim., Amb., Sight See)
Intercity & Rural Highways (Buslines)
School Buses
Bus Terminal & Service Facilities
Local Trucking Without Storage
Trucking
Local Trucking With Storage
Courier Services, Except by Air
Freight Truck Terminals, W/ or W/O Maintenance.
Truck Rental & Leasing, Without Drivers

Household Equipment

Household Cooking Equipment
Household Refrig. & Home & Farm Freezers
Household Laundry Equipment
Electric Housewares & Fans
Household Vacuum Cleaners
Household Appliances
Electric Lamps
Current-Carrying Wiring Devices
Noncurrent-Carrying Wiring Devices
Residential Electrical Lighting Fixtures
Commercial, Ind. & Inst. Elec. Lighting Fixtures
Lighting Equipment
Radio & Television Sets Except Commn. Types
Radio & Television Repair Shops
Refrig. & Air Cond. Serv. & Repair Shops

Instruments

Coating, Engraving, & Allied Services
Search & Navigation Equipment
Laboratory Apparatus & Furniture
Automatic Environmental Controls
Process Control Instruments
Fluid Meters & Counting Devices
Instruments to Measure Electricity
Analytical Instruments
Measuring & Controlling Devices
Optical Instruments & Lenses
Surgical & Medical Instruments & Apparatus
Orthopedic, Prosthetic, & Surgical Supplies
Dental Equipment & Supplies
Ophthalmic Goods
Watches, Clocks, Associated Devices & Parts
Pens, Mechanical Pencils, & Parts
Manufacturing Industries
Miscellaneous repair Shops & Related Services

Motor Vehicle

Carburetors, Pistons Rings, Valves

Vehicular Lighting Equipment
Electrical Equipment for Motor Vehicles
Motor Vehicle Parts & Accessories
Motorcycles
Miscellaneous Transportation Equipment
Automotive Stampings
Motor Vehicle & Automotive Bodies
Mobile Homes
Travel Trailers & Campers
Taxicabs
Automotive Equipment
Automobile Dealers (new & used)
Gasoline Service Stations
Recreational & Utility Trailer Dealers
Motorcycle Dealers
Auto. Dealers (Dunebuggy, Go-cart, Snowmobile)
Passenger Car Rental
Passenger Car Leasing
Utility Trailer & Recreational Vehicle Rental
Top & Body Repair & Paint Shops
Auto Exhaust System Repair Shops
Automotive Glass Replacement Shops
Automotive Transmission Repair Shops
General Automotive Repair Shops
Automotive Repairs Shops
Automobile Service (includes Diag. & Insp. Cntrs.)
Welding Shops (includes Automotive)

Office Machine

Electronic Computers
Computer Storage Devices
Computer Terminals
Computer Peripheral Equipment
Calculating & Accounting Equipment
Office Machines
Photographic Equipment & Supplies
Compute Rental & Leasing
Compute Maintenance & Repair
Computer Related Services
Electrical & Electronic Repair

Precious & Nonprecious Metals

Jewelry, Precious Metal
Silverware, Plated Ware, & Stainless
Jewelers' Materials & Lapidary Work
Musical Instruments
Costume Jewelry

Railroad

Railcars, Railway Systems
Line-Haul Railroads
Switching & Terminal Stations

Ships and Boats

Ship Building & Repairing
Boat Building & Repairing
Marines
Deep Sea Domestic Transportation of Freight
Freight Transportation on the Great Lakes
Water Transportation of Freight
Deep Sea Passenger Transportation, Except by Ferry
Water Passenger Transportation
Ferries
Towing & Tugboat Service
Water Transportation Services

PART 464—[AMENDED]

4. The authority citation for part 464 continues to read as follows:

Authority: Secs. 301, 304(b), (c), (e), and (g), 306(b) and (c), 307, 308, and 501 of the Clean Water Act (Federal Water Pollution Control Act Amendments of 1972, as amended by the Clean Water Act of 1977) (the ''Act''); 33 U.S.C. 1311, 1314(b), (c), (e) and (g), 1316(b) and (c), 1317 (b) and (c), 1318, and 1361; 86 Stat. 816, Pub. L. 92–500; 91 Stat. 1567, Pub. L. 95–217.

5. Section 464.02 is amended by revising the last sentence of paragraphs (a), (b), (c), and (d) to read as follows:

§ 464.02 General definitions.

* * * * *

(a) * * * Processing operations following the cooling of castings not covered under aluminum forming, except for grinding scrubber operations which are covered in this section, are covered under the electroplating, metal finishing, and metal products and machinery point source categories (40 CFR parts 413, 433 and 438).

(b) * * * Except for grinding scrubber operations which are covered in this section, processing operations following the cooling of castings are covered under the electroplating, metal finishing, and metal products and machinery point source categories (40 CFR parts 413, 433 and 438).

(c) * * * Except for grinding scrubber operations which are covered in this section processing operations following the cooling of castings are covered under the electroplating, metal finishing, and metal products and machinery point source categories (40 CFR parts 413, 433 and 438).

(d) * * * Processing operations following the cooling of castings not covered under nonferrous metals forming are covered under the electroplating, metal finishing, and metal products and machinery point source categories (40 CFR parts 413, 433 and 438).

* * * * *

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