

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 440

[WH FRL 1979-8]

Ore Mining and Dressing Point Source Category; Effluent Limitations Guidelines and New Source Performance Standards

AGENCY: Environmental Protection Agency (EPA).

ACTION: Proposed regulation.

SUMMARY: EPA proposes a regulation to limit effluent discharges to waters of the United States and introduction of pollutants from facilities engaged in mining and processing of metal ores. The purpose of this proposed rulemaking is to provide effluent limitations guidelines for "best available technology," (BAT) and to establish new source performance standards (NSPS) under the Clean Water Act.

DATE: Comments on this proposal must be submitted on or before August 13, 1982.

ADDRESS: Send comments to: Mr. William Telliard, Effluent Guidelines Division (WH-552), Environmental Protection Agency, 401 M Street, SW., Washington, D.C. 20460. Attention: EGD Docket Clerk, Proposed Rulemaking—Ore Mining and Dressing Industry. The supporting information and all comments on this proposal will be available for inspection and copying at the EPA Public Information Reference Unit, Room 2922 (EPA Library), at the EPA address given above. The EPA information regulation (40 CFR Part 2) provides that a reasonable fee may be charged for copying.

FOR FURTHER INFORMATION CONTACT: Technical information may be obtained from Mr. B. Matthew Jarrett, at the address listed above, or by calling (202) 426-4618. Copies of technical documents may be obtained from the Distribution Officer at the above address or by calling (202) 426-2724. The economic information may be obtained from Mr. John Ataman, Office of Analysis and Evaluation (WH-586), Environmental Protection Agency, 401 M Street, SW., Washington, D.C. 20460, or by calling (202) 755-2484.

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I. Legal Authority

The regulations described in this notice are proposed under authority of sections 301, 304, 306, 307, 308, and 501 of the 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) (the "Act"). These regulations are also proposed in response to the Settlement Agreement in *Natural Resources Defense Council, Inc., v. Train*, 8 ERC 2120 (D.D.C. 1976), modified, 12 ERC 1833 (D.D.C. 1979).

II. Background

A. The Clean Water Act

The Federal Water Pollution Control Act Amendments of 1972 established a comprehensive program to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters." Section 101(a). By July 1, 1977, existing industrial discharges were required to achieve "effluent limitations requiring the application of the best practicable control technology currently available" (BPT), Section 301(b)(1)(A). By July 1, 1983, these dischargers were required to achieve "effluent limitations requiring the application of the best available technology economically achievable" * * * which will result in reasonable further progress toward the national goal of eliminating the discharge of all pollutants" (BAT), Section 301(b)(2)(A). New industrial direct dischargers were required to comply with section 306 new source performance standards (NSPS), based on best available demonstrated technology. The requirements for direct dischargers were to be incorporated into National Pollutant Discharge Elimination System (NPDES) permits issued under section 402 of the Act.

Although section 402(a)(1) of the 1972 Act authorized the setting of requirements for direct dischargers on a case-by-case basis, Congress intended that for the most part, control requirements would be based on regulations promulgated by the Administrator of EPA. Section 304(b) of the Act required the Administrator to promulgate regulations providing guidelines for effluent limitations setting

forth the degree of effluent reduction attainable through the application of BPT and BAT. Moreover, sections 304(c) and 306 of the Act required promulgation of regulations for NSPS. In addition to these regulations for designated industry categories, section 307(a) of the Act required the Administrator to promulgate effluent standards applicable to all dischargers of toxic pollutants. Finally, section 501(a) of the Act authorized the Administrator to prescribe any additional regulations "necessary to carry out his functions" under the Act.

EPA was unable to promulgate many of these regulations by the dates contained in the Act. In 1976, EPA was sued by several environmental groups, and in settlement of this lawsuit EPA and the plaintiffs executed a Settlement Agreement which was approved by the Court. This Agreement required EPA to develop a program and adhere to a schedule for promulgating BAT effluent limitations guidelines, and new source performance standards covering 65 classes of toxic pollutants (subsequently defined by the Agency as 129 specific "priority pollutants") for 21 major industries. See *Natural Resources Defense Council, Inc. v. Train*, 8 ERC 2120 (D.D.C. 1976), modified, 12 ERC 1833 (D.D.C. 1979).

On December 27, 1977, the President signed into law the Clean Water Act of 1977 ("the Act"). Although this law makes several important changes in the Federal Water Pollution Control Program, its most significant feature is its incorporation of several basic elements of the Settlement Agreement program for toxic pollution control. Sections 301(b)(2)(A) and 301(b)(2)(C) of the Act now require the achievement, by July 1, 1984, of the effluent limitations requiring application of BAT for toxic pollutants, including the 65 priority pollutants and classes of pollutants that Congress declared toxic under section 307(a) of the Act. Likewise, EPA's programs for new source performance standards are now aimed principally at toxic pollutant controls. Moreover, to strengthen the toxics control program, section 304(e) of the Act authorizes the Administrator to prescribe "best management practices" (BMPs) to control the release of toxic and hazardous pollutants from plant site runoff; spillage or leaks; sludge or waste disposal; and drainage from raw material storage associated with, or ancillary to, the manufacturing or treatment process.

In keeping with its emphasis on toxic pollutants, the Act also revises the control program for nontoxic pollutants.

Instead of BAT for "conventional" pollutants identified under section 304(a)(4) (including biochemical oxygen demand (BOD), total suspended solids (TSS), fecal coliform, oil and grease, and pH), the new Section 301(b)(2)(E) requires achievement, by July 1, 1984, of "effluent limitations requiring the application of the best conventional pollutant control technology" ("BCT"). The factors considered in assessing BCT for an industry include an analysis of cost-effectiveness and the costs and benefits of reducing pollutants at a point source compared with the costs and benefits of reducing pollutants at POTWs (section 304(b)(4)(B)). For nontoxic, nonconventional pollutants, sections 301(b)(2)(A) and (b)(2)(F) require achievement of BAT effluent limitations within three years after their establishment or by July 1, 1984, whichever is later, but not later than July 1, 1987.

The purpose of the proposed regulations is to provide effluent limitations guidelines for BAT and to establish NSPS on the basis of the authority granted in sections 301, 304, 306, 307, and 501 of the Clean Water Act. Pretreatment Standards (PSES and PSNS) are not proposed for the ore mining and dressing category since no known indirect dischargers exist nor are any known to be in the planning stage. In general, ore mines and mills are located in rural areas, far from a POTW. EPA expects that the cost of pumping mine drainage and mill process water to a POTW would be prohibitive, and onsite treatment is more cost effective in virtually every instance.

B. Prior EPA Regulations

On November 6, 1975, EPA published interim final regulations establishing BPT requirements for existing sources in the ore mining and dressing industry (see 40 FR 51722). These regulations became effective upon publication. However, concurrent with their publication, EPA solicited public comments with a view to possible revisions. On the same date, EPA also published proposed BAT, NSPS, and pretreatment standards for this industry (see 40 FR 51738). Comments were also solicited on these proposals.

On May 24, 1976, as a result of the public comments received, EPA suspended certain portions of the interim final BPT regulations and solicited additional comments (see 41 FR 21191). EPA promulgated revised, final BPT regulations for the ore mining and dressing industry on July 11, 1978, (see 43 FR 29711, 40 CFR Part 440). On February 8, 1979, EPA published a clarification of the regulations as they

apply to storm runoff (see 44 FR 7953). On March 1, 1979, the Agency amended the final regulations by deleting the requirements for cyanide applicable to froth flotation mills in the base and precious metals subcategory (see 44 FR 11546).

On December 10, 1979, the United States Court of Appeals for the Tenth Circuit upheld the BPT regulations, rejecting challenges brought by five industrial petitioners. *Kennecott Copper Corp. v. EPA* 612 F.2d 1232 (10th Cir. 1979). These regulations are in effect and EPA is not proposing any changes to them.

The Agency withdrew the proposed BAT, NSPS, and pretreatment standards on March 19, 1981 (see 46 FR 17567).

C. Industry Overview

The ore mining and dressing industry is both large and diverse. It includes the ores of 23 separate metals and is segregated by the U.S. Bureau of the Census Standard Industrial Classification (SIC) into nine major codes; SIC 1011, Iron Ore; SIC 1021, Copper Ores; SIC 1031, Lead and Zinc Ores; SIC 1041, Gold Ores, SIC 1044, Silver Ores; SIC 1051, Aluminum Ore; SIC 1061, Ferroalloy Ores including Tungsten, Nickel, and Molybdenum; SIC 1092 Mercury Ores; SIC 1094 Uranium, Radium, and Vanadium Ores; and SIC 1099 Metal Ores, Not Elsewhere Classified including Titanium and Antimony.

Over 500 active mining and over 150 milling operations are located in the United States and many are in remote areas.

The industry includes facilities that mine ores to produce metallic products and all ore dressing and beneficiating operations at mills operated either in conjunction with a mine operation or at a separate location.

Mining is defined as the extraction of metal ores from natural deposits. It also means recovery of metal ores from refuse and storage piles derived from actual mining or concentration of metal ores.

The mining of metals ores is usually divided into four principal methods: underground or deep-mining, open-cut, in situ or solution mining, and placer or dredge mining.

Underground mining methods include open stopes, timbered stopes, filled stopes, caving method, and combinations of these methods. In open stope mining, an underground chamber is created in which the walls are supported by pillars of ore left in place. The finished stope is an open cavity. In timbered stope mining the chamber is

supported by wood and steel timber. The wood and steel are used where the walls require support during mining and can also serve as a working platform for workers and equipment. A filled stope is an underground chamber where waste rock, tailings, or other fill material is an integral part of the support of the walls and sometimes the back of the ore body. Also fill material usually serves as a working platform for workers and equipment to work the next adjacent portion of the ore body. Caving methods use the weight of the ore, the overlying rock, or a combination of the two to break the ore down. The ore is first undercut and then worked by sublevel caving, block-caving, or top-slicing, with many modifications to these methods.

Three different open-cut or surface mining methods are used to mine metal ores: open pit, area stripping, and contour mining. In open-pit mining, the amount of overburden that must be removed to mine the ore is small in relation to the amount of ore mined. By this method, a large quantity of ore can be removed from a comparatively small surface area because of the thickness of the ore body. The mining follows the ore body. In area strip mining, larger areas are excavated to mine the ore body, which is generally in a seam or zone, and the amount of overburden can be large in comparison with the ore removed. Area strip mining is generally limited to fairly flat topography. In contour mining, excavation follows the contour of the land until the ore recovery is prohibited by the amount of overburden. Contour mining is used in hilly or mountainous terrain and has limited application in ore mining.

In situ or solution mining methods are generally restricted to the recovery of copper and uranium from surface or underground deposits. In in situ mining, a leaching solution (often acid or water) is brought into contact with the ore zone, either in place or after it has been broken in the mine, and the barren solution is allowed to seep through the ore to a lower level where the pregnant leach solution is collected for transfer to a metal recovery or precipitation facility. In situ mining also includes the secondary recovery of metal values by leaching mined ore, waste rock, low grade ore, or tailings.

Placer mining is the mining of alluvial deposits (generally loose gravel, sand, soil, or mud that has been deposited by water or ice) of minerals derived from erosion or weathering of bedrock. Placer mining consists of excavating waterborne or glacial deposits, e.g., gold-bearing gravel and sands, which can then be separated by physical or

gravity means. Methods that are used today include various dredging techniques (clam shell, continuous bucket, or dragline) and the use of bulldozers and front-end loaders. Where water availability and physical characteristics permit, dredging or hydraulic methods are often favored because they are economical. At some locations, hydraulic excavation (water cannons) is used both for overburden removal and for sluicing ores.

Water is little and seldom used in the mining process. Of the principal mining methods used, only in situ or solution mining and placer mining actually use water as part of the mining method. In underground and open-cut mining a small amount of water is used (e.g., for machine cooling, dust suppression, drilling fluids, etc.). Approximately nine deep mines use water in hydraulic backfilling of stopes. This water is brought back to the surface combined with mine water.

An even larger quantity of water may enter the mine by percolation, interception of an aquifer, and runoff. This water, though usually unwanted, must also be managed by the mine operator and discharged as mine process wastewater of mine drainage. The management of mine drainage is an integral part of most mining systems. Mine water flows are extremely variable, ranging from nonexistent to flows occasionally as high as 227,000 m³ (60 million gallons) per day or more. Mine drainage flow rates are related to geologic conditions, climate, and topography and are generally beyond the control of the mine operator.

Five main ore dressing processes use water: gravity concentration, magnetic separation, electrostatic separation, froth flotation, and leaching. Most of the processes follow comminution (size reduction).

In froth flotation, chemicals are added to make particles of a mineral or group of minerals adhere preferentially to air bubbles (froth). When air is forced through a slurry (water plus finely ground ore) of mixed minerals, the rising bubbles carry the particles of the mineral(s) to be separated from the matrix. If a foaming agent is added, which prevents the bubbles from bursting when they reach the surface, a mineral-layer of foam is built up at the surface of the flotation cell that may be removed to recover the mineral. Details of the process and reagents employed vary from ore to ore and with time at a given mill, but because the process is adaptable to fine particle sizes, it often allows a high rate of recovery even from low-grade ores.

Gravity concentration processes use differences in specific gravity to separate the valuable ore minerals from gangue (unwanted minerals). They depend upon viscosity forces to suspend and transport gangue away from the heavier, valuable mineral. Several techniques are employed including jigs, tables, spirals, and sink/float separation. Each technique employs water as the medium through which the separation takes place and provides a means of removing the unwanted minerals.

The magnetic separation process, based on differences in magnetic permeability, involves the transport of ore through a region of high magnetic field gradient. The most magnetically permeable minerals are attracted to a moving surface behind which is the pole of a large electromagnet, and are carried by it out of the ore stream. Although dry separators are used for rough separations, the process is often run wet on slurries produced by grinding mills.

Electrostatic separation is used to separate minerals on the basis of their conductivity. This process is inherently dry and uses very high voltages. The ore is typically charged to 20,000 to 40,000 volts, and the charged particles are dropped onto a conductive rotating drum. The conductive particles discharge very rapidly and are thrown off and collected, while the nonconductive particles keep their charge and adhere by electrostatic attraction.

The leaching process dissolves away either gangue or metal values in aqueous acids or bases, liquid metals, or other specific solutions. Amalgamation and cyanidation are two variations of leaching. The cyanidation process is used to extract gold and silver by using potassium or sodium cyanide in diluted weak alkaline solutions. Amalgamation uses mercury to form an amalgam, a combination of mercury and another metal. Amalgamation, once used extensively to extract gold and silver from pulverized ore, has largely been replaced by cyanidation because of environmental concerns about the use and control of mercury.

Leach solutions of acids or bases are used to extract copper, uranium, vanadium and tungsten. The solutions dissolve certain metals present as well as constituents of the gangue. Heat, agitation, and pressure are often used to speed the action of the leach. Ores can be exposed to leach in a variety of ways, including in situ (in the ore body), vats, and heap or dump. The pregnant leach solution containing metal values is

further processed to remove the metals from solutions.

General Wastewater Characteristics

Mine Water. The wastewater situation in the mining segment differs from that encountered in most other industries. Usually, most industries (such as the milling segment) use water in the specific processes they employ. This water frequently becomes contaminated during the process and must be treated before it is discharged. In the ore mining segment, process water is not normally used in the actual mining of ores except in the in situ leaching process or placer mining operations and in dust control, or for drilling fluids. Water is a natural feature that interferes with mining activities. It enters surface mines by direct precipitation, runoff and infiltration and underground mines by infiltration. The quantity of water from an ore mine is thus unrelated (or only indirectly related) to production quantities. Generally, raw mine water has high concentrations of dissolved metals because ground water or surface water has come into contact with minerals in the ore, host rock, and overburden. Generally, infiltration water is relatively low in suspended solids (as compared with mill process water) although water used for dust control may contain elevated solids levels. At a few facilities, trace quantities of process reagents may be present because of the backfilling of stopes with coarse fractions of mill tailings.

Mill Water. Process water is primarily used in wet screening or classification, gravity separation processed, heavy-media separation, flotation processes, leaching solutions, and for transporting ore between various process steps. Process water is often obtained from wells, domestic sources, and mine water. It is often recycled and reused in areas where water is scarce or where water balance in an integrated system allows it. Recycling often requires a great deal of planning and careful engineering, but results in reduction of the costs associated with purchase of water, exploration, and drilling of new wells and reduction of pollutants discharged to the environment.

Mill process wastewater is characterized by very high suspended solids levels (often in the percent range rather than milligrams per liter), high metals levels, and process reagents such as cyanide.

The diversity of the ore mining and milling industry makes it difficult to generalize about process metallurgy, water use patterns, or wastewater treatment practices for the industry. As

a result, the mining and processing of each ore is described separately.

Iron

The United States has approximately 50 iron ore mines which produce about 270 million metric tons of ore annually. Forty-four iron ore milling operations annually produce 69 million metric tons of pellets and 16.2 million metric tons of fines, coarse, and sinter. The vast majority of production (over ¾) is in the Great Lakes states, especially the Mesabi and Marquette Ranges. Beneficiation processes generally employed include direct shipping, gravity separation, magnetic separation, and flotation.

On the basis of production figures, about 54 percent of iron milling operations achieve no discharge, 31 percent discharge to surface waters, and 15 percent have unknown discharges. The trend in recent years for newer facilities has been no discharge, primarily for pelleting operations in the Mesabi Range in Minnesota. This trend reflects a concern for treatment costs, discharge of pollutants into the environment, and increased use of recycle to ensure adequate water availability.

The primary wastewater treatment technology used in iron ore mining and milling operations is removal of suspended solids by settling.

In reviewing BAT for the iron ore subcategory, EPA found the following pollutants for control: iron and TSS. (See Section VIII of this notice for a discussion of pollutant parameter selection.)

Copper, Lead, Zinc, Gold, Silver, Molybdenum

In reviewing BAT for the copper, lead, zinc, gold, silver, and molybdenum ores subcategory, EPA found the following pollutants for control: copper, lead, zinc, mercury, cadmium, nickel, arsenic, cyanide, and TSS. (See section VIII of this notice for a discussion of pollutant parameter selection.)

Copper

The United States has 59 copper mines, which produce 258 million metric tons of ore annually. Of these, 22 are small operations employing 10 people or less. The majority of these mines (31) are in Arizona and produce 67 percent of the total amount of copper mined in the United States annually. The U.S. Bureau of Mines estimates that 90 percent of all copper ore produced in the United States comes from open-pit mines. Twenty-six copper mills in the United States produce over 7.1 million metric tons of copper concentrate

primarily using the froth flotation method. Byproducts of these mills include molybdenum and silver concentrate.

Many copper mills use mine water for mill process water. Some mine water is also directly discharged to surface waters. In arid areas, many mills practice total recycle and achieve zero discharge. In addition, mines and mills which leach the ore to recover copper collect leaching water, strip it of the metal values, and recycle/reuse or evaporate it, resulting in zero discharge.

Mine drainage and wastewater from froth flotation mills are often treated in combined treatment systems which use lime precipitation or pH adjustment and settling.

Lead and Zinc

Since lead and zinc are most often found in the same ore, they are generally mined and milled together. The United States has 49 individual mines which annually produce over 16 million metric tons of ore. Lead and zinc ores are produced almost exclusively from underground mines. Many of these mines and mills also produce silver and copper concentrates from the lead/zinc ore. Thirty-three milling operations produce over 0.9 million metric tons of lead concentrates, over 408,000 metric tons of zinc concentrates, and 25,000 metric tons of copper concentrates annually.

Missouri produces 83 percent of the lead, with the remaining portion coming primarily from Idaho, Colorado, and Utah. New York produces 19 percent of the zinc, followed by Missouri (18 percent), Tennessee (17 percent), and Colorado (10 percent).

Most mine and mill wastewaters are treated in combined treatment systems, which use lime precipitation for pH adjustment and setting predominately.

Gold

Four leading producers accounted for 73 percent of total annual gold production in the United States in 1975. Ninety-five percent of all production came from 25 mines or mine/mill operations, 10 of which operate primarily for the recovery of gold. Thirty-six percent of the total gold produced in the United States is a byproduct of copper, lead, or zinc production; the rest is the result of primary recovery from gold lode and placer operations. Placer deposits are alluvial or glacial deposits containing a valuable mineral, primarily gold. These operations are concentrated in Alaska.

Domestic gold production has steadily declined in recent years. This decline is

due to increased costs, mining of lower grade ores, diminished copper production, and depletion of easily mined ore. Increased exploration and development is stimulated by price increases, which may reverse this trend as the price of gold fluctuates.

Most of the nine active gold milling operations in the United States use the cyanidation process to recover gold, but some flotation, concentration, and amalgamation processes are also used. For the most part, spent leach solutions used to beneficiate ore are recycled, resulting in zero discharge of mill wastewater.

Many placer mines do not treat wastewater, although several large dredge operations recycle process water from the dredge pond and settle solids in the pond itself before discharging the excess wastewater. Several facilities use settling ponds for water treatment and to conserve process water for use during periods of water scarcity.

Silver

Eight major mines produce over 1,090 metric tons (35 million troy ounces) of silver in the United States each year. Seventy percent of this silver is a byproduct of lead/zinc and copper mining.

All five major milling operations recover silver metal concentrates. In most cases, froth flotation is the beneficiation method used.

Wastewater treatment at major mine/mill operations consist of a tailings pond to settle bulk flotation circuit tailings before final discharge. In some cases, however, process wastewater is recycled for reuse within the mill.

Molybdenum

The United States has three active molybdenum mines, with three more under exploration. Two existing mines discharge to surface waters and the third has zero discharge because there is little or no infiltration of ground waters. The mines produce over 10 million metric tons of ore, while the mills produce over 50,000 metric tons of concentrate.

All three mines are associated with froth flotation mills. To treat wastewaters, the mills typically use lime precipitation for pH adjustment, followed by primary and secondary settling. One wastewater treatment system uses granular media filters. Two facilities have wastewater treatment technology for the reduction of cyanide: one by alkaline chlorination and the second by hydrogen peroxide (described in Section VI of this notice). The third facility recycles process water and has no discharge.

Aluminum

Two open-pit mining operations in Arkansas produce bauxite ore for metallurgical production of aluminum. For the past 10 years, the annual production rate of bauxite ore has been approximately 1.8 million metric tons. Each bauxite ore mine discharges about 15 million gallons of water a day. No process water is used to crush or grind ore, and no beneficiation processes are used that would require water. Both operations use lime precipitation for pH adjustment and settling to treat wastewaters.

In reviewing BAT for the aluminum ore subcategory, EPA found the following pollutants for control: iron, aluminum, and TSS. (See section VIII of this notice for a discussion of pollutant parameter selection.)

Tungsten

The United States, has five large mines, each producing over 5,000 metric tons of tungsten ore per year, and over 30 small mines, each producing less than 5,000 metric tons of tungsten ore per year. Most small tungsten mining and milling operations are intermittent. Annual production in the United States is about 740,203 metric tons. All mines are underground and are located in California, Oregon, Idaho, Utah, and Nevada. These facilities typically do not discharge mine water. Of the 14 tungsten mills, 7 produce more than 5,000 metric tons of ore per year each. They generally use gravity separation and/or froth flotation to beneficiate the ore.

The tungsten industry is expected to increase production in the coming years. At least two new large operations are in the planning, exploration, or development stages in Nevada.

Mill wastewater treatment methods vary but include impoundment of wastewater in a tailings pond (settling) and recycle and/or evaporation. Most of the active mills recycle mill process water, since they are located in arid regions.

In reviewing BAT for the tungsten ore subcategory, EPA found the following pollutants for control: arsenic, cadmium, copper, zinc and TSS. (See Section VIII of this notice for a discussion of pollutant parameter selection.)

Nickel

The relatively small amount of nickel produced domestically is obtained from one open-pit mine in Oregon. The mine has a smelter, but no milling or beneficiation is practiced.

Wet beneficiation processes are not practiced at this nickel mine/smelter. Most of the plant water is used in the

smelting operation for ore belt washing, cooling and slag granulation. The process water is treated in two settling ponds and then recycled for use in the smelter. An average yearly runoff of 120,000 gallons of water per day comes from the mine itself. Most of this runoff occurs during the winter rainy season when daily flows can be as high as 580,000 gallons per day. The mine water runoff is treated at the settling ponds and used at the smelter. Excess water is discharged after treatment.

In reviewing BAT, EPA established a separate subcategory for nickel ore subcategory reserving effluent limitations until the Agency gathers additional data on the wastewater discharge of the single existing facility.

Vanadium

Vanadium, radium, and uranium are usually found in the same ore. Vanadium itself is almost exclusively obtained as a byproduct of uranium mining/milling. However, the United States has one open-pit vanadium mine/mill that extracts vanadium from nonradioactive ore using a leaching process. After the ore is extracted, the mill uses complex hydrometallurgical processes such as roasting, leaching, solvent extraction, and precipitation. (These processes are explained in the development document). At present, this mill is inactive because of the decreased demand for vanadium.

Nearly 70 percent of the effluent stream and all of the pollutants it contains come from leaching and solvent extraction, wet scrubbers or roasters, and ore dryers.

In reviewing BAT, EPA established a separate subcategory for vanadium ores (mined along and not as a byproduct) reserving effluent limitations until the Agency gathers additional data on the wastewater discharges of the single existing facility.

Uranium

Of the approximately 213 underground and open-pit uranium mines in the United States, about 44 percent now have fewer than five employees. As a result, the actual number of active mines at any given time will vary, depending on market conditions and company status. The large number of small mines means that each of 18 active uranium mills may service as many as 40 different mines.

While uranium mines produce approximately 0.1 million metric tons of ore annually (0.15 percent U_3O_8), the mills produce only 28,000 metric tons of processed U_3O_8 . Uranium mills use acid leach, alkaline leach, and combined

acid/alkaline leach processes to beneficiate the ore.

Uranium Milling Processes. Uranium ores tend to vary in consistency and grade and may come from mines owned by different companies. Because uniform grade and consistency must be achieved, ore blending is required before further processing. Ore high in vanadium is often roasted with sodium chloride to facilitate its removal by other processes. Roasting to carbonize and oxidize organics may be necessary to prevent interference with hydrometallurgical processes. Ore is ground to the proper size for either acid, alkaline, or combined acid/alkaline leach processes.

The acid leach process is used for ores with less than 12 percent calcium carbonate. Sulfuric acid, which extracts values quickly (usually 4 to 24 hours) is used. Tetravalent uranium must be oxidized to the uranyl form (VI) by adding an oxidizing agent (typically sodium chlorate or manganese dioxide). Uranyl sulfate forms a complex compound in the leach, with the anions subsequently extracted for value.

The alkaline leach process employs a solution of sodium carbonate in an oxidizing environment. In this process, uranium and vanadium values are extracted from their ores selectively and subsequently precipitated from the leach by raising the pH through the addition of sodium hydroxide.

Uranium in the pregnant leach liquor can be concentrated through ion exchange or solvent extraction. The values are then stripped or extracted and precipitated.

Approximately 80 percent of the total amount of uranium ore produced in the United States is recovered from mines that generate mine water. Water treatment practices in those mines include: (1) impoundment and solar evaporation, (2) ion exchange for uranium recovery, (3) flocculation and settling for heavy metals and suspended solids removal, (4) barium chloride (BaCl₂) coprecipitation of radium 226, and (5) radium 226 removal by ion exchange. Mine drainage is usually discharged to surface waters.

Only one of the 18 uranium mills discharges mill process water to surface waters. It treats the 580,000 gallon per day waste stream by settling, flocculation, and barium chloride coprecipitation for radium 226 removal. The remaining mills achieve zero discharge largely by impoundment and evaporation.

In reviewing BAT for the uranium ores subcategory, EPA found the following pollutants for control: arsenic, nickel, zinc, radium 226, uranium, COD, and

TSS. (See Section VIII of this notice for a discussion of pollutant parameter selection.)

Antimony

Antimony is recovered both from ore and as a byproduct of silver and lead concentrates. Antimony is located in ores in Idaho and Montana. However, only one operating mine/mill now produces antimony as a primary product. The ore is mined underground and concentrated using the froth flotation process. The mine has no known discharge because it is above the water table. The mill wastewater flows to an impoundment and is then retained.

Other mine/mills and smelters recover byproduct antimony. Thirty to fifty percent of domestic production of antimony (724 metric tons in 1977) in recent years has been recovered as a byproduct of lead smelting.

In reviewing BAT, EPA established a separate subcategory for antimony ores, reserving effluent limitations reserved until the Agency gathers additional data on the waste water discharges of this single existing facility.

Titanium

Four facilities in the United States produce titanium concentrates. One operation extracts titanium from lode ore deposits. Three operations dredge sands to recover titanium minerals (ilmenite). The lode ore operation is in New York, one sand dredging operation is in New Jersey and the remaining facilities are in Florida. In 1979, severe price competition from Australian titanium-producing operations forced three other sand dredging operations to close.

The titanium sand dredging mines are now processing over 27 million metric tons of ore per year. From this ore, the mills produce approximately 500,000 metric tons per year of mineral concentrate.

The mine that extracts ilmenite from lode ore treats wastewater by settling. The mill associated with this mine uses pH adjustment, settling, and recycle to treat wastewaters, with seasonal discharge to a river. Usually the discharge period lasts approximately three weeks per year. At the sand dredging facilities, multiple settling ponds are used before discharge. Dredge pond water is recycled for reuse, with excess water entering the multiple settling pond system. Wastewater treatment removes suspended solids primarily.

In reviewing BAT for the titanium ore subcategory, EPA found the following pollutants for control: nickel, zinc, iron, and TSS. (See Section VIII of this

preamble for a discussion of pollutant parameter selection.)

III. Scope of This Rulemaking and Summary of Methodology

The proposed regulation is an expansion of water pollution control requirements for the ore mining and dressing industry. From 1973 through 1976, EPA emphasized the achievement of limitations based on application of best practicable technology (BPT) by July 1, 1977. In general, this technology level represented the average of the best existing performances of well-known technologies for control of familiar (i.e., "classical") pollutants. In this industry, many metal pollutants that Congress subsequently designated as toxic were also regulated under BPT.

In this rulemaking, EPA has sought to ensure the achievement, by July 1, 1984, of limitations based on application of the best available technology economically achievable (BAT). In general, this technology level represents the best economically achievable performance in any industry category or subcategory. Moreover, as a result of the Clean Water Act of 1977, the emphasis of EPA's program has shifted from control of "classical" pollutants to the control of toxic substances.

In the 1977 legislation, Congress recognized that it was dealing with areas of scientific uncertainty when it declared the 65 "priority" pollutants and classes of pollutants "toxic" under section 307(a) of the Act. The "priority" pollutants have been relatively unknown outside the scientific community, and those engaged in wastewater sampling and control have had little experience dealing with these pollutants. Additionally, these pollutants can often appear and can have toxic effects at concentrations that severely tax current analytical techniques. Even though Congress was aware of the state-of-the-art difficulties and expense of toxics control and detection, it directed EPA to act quickly and decisively to detect, measure, and regulate these substances.

EPA's implementation of the Act is described in this section and succeeding sections of this notice. Initially, because in many cases no public or private agency had done so, EPA, its laboratories, and consultants had to develop analytical methods for toxic pollutant detection and measurement (see section IV of this notice). EPA then gathered technical and economic data about the industry, which are also summarized in Section IV. A number of steps were involved in arriving at the proposed limitations.

First, EPA studied the ore mining and dressing industry to determine whether differences in raw materials; final products; manufacturing processes; equipment, age, and size of plants, water usage; wastewater constituents; or other factors required the development of separate effluent limitations and standards for different subcategories and segments of the industry. This study included identifying raw waste and treated effluent characteristics, including: the sources and volume of water used, the processes employed, the sources of pollutants and wastewater in the plant and the constituents of wastewater, including toxic pollutants. EPA then identified the constituents of wastewaters that should be considered for effluent limitations guidelines and standards of performance.

Next, EPA identified several distinct control and treatment technologies, including both in-plant and end-of-process technologies, that are in use or capable of being used in the ore mining and dressing industry. The Agency compiled and analyzed historical and newly generated data on the effluent quality resulting from the application of these technologies. The long-term performance, operations, limitations, and reliability of each treatment and control technology were also identified. In addition, EPA considered the non-water quality environmental impacts of these technologies, including impacts on air quality, solid waste generation, water availability, and energy requirements.

The Agency then estimated the costs of each control and treatment technology from unit cost curves developed by standard engineering analyses as applied to ore mining and dressing wastewater characteristics. EPA derived unit process costs from representative plant characteristics (production and flow) applied to each treatment process (i.e., secondary settling, pH adjustment and settling, granular-media filtration, etc.). These unit process costs were added to yield total cost at each treatment level. After confirming the reasonableness of this methodology by comparing EPA cost estimates with treatment systems supplied by the industry, the Agency evaluated the economic impacts of these costs. (Costs and economic impacts are discussed in detail under the various technology options and in section XVII of this preamble.)

After considering these factors, EPA identified various control and treatment technologies as BAT and BADT (Best Available Demonstrated Technology).

The proposed regulation, however, does not require the installation of any particular technology or limit the choices of technologies that may be used in specific situations. Rather, it requires achievement of effluent limitations that represent the proper design, construction, and operation of these or equivalent technologies.

The effluent limitations for ore mining and dressing BAT, BCT, and NSPS are expressed in concentrations (e.g., milligrams of pollutant per liter of wastewater) rather than loading per unit(s) of production (e.g., kg of pollutant per metric ton of product) because correlating units of production and wastewater discharged by mines and mills was not possible for this category. The reasons are:

(1) The quantity of mine water discharged varies considerably from mine to mine and is influenced by topography, climate, geology (affecting infiltration rates) and the continuous nature of water infiltration regardless of production rates. Mine water may be generated and required to be treated and discharged even if production is reduced or terminated.

(2) Consistent water use and loss relationships for ore mills could not be derived from facility to facility within a subcategory because of wide variations in application of specific processes. The subtle differences in ore mineralogy and process development may require the use of differing amounts of water and process reagents but do not necessarily require different wastewater treatment technology(ies).

The Agency is not proposing pretreatment standards because it does not know of any existing facilities that discharge to POTWs or any that are planned.

IV. Data-Gathering Program

(A) Sampling and Analytical Methods

As Congress recognized in enacting the Clean Water Act of 1977, the state-of-the-art ability to monitor and detect toxic pollutants is limited. Most toxic pollutants were relatively unknown until only a few years ago, and only on rare occasions has EPA regulated or has industry monitored or even developed methods to monitor these pollutants. Section 304(h) of the Act, however, requires the Administrator to promulgate guidelines to establish test procedures for the analysis of toxic pollutants. As a result, EPA scientists, including staff of the Environmental Research Laboratory in Athens, Georgia, and staff of the Environmental

Monitoring and Support Laboratory in Cincinnati, Ohio, conducted a literature search and initiated a laboratory program to develop analytical protocols. The analytical techniques used in this rulemaking were developed concurrently with the development of general sampling and analytical protocols and were incorporated into the protocols ultimately adopted for the study of other industrial categories. See *Sampling and Analysis Procedures for Screening of Industrial Effluents for Priority Pollutants*, revised April 1977.

Because section 304(h) methods were available for most toxic metals, pesticides, cyanide and phenolics (4AAP), the analytical effort focused on developing methods for sampling and analyses of organic toxic pollutants. The three basic analytical approaches considered by EPA are infrared spectroscopy (IS), gas chromatography (GC) with multiple detectors, and gas chromatography/mass spectrometry (GC/MS). Evaluation of these alternatives led the Agency to propose analytical techniques for 113 toxic organic pollutants (see 44 FR 69464, December 3, 1979, amended 44 FR 75028, December 18, 1979) based on: (1) GC with selected detectors, or high-performance liquid chromatography (HPLC), depending on the particular pollutant and (2) GC/MS. In selecting among these alternatives, EPA considered their sensitivity, laboratory availability, costs, applicability to diverse waste streams from numerous industries, and capability for implementation within the statutory and court-ordered time constraints of EPA's program. The rationale for selecting the proposed analytical protocols may be found in 44 FR 69464 (December 3, 1979).

In EPA's judgment, the test procedures used in this rulemaking represent the best state-of-the-art methods for toxic pollutant analyses available when this study was begun. As state-of-the-art technology progresses, future rulemaking will be initiated to evaluate, and if necessary, incorporate these changes.

Before analyzing ore mining and dressing wastewater, EPA defined specific toxic pollutants for the analyses. The list of 65 pollutants and classes of pollutants potentially includes thousands of specific pollutants, and the expenditure of resources in government and private laboratories would be overwhelming if analyses were attempted for all these pollutants. Therefore, to make the task more manageable, EPA selected 129 specific toxic pollutants for study in this

rulemaking and other industry rulemakings.

In general, EPA collected four types of samples from each sampling point: (1) a 9.6 liter, 24-hour composite sample used to analyze metals, pesticides, PCBs, asbestos, organic compounds, and the classical parameters; (2) a 1-liter, 24-hour composite sample used to analyze total cyanide; (3) a 0.47-liter, 24-hour composite sample to analyze total phenolics (4AAP); and (4) two 125-ml grab samples to analyze volatile organic compounds by the "purge and trap" method.

EPA analyzed for toxic pollutants according to groups of chemicals and associated analytical schemes. Organic toxic pollutants included volatile (purgeable), base-neutral and acid (extractable) pollutants, and pesticides. Inorganic toxic pollutants included toxic metals, cyanide, and asbestos (chrysotile and total asbestiform fibers).

The primary method used in screening and verification of the volatile, base-neutral, and acid organics was gas chromatography with confirmation and quantification on all samples by mass spectrometry (GC/MS). Phenolics (total) were analyzed by the 4-aminoantipyrine (4AAP) method. GC was employed for analysis of pesticides with limited MS confirmation. The Agency analyzed the toxic metals by atomic adsorption spectrometry (AAS), with flame or graphite furnace atomization following appropriate digestion of the sample. Samples were analyzed for total cyanide by a colorimetric method, with sulfide previously removed by distillation. Asbestos was analyzed by transmission electron microscopy and fiber presence reported as chrysotile and total fiber counts. EPA analyzed for seven other parameters including: pH, temperature, TSS, VSS, COD, TOC, iron, aluminum, and radium 226 (total and dissolved).

The high costs, time-consuming nature of analysis, and limited laboratory capability for toxic pollutant analyses posed considerable difficulties to EPA. The cost of each wastewater analysis for organic toxic pollutants ranges between \$650 and \$1,700, excluding sampling costs (based on quotations recently obtained from a number of analytical laboratories). Even with unlimited resources, however, time and laboratory capability would have posed additional constraints. Efficiency is improving, but when this study was initiated, a well-trained technician using the most sophisticated equipment could perform only one complete organic analysis in an eight-hour workday. Moreover, when this rulemaking study began only about 15 commercial laboratories in the United States could

perform these analyses. Today, EPA knows of over 50 commercial laboratories that can perform these analyses, and the number is increasing as the demand increases.

In planning data generation for this rulemaking, EPA considered requiring dischargers to monitor and analyze toxic pollutants under section 308 of the Act. The Agency did not use this authority, however, because it was reluctant to increase the cost to the industry and because it desired to keep direct control over sample analyses in view of the developmental nature of the methodology and the need for close quality control. In addition, EPA believed that the slow pace and limited laboratory capability for toxic pollutant analysis would have hampered mandatory sampling and analysis. Although EPA believes that available data support these regulations, it would have preferred a larger data base for some of the toxic pollutants and will continue to seek additional data. EPA will periodically review these regulations, as required by the Act, and make any revisions supported by new data.

(B) Data Gathering Efforts

Data gathering for the ore mining and dressing industry included an extensive collection of information:

- (1) Screening and verification sampling and analysis programs
- (2) Engineering cost site visits
- (3) Supporting data from EPA regional offices
- (4) Treatability studies
- (5) Industry self-monitoring sampling
- (6) BPT data base
- (7) Placer study
- (8) Titanium sand dredges study
- (9) Uranium study

EPA began an extensive data collection effort during 1974 and 1975 to develop BPT effluent standards. These data included results from sampling programs conducted by the Agency at mines and mills and an assimilation of historical data supplied by the industry, the Bureau of Mines, and other sources. This information characterized wastewaters from ore mining and milling operations according to what were then considered key parameters—total suspended solids, pH, lead, zinc, copper, and other metals. However, little information on other environmental parameters, such as other toxic metals and organics, was available from industry or government sources. To establish the levels of these pollutants, the Agency instituted a second sampling and analysis program to specifically address these toxic substances, including 129 specific toxic pollutants

for which regulation was mandated by the Clean Water Act.

EPA began the second sampling and analysis program (screening and verification sampling) in 1977 to establish the quantities of toxic, conventional, and nonconventional pollutants in ore mine drainage and mill processing effluents. EPA visited 20 and 14 facilities respectively for screening and verification sampling.

EPA selected at least one facility in each major BPT subcategory. The sites selected were representative of the operations and wastewater characteristics present in particular subcategories. To determine these sites, the Agency reviewed the BPT data base and industry as a whole, with consideration to:

- (1) Those using reagents or reagents constituents on the toxic pollutants list;
- (2) Those using effective treatment for BPT regulated pollutants;
- (3) Those for which historical data were available as a means of verifying results obtained during screening;
- (4) Those suspected of producing wastewater streams that contain pollutants not traditionally monitored. These facilities were visited from April through November 1977.

After reviewing screen sampling analytical results, EPA selected 14 sites for verification sampling visits. Because most of the organic toxic pollutants were either not detected or detected only at low concentrations in the screen samples, the Agency emphasized verification sampling for total phenolics (4AAP), total cyanide asbestos (chrysotile), and toxic metals.

EPA revisited six of the facilities to collect additional data on concentrations of total phenolics (4AAP) total cyanide, asbestos (chrysotile), and to confirm earlier measurements of these parameters.

After completing verification sampling, EPA conducted sampling of two additional sites. At one molybdenum mill operation, a complete screen sampling effort was performed to determine the presence of toxic pollutants and to collect data on the performance of a newly installed treatment system. The second facility, a uranium mine/mill, was sampled to collect data on a facility removing radium 226 by ion exchange. Samples collected at this facility were not analyzed for organic toxic pollutants.

The Agency conducted a separate sampling effort to evaluate treatment technologies at Alaskan placer gold mines. This study was undertaken because gold placer mining was reserved under BPT rulemaking and

because little data were previously available on the performance of existing treatment systems.

Industrial self-sampling was conducted at three facilities visited during screen sampling to supplement and expand the data for these facilities. The programs lasted from two to twelve weeks. EPA selected two operations because they had been identified during the BPT study as two of the best treatment facilities; the third because additional data on long-term variations in waste stream characteristics at these sites were needed to supplement the historical discharge monitoring data, to reflect any recent changes or improvements in the treatment technology used, and to confirm that variations in raw wastewater levels did not affect concentrations in treated effluents.

The Agency's regional surveillance and analysis groups performed additional sampling at fourteen facilities: nine in Colorado, Idaho, Wyoming, and Montana; one in Arkansas; and four in Missouri.

Discharge monitoring reports were collected from EPA regional offices for many of the ore producing facilities with treatment systems. These data were used in evaluating the variations in flow and wastewater characteristics associated with mine drainage and mill wastewater.

The Agency took samples during the cost-site visits, although the primary reason for the visits was to collect data that would assist the Agency in developing unit process cost curves and that would verify the cost assumptions made. However, since many of the sites had been sampled previously, the new sampling data obtained served as additional verification of waste characterization data.

EPA conducted thirteen treatability studies to characterize performance of alternative treatment technologies on ore mine and mill wastewaters. Secondary settling, flocculation, granular media filtration, ozonation, alkaline chlorination and hydrogen peroxide treatment (described in detail in section VI) were all examined in bench- and pilot-scale studies. The data obtained from these studies were compared with data obtained on the performance of these systems in actual operation on pilot and full scale. In addition, the data were used to determine the range of variability that might be expected for these technologies, especially during periods of steady running.

EPA obtained the data for its economic analysis primarily from a survey conducted under section 308 of

the Clean Water Act. The Agency sent questionnaires to 138 companies engaged in mining and milling of metal ores. The data collected included production levels, employment, revenue, operating costs, working capital, ore grade, and other relevant information. The economic survey data were supplemented by data from government publications, trade journals, and visits to several mine/mills.

V. Industry Subcategorization

All industries vary among facilities with respect to raw materials and other factors which can affect wastewater characteristics and treatment technology. These factors in the ore mining and dressing industry are extraordinarily diverse. Therefore, EPA had to decide on a subcategorization which would, adequately account for important differences among different types of mines and mills. On the other hand, many differences are simply not relevant to the issue underlying subcategorization—whether the effluent limitations for plants in one group should differ from those in another group.

The BPT subcategorization scheme was based on several factors that the Agency deemed important in subcategorizing the industry for BAT. Ore mineralogy was a useful method for initially subcategorizing the industry. Generally, the type of ore is one factor in determining the types of pollutants found in wastewater, and hence the treatment technology required. For example, wastewater associated with uranium ore contains radium 226 and uranium, which require treatment technologies not needed for iron ore wastewater. On the other hand, wastewater from lead, zinc, or copper facilities contains a variety of toxic metals not associated with uranium ores.

However, in some cases, wastewater characteristics, treatment technology, and achievable effluent limitations are independent of ore type. This is particularly true for copper, lead, zinc, gold, and silver ores which are processed by froth flotation. Moreover, these metals are frequently found together in the same ore.

Thus, the BPT regulations subcategorized the industry first by basic ore type: iron ore, base and precious metals (including copper, lead, zinc, gold, platinum and silver), aluminum, ferroalloy, uranium, radium and vanadium, mercury, and titanium.

EPA subdivided each subcategory on the basis of whether the discharger is a mine or a mill, since the flow of minewater may vary considerably and

untreated mine water generally contains lower concentrations of most pollutants than untreated mill process water.

EPA further subdivided some subcategories according to the type of beneficiation process employed. Flotation processes, for example, significantly change the character of mill effluent because of pH control, which is needed to maximize metals recovery, and addition of chemical reagents during the mill process. Consequently, flotation processes create different kinds of wastewater than other beneficiation processes. Moreover, EPA determined that for some beneficiation processes, zero discharge of process wastewater was a proper BPT requirement.

In *Kennecott Copper Corp. v. EPA*, *supra*, the court upheld the Agency's BPT subcategorization scheme against industry challenge (with one minor exception not pertinent here). Consequently, the Agency has retained the BPT subcategorization scheme, with a few minor adjustments.

Subpart D of the BPT regulations created a subcategory consisting of ferroalloy ores, which include chromium, cobalt, columbium, tantalum, manganese, molybdenum, nickel, tungsten, and vanadium (recovered alone, not as a byproduct of uranium mining or milling). EPA made a further subdivision that was based on whether more or less than 5,000 tons per year is processed. However, more recent data show that wastewater from molybdenum mines and mills is like the discharges from facilities in the BPT base and precious metals subcategory—that is, mines and mills extracting copper, lead, zinc, gold, or silver (see 40 CFR Subpart B). Consequently, this proposed regulation move molybdenum mines and mills into the Copper, Lead, Zinc, Gold, Silver, Platinum, and Molybdenum Subcategory (see 40 CFR 440.120). (There are three known molybdenum mines and three mills, all of which process more than 5,000 tons per year.)

In the BPT ferroalloy subcategory, one nickel mine remains and one vanadium mine and mill. Except for tungsten, all other ores are recovered as byproducts of ores directly regulated under other subcategories. The Agency has commissioned studies to consider more closely the nickel and vanadium facilities. After reviewing these data, EPA will take appropriate action. Accordingly, this rulemaking creates subcategories for nickel and vanadium, with limitations reserved. (See 40 CFR 440.90, 440.100).

Tungsten mines and mills, however, would be regulated under this rulemaking (see 40 CFR 440.80). Unlike the BPT requirements, this rulemaking makes no distinctions about facility size. Seven tungsten mines and two mills are known which process more than 5,000 tons per year. Mines and mills with smaller production are generally intermittent operations, which open and close frequently. In addition, EPA believes that many of these facilities are dry and do not discharge. Because of their intermittent nature, these facilities are difficult to locate and thus, the Agency lacks extensive data on them. However, EPA has no information at this time indicating that a separate subcategory should be created, for BAT limitations, for tungsten mines based on size. Tungsten facilities processing less than 5,000 tons per year are encouraged to submit all pertinent information during the comment period on these proposed regulations.

These effluent limitations are applicable to facilities discharging water from ore mining and milling operations. However, some operations, known as complex facilities, combine waste streams from other processes such as refining and smelting with their ore mining and milling wastes, and this combined waste stream is then treated for discharge. BPT effluent limitations are not directly applicable to these complex facilities, but provide a basis for facility-specific limitations (see 43 FR 29771). During the BAT study, EPA gathered additional data on 3 facilities that are known to be complex facilities: White Pine Copper Division, Copper Range Co., White Pine Michigan; Kennecott Copper Corp., Utah Copper Division (Treatment plant effluent only), Salt Lake City, Utah, and Bunker Hill Co., Kellogg, Idaho. EPA considered creating a separate subcategory for all the complex facilities or a separate subcategory for each of the complex facilities.

We have, however, decided not to propose such regulation and instead have prepared a separate report on each of the 3 facilities to be used as guidance documents by the permitting authority in issuing NPDES permits. In effect, each facility will be given effluent limitations that will take into account BAT mine and mill guidelines, treatability of waste streams, and smelter and refining guidelines.

BAT effluent limitations for smelters and refineries Nonferrous Metals Manufacturing, were promulgated February 27, 1975 (40 FR 8527), but, as a result of the 1977 amendments to the Act addressing the control of toxics, is being

reviewed. The Agency will be proposing revised BAT limits for smelters and refineries

VI. Available Wastewater Control and Treatment Technology

(A) Status of In-Place Technology

BPT regulations for the ore mining and dressing industry have been in effect since 1978. The treatment technologies required to meet these limitations vary somewhat from subcategory to subcategory. In general, mines and mills use wastewater treatment that includes chemical precipitation (usually with lime) of metals by elevation of pH, followed by settling to remove solids. Use of flocculation aids, such as alum or polyelectrolytes, was identified as a BPT technology for treatment of mine drainage and mill process water in the iron ore subcategory (except for the Mesabi Range mills, where zero discharge was specified). Secondary settling and flocculation chemicals were identified as BPT treatment technologies for mine drainage in the ferroalloy ore (tungsten ore) subcategory. In the uranium ore subcategory, for mine drainage and mill process water, BPT treatment included chemical precipitation of metals, settling, ion exchange (for uranium), and secondary settling. Throughout the industry, EPA found facilities that employed these technologies to various degrees to suit their specific situation(s). In fact, several facilities used settling alone to achieve BPT limitations.

(B) Control Technologies Considered for Use in the Industry

Current industry practices and other available wastewater treatment technologies considered for control of the pollutants discharged by the ore mining and dressing industry include secondary settling, flocculant addition, additional pH adjustment, granular media filtration, use of mechanical clarifiers, activated carbon adsorption, sulfide precipitation, ion exchange, ozonation, alkaline chlorination, hydrogen peroxide oxidation, and partial or total recycle. All these technologies are considered to be "add-on" technologies to the basic BPT treatment schemes, which EPA assumes are already in place. The "add-on" element is taken into account both in the evaluation of achievable effluent pollutant levels and in the cost estimates prepared for each facility.

A number of facilities may be able to meet BAT limitations more stringent than BPT limitations by optimizing their present treatment system. In addition, many facilities may employ additional

process controls rather than additional treatment technologies to achieve more stringent limitations. Specific facilities may be able to meet more stringent limitations without installation of the technologies identified above. For example, initial raw wastewater pollutant concentrations may be low; or particle size distributions may be amenable to rapid settling and thus effect removal of suspended solids and contained metals, in primary settling ponds. Regardless, for each technology studied, the limitation can be achieved provided the technologies are operated optimally.

Wastewater treatment technologies were evaluated for applicability to the pollutant parameters of concern, appropriateness for the wastewater volume and pollutant concentrations found in this industry, and economic achievability. The technologies that fulfilled these criteria are described below.

Pollutant levels or concentrations achievable by these technologies were determined using data from sampling and analysis at existing facilities, together with data from 13 treatability studies and data provided by the industry.

(1) Toxic Metals and TSS Removal. Secondary Settling

Settling ponds are frequently used in a multiple arrangement, in which one or more settling ponds are added in series with primary settling ponds. The purpose of this scheme is to further reduce suspended solid loading in the sequential ponds. It may also be used to allow the use of chemical precipitation, pH control, or coagulants or flocculations before discharge or recycle. Unaided secondary settling is most effective when existing conditions are not ideal in the primary settling ponds. It provides additional residence time in the treatment system and affords additional removal of suspended solids and associated heavy metals. At least 17 facilities practice secondary or multiple pond treatment.

Coagulation/Flocculation

In coagulation and flocculation, chemical coagulants act to destabilize colloidal solids, causing them to gather together in a floc and settle. The primary purpose of chemical coagulation or flocculant addition to wastewater is to increase the size of settling particles by forming flocs of individual particles that act as a single large particle, which settles faster than individual particles. These chemicals typically are added upstream of sedimentation ponds,

clarifiers, or filter units. This practice has demonstrated improved metals removal due to the formation of flocs, which appear to be effective in adsorbing and absorbing fine metal hydroxide precipitates (particles) formed either naturally or by pH adjustment using lime.

Over ten facilities in the industry now practice this type of treatment.

pH Adjustment and Settling

Adjustment of pH, usually with lime, changes the solubility of many dissolved metals, causing them to precipitate as a solid. These precipitated metals are then removed with other solids through settling. This technology is commonly used in the industry and is the basis for BPT in most subcategories. It is considered again because the process can be applied or optimized with the potential for significantly improved metals removal in some subcategories. For example, a treatment system operated at a pH of 7 can often improve dissolved metals removal by increasing the pH to 9 while maintaining the same settling time.

Granular Media Filtration

Filtration is accomplished by passing water through a physically restrictive medium (such as sand), thereby entrapping suspended particulate matter. Filtration systems are usually located downstream of primary settling ponds and work best when applied to waste streams having TSS loads of 50 mg/l or less. Filtration can be used to remove a wide range of suspended particle sizes. Next to gravity sedimentation (unaided settling), granular-media filtration is the most widely used process for the separation of solids from wastewater. Ultimate clarification of the filtered water is a function of particle size, filter medium porosity, filter loading rate, frequency of backwash, and other variables. This technology has been demonstrated in both industrial and municipal applications and is cost-effective in relation to other technologies when reductions to 10 mg/l TSS are required. During periods of steady operation of properly sized and designed units, granular media filters have consistently demonstrated the ability to achieve proposed limitations for TSS and metals. Reduction of metals is a function of the metals contained in the solids (particles of ores, waste rock, tailings, and solids formed during lime precipitation of dissolved metals).

Clarifiers

Clarifiers are large tanks that have systems to direct and segregate solids.

The design of these devices provides for concentration and removal of suspended and settleable solids in one effluent stream and a clarified liquid in the other. Clarified waters with extremely low solids contents may be produced through proper design and application. Settled solids from clarifiers are removed periodically or continuously for either disposal or recovery of contained values. The use of clarifiers improves treatment efficiency, reduces the area needed for tailing ponds, and facilitates the reuse or recycle of water in the milling operation. The use of flocculants to enhance the performance of clarifiers is common practice. In this industry, clarifiers have their greatest use when the additional space for more settling ponds is not available or topography precludes construction of ponds.

Complete Recycle

Raw wastewater discharged from a typical ore mill is usually routed to a settling pond for suspended solids and metals removal. In complete recycle, all treated water is routed back to the mill for reuse in the beneficiating process. Facilities that use recycle are often in arid regions because of the scarcity of available water. Many facilities both in arid and humid regions recycle at least a portion of their process wastewater.

Complete recycle of mine drainage is generally not a viable option. Except for small amounts of water used in dust control, cooling, drilling fluids, and transport fluids for sluicing tailings back to the mine, water is not widely used in mines. In some cases, mine drainage is used by the mill as process water in beneficiation. However, the volume of mine drainage may exceed the mill's requirement for process water, making complete reuse unachievable.

(2) Cyanide Removal.

Three technologies, alkaline chlorination, ozonation, and hydrogen peroxide oxidation were considered to convert cyanide into the nontoxic gases carbon dioxide (CO₂) and nitrogen (N₂). These technologies do not remove toxic metals. Cyanide appears in wastewater as the result of two processes used in the ore mining and dressing industry: (1) the cyanidation leach process used primarily for gold recovery and (2) the froth flotation process in which cyanide compounds are used as selective reagents. Under BPT, wastewater from the cyanide leach process for gold was subject to no discharge. The cyanide limits for the froth flotation mills under the base and precious metals ores were later withdrawn because of an inadequate data base. Raw wastewater from froth flotation mills typically contains some total cyanide, but the

highest treated effluent level measured was less than 0.4 mg/l. A few mines in the industry practice hydraulic backfilling of mines with tailings from froth flotation process, and in these cases, cyanide is found in the mine drainage in concentrations less than those found in the mill discharge.

Specific technology for destruction of cyanide is not used at most domestic mine/mill operations that use cyanide. Such technology is generally not necessary because in-process controls and retention of wastewater in tailing ponds have reduced cyanide concentrations to less than detectable. The mechanism of cyanide decomposition within a tailing pond is thought to involve photo-decomposition by ultraviolet light, aeration, and biological oxidation.

Some domestic and foreign mine/mill operations have investigated and implemented specific technologies for cyanide oxidation. The technologies most applicable to mine/mill wastewater are discussed below.

Alkaline Chlorination

In alkaline chlorination, free cyanide (CN) is oxidized to cyanate (CNO⁻), then to carbon dioxide (CO₂) and free nitrogen (N₂). One facility in the industry now has an alkaline chlorination system in operation as a standby treatment if an emergency discharge should occur (mill treatment system has no discharge). A major mill has installed a full-scale system (2000 gpm). Several other facilities are performing treatability studies to determine the applicability and economics of operation of this technology.

The process uses free chlorine or sodium hypochlorite at a pH above 10. Reagent dosage, contact time, and the number of stages must be suited to the wastewater in question. Optimization of this process is best done using pilot-scale testing. Advantages to the use of alkaline chlorination include relatively low reagent costs, applicability of automatic process control, and experience with its use in other industries (e.g., electroplating).

Ozonation

In the ozonation process, the highly reactive ozone (O₃) molecules readily liberate oxygen atoms, which then react with cyanide to form cyanate very rapidly. Complete oxidation to CO₂ and N₂ occurs over a longer period of time (perhaps 30 minutes) with a higher concentration of ozone. Cyanide oxidation to cyanate is very rapid (10 to 15 minutes) at pH 9 to 12 and is

practically instantaneous if copper is present.

Ozone also oxidizes other organic compounds if sufficient ozone and retention time are provided. However, the concentrations of compounds, such as phenol are already very low and may be below the levels at which this treatment may be applied economically.

Hydrogen Peroxide Oxidation

This process uses hydrogen peroxide to oxidize cyanide. In practice, a 30 percent solution is usually used at an alkaline pH with a copper catalyst. A patented process is also commercially available, which is capable of oxidizing cyanide to cyanate. This process has been successfully employed at one molybdenum mining and milling facility to treat relatively low concentrations of cyanide and reduce effluent levels to near detection limit.

In-Process Control of Cyanide

As noted, sodium cyanide is used as a reagent in the froth flotation process. Control of sodium cyanide dosages is important for optimal recovery and purity of the ore concentrate, for control of reagent costs, and for quality of the facility wastewater effluent. An insufficient amount of reagent may seriously reduce recovery but an excess amount seldom affects recovery except in extreme dosages. As a result, mills may tend to overshoot the necessary dosage. Therefore, improvements in control and reduction of cyanide dosage to the absolutely necessary level will result in lowered effluent cyanide levels. Seven mills in the industry have installed on-line X-ray analysis systems of ore feed. Other mills have replaced valve operated reagent feeders with metered feeders, such as the Clarkson or Geary feeder, which maintain constant flow. Use of these technologies to influence the amount of cyanide fed to the process insures that the proper amount of reagent required is added and reduces the possibility of "overshooting" the correct dosage.

Reagent Substitution

Research sponsored by EPA shows that, in some cases, sodium sulfite or sodium monosulfide can replace sodium cyanide as reagents in froth flotation. In fact, one mill in the ore industry uses sodium sulfide and another uses sodium bisulfide in its froth flotation process. However, the successful use of cyanide alternatives would generally require readjustment (for maximum recovery) of the process and adjustment of other reagent concentrations at the flotation mill. The degree of effectiveness of any given reagent varies, depending on the

properties of the ore at a particular location. The Agency has not been able to determine whether reagent substitution is feasible on an industry-wide basis.

(c) Cost Development.

EPA determined the costs of applying these technologies by obtaining cost data from equipment manufacturers and by applying standard engineering data and cost estimation techniques (see section IX of the development document). The Agency then assessed the impact of these costs on individual companies, the subcategories within the industry, and the industry as a whole.

None of the in-plant control or end-of-pipe treatment technologies studied in the development of these regulations is considered innovative within section 301(k) of the Clean Water Act. All the in-plant controls and process modifications described in this notice, and in greater detail in the development document, have either been used or investigated for use in this industry and do not represent major process changes in cyanide control. The end-of-pipe treatment technologies have also been applied in this and other industries.

VII. Substantive Change From Prior Regulations

This proposed rulemaking requires no more stringent effluent limitations in most instances than do the BPT regulations applicable to this industry. However, today's proposal would differ from the BPT requirements in the following respect.

Storm Provision

The BPT regulation states that:

Any excess water, resulting from rainfall or snowmelt, discharged from facilities designed, constructed, and maintained to contain or treat the volume of water which would result from a 10-year, 24-hour precipitation event, shall not be subject to the limitations set forth in 40 CFR 440.40 CFR 440.81(c) (1980).

This provision was further clarified by EPA on February 8, 1979 (see 44 FR 7954). As explained in that notice, the storm provision modifies the requirements for both mill process water and mine.

The (BPT) regulations are intended to require that, if a holding facility * * * is designed, constructed, and maintained to hold a volume of water equal to (1) all process water applied by the operator to the active leach area plus (2) a volume of storm water which, during a 10-year, 24-hour storm event, falls on the area which drains into such holding facility, then any excess water discharged * * * may be discharged.

(44 FR 7954 (February 8, 1979))

The storm provision modified the effluent requirements for mine drainage in similar fashion. *Id.*

The storm provision proposed in this rulemaking would differ slightly depending on whether or not a facility must achieve no discharge. Under the BPT provision, the storm exemption in all cases is predicated on a design volume criterion—that the facility be constructed and operated to provide proper treatment or containment of (1) process water and (2) a volume of water equal to the volume that would result from a 10-year, 24-hour storm. If the facility met that volume criterion, the storm provision could apply during a storm of any magnitude. In short, the storm exemption was tied to a design volume, not to a design storm event.

However, this proposed rulemaking ties the storm exemption to the 10-year, 24-hour storm event for new sources subject to no discharge requirements. For example, wastewater from a copper dump leach operation, which is subject to no discharge (40 CFR 440.124), must be contained, including all storm runoff draining into the holding pond. Process wastewater may be discharged only when a 10-year, 24-hour or larger precipitation event occurs. For facilities not subject to no discharge (e.g., existing froth flotation mills and existing and new source mine drainage), the storm provision remains tied to a design volume criterion. The Agency recognizes that these facilities, which frequently have a continuous discharge, may not be able to meet the prescribed effluent limitations during storms smaller than a 10-year event.

VIII. Pollutant Parameter Selection

(A) Pollutants Not Regulated

The Revised Settlement Agreement discussed in Sections I and II authorizes the exclusion from regulation, in certain instances, of pollutants and industry subcategories. Data collected by EPA and individual companies within the industry were used in deciding which specific toxic pollutants would be excluded.

Paragraph 8(a)(iii) of the Revised Settlement Agreement allows the Administrator to exclude from regulation toxic pollutants not detectable by section 304(h) analytical methods or other state-of-the-art methods. This provision includes pollutants below EPA's nominal detection limit. In addition, Paragraph 8(a)(iii) allows the exclusion of pollutants that were detected in amounts too small to be effectively reduced by technologies known to the

Administrator. Pollutants excluded under these provisions are listed in Appendices B, C and D. One hundred and thirteen toxic organics, cyanide and six toxic metals are excluded from regulation under these provisions.

Cyanide, as measured by the EPA-approved method for total cyanide, is subject to 100-percent error when applied to the concentrations found in the discharges from the ore mining and dressing point source category. Problems were frequently encountered with quality control and analysis of cyanide in mining wastewater samples using the EPA-approved Belack Distillation method. A study of the analysis of cyanide in ore mining and processing wastewater was conducted in cooperation with industry, EPA's EMSL laboratory in Cincinnati, and private chemical laboratories. (Section V of the development document presents a discussion of this study).

This study indicates that any limitation for cyanide from this industry must allow an analytical measurement of up to 0.4 mg/1 for total cyanide, where the sample is collected as a grab sample. Because of inprocess controls on the use of cyanide which have been implemented by the industry and the natural aeration that occurs in the BPT systems designed essentially for the removal of metals and TSS, all of the effluent data on total cyanide and many existing permit conditions show concentrations below 0.4 mg/1. Therefore, further reduction of cyanide is unnecessary and beyond the technologies known to the Administrator.

Paragraph 8(a)(iii) also allows the Administrator to exclude from regulation pollutants detected in the effluent of only a small number of sources within the category and uniquely related to those sources. The toxic organic pollutant, 2,4-dimethylphenol, was detected in the effluent at only one facility (9202) during the screen sampling program. Aerofloat TM, used as a flotation agent in ore beneficiation at this facility, is a precursor of 2,4-dimethylphenol. Thus, 2,4-dimethylphenol is excluded under this provision.

Paragraph 8(a)(iii) also allows the Administrator to exclude from regulation pollutants that are effectively controlled by the technology upon which other effluent limitations and guidelines are based. The Agency believes that the technology upon which BPT and BCT effluent limitations for TSS are based will effectively control the toxic pollutant asbestos (chrysotile). As discussed in Section X of this notice,

BCT limitations for TSS are established equal to BPT limitations.

Furthermore, the Agency believes that arsenic and nickel found in discharges from ore mining and dressing are adequately controlled by the incidental removal associated with the control and removal of other metals found in the discharges from this industry, e.g., copper, lead, mercury, and zinc. Where any of these metals are limited, they are also found in the raw discharge and if controlled to the limitations specified, any arsenic and nickel in the raw discharge would be reduced to levels that would be proposed if arsenic and nickel were controlled directly (see section X of the development document).

Paragraph 8(a)(i) allows the exclusion of specific pollutants or subcategories for which equal or more stringent protection is already provided by an effluent standard, new source performance standard, or pretreatment standard. EPA proposes to exclude particular subcategories and subparts as listed in Appendix G where BPT provides protection equal to those options considered for BAT.

In addition to the toxic pollutants excluded for all subcategories, EPA is proposing to exclude certain toxic pollutants from particular subcategories and subparts. These pollutants were either not detected or detected in particular subcategories and subparts and then excluded because the pollutants were present in amounts too small to be effectively reduced by technologies known to the Administrator. See Appendix H for pollutants excluded by subcategory and subpart.

In addition to the toxic pollutants excluded for subcategories and subparts, EPA is proposing to exclude from BAT the uranium mill subpart of the uranium ore subcategory. A subcategory or subpart may be excluded for a specific pollutant if the pollutant is detectable in the effluent from only a small number of sources within the subcategory or subpart and the pollutant is uniquely related to these sources. Currently eighteen of nineteen existing uranium mills achieve zero discharge of process wastewater. In addition, the Agency knows of no uranium mill that commingles its process wastewater with mine drainage and it is anticipated that none of these zero discharge mills would elect to treat and discharge at the BPT limitations because of the expense to install BPT, i.e., ion exchange, ammonia stripping, lime precipitation, barium chloride coprecipitation, and settling. Therefore, the pollutants detected in the

uranium mill subpart are uniquely related to one point source, the single discharging mill, and the uranium mill subpart is excluded from BAT under the provision. However, as discussed in section XI of this preamble, NSPS is proposed at zero discharge.

The limitations in this regulation have been developed to apply to the general case for this industry category. In specific cases, the NPDES permitting authority may have to establish permit limits on toxic pollutants that are not subject to limitations in this regulation (see Section XVII of this preamble).

(B) Regulated Pollutants

The basis on which the controlled pollutants were selected is set out in Section VII of the development document.

(1) *BAT and NSPS.* Five toxic pollutants found in the ore mining and dressing wastewaters are controlled, except when excluded by criteria described in subsection (A) above. BAT limitations and NSPS are being established for cadmium, copper, lead, mercury, and zinc in particular subcategories and subparts.

In addition to the control of toxics, nonconventional pollutants which were regulated under BPT are being controlled in BAT. Effluent limitations are being established for: radium 226 (total and dissolved), uranium, aluminum, and iron (total and dissolved) in the same subcategories and subparts where these pollutants were regulated in BPT.

Pollutants are subject to limitations expressed in milligrams per liter or milliliters per liter for settleable solids. The rationale for the development of concentration-based limitations instead of those based on mass loadings is presented in Section III.

Pollutants that were regulated under BPT and have the same requirements under BAT include the toxic metals and the nonconventional pollutants: radium 226 (total and dissolved), uranium, aluminum, and iron (total and dissolved).

(2) *BCT.* Specific effluent limitations based on BPT are being established for TSS and pH. TSS is also used to control the toxic pollutant asbestos (chrysotile). "Asbestiform fibers" are evident in discharges from ore mining and milling facilities, and chrysotile asbestos was detected in wastewaters in all subcategories and subparts. The difficulty and high cost of analyses for asbestos (chrysotile) found in ore mining and dressing wastewaters has prompted EPA to propose an alternative method of regulation. The BPT and proposed BCT

effluent limitations on TSS, discussed in Section X of this notice, will also control asbestos. The data available to EPA show that the reduction of TSS results in a concomitant reduction in asbestos (chrysotile) to levels that the Agency believes are approximately equal to natural background levels. The Agency believes the limitations on TSS will reduce the difficulty, high cost, and delays of pollutant monitoring and analyses that result if compliance monitoring is based on specific effluent limitations on asbestos (chrysotile). EPA estimates that the indirect regulation by TSS rather than direct regulation of asbestos will save each facility between \$3,000 and \$11,000 annually in monitoring and analysis costs.

In the initial review of the draft technical documents supporting the regulation (see Section XVIII of this preamble), EPA received comments on whether chrysotile asbestos was actually present in some facilities discharges from this industry. If a facility wants to determine whether it is discharging asbestos, the mine or mill operator may monitor for chrysotile asbestos with the limitation of a daily maximum not to exceed 1×10^6 fibers/liter to confirm the absence of asbestos above natural background levels.

IX. BAT Effluent Limitations

The factors considered in assessing BAT include the age of equipment and facilities involved, the process employed, process changes, non-water quality environmental impacts (including energy requirements), and the costs of applying such technology. (Section 304(b)(2)(B)) In general, the BAT level represents the best economically achievable performance of plants of various ages, sizes, processes, or other shared characteristics. Where existing performance is uniformly inadequate in a particular subcategory, BAT may be transferred from a different subcategory or category. BAT may include process changes or internal controls, even when not common industry practice.

The statutory assessment of BAT considers costs but does not require a balancing of costs against effluent reduction benefits. See *Weyerhaeuser v. Costle*, 590 F. 2d 1011 (D.C. Cir. 1978). Nevertheless, in developing the proposed BAT effluent limitations EPA has given substantial weight to the reasonableness of costs. The Agency has considered the volume and nature of discharges, the volume and nature of discharges expected after application of BAT, the general environmental effects of the pollutants, the technical feasibility of implementing the

technology, and the costs and economic impacts of the required pollution control levels.

(A) BAT Options for Reduction of Toxic Metal Pollutants

The options considered for BAT are essentially all "add-on" treatment technologies and would be used after treating wastewater in BPT systems (see Section VI (a)).

A study was performed to evaluate the relation of toxic metals to TSS reduction when candidate BAT technologies were applied to ore mining and dressing wastewater (see Section VII of the development document). EPA determined that removing the toxic metals to be regulated is directly correlated to the removal of TSS. Therefore, suspended solids removal technologies can also be used to remove the toxic metals in this industry. These technologies are discussed as options for all subcategories and subparts. (For a discussion of the individual treatment technologies, see Section VI of this preamble.)

Option 1: Secondary Settling. Another settling pond is added in series with any existing ponds required for BPT. EPA estimates that no mines/mills would close as a result of adopting Option 1.

Option 2: Coagulation/Flocculation. Chemical coagulating/flocculating aids are added followed by mixing and settling. EPA estimates that no mines/mills would close as a result of adopting Option 2.

Option 3: Granular Media Filtration. Granular media, such as sand and anthracite coal, are used to filter out the suspended solids and associated toxic metals. EPA estimates that no mines/mills will close as a result of adopting Option 3.

Option 4: Zero Discharge/Complete Recycle. Mill process water is completely recycled and reused (not once-through mine water used as mill process water). This option was analyzed only for the uranium subcategory. EPA recognizes that some treatment of process water may be required before reuse in the process. EPA estimates that one mine/mill employing 160 persons might close as a result of adopting Option 4. This option was considered for froth-flotation mills, but was rejected for technical reasons because of the potential changes in some of the existing metallurgical processes. Therefore, no economic analysis was conducted for existing froth-flotation mills required to go to zero discharge.

Option 5: BAT Equals BPT. In-place BPT is used. This option is viable if (1) the candidate BAT treatment

technologies do not appreciably reduce the levels of toxics below levels in BPT, (2) the levels measured were at or below detection levels, (3) the amount and toxicity of the pollutant does not require further control, or (4) BPT specified no discharge.

(b) *BAT Selection and Decision Criteria Subcategories and Subparts Under Option 5.* Option 5 BAT equals BPT, has been selected for iron ore mills in the Mesabi Range; copper, lead, zinc, silver, gold, platinum and molybdenum, mines and mills that use leach to recover copper, mills that use the cyanidation process to recover gold; and mercury mills, since BPT specified zero discharge of process wastewater. Therefore, no additional reduction of toxic pollutants is possible under BAT for these subparts.

Since the application of candidate BAT did not reduce the levels of the toxic pollutants, this option has also been selected for iron ore mine drainage and mill process water (not in the Mesabi Range), aluminum ore mine drainage (there are no mills), titanium ore mine drainage, mills, and dredges, and mercury ore mine drainage. The concentration levels of toxic metals found in effluents from these subcategories and subparts are at or near detection levels or are found at concentrations below the practical limits of additional technology. Consequently, further reduction of these parameters is not technically or economically justified.

However, BPT controlled certain nonconventional pollutants in these subcategories and subparts, including iron and aluminum. BAT for these subcategories and subparts will control these nonconventional pollutants at BPT levels.

Subcategories and Subparts Under Option 4. Option 4, no discharge, was considered for process wastewater emanating from uranium mills. Of the 19 operating mills, 18 now achieve zero discharge of process wastewater. The Agency believes that uranium mills should be excluded from BAT regulation under paragraph 8 of the Consent Decree (as discussed in Section VIII of this notice).

Subcategories and Subparts Under Option 1. Option 1, secondary settling was considered for copper, lead, zinc, gold, silver, platinum, and molybdenum mine drainage and mill wastewater from froth flotation process, titanium ore mills, and tungsten mine drainage and mill wastewater, but was not chosen.

The effluent limitations considered under this option were derived by the following method: eighteen facilities

throughout the ore mining and dressing industry were identified as using multiple settling ponds; fourteen facilities using coagulation and flocculation; and one facility using granular media filtration. The entire BAT and BPT data base was searched and screened to obtain 17 facilities with data. Of these 17 facilities, 7 were eliminated because the Agency believed that they were not operated properly (e.g., observed short circuiting in the settling ponds) or no raw wastewater data was available to compare with treated effluent.

The facility mean values were ranked for each pollutant from largest to smallest. Since each facility used only one of the candidate BAT treatment technologies, the facility mean also represents a treatment technology mean value. When examining the ranked mean values, EPA observed that mean values for secondary settling were both smaller and larger than those for flocculation and granular media filtration. This variation indicates that the differences between facilities are greater than the differences between treatment technologies. Possibly, differences exist between the true performance capabilities of the treatment technology; however, on the basis of available data, the Agency is unable to discern such differences.

The 10 facilities were then further reduced to six by eliminating facilities whose raw waste contained low pollutant concentrations. Data for a particular pollutant was excluded if the median raw wastewater concentration was less than the average facility effluent concentration of any other facility. Of the six facilities, 5 use secondary settling and one uses granular media filtration. Since the Agency was unable to discern any true difference in the levels achievable by the three technologies (based on available data), it selected the least costly alternative for establishing effluent limitations, secondary settling.

Effluent limitations were derived by using the average of the facility averages for each pollutant to represent the average discharge. The statistical analysis used data from the five facilities using secondary settling (two copper, two lead/zinc, and one silver) that remained following the screening procedures described above. Most of the data were supplied by the industry.

The method used to derive the limitations assumed that within plant effluent concentrations are log normally distributed. The 30-day average maximum and daily maximum effluent limits were determined on the basis of 99-percent percentile estimates. The 30-

day limits were determined on the central limit theorem. (Further explanation is provided in Section X of the development document). The limitations derived from the data analysis for some metals in the subcategories were more stringent than the BPT limitations.

However, because 95 percent of the relevant pollutants are removed by BPT and because of the unique nature of the ore mining industry effluent and other factors, the Agency has determined that nationally applicable regulations based on secondary settling are not warranted. (See section X of the development document.)

Where site specific considerations, including the pH of the receiving stream, so indicate, individual permit writers may impose more stringent limitations.

Control of Asbestos (Chrysotile).

Direct regulation and indirect regulation through control of TSS were considered for asbestos. The analytical method used to determine the concentration of asbestos is not an approved EPA method and though the method is the most viable one available, there are serious concerns as to its precision and accuracy.

Asbestos (chrysotile) is controlled in BAT by the BPT and BCT effluent limitations on TSS. Individual mines or mills may monitor for asbestos (chrysotile) using the analytical method as defined in Supplement B of the technical development document should they wish to establish that their effluent asbestos (chrysotile) level is less than 1×10^6 fibers per liter.

Regulation of Gold Placer Mines.

Gold placer mines were not regulated under BPT because of insufficient data. The data gathering effort for this rulemaking included two separate studies of existing gold placer mines in Alaska. These studies support effluent limitations on settleable solids as the appropriate and most viable control of pollutants in the wastewater discharges from gold placer mines. However, the actual effluent quality data from existing settling ponds associated with gold placer mines is limited because many mines do not operate settling ponds and many of the remaining mines settling ponds are undersized, filled with sediment, or short circuited. The data from well constructed, operated, and maintained settling ponds is limited to demonstration projects and a few existing settling ponds which may not be truly representative of gold placer mining operations.

Moreover, no economic analysis was performed for the gold placer mining subpart because no data are available,

although several requests for data have been made to that industry.

In the absence of more information regarding the environmental benefits and economic impact of regulating gold placer mines, the placer mining subpart of the copper, lead, zinc, silver, gold, platinum and molybdenum subcategory is reserved in this rulemaking while the Agency solicits additional information on which to base a decision.

X. BCT Effluent Limitations

The 1977 Amendments added Section 304(b)(4) to the Act, establishing BCT for discharges of conventional pollutants from existing industrial point sources. Conventional pollutants are those defined in Section 304(b)(4)—BOD, TSS, fecal coliform, and pH—and any additional pollutants defined by the Administrator as "conventional." On July 30, 1978, EPA designated oil and grease as conventional pollutants (see 44 FR 44501).

On July 28, 1981, the Fourth Circuit Court of Appeals remanded the regulations establishing the "best conventional technology" (BCT) methodology and directed EPA to conduct an additional cost-effectiveness test and to correct data errors. *American Paper Institute v. EPA*, No. 79-1511. While EPA has not yet promulgated a new BCT methodology, EPA is proposing BCT Limitations for the ore mining and dressing industry. These limits are identical to those for BPT. Since BPT is the minimal level of control required by law, no possible reassessment of BCT pursuant to the Court's remand could result in BCT limitations lower than those proposed today. Accordingly, there is no reason to wait until EPA revises the BCT methodology before proposing these BCT limitations.

XI. New Source Performance Standards (NRSPS)

The basis for new source performance standards (NSPS) under Section 306 of the Act is the application of the best available demonstrated technology (BADT). New facilities have the opportunity to implement the best and most efficient ore mining and milling processes and wastewater technologies. Accordingly, Congress directed EPA to consider the best demonstrated process changes and end-of-pipe treatment technologies capable of reducing pollution to the maximum extent feasible through a standard of performance which includes, "where practicable, a standard permitting no discharge of pollutants."

(A) NSPS Options

(1) Option 1: Require achievement of performance standards in each subcategory that are based on the same technology proposed for BAT.

(2) Option 2: Require standards that are based on a complete water recycle system (no discharge of pollutants).

(B) NSPS Selection and Decision Criteria Subcategories and Subparts Under Option 1

This proposed rulemaking requires that all facilities in the ore mining and dressing industry achieve performance standards based on the same technology proposed for BAT, except those facilities using froth flotation in the copper, lead, zinc, gold, silver, platinum, and molybdenum subcategory and mills in the uranium subcategory. Option 1 has been selected for iron ore mills in the Mesabi range; copper, lead, zinc, silver, gold, platinum, and molybdenum mills that use leaching to recover copper and the cyanidation process for the recovery of gold; and mercury mills since BAT specifies zero discharge. Option 1 has also been selected for iron ore mine drainage, iron ore mills, aluminum mine drainage, copper, lead, zinc, gold, silver, platinum, and molybdenum mine drainage, titanium mine drainage, dredges and mills, and mercury mine drainage. The concentration levels of toxic metals found in new sources in these subcategories and subparts are expected to be similar to existing sources. Since concentrations of some toxic metals were found at or near detection levels or at concentrations below the practical limits of additional technology, further reduction of these parameters would not be technically or economically justified.

Subcategories and Subparts Under Option 2

The Agency proposes that new source copper, lead, zinc, gold, silver, platinum, and molybdenum mills that use froth flotation achieve zero discharge of process wastewater.

For this subpart, EPA considered zero discharge based on recycle for BAT, but rejected it because of the extensive retrofit required at some existing facilities, the cost of retrofitting, and the possible changes required in the process. This concern does not apply to new sources. Recycle, if required to achieve zero discharge, is a demonstrated technology and meets the definition of standard of performance permitting zero discharge of pollutants. New sources have the option to recycle because the metallurgical processes can be adjusted and designed to recycle

process wastewater before the actual construction of the new source. While reagent buildup has been mentioned by industry as a potential problem in extractive metallurgy, no evidence has been submitted to validate this assertion. The Agency will entertain any specific comments containing actual data which may validate the assertion.

The Agency proposes that new source uranium mills achieve zero discharge of process wastewater. For this subpart, EPA considered zero discharge for BAT based on total impoundment and evaporation or recycle and reuse of the mill process water or a combination of these technologies. Because the pollutants detected in the current discharge from this subpart are uniquely related to one point source, the single mill discharging, the uranium mill subpart is excluded from BAT (see section VIII of this preamble).

However, the Agency believes that for new sources a standard of performance must be proposed. Otherwise additional discharges (new sources) could occur that obviously would not be unique to one source. New source mills are anticipated by the Agency and these mills can achieve zero discharge as indicated by the fact that 18 of 19 mills currently achieve no discharge.

EPA estimates that the cost to implement zero discharge for new sources would approximate the cost to implement the technology identified as BPT for the two subparts, therefore, the zero discharge requirement should not impede construction of new facilities. (See section IX of the development document).

XII. Best Management Practices

As described in sections I and II, section 304(e) of the Act authorizes the Administrator to publish regulations to control discharges of significant amounts of toxic pollutants under section 307 or hazardous substances under section 311 to avoid activities that the Administrator determines are associated with or ancillary to industrial manufacturing or treatment process.

Section 402(a)(1) of the Act allows the Administrator to prescribe conditions in a permit determined necessary to carry out the provisions of the Act. BMPs are one such condition. The discharges to be controlled by BMPs are plant site runoff, spillage or leaks, sludge or waste disposal and drainage from raw material storage.

EPA intends to develop BMPs that are (1) applicable to all industrial sites; (2) applicable to a designated industrial category, or (3) capable of guiding permit authorities in establishing BMPs

required by unique circumstances of a given plant.

The ore mining and dressing industry has numerous problem areas, including storm water runoff, groundwater infiltration, and seepage. Section XIII of the development document addresses possible BMP approaches and can guide the permitting agency in developing case-by-case BMP requirements for NPDES permits. The following paragraphs contain a brief description of some possible BMP approaches.

Minimizing the volume of water contaminated in a mine is desirable because the mass of pollutants to be treated is less. Diversion of water around a mine site to prevent its contact with possible pollution-forming materials is an effective and widely applied control technique. For example, settling ponds should be designed with adequate drainage and storm water diversion around the pond.

Regrading or recontouring of some types of surface mines, and surface waste piles can be used to modify surface runoff, decrease erosion, and prevent infiltration of water into the mine area.

Mine-sealing techniques are more frequently applied to inactive or abandoned mines. Internal sealing by placing barriers within an underground mine can be used in an active mine. However, this practice must be applied with caution. The barriers must be carefully designed so as to prevent inundation of the working areas.

Most of the metal-ore mines examined in this report practice some measure of mine drainage control, including regulated pumping of mine drainages and the use of mine drainage as intake mill process water. Use of mine water as makeup water in mill circuits is a desirable management practice and is widely implemented in this industry.

In some situations, operators must prevent or control seepage of toxic substances into groundwater supplies. Prevention of seepage from impoundment systems can be achieved by the use of liners. Pond liners fall into two general categories: natural (clay or treated clay) and synthetic (commonly polyvinyl chloride (PVC), polyethylene (PE), chlorinated polyethylene (CPE), or Hypalon). Other materials that can be used as pond liners are compacted earth, waste tailings, concrete, shotcrete, rock or brick. See section VIII of the Development Document.

XIII. Variances and Modifications

After the final regulations are promulgated, the effluent limitations must be incorporated in all new or

renewed NPDES permits issued to direct dischargers in this industrial category, and also in those permits that have been issued with a reopener clause.

The BAT, BPT and BCT effluent limitations are subject to EPA's "fundamentally different factors" variance. See *E. I. du Pont de Nemours and Co. v. Train*, 430 U.S. 1112 (1977); *EPA v. National Crushed Stone Association*, 101 S. Ct. 295 (1980) *Weyerhaeuser Co. v. Costle*, supra. This variance recognizes factors concerning a particular discharger that are fundamentally different from the factors considered in this rulemaking. Although this variance clause was set forth in EPA's 1973-1976 industry regulations, it will now be included only by reference in the ore mining and dressing and other industry regulations. (See 40 CFR 125.30-.32, for the text and explanation of the "fundamentally different factors" variance.)

In addition, BAT limitations for nonconventional pollutants are subject to modifications under sections 301(c) and 301(g) of the Act. These statutory modifications do not apply to toxic or conventional pollutants. According to section 301(j)(1)(B), applications for these modifications must be filed within 270 days after promulgation of final effluent limitations guidelines. (See 43 FR 40859 September 13, 1978).

NSPS is not subject to modification through EPA's "fundamentally different factors" variance or any statutory or regulatory modifications. (See *du Pont vs. Train*, supra).

After reviewing MSHA and Army Corps of Engineers regulations, design guidelines, and holding discussions with representatives of the appropriate Federal regulatory agencies (Department of Labor, Department of Interior, Department of Defense), EPA is confident that the impoundment facilities needed to comply with the regulations proposed in this notice are reasonable, and that no additional danger will result from their implementation. If evidence is submitted to the Agency that indicates that facilities would have to construct a structure which would violate safety standards set out by a State or Federal agency, EPA will consider granting a variance. The Agency does not expect the construction of impoundment facilities would result in violation of State or Federal safety standards. However, if an operation submits to the permitting authority evidence to the contrary, a variance from the national effluent limitations may be considered through the "fundamentally different factors" variance. Under no circumstances will an owner or operator

be required to violate applicable safety standards to meet these requirements. If more than isolated instances occur, EPA will consider amending this regulation. However, the State and Federal authorities with whom EPA has consulted on this matter uniformly have concluded that safety issues should arise infrequently, if at all.

XIV. Upset and Bypass Provisions

An issue of recurrent concern has been whether industry guidelines should include provisions authorizing noncompliance with effluent limitations during periods of "upset" or "bypass." An upset, sometimes called an "excursion," is unintentional noncompliance occurring for reasons beyond the reasonable control of the permittee. Some argue that an upset provision in EPA's effluent limitations guidelines is necessary because such upsets will inevitably occur because of the limitations, even in properly operated control equipment. Because technology-based limitations require only what technology can achieve, some claim that liability for such situations is improper. When confronted with this issue, courts have disagreed on the question of whether an explicit upset or excursion exemption is necessary, or whether upset or excursion incidents may be handled through EPA's exercise of enforcement discretion.

While an upset is an unintentional episode during which effluent limits are exceeded, a bypass is an act of intentional noncompliance during which waste treatment facilities are circumvented in emergency situations. Bypass provisions have in the past been included in NPDES permits.

EPA has determined that both explicit upset and bypass provisions should be included in NPDES permits and has promulgated NPDES regulations that include upset and bypass permit provisions (see 45 FR 33448, 122.60 (g) and (h) (May 19, 1980)). The upset provision establishes an upset as an affirmative defense if an operation is prosecuted for violating a technology-based effluent limitation. The bypass provision authorizes bypassing to prevent loss of life, personal injury, or severe property damage.

The Agency has received several inquiries on the relation between the general upset and bypass provisions set forth in the consolidated permit regulations and the storm exemption contained in the BPT regulations for ore mining and dressing. The storm exemption discussed in Section VII of this preamble supersedes the generic upset and bypass provisions with respect to precipitation events; that is,

an operator wishing to obtain relief from BAT limitations and NSPS during precipitation events must comply with the prerequisites of the rainfall exemption provision. However, the upset and bypass provisions are available in all other applicable situations.

XV. Non-Water-Quality Aspects of Pollution Control

The elimination or reduction of one form of pollution may aggravate other environmental problems. Therefore, section 304(b) and 306 of the Act require EPA to consider the non-water-quality environmental impacts (including energy requirements) of certain regulations. In compliance with these provisions, EPA has considered the effect of these regulations on air pollution, solid waste generation, land requirements, and energy consumption. This proposal was circulated to and reviewed by EPA personnel responsible for non-water-quality environmental programs. While balancing pollution problems against each other and against energy use is difficult, EPA is proposing a regulation that it believes best serves competing national goals.

The following are the non-water-quality environmental impacts associated with proposed regulation.

Air Pollution

Imposition of BAT and BCT limitations and NSPS will not create any additional air pollution problems.

Solid Waste Generation

Some of the solid waste production associated with the ore mining and dressing industry is generated by treatment systems installed primarily to treat wastewater. For subcategories in which the Agency has concluded that BAT limitations are equal to those under BPT, BAT standards add no additional solid waste. In those subparts for which NSPS is more stringent than BPT, the increase in solid waste generated should not be greater than one percent.

In addition, section 7 of the Solid Waste Disposal Act Amendments of 1980 has exempted under Subtitle C of the RCRA solid waste from the extraction, beneficiation, and processing of ores and minerals. This exemption will remain in effect until at least six months after the Administrator submits a study on the adverse environmental effects of solid waste from mining. The study is required to be submitted by October 21, 1983 (see 42 U.S.C. 6982).

Land Requirements

As a general rule, imposition of BAT, BCT, and NSPS standards is not expected to create any significant adverse impacts on land requirements beyond those associated with BPT standards.

Energy Consumption

Achievement of BAT and BCT limitations and NSPS will not result in a significant net increase in energy requirements. The main use of energy is for pumping, mixing, and control instrumentation. Wherever feasible, gravity flow is used in treatment facilities for mine drainage and mill process wastewater.

XVI. Costs And Economic Impact

Executive Order 12291 requires that EPA and other agencies perform Regulatory Impact Analyses of major regulations. The three conditions that determine whether a regulation is classified as major are:

- An annual effect on the economy of \$100 million or more or;
- A major increase in costs or prices for consumers, individual industries, federal, state, or local government agencies, or geographic regions; or
- Significant adverse effects on competition, employment, investment productivity, innovation, or on the ability of United States based enterprises to compete with foreign based enterprises in domestic or export markets.

EPA estimates that compliance with these regulations (BAT, BCT, NSPS) for all subcategories will impose no additional cost burden on industry.

EPA believes that this regulation will have no impact on prices and no significant effects on competition, employment, investment, productivity, innovation or the balance of payments. Therefore, EPA believes that this does not constitute a major regulation.

Nonetheless EPA conducted a detailed economic impact analysis on all portions of the industry except small tungsten mines and mills and gold placer mines. This analysis was conducted using financial data supplied by industry on a confidential basis. The analysis used discounted cash flow techniques to estimate a net present value for each facility. Only one uranium mill was projected to close with the application of any of the technologies under consideration. Because this rule imposes no significant cost and therefore no economic impact on any portion of the industry included in the economic analysis, and because of concerns about the sensitive nature of

the confidential information supplied by industry, EPA is not publishing this analyses.

Regulatory Flexibility Analysis: Pub. L. 96-354 requires that EPA prepare an Initial Regulatory Flexibility Analysis for all proposed regulations that have a significant impact on a substantial number of small entities. This analysis must:

- Describe the reasons, objectives, and legal basis for the proposed rule;
- Describe, and where feasible, estimate the number of small entities affected by the proposed rule;
- Describe the reporting, recordkeeping, and other compliance requirements;
- Identify any Federal rules that may duplicate, overlap, or conflict with the proposed rule;
- Describe any significant alternatives that would accomplish the stated objectives, and summarize any significant economic impacts of the proposed rules on small entities.

Many of the provisions of the Initial Regulatory Flexibility Analysis have been addressed in detail in other sections of this preamble. Sections I, IIA, and III discuss the legal authority and objectives of the proposed rules. Sections XVIII and XIX discuss the public participation procedures. Section XVII discusses the reporting requirements. The Agency is not aware of any other Federal rules that may overlap or conflict with this proposed rule.

Therefore there can be no significant impact on a substantial number of small entities.

RCRA Costs

On May 19, 1980, EPA promulgated Interim Status Standards (ISS) for handling and disposal of hazardous wastes under the Resource Conservation and Recovery Act (RCRA) (see 45 FR 33066). As a part of assessing the economic impact of the BAT and BCT limitations and NSPS on an industry, EPA includes the cost of waste disposal based on current practices that may not comply with the RCRA-ISS. Solid waste from the extraction, beneficiation, and processing of ores is now excluded from regulation under Subtitle C of RCRA. Such waste may not be regulated under Subtitle C until at least six months after the Administrator submits a study on the adverse effects of solid wastes from mining. The study must be submitted by October 21, 1983 (see 42 U.S.C. 6982). To predict what regulations, if any, may be applied to the ore mining industry under RCRA Subtitle C is not possible. Therefore, the Agency has not projected any costs for

RCRA ISS compliance in its economic impact analysis.

XVII. Relation to NPDES Permits

The BAT and BCT limitations and NSPS in this regulation will be applied to individual ore mines and mills through NPDES permits issued by EPA or approved State agencies, under section 401 of the Act. Immediately after promulgation of final regulations, the effluent limitations must be incorporated in all Federal NPDES permits issued to ore mining and dressing direct dischargers. Permits issued by States with NPDES authority must have limitations as stringent as those proposed in this regulation. However, State-issued NPDES permits may contain, as determined by each State permit issuing authority, limitations that are more stringent than those proposed today.

If this regulation does not control a particular pollutant, the permit issuer is not precluded from limiting such a pollutant on a case-by-case basis when necessary to carry out the purposes of the Act. In addition, to the extent that State water quality standards or other provisions of State or Federal law require limitation of pollutants not covered by this regulation (or require more stringent limitations on covered pollutants), such limitations can be applied by the permit-issuing authority.

With respect to monitoring requirements, the Agency intends to establish a regulation requiring permittees to conduct additional monitoring when they violate permit limitations. The provisions of such monitoring requirements will be specific for each permittee and may include analysis for some or all of the toxic pollutants or the use of biomonitoring techniques. The additional monitoring is designed to determine the cause of the violation, necessary corrective measures, and the identity and quantity of toxic pollutants discharged. The permit-issuing authority will evaluate each violation on a case-by-case basis. (For more discussion of this requirement, see 45 FR 33290 (May 19, 1980)).

One additional topic that warrants discussion is the operation of EPA's NPDES enforcement program, many aspects of which have been considered in developing this regulation. 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 this discretion in a manner that recognizes and promotes good faith compliance

efforts and conserves enforcement resources for those who fail to make good faith efforts to comply with the Act.

XVIII. Summary of Public Participation

Before publication of this notice, EPA distributed a contractor's draft technical document to Federal agencies, all State and territorial pollution control agencies, industry trade associations (including the American Mining Congress and American Iron Ore Association), and conservation organizations, including the Natural Resources Defense Council. Comments on that report were solicited. The major comments and the Agency's responses are set forth below.

The following groups responded to the request for written comments contained in the letter of transmittal sent along with the contractor's draft technical document: American Mining Congress, Bunker Hill Company, Natural Resources Defense Council, Inc., Prather, Seeger, Doolittle, and Farmer, St. Joe Minerals Corporation, Trustees for Alaska, U.S. Department of Interior—Bureau of Mines, U.S. Department of Labor, USEPA—Environmental Research Laboratory (Athens, GA), Walter C. McCrone Associates, Inc., White Pine Copper Division.

Comment: One commenter expressed concern that the 1976 costs presented in the contractors draft were outdated and did not reflect variability on a regional basis. One commenter stated that the cost assumptions and factors used were not documented properly and further, that the treatment costs could not be evaluated because the parameters and levels chosen for regulation were not known. One commenter stated that monitoring costs should be further supported and another stated that waste disposal costs might be too low if the wastes were defined under RCRA as "hazardous."

Response: At the time the contractor's draft was forwarded for comment, the Agency was revising costs to reflect a December 1979 data base. Each facility's potential treatment costs were evaluated several options for control and treatment. These updated and revised costs are summarized in the development document which outlines the technical analysis used to develop this proposed rulemaking. These updated facility-by-facility costs were used by the economic assessment contractor. Actual costs for reagents, energy, land, waste disposal, chemical analysis, etc. were solicited from the industry, and factors were used that represented the reported range of costs

incurred in 1979 dollars. Although the entire cost calculations for each facility were not presented in the contractor's report, the system definitions, cost factors and assumptions used, and references sources were included. In this way, a comparison of an individual facility's costs to those stated could be made. At the time the contractor's draft was prepared, the Agency had not selected parameters to be regulated or effluent limitations. However, potential technologies for implementing BAT were identified in the contractor's draft. These treatment technologies were sized and costed on the basis of typical (or range of) flow rates encountered and influent expected from BPT treatment systems.

With respect to solid wastes resulting from mining activities and associated treatment, EPA had not issued any standards or guidelines against which solid waste disposal costs could be compared when the draft was issued. Of importance now is that at present, solid waste from the extraction, beneficiation, and processing of ores and minerals is excluded from regulation under Subtitle C of RCRA (see 42 U.S.C. 6921(b)(3)(A)(ii); 45 FR 76618 (November 19, 1980) and Section XVI of this preamble).

Comment: A number of commenters expressed concern about the analytical and sampling procedures used during the screening and verification phases of the study. Some commented that grab or short-term composite samples do not properly assess the impact of seasonal or annual variations. One commenter stated that the reliability of cyanide analysis is questionable. One commenter stated that no health basis exists for removing asbestiform fibers from water, therefore there is no reason to regulate asbestos, and also, that the definition of asbestos is confusing.

Response: The analytical methods and procedures used during screening and verification—including collection and transportation of samples—are outlined in Appendix III of *Sampling and Analysis Procedures for Screening of Industrial Effluents for Priority Pollutants* (USEPA-EMSL). The analytical procedures and sampling methods used are also outlined in the development document which accompanies this rulemaking and are summarized in Section IV(a) of this preamble. In addition, the Effluent Guidelines Division has sponsored numerous technical seminars during the past three years to which industry representatives, technical contractors, EPA laboratory personnel, and interested persons were invited. Problems with analytical procedure,

data variability, suggestions for improvement, and results obtained were discussed at each of these meetings. EPA does not rely on one-time sampling as its data base for pollutants that it chooses to regulate. Rather, the data obtained during screening and verification are supplemented by long-term monitoring data, NPDES monitoring reports, company data, pilot scale studies, and data available from other studies.

With respect to cyanide analysis, EPA recognized the variability of results being obtained by commercial and industrial laboratories and commissioned an in-depth review of the analytical method and results obtained as discussed in Section IX of this preamble. The guidelines proposed here reflect the results of that in-depth study.

"Asbestos" was not defined in the EPA-NRDC Consent Decree, and consequently EPA had to develop a working definition for this pollutant. The Agency had to choose a particular mineral form of asbestos from the many varieties so that screening could be performed. The Agency chose chrysotile because of: (1) its known toxicity as the result of respiration of the particles; (2) its industrial prevalence (over 90 percent of all commercial asbestos is chrysotile); (3) its distinctive selected area diffraction pattern. Asbestos was included in the Agency's review of BAT because the Act requires the Agency to limit the discharge of pollutants identified as toxic unless the pollutant can be excluded by the criteria discussed in Section VIII of this notice.

Comment: In various places in the draft technical document, detection levels for particular pollutants are reported at different levels.

Response: The data presented reflect the actual data reported from different laboratories or the detection levels obtained by the laboratories at the time of analysis. Slight differences may occur with analytical instrumentation from day to day or week to week, thus accounting for these differing values reported as "less than."

Comment: One commenter stated that improvements in ore processing technology were overlooked in the document and cited those technologies. The commenter stated that no wastewater samples were obtained from Arizona copper producers. In addition, the commenter stated that improvements in uranium processing technology were also overlooked in the development document.

Response: The "new" process technology cited by the commenter is described in the development document

supporting this proposed regulation and is taken into account in selecting BAT. In any event, the subpart in which the facilities are classified is subject to zero discharge requirements under the BPT guidelines. No wastewater samples were or could be obtained from Arizona copper operations achieving zero discharge. Similarly, the uranium processing technology is noted in the development document. Uranium mills would be subject to zero discharge under NSPS.

Comment: One commenter stated that the industry data base (Section III of the draft technical document) should be updated, since some of the data are from 1976.

Response: Much of the data in the contractor's draft are from 1976; some are also as recent as 1977, 1978, and 1979. Much of the data on the industry had to be gathered from individual companies under Section 308 authority and was not submitted voluntarily. In addition, industry-wide statistics had not been issued at that time. For example, recently the U.S. Government Printing Office released the 1977 *Minerals Yearbook*. A continuous effort to update the development document and the industry profile has been made and, to the degree that Agency resources permit, will be made as information becomes available to the Agency.

Comment: Two commenters stated that closer consideration should be given to recycling mine water rather than treatment and discharge. One commenter was particularly concerned about recycling process water at gold placer mining operations as an option.

Response: There are few uses of water in underground or open pit mining. Mine water can usually be "reused" in limited amounts for dust control, drilling fluid, cooling or sluicing of sand backfill. Mine water must be removed from mines so that ore extraction may be carried on and for safety considerations. Therefore, recycle of water back into a mine, except for small volumes, is impractical. At many facilities, mine water is "reused" as mill process water or makeup water. This regulation encourages such practice. In such cases, the wastewater is subject to mill limitations as discussed in Section VII(B) of this preamble.

A few placer mines may be able to recycle water for use in sluicing sediments containing minerals to be extracted. However, for gold placer deposits in rural areas of Alaska, electric power is not available to run recycle pumps, and the costs and energy requirements are prohibitive.

Comment: One commenter claimed that the control of mine wastewater was

not adequately addressed in the draft document.

Response: The entire mining portion of the industry is profiled in the development document supporting this regulation with data presented on flow, production, status, product, type of mine, etc. The tables in the development document summarize the data gathered as part of the industry data base. Detailed data for cost estimates are summarized in the cost section of the report. In addition, at every mine visited that had wastewater flow, EPA performed separate sampling and characterization. These data were then evaluated with historical data on mine water. Mining and milling operations are often located together, and discharges are commingled and treated in a common treatment system. The most important factor considered with respect to mine water is whether any differences were noted that would significantly affect the quality of wastewater discharged after BAT treatment. The regulation proposed here lists separate limitations for mine and mill wastewater.

Comment: One commenter expressed concern about disposal of hazardous waste at uranium facilities.

Response: The standards proposed under NSPS will result in zero discharge of process water for new uranium mills. For the mines, no additional total suspended solids are removed compared with the volumes that are removed under BPT limitations.

Comment: One commenter charged that the EPA method of asbestos analysis was faulty because it required extensive dilution of raw wastewater samples and that no attempts were made to identify through mineralogy whether serpentine (chrysotile) was present. In the commenters opinion, asbestos determinations from samples with the high solids concentrations typical in this industry are not quantitative.

Response: While extensive dilution of "raw" wastewater samples is often necessary, extensive dilution is not normally required for samples of treated wastewater that achieve the BPT total suspended solids daily limitation of 30 mg/l. Since effluent level(s) are of primary interest in this BAT rulemaking, the analytical method is considered adequate to evaluate whether substantial discharges of this parameter exist. A detailed determination of the presence of asbestiform fibers in the ore itself would be time-consuming and expensive. The Agency undertook this study in the same manner as it screened other parameters. Many sources other than the ore itself which may contribute

small "asbestos" fibers to the wastewater, including cement-asbestos pipe, spray-on or other types of insulation, seals or gaskets, etc. These sources are common in this industry.

Comment: Several commenters stated that guidelines for operations that combine mine, mill, smelter, and refinery wastewater should be developed on a case-by-case basis.

Response: The Agency considered this alternative and during the BAT investigation, EPA gathered additional data on three facilities that are known to have combined wastewater treatment that included smelter and/or refinery wastewater in addition to mine and/or mill wastewater. These facilities are: White Pine Copper Division, Copper Range Co., White Pine, Michigan; Kennecott Copper Corp., Utah Copper Division (treatment plant effluent only), Salt Lake City, Utah; and Bunker Hill Co., Kellogg, Idaho. A separate report has been prepared on each facility to be used as guidance documents by the regional permitting authority in issuing NPDES permits. In effect, each facility will be given effluent limitations that will take into account BAT mine and mill guidelines, smelter and refinery guidelines, treatability of waste streams, and any special circumstances that may result from the combining waste streams.

Comment: One commenter stated that pH values above 9.0 may be required to insure adequate removal of certain heavy metals.

Response: A pH above 9.0 may be necessary to achieve desired treatment levels for certain toxic metals at selected facilities. Subpart M of these regulations (General Provisions) allows a small excursion from an effluent value of pH from 6 to 9 to meet other limitations. In these cases, the pH of the final effluent may be under or over the range stipulated if evidence is submitted to the permitting authority demonstrating that this provision will not result in degradation of water quality in the receiving stream or toxic conditions for its biota.

Comment: One commenter stated that the report gave inadequate consideration to controlling the seepage that occurs at uranium mill tailing impoundments and other ore facilities (the commenter defined seepage as a point source discharge, but urged control of seepage as a BMP).

Response: EPA is aware that seepage from uranium tailings impoundments has posed serious threats to groundwater and, in some cases, may possibly affect surface waters. However, the Agency notes that the Uranium Mill

Tailings Radiation Control Act of 1978, as amended 42 U.S.C. 2021(o), 2022, 2113, 2114, 2201(x), 7901-7942 ("UMTRCA") provides comprehensive and direct authority to remedy this problem. UMTRCA establishes a program to (1) regulate mill tailings during uranium or thorium ore processing at active and inactive uranium mill operations, (2) stabilize and control tailings in a safe and environmentally sound manner, and (3) minimize or eliminate radiation health hazards to the public. Title I of UMTRCA establishes a remedial action program to clean up inactive uranium mill tailings sites, to be carried out by the Secretary of Energy (42 U.S.C. 7911-7925). Title II expands the authority of the Nuclear Regulatory Commission (NRC) to establish standards concerning uranium mill tailings in licenses issued under the Atomic Energy Act of 1954. Title II also directs the Administrator to promulgate, within one year after enactment, standards of general application for the protection of public health and safety and the environment from radiological and nonradiological hazards associated with inactive mill tailings sites (42 U.S.C. 2022(a)). These general standards would be the basis for the Secretary of Energy's remedial actions at individual inactive sites. The Administrator is also directed, within eighteen months after enactment, to establish general standards to protect the public health and safety and the environment from radiological and nonradiological hazards associated with the possession, transfer and disposal of "by-product material" (including uranium mill tailings) at active uranium mill sites (42 U.S.C. 2022(b)). These standards are to be implemented and enforced by the NRC and the States (42 U.S.C. 2022(d)).

EPA expects to propose general standards for inactive uranium sites within the next several months and for active sites within several months thereafter. These standards will, among other things, address the problems of seepage from uranium mill tailings impoundments.

Moreover, shortly after promulgation of UMTRCA, the NRC embarked on a rulemaking, partly in response to a petition filed by the Natural Resources Defense Council (NRDC), to address the potential environmental impacts of uranium mill tailings. On rules and a draft generic environmental impact statement, the NRC promulgated final regulations. 45 FR 65521 (amending 40 CFR Part 40). These regulations establish a number of technical criteria that operators of uranium mill tailings

facilities must meet. The regulations require measures "to reduce seepage of toxic materials into groundwater to the maximum extent reasonably achievable" 45 FR at 65534, 40 CFR Part 40, Appendix A. In addition, unpreventable seepage may not cause a deterioration of existing groundwater supplies "from their current or potential uses." (Id). The regulations state that several technologies should be considered in achieving these goals, including the installation of low permeability liners, maximum recycle, conservation of process water, dewatering of tailings and other measures. The NRC will ensure that these regulations remain compatible with the general standards to be promulgated by EPA under UMTRCA (45 FR 65530). In fact, the staffs of the two agencies have coordinated, and will continue to coordinate, their efforts in this area.

In any event, Congress has created through UMTRCA comprehensive approach to ameliorating the environmental impacts of uranium mill tailings disposal and has provided a vehicle for participation and coordination among Federal agencies with jurisdiction in this area. Accordingly, EPA believes it appropriate to continue to address the problem of seepage from uranium mill tailings impoundments through UMTRCA, rather than through the Clean Water Act.

Moreover, the Agency does not propose to regulate seepage from impoundments at ore mines and mills other than those extracting uranium. The extent to which such seepage adversely affects navigable waters (as opposed to groundwater) is highly problematic. Frequently, even when seepage reaches navigable waters, it does not constitute a point source discharge—a "discernible, confined and discrete conveyance"—and is therefore not subject to effluent limitations. In such cases, BMP's might be imposed under section 304(e) of the Act (see Section XII of this preamble). However, section 304(e) of the Act authorizes the promulgation of BMP's only when the Administrator finds them necessary to prevent "significant amounts" of toxic pollutants from reaching navigable waters on a national scale. At this time, the Agency does not possess information indicating that seepage from non-uranium tailings impoundments or lagoons contributes significant amounts of toxic pollutants to the navigable waters on a national scale. For these reasons, the Agency does not propose at this time to establish national

regulations covering seepage from settling ponds and tailings impoundments in this industry. Of course, permit writing authorities retain the authority under section 402(a)(1) of the Act to require control of seepage when necessary on a case-by-case basis.

Comment: One commenter argued that the effluent from a mine and a mill producing and processing ores with "high, and approximately equal, percentages of lead and zinc has a very different content from that of mines and mills processing ores with either a high lead or zinc content but not both." This commenter therefore urged that a separate subcategory be established for mines and mills whose ores have "high, and approximately equal, percentages of lead and zinc."

Response: After the promulgation of BPT regulations, and concurrent with the filing of its brief in the BPT litigation, this commenter filed a petition for reconsideration with the Agency, in which the commenter argued that facilities processing ores with a high ratio of zinc to lead should be subcategorized separately. The agency investigated that claim, found it to be without merit, and denied the petition for reconsideration. A second petition was then filed with EPA, in which the commenter made the claim (for the first time) repeated here—that ores with high concentrations of both zinc and lead warrant separate subcategorization. Since the BPT litigation, the Agency's contractor has revisited this facility, sampled and analyzed its wastewater, and performed treatability studies on its waste streams. These investigations (discussed in Section VIII of the development document) reconfirm the Agency's earlier conclusions that this plant's waste stream is similar to other effluents in the proposed subcategory and that, with proper pH control, application of BAT technology will achieve the proposed effluent limitations at this facility. At a meeting in January 1980, Agency counsel invited this commenter to submit new information and data to support the claim. The commenter has not done so. Accordingly, the Agency sees no need or justification to create a separate subcategory for mines and mills processing ores with high concentrations of lead and zinc.

Comment: One commenter asked whether replicate samples were taken during the screening and verification sampling program. This commenter also requested information on the holding times associated with the samples collected.

Response: EPA did not collect replicate samples, but each facility where sampling was conducted was invited to participate in the program by using split samples. Many facilities accepted this invitation, and these split samples are included in the Agency's data base. Holding times for the samples were kept to a minimum in all cases, allowing for the remote location of many mines and mills in relation to commercial airports and analytical laboratories.

Comment: One commenter objected to the subcategorization scheme, stating that it was the same as the scheme used for BPT and cited the numerous differences from facility to facility in ore mineralogy and other factors that exist in this industry. This commenter did not propose a subcategorization scheme other than to suggest that effluent limitations should be established on a plant-by-plant basis.

Response: The commenter has provided no information that would warrant altering the basic BPT subcategorization scheme now used, which was upheld by the Tenth Circuit (see section V of this notice). Plant-by-plant limitations are impracticable and inconsistent with the goal of the Clean Water Act.

Comment: One commenter stated that he could not comment on the information in the draft document until numerical effluent limitations are proposed and he knows "to what use the data will be put."

Response: The purpose of circulating the technical document in draft form was to give the regulated community and other interested groups an opportunity to review the Agency's data base and methodology as early in the regulatory process as feasible so that errors could be corrected and improvements made.

Comment: One commenter submitted data and a report on the presence of asbestos in his wastewater discharge. The data showed that the asbestos reported by EPA's technical contractor was not chrysotile, but was in fact diatoms. The commenter stated the EPA data were wrong and that in the commenter's analysis of the wastewater, no asbestos fibers of any kind, including chrysotile, were found.

Response: First, the samples from the EPA study and the commenter's study were collected over two years apart and only one of the commenter's sampling sites corresponds directly with the EPA sampling site. Also, the preparation of the sample before analysis was different. The commenter stated that the entire sample volume was filtered as compared with the 10 ml sample and 40

ml blank diluent that was filtered by the EPA contractor. For the common EPA and commenter's sampling site, assuming TSS levels are approximately equal in the samples taken two years apart, the loading on the filter used by the commenter before his analysis would be over ten times the maximum loading recommended and over 500 times the optimal loading recommended in the EPA sampling and analysis method. One explanation for the difference is that preferential settling of the denser particles might have occurred in the commenter's sample during filtering. The less dense debris would cover the denser particles on the filter, causing the denser mineral material to be missed during scanning electron microscopy, which looks only at the surface.

Second, the EPA procedure requires the use of Transmission Electron Microscope (TEM) analysis and the commenter's study used the Scanning Electron Microscope (SEM) analysis. EPA does not use the SEM method because of the high probability of missing smaller asbestos fibers. The emphasis of the commenter's report is on larger fibers (fibers greater than 1 micron in length). The EPA study reported asbestos fibers in the commenter's wastewater discharge of 0.3 to 0.4 microns in length. In fact, the majority of fiber sizes reported by EPA are less than 1.0 micron in length and typically 0.025 to 0.2 microns in width, while the diatoms reported by the commenter are approximately 5 to 10 microns in length and 2 microns in width. The EPA data is based on what the commenter terms "negligible fibers", possibly because the SEM is not a powerful enough tool to identify them. Also, low fiber counts have been attributed to letting a sample sit for a period of time before analysis; the commenter did not mention the age of the samples. The size of the particles reported by EPA and by the commenter indicates that the particles referenced in the two reports are different and not the same particles misidentified.

Regardless, the EPA data do show the fibers claimed, i.e. chrysotile. After receiving the report submitted by the commenter, the Agency had the technical contractor do a qualitative analysis of a portion of the original samples and again found chrysotile asbestos fibers.

Also, additional wastewater samples were obtained in July 1981 from the mine and mill that questioned whether asbestos was present in their discharge, and these samples were analyzed by a second laboratory who confirmed the presence of chrysotile. This laboratory

not only confirmed the presence of chrysotile by use of the TEM and the selected area electron diffraction pattern to identify the crystalline structure of the fiber, but also confirmed that the fibers are chrysotile by employing a combined scanning and transmission electron microscope with an energy dispersive X-ray microprobe (EDX) attachment. The chemical composition was determined with the microprobe which confirmed the elemental composition which is primarily magnesium and silicon oxides.

XIX. Solicitation Of Comments

The regulations as proposed here are supported by: *Development Document for Proposed Effluent Limitations Guidelines and New Source Performance Standards for the Ore Mining and Dressing Point Source Category.*

EPA encourages public participation in this rulemaking. The Agency asks that any deficiencies in the BAT record of this proposal be pointed to with specificity and that suggested revisions or corrections be supported by data.

EPA is particularly interested in receiving comments and data on the following issues:

(1) The Agency is reviewing the sampling and analytical methods used to determine the presence and magnitude of toxic pollutants and solicits comments on the data produced by these methods, as well as the methods themselves. Guidelines establishing test procedures for analyzing pollutants were proposed in 44 FR 69463 (December 3, 1979), amended, 44 FR 75028 (December 18, 1979).

(2) The *Preliminary Interim Procedure for Fibrous Asbestos*, EPA 600/4-80-005, PB-80-152879, may be used as the method for analyzing chrysotile asbestos. The method appears in Appendix B of the development document. The Agency solicits comments on the use of this method as the designated method for asbestos determinations.

(3) EPA recognizes the limits of available data and the expense of monitoring for certain toxic pollutants. Therefore, EPA proposes to control these toxic pollutants through the limitations on other pollutants. The data indicate that when concentrations of certain traditional pollutants are reduced, concentrations of toxic pollutants are also reduced. Control of the traditional pollutant would insure control of toxics with similar physical and chemical properties that respond to similar treatment mechanisms. This

method of toxics regulation could obviate the difficulties, high costs, and delays of monitoring and analysis that could result from direct limitations of certain toxic pollutants. Specifically, EPA is proposing limitations on TSS to control chrysotile asbestos (see section VIII of this preamble). TSS limitations would be based on TSS concentrations achievable with technologies identified as BPT, BCT, and NSPS. Also, EPA believes that arsenic and nickel are adequately controlled by the incidental removal associated with the control and removal of copper, lead, mercury, and zinc found in the discharges from this industry (see section VIII of this preamble). EPA requests comments on limitations of indicator pollutants as an alternative to direct limitations on the toxic pollutants.

(4) EPA has obtained from the industry a substantial data base for the control and treatment technologies that form the basis for the proposed regulation. Plants that have not submitted data, or that have compiled more recent data than that already submitted, are requested to forward these data to EPA. These data should be individual data points, not averages or other summary data, including flow, production, and all pollutant parameters for which analyses were run. Please submit any qualification to the data, such as descriptions of facility design, operating procedures, and upset problems during specified periods.

EPA specifically requests any comments, data, or information pertaining to the technical or economic feasibility of the following issues as they apply to existing sources:

(1) Comments are requested on the approach proposed here for the precipitation relief. A substantial number of proposals and modifications have been made in this area, and the Agency invites substantive comments.

(2) Industry and other sources are invited to submit any data from pilot or commercial studies of flocculant addition, secondary settling, or granular-media filtration, particularly on their effectiveness in controlling toxic metals. Although the Agency has conducted a variety of treatability studies to address these technologies, EPA invites the submission of results from additional studies representing the diverse characteristics of raw wastewaters present in the ore mining and dressing industry.

(3) The Agency has completed an extensive effort to establish realistic costs for treatment technologies being considered, including verification of cost estimates at specific mines and mills where site-specific data have been

collected. However, the Agency is aware that many approaches to cost estimation are available and invites commenters to present alternative cost methodologies. To perform a meaningful comparison between these alternatives and EPA's approach, commenters are requested to supply detailed information on salient design and operating characteristics; actual installed costs for each unit treatment operation or piece of equipment, the date of installation and the amount of installation labor provided by facility personnel; the actual cost of operation, maintenance, amortization; and other annual cost factors, including energy use, land, raw material, and labor requirements. Commenters should supply this information on an itemized basis with necessary supporting information to permit a meaningful evaluation of the alternative. The Agency specifically requests information from gold placer mine operations on these items.

(4) Both BAT and MSPS for gold placer mines are reserved in this rulemaking. EPA has been unable to acquire detailed, factual information that would enable the Agency to perform a cash flow analysis for gold placer mine operations and small tungsten mine operations. The Agency seeks individual replies. Replies will be treated as confidential, if so requested, at the time they are submitted.

EPA has conducted two separate studies of gold placer mines as part of the review of BAT and has reviewed additional studies performed by State and Federal agencies. This data indicates that limitations on settleable solids are the most appropriate and viable control for wastewater discharges from gold placer mines. However, the data on discharges from well constructed, operated, and maintained settling ponds associated with gold placer mines are limited because many of the mines do not operate settling ponds or the ponds were filled with sediment or the flow was short circuited through the pond. The Agency seeks additional data on the effluent from settling ponds associated with gold placer mines to augment the present data base and here asks for data from individual mines, miners associations and agencies. Specifically the Agency would like data on discharges during the forthcoming 1982 mining season in Alaska.

XX. Small Business Administration (SBA) Financial Assistance

Two SBA programs might be important sources of financing for the ore mining and dressing industry: SBA's Economic Injury Loan Program and the

Pollution Control Financing Bond Guarantees.

Section 8 of the Clean Water Act of 1977 amended Section 7 of the Small Business Act, 5 U.S.C. 636, to authorize the SBA through its Economic Injury Loan Program to make loans to assist small business concerns in making additions to, or alterations in, equipment, facilities, or methods of operation to meet water pollution control requirements under the Act if the concern is likely to suffer a substantial economic injury without such assistance. This program is open to small business firms as defined by the SBA. Loans can be made either directly by SBA or through a bank using an SBA guarantee. The interest on direct loans depends on the cost of money to the Federal Government. Loan repayment periods, depending on the ability of the firm to repay the loan may extend up to thirty years but will not exceed the useful life of the equipment.

Firms in the ore mining and dressing industry may be eligible for direct or indirect SBA loans. For further details on this Federal loan program, write or telephone any of the following individuals at EPA headquarters or at the ten EPA regional offices:

Headquarters—Ms. Frances Desselle, Office of Analysis and Evaluation (WH-586), Environmental Protection Agency, 401 M Street, S.W., Washington, D.C. 20460 Telephone: (202) 426-7874

Region I—Mr. Ted Landry, Enforcement Division, Environmental Protection Agency, J. F. Kennedy Federal Building, Boston, MA 02203, Telephone: (617) 223-5061

Region II—Mr. Gerald DeGartano, Enforcement Division, Room 432, Environmental Protection Agency, 26 Federal Plaza, New York, NY 10007, Telephone: (212) 264-4711

Region III—Mr. Bob Gunter, Environmental Protection Agency, Curtis Building, 31R20, 6th and Walnut Streets, Philadelphia, PA 19106, Telephone: (215) 597-2564

Region IV—Mr. John Hurlebaus, Grants Administrative Support Section, Environmental Protection Agency, 345 Courland Street, N.E., Atlanta, GA 30308, Telephone: (404) 881-4491

Region V—Mr. Arnold Leder, Water and Hazardous Material, Enforcement Branch, Environmental Protection Agency, 230 South Dearborn Street, Chicago, IL 60605, Telephone: (312) 353-2114

Region VI—Ms. Jan Horn, Enforcement Division, Environmental Protection Agency, 1st International Building, 1201 Elm Street, Dallas, TX 75270, Telephone: (214) 729-2760

Region VII—Mr. Paul Walker, Water Division, Environmental Protection Agency, 1735 Baltimore Avenue, Kansas City, MO 64108, Telephone: (816) 374-2725

Region VIII—Mr. Gerald Burke, Office of Grants, Water Division, Environmental Protection Agency, 1860 Lincoln Street,

Denver, CO 80203, Telephone: (303) 327-4579

Region IX—Ms. Linda Powell, Permits Branch, Enforcement Division (E-4), Environmental Protection Agency, 215 Fremont Street, San Francisco, CA 94105, Telephone: (415) 556-3450

Region X—Mr. Danforth Bodien, Enforcement Division, Environmental Protection Agency, 1200 6th Avenue, Seattle, WA 98101, Telephone: (206) 442-1352

Interested persons may also contact the Assistant Regional Administrators for Financial Assistance in the Small Business Administration Regional offices for more details on Federal loan assistance programs. For further information, write or telephone any of the following individuals:

Region I—Mr. George H. Allen, Assistant Regional Administrator for Financial Assistance, Small Business Administration, 60 Battery March, 10th Floor, Boston, MA 02110, Telephone: (617) 223-3891

Region II—Mr. John Axiotakis, Assistant Regional Administrator for Financial Assistance, Small Business Administration, 28 Federal Plaza, New York, NY 10007, Telephone: (212) 264-1452

Region III—Mr. David Malone, Assistant Regional Administrator for Financial Assistance, Small Business Administration, 231 St. Asaphs Road, West Lobby, Suite 646, Bala Cynwyd, PA 19004, Telephone: (215) 596-5909

Region IV—Mr. Merritt Scoggins, Assistant Regional Administrator for Financial Assistance, Small Business Administration, 1375 Peachtree Street, N.E., Atlanta, GA 30367, Telephone: (404) 881-2009

Region V—Mr. Howard Bondruska, Assistant Regional Administrator for Financial Assistance, Small Business Administration, 219 South Dearborn Street, Chicago, IL 60604, Telephone: (312) 353-4534

Region VI—Mr. Till Phillips, Assistant Regional Administrator for Financial Assistance, Small Business Administration, 1720 Regal Row, Suite 230, Dallas, TX 75202, Telephone: (214) 767-7873

Region VII—Mr. Richard Whitley, Assistant Regional Administrator for Financial Assistance, Small Business Administration, 911 Walnut Street, 23rd Floor, Kansas City, MO 64018, Telephone: (816) 374-3210

Region VIII—Mr. James Chuculate, Assistant Regional Administrator for Financial Assistance, Small Business Administration, 1405 Curtis Street, Executive Tower Building, 22nd Floor, Denver, CO 80202, Telephone: (303) 837-3688

Region IX—Mr. Larry J. Wodarski, Deputy Assistant Regional Administrator for Financial Assistance, Small Business Administration, 450 Golden Gate Avenue, San Francisco, CA 94102, Telephone: (415) 556-7782

Region X—Mr. Jack Welles, Regional Administrator, Small Business Administration, 710 2nd Avenue, Dexter Horton Bldg., 5th Floor, Seattle, WA 98104, Telephone: (206) 442-1455

In addition to the Economic Injury Loan Program, the Small Business

Investment Act, as amended by Pub. L. 94-305, authorizes SBA to guarantee the payments on qualified contracts entered into by eligible small businesses to acquire needed pollution facilities when the financing is provided through tax-exempt revenue or pollution control bonds. This program is open to all eligible small businesses as defined by the SBA. Bond financing with SBA's guarantee of payments makes available long-term (20-30 years), low-interest (7 percent) financing to small businesses. For further details on this program write to the SBA, Pollution Control Financing Division, Office of Special Guarantees, 1815 North Lynn Street, Magazine Bldg., Rosslyn, VA 22209, (703) 235-2900.

XXI. Executive Order 12291

Under Executive Order 12291, EPA must judge whether a regulation is "Major" and therefore subject to the requirement of a Regulatory Impact Analysis. This regulation is not Major and does not require a Regulatory Impact Analysis because the annual effect on the economy is less than \$100 million, it will not cause a major increase in costs, or significant adverse effects on the industry.

This regulation was submitted to the Office of Management and Budget for review as required by Executive Order 12291. Any comments from OMB to EPA and any EPA response to those comments are available for public inspection at the EPA Public Information Reference Unit, Room 2922 (EPA Library), Environmental Protection Agency, 401 M Street, SW., Washington, D.C.

List of Subjects in 40 CFR Part 440

Metal, Mines, Water pollution control, Waste treatment and disposal.

May 25, 1982.

Anne M. Gorsuch,
Administrator.

Appendix A.—Abbreviations, Acronyms and Units Used in This Notice

Act—The Clean Water Act.
Agency—The U.S. Environmental Protection Agency.
BADT—Best available demonstrated technology under sections 304(c) and 306.
BAT—The best available technology economically achievable, under section 304(b)(2)(B) of the Act.
BCT—The best conventional pollutant control technology, under section 304(b)(4) of the Act.
BMP's—Best management practices under section 304(e) of the Act.
BPT—The best practicable control technology currently available, under section 304(b)(1) of the Act.
CWA—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).

FWPCA—Federal Water Pollution Control Act.

MSHA—The Department of Labor, Mine Safety and Health Administration.

NPDES Permit—A National Pollutant Discharge Elimination System permit issued under section 402 of the Act.

NSPS—New Source performance standards under section 306 of the Act.

POTW—Publicly owned treatment works.

RCRA—Resource Conservation and Recovery Act (Pub. L. 94-580) of 1976, Amendments to Solid Waste Disposal Act.

Units

gpd—gallons per day.
mgd—million gallons per day.
mg/l—milligram(s) per liter.
µg/l—microgram(s) per liter.

Appendix B.—Toxic Organic Compounds Not Detected During Sampling

1. Acenaphthene.
2. Acrolein.
3. Acrylonitrile.
4. Benzidene.
5. Carbon Tetrachloride.
6. 1,2,4-Trichlorobenzene.
7. Hexachlorobenzene.
8. 1,2-Dichloroethane.
9. Hexachloroethane.
10. 1,1-Dichloroethane.
11. 1,1,2-Trichloroethane.
12. 1,1,2,2-Tetrachloroethane.
13. Chloroethane.
14. Bis(Chloromethyl) Ether.
15. Bis(2-Chloroethyl) Ether.
16. 2-Chloroethyl Vinyl Ether.
17. 2-Chloronaphthalene.
18. 2,4,6-Trichlorophenol.
19. Parachlorometa Cresol.
20. 2-Chlorophenol.
21. 1,2-Dichlorobenzene.
22. 1,3-Dichlorobenzene.
23. 1,4-Dichlorobenzene.
24. 3,3-Dichlorobenzidene.
25. 1,1-Dichloroethylene.
26. 2,4-Dichlorophenol.
27. 1,2-Dichloropropane.
28. 1,3-Dichloropropylene.
29. 2,4-Dinitrotoluene.
30. 2,6-Dinitrotoluene.
31. 1,2-Diphenylhydrazine.
32. Fluoranthene.
33. 4-Chlorophenyl Phenyl Ether.
34. 4-Bromophenyl Phenyl Ether.
35. Bis(2-Chloroisopropyl) Ether.
36. Bis(2-Chloroethoxy) Methane.
37. Methyl Chloride.
38. Methyl Bromide.
39. Bromoform.
40. Dichlorodifluoromethane.
41. Chlorodibromomethane.
42. Hexachlorobutadiene.
43. Hexachlorocyclopentadiene.
44. Isophorone.
45. Naphthalene.
46. Nitrobenzene.
47. 2-Nitrophenol.
48. 4-Nitrophenol.
49. 2,4-Dinitrophenol.
50. 4,6-Dinitro-O-Cresol.
51. N-Nitrosodimethylamine.

52. N-Nitrosodiphenylamine.
53. N-Nitrosodi-N-Propylamine.
54. Pentachlorophenol.
55. Benzo(A)Anthracene.
56. Benzo(A)Pyrene.
57. 3,4-Benzofluoranthene.
58. Benzo(K)Fluoranthene.
59. Chrysene.
60. Acenaphthylene.
61. Anthracene.
62. Benzo(G,H,I)Perylene.
63. Phenanthrene.
64. Dibenzo(A,H)Anthracene.
65. Indeno(1,2,3-C,D)Pyrene.
66. Pyrene.
67. Trichloroethylene.
68. Vinyl Chloride.
69. Chloradane.
70. 4,4-DDT.
71. 4,4-DDE.
72. 4,4-DDD.
73. Endosulfan-Alpha.
74. Endosulfan-Beta.
75. Endosulfan Sulfate.
76. Endrin Aldehyde.
77. Heptachlor Epoxide.
78. γ BHC(Lindane)-Gamma.
79. PCB-1242 (AROCHLOR 1242).
80. PCB-1254 (AROCHLOR 1254).
81. PCB-1221 (AROCHLOR 1221).
82. PCB-1232 (AROCHLOR 1232).
83. PCB-1248 (AROCHLOR 1248).
84. PCB-1260 (AROCHLOR 1260).
85. PCB-1016 (AROCHLOR 1016).
86. Toxaphene.
87. 2,3,7,8-Tetrachlorodibenzo-p-Dioxin.

Appendix C.—Toxic Organic Compounds Detected at Least One Facility But Always 10 μ g/l or less

1. Chlorobenzene.
2. Dichlorobromomethane.
3. Fluorene.
4. Aldrin.
5. Dieldrin.
6. Endrin.
7. Heptachlor.
8. 1,1,1-Trichloroethane.
9. Chloroform.
10. Ethylbenzene.
11. Trichlorofluoromethane.
12. Diethyl Phthalate.
13. Tetrachloroethylene.
14. Toluene.
15. α BHC-Alpha.
16. β BHC-Beta.
17. Δ BHC-Delta.

Appendix D.—Toxics Detected at Levels Too Small To Be Effectively Reduced by Technologies Known to the Administrator

1. Antimony.
2. Beryllium.
3. Silver.
4. Thallium.
5. Selenium.
6. Chromium.
7. Cyanide.
8. Benzene.
9. 1,2-Trans-Dichloroethylene.
10. Phenol.
11. Bis(2-Ethylhexyl) Phthalate.
12. Butyl Benzyl Phthalate.
13. Di-N-Butyl Phthalate.
14. Di-n-Octyl Phthalate.
15. Dimethyl Phthalate.
16. Methylene Chloride.

Appendix E.—Toxic Organic Compounds Detected From a Small Number of Sources and Uniquely Related to These Sources

2,4-dimethylphenol.

Appendix F.—Pollutants Effectively Controlled by the Technology upon Which Other Effluent Limitations and Guidelines are Based

1. Asbestos.
2. Arsenic.
3. Nickel.

Appendix G.—Subcategories and Subparts Where Equal or More Stringent Protection is Already Provided by Existing Effluent Limitations (BAT=BPT)

Iron Ore Subcategory
Aluminum Ore Subcategory
Uranium, Radium, and Vanadium Ores Subcategory, Mine Drainage
Mercury Ore Subcategory, Mills
Copper, Lead, Zinc, Silver, Gold, Platinum, and Molybdenum Ore Subcategory
Mills and mine areas employing leaching for the recovery of copper
Mills employing cyanidation process or the amalgamation process for the recovery of gold or silver.

Appendix H.—Pollutants Excluded by Subcategory and Subpart

Uranium Ore Subcategory—Mine Drainage

Cadmium (not detected)
Copper (present in amounts too small to treat)
Lead (present in amounts too small to treat)
Mercury (present in amounts too small to treat)

Tungsten Ore Subcategory—Mine Drainage

Cadmium (present in amounts too small to treat)
Lead (not detected)
Mercury (present in amounts too small to treat)

Tungsten Ore Subcategory—Mill Process Water

Cadmium (present in amounts too small to treat)
Mercury (not detected)

Mercury Ore Subcategory—Mine Drainage

Mercury (present in amounts too small to treat)

Appendix I.—Subpart Where Pollutants Are Detected From a Small Number of Sources Within the Subpart and the Pollutants Are Uniquely Related to These Sources

Uranium, Radium, and Vanadium Ores Subcategory
Mills using the acid and alkaline leach process for the extraction of uranium

Appendix J. Proposed BAT=BPT

Pollutants Where the Small Amounts Remaining in the BPT Effluent Does Not Justify Additional Regulation
Titanium Ore—Mills, Zinc
Tungsten Ore—Mine Drainage and Mills
Copper
Zinc
Cadmium

Copper, Lead, Zinc, Silver, Gold, Platinum, and Molybdenum Ore—Mine Drainage and Mills Employing Froth-Flotation

Copper
Zinc
Lead
Mercury
Cadmium

For the purpose of clarity, the BPT effluent limitations guidelines are being published as part of today's document. However, the BPT requirements remain unaffected by today's proposal and are not being repropose today. For the reasons discussed above, EPA proposes to revise Part 440 to read as follows:

PART 440—ORE MINING AND DRESSING POINT SOURCE CATEGORY

Subpart A—Iron Ore Subcategory

Sec.

- 440.10 Applicability: description of the iron ore subcategory.
- 440.11 [Reserved]
- 440.12 Effluent limitations representing the degree of effluent reduction attainable by applying the best practicable control technology currently available (BPT).
- 440.13 Effluent limitations representing the degree of effluent reduction attainable by applying the best available technology economically achievable (BAT).
- 440.14 New Source Performance Standards (NSPS) representing the degree of effluent reduction attainable by applying the best available demonstrated technology (BADT).
- 440.15 Effluent limitations representing the degree of effluent reduction attainable by applying the best conventional pollutant control technology (BCT).

Subpart B—Base and Precious Metals Subcategory

- 440.20 Applicability: description of the base and precious metals subcategory.
- 440.21 [Reserved]
- 440.22 Effluent limitations representing the degree of effluent reduction attainable by applying the best practicable control technology currently available (BPT).

Subpart C—Aluminum Ore Subcategory

- 440.30 Applicability: description of the aluminum ore subcategory.
- 440.31 [Reserved]
- 440.32 Effluent limitations representing the degree of effluent reduction attainable by applying the best practicable control technology currently available (BPT).
- 440.33 Effluent limitations representing the degree of effluent reduction attainable by applying the best available technology economically achievable (BAT).
- 440.34 New Source Performance Standards (NSPS) representing the degree of effluent reduction attainable by applying best available demonstrated technology (BADT).
- 440.35 Effluent limitations representing the degree of effluent reduction attainable by

- Sec. applying the best conventional pollutant control technology (BCT).
- Subpart D—Ferroalloy Ores Subcategory**
- 440.40 Applicability: description of the ferroalloy ores subcategory.
- 440.41 [Reserved]
- 440.42 Effluent limitations representing the degree of effluent reduction attainable by applying the best practicable control technology currently available (BPT).
- Subpart E—Uranium, Radium, and Vanadium**
- Ores Subcategory**
- 440.50 Applicability: description of the uranium, radium, and vanadium ores subcategory.
- 440.51 [Reserved]
- 440.52 Effluent limitations representing the degree of effluent reduction attainable by applying the best practicable control technology currently available (BPT).
- 440.53 Effluent limitations representing the degree of effluent reduction attainable by applying the best available technology economically achievable (BAT).
- 440.54 New Source Performance Standards (NSPS) representing the degree of effluent reduction attainable by applying the best available demonstrated technology (BADT).
- 440.55 Effluent limitations representing the degree of effluent reduction attainable by applying the best conventional pollutant control technology (BCT).
- Subpart F—Mercury Ores Subcategory**
- 440.60 Applicability: description of the mercury ores subcategory.
- 440.61 [Reserved]
- 440.62 Effluent limitations representing the degree of effluent reduction attainable by applying the best practicable control technology currently available (BPT).
- 440.63 Effluent limitations representing the degree of effluent reduction attainable by applying the best available technology economically achievable (BAT).
- 440.64 New Source Performance Standards (NSPS) representing the degree of effluent reduction attainable by applying the best available demonstrated technology (BADT).
- 440.65 Effluent limitations representing the degree of effluent reduction attainable by applying the best conventional pollutant control technology (BCT).
- Subpart G—Titanium Ore Subcategory**
- 440.70 Applicability: description of the titanium ore subcategory.
- 440.71 [Reserved]
- 440.72 Effluent limitations representing the degree of effluent reduction attainable by applying the best practicable control technology currently available (BPT).
- 440.73 Effluent limitations representing the degree of effluent reduction attainable by applying the best available technology economically achievable (BAT).
- 440.74 New Source Performance Standards (NSPS) representing the degree of effluent reduction attainable by applying the best available demonstrated technology (BADT).
- Sec. 440.75 Effluent limitations representing the degree of effluent reduction attainable by applying the best conventional pollutant control technology (BCT).
- Subpart H—Tungsten Ore Subcategory**
- 440.80 Applicability: description of the tungsten ore subcategory.
- 440.81 [Reserved]
- 440.82 Not Applicable
- 440.83 Effluent limitations representing the degree of effluent reduction attainable by applying the best available technology economically achievable (BAT).
- 440.84 New Source Performance Standards (NSPS) representing the degree of effluent reduction attainable by applying the best available demonstrated technology (BADT).
- 440.85 Effluent limitations representing the degree of effluent reduction attainable by applying the best conventional pollutant control technology (BCT).
- Subpart I—Nickel Ore Subcategory**
- 440.90 Applicability: description of the nickel ore subcategory.
- 440.91 [Reserved]
- 440.92 Not applicable.
- 440.93 Effluent limitations representing the degree of effluent reduction attainable by applying the best available technology economically achievable (BAT).
- 440.94 New Source Performance Standards (NSPS) representing the degree of effluent reduction attainable by applying the best demonstrated technology (BADT).
- 440.95 Effluent limitations representing the degree of effluent reduction attainable by applying the best conventional pollutant control technology (BCT).
- Subpart J—Vanadium Ore Subcategory (Mined Alone and Not as a Byproduct)**
- 440.100 Applicability: description of the vanadium ore subcategory.
- 440.101 [Reserved]
- 440.102 Effluent limitations representing the degree of effluent reduction attainable by applying the best practicable control technology currently available (BPT).
- 440.103 Effluent limitations representing the degree of effluent reduction attainable by applying the best available technology economically achievable (BAT).
- 440.104 New Source Performance Standards (NSPS) representing the degree of effluent reduction attainable by applying the best available demonstrated technology (BADT).
- 440.105 Effluent limitations representing the degree of effluent reduction attainable by applying the best conventional pollutant control technology (BCT).
- Subpart K—Antimony Ore Subcategory**
- 440.110 Applicability: description of the antimony ore subcategory.
- 440.111 [Reserved]
- 440.112 Effluent limitations representing the degree of effluent reduction attainable by applying the best practicable control technology currently available (BPT).
- 440.113 Effluent limitations representing the degree of effluent reduction attainable by

- Sec. applying the best available technology economically achievable (BAT).
- 440.114 New Source Performance Standards (NSPS) representing the degree of effluent reduction attainable by applying the best available demonstrated technology (BADT).
- 440.115 Effluent limitations representing the degree of effluent reduction attainable by applying the best conventional pollutant control technology (BCT).

Subpart L—Copper, Lead, Zinc, Gold, Silver, Platinum, and Molybdenum Ores Subcategory

- 440.120 Applicability: description of the copper, lead, zinc, gold, silver, platinum, and molybdenum ores subcategory.
- 440.121 [Reserved]
- 440.122 Not applicable.
- 440.123 Effluent limitations representing the degree of effluent reduction attainable by applying the best available technology economically achievable (BAT).
- 440.124 New Source Performance Standards (NSPS) representing the degree of effluent reduction attainable by applying the best available demonstrated technology (BADT).
- 440.125 Effluent limitations representing the degree of effluent reduction attainable by applying the best conventional pollutant control technology (BCT).

Subpart M—General Provisions and Definitions

- 440.130 Applicability.
- 440.131 General provisions.
- 440.132 General definitions.

Authority: Secs. 301, 304(b) and (c), 306, and 501, Clean Water Act [The Federal Water Pollution Control Act Amendments of 1972, as amended by the Clean Water Act of 1977 (the Act)] as amended 33 U.S.C. 1311, 1314(b) and (c), 1316, and 1361; 86 Stat. 816, Pub. L. 92-500; 91 Stat. 1567, Pub. L. 95-217.

Subpart A—Iron Ore Subcategory

§ 440.10 Applicability: Description of the iron ore subcategory.

The provisions of this subpart are applicable to discharges from:

(a) Mines operated to obtain iron ore, regardless of the type of ore or its mode of occurrence;

(b) Mills beneficiating iron ores by physical (magnetic and nonmagnetic) and/or chemical separation and

(c) Mills beneficiating iron ores by magnetic and physical separation (Mesabi Range).

§ 440.11 [Reserved]

§ 440.12 Effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT).

Subject to Subpart M-General Provisions and Definitions, the following limitations establish the concentrations of pollutants controlled by this section

which may be discharged by a point source after application of the best practicable control technology currently available:

(a) The concentration of pollutants discharged in mine drainage from mines operated to obtain iron ore shall not exceed:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days
Milligrams per liter		
TSS.....	30	20
Fe (dissolved).....	2.0	1.0
pH.....	(¹)	(¹)

¹Within the range 6.0 to 9.0.

(b) The concentration of pollutants discharged from mills that employ physical (magnetic and nonmagnetic) and/or chemical methods to beneficiate iron ore shall not exceed:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days
Milligrams per liter		
TSS.....	30	20
Fe (dissolved).....	2.0	1.0
pH.....	(¹)	(¹)

¹Within the range 6.0 to 9.0.

(c) (1) There shall be no discharge of process wastewater from mills that employ magnetic and physical methods to beneficiate iron ore (Mesabi Range) except as provided in paragraph (c)(2) of this section.

(2) In the event that the annual precipitation falling on the treatment facility and the drainage area contributing surface runoff to the treatment facility exceeds the annual evaporation, a volume of water equivalent to the difference between annual precipitation falling on the treatment facility and the drainage area contributing surface runoff to the treatment facility and annual evaporation may be discharged subject to the limitations set forth in paragraph (a) of this section.

§ 440.13 Effluent limitations representing the degree of effluent reduction attainable by the application of the best available technology economically achievable (BAT).

Except as provided in Subpart M of this regulation and 40 CFR 125.30-125.32,

any existing point source subject to this subpart must achieve the following effluent limitations:

(a) The concentration of pollutants discharged in mine drainage from mines operated to obtain iron ore shall not exceed:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days
Milligrams per liter		
Fe (dissolved).....	2.0	1.0

(b) The concentration of pollutants discharged from mills that employ physical (magnetic and nonmagnetic) and/or chemical methods to beneficiate iron ore shall not exceed:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days
Milligrams per liter		
Fe (dissolved).....	2.0	1.0

(c)(1) There shall be no discharge of process wastewater from mills that employ magnetic and physical methods to beneficiate iron ore (Mesabi Range) except as provided below in paragraph (c)(2) of this section.

(2) In the event that the annual precipitation falling on the treatment facility and the drainage area contributing surface runoff to the treatment facility exceeds the annual evaporation, a volume of water equal to the difference between annual precipitation falling on the treatment facility and the drainage area contributing surface runoff to the treatment facility and annual evaporation may be discharged subject to the limitations set forth in paragraph (a) of this section.

§ 440.14 New Source Performance Standards (NSPS).

Except as provided in Subpart M of this regulation, any new source subject to this subpart must achieve the following NSPS representing the degree of effluent reduction attainable by applying the best available demonstrated technology (BADT):

(a) The concentration of pollutants discharged in mine drainage from mines

operated to obtain iron ore shall not exceed:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days
Milligrams per liter		
Fe (dissolved).....	2.0	1.0
pH.....	(¹)	(¹)
TSS.....	30.0	20.0

¹Within the range 6.0 to 9.0.

(b) The concentration of pollutants discharged from mills that employ physical (magnetic and nonmagnetic) and/or chemical methods to beneficiate iron ore shall not exceed:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days
Milligrams per liter		
Fe (dissolved).....	2.0	1.0
pH.....	(¹)	(¹)
TSS.....	30.0	20.0

¹Within the range 6.0 to 9.0.

(c) There shall be no discharge of process wastewater from mills that employ magnetic and physical methods to beneficiate iron ore (Mesabi Range) except as provided below.

In the event that the annual precipitation falling on the treatment facility and the drainage area contributing surface runoff to the treatment facility exceeds the annual evaporation, a volume of water equal to the difference between annual precipitation falling on the treatment facility and the drainage area contributing surface runoff to the treatment facility and annual evaporation may be discharged subject to the limitations set forth in paragraph (a) of this section.

440.15 Effluent limitations representing the degree of effluent reduction attainable by applying the best conventional pollutant control technology (BCT).

Except as provided in Subpart M of this regulation and 40 CFR 125.30-125.32, any existing source subject to this subpart must achieve the following limitations:

(a) The concentration of pollutants discharged in mine drainage from mines operated to obtain iron ore shall not exceed:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days
Milligrams per liter		
pH.....	(¹)	(¹)
TSS.....	30.0	20.0

¹ Within the range 6.0. to 9.0.

(b) The concentration of pollutants discharged from mills that employ physical (magnetic and nonmagnetic) and/or chemical methods to beneficiate iron ore shall not exceed:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days
Milligrams per liter		
pH.....	(¹)	(¹)
TSS.....	30.0	20.0

¹ Within the range 6.0. to 9.0.

(c)(1) There shall be no discharge of process wastewater from mills that employ magnetic and physical methods to beneficiate iron ore (Mesabi Range) except as provided in paragraph (c)(2) of this section.

(2) In the event that the annual precipitation falling on the treatment facility and the drainage area contributing surface runoff to the treatment facility exceeds the annual evaporation, a volume of water equal to the difference between annual precipitation falling on the treatment facility and the drainage area contributing surface runoff to the treatment facility and annual evaporation may be discharged subject to the limitations set forth in paragraph (a) of this section.

Subpart B—Base and Precious Metal Ores Subcategory

§ 440.20 Applicability: description of the subcategory.

The provisions of this subpart are applicable to discharges from:

(a) Mines operated to obtain copper bearing ores, lead bearing ores, zinc bearing ores, gold bearing ores or silver bearing ores, or any combination of these ores from open pit or underground operations other than placer deposits;

(b) Mills which employ the froth-flotation process alone or in conjunction with other processes, for the

beneficiation of copper ores, lead ores, zinc ores, gold ores or silver ores, or any combination of these ores;

(c) Mines and mills which employ dump, heap, in-situ leach or vat-leach processes for the extraction of copper from ores or ore waste materials;

(d) Mills which extract gold or silver by the cyanidation process and

(e) Mines or mines and mills beneficiating gold ores, silver ores, or platinum ores by gravity separation methods, (this includes placer or dredge mining or concentrating operations, and hydraulic mining operations).

§ 440.21 [Reserved]

§ 440.22 Effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT).

Subject to the provisions of Subpart M—General Provisions and Definitions, the following limitations establish the concentration of pollutants controlled by this section which may be discharged by a point source after application of the best practicable control technology currently available:

(a) The concentration of pollutants discharged in mine drainage from mines operated to obtain copper bearing ores, lead bearing ores, zinc bearing ores, gold bearing ores, or silver bearing ores or any combination of these ores open-pit or underground operations other than placer deposits shall not exceed:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days
Milligrams per liter		
TSS.....	30	20
Cu.....	.30	.15
Zn.....	1.5	.75
Pb.....	.6	.3
Hg.....	.002	.001
pH.....	(¹)	(¹)

¹ With the range 6.0 to 9.0

(b) The concentration of pollutants discharged from mills which employ the froth-flotation process alone or in conjunction with other processes, for the beneficiation of copper ores, lead ores, zinc ores, gold ores, or silver ores or any combination of these ores shall not exceed:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days
Milligrams per liter		
TSS.....	30	20
Cu.....	.30	.15
Zn.....	1.0	.5
Pb.....	.6	.3
Hg.....	.002	.001
Cd.....	.10	.05
pH.....	(¹)	(¹)

¹ Within the range 6.0 to 9.0.

(c)(1) There shall be no discharge of process wastewater from mines and mills which employ dump, heap, in situ leach or vat-leach processes for the extraction of copper from ores or ore waste materials except as provided in paragraph (c)(2) of this section.

(2) In the event that the annual precipitation falling on the treatment facility and the drainage area contributing surface runoff to the treatment facility exceeds the annual evaporation, a volume of water equivalent to the difference between annual precipitation falling on the treatment facility and the drainage area contributing surface runoff to the treatment facility and annual evaporation may be discharged subject to the limitations set forth in paragraph (a) of this section.

(d)(1) There shall be no discharge of process wastewater from mills which extract gold or silver by use of the cyanidation process except as provided in paragraph (d)(2) of this section.

(2) In the event that the annual precipitation falling on the treatment facility and the drainage area contributing surface runoff to the treatment facility exceeds the annual evaporation, a volume of water equivalent to the difference between annual precipitation falling on the treatment facility and the drainage area contributing surface runoff to the treatment facility and annual evaporation may be discharged subject to the limitations set forth in paragraph (a) of this section.

(5) The concentration of pollutants discharged in mine drainage from mines or discharged from mine and mill complexes beneficiating gold ores, silver ores or platinum ores by gravity separation methods including mining of

placer deposits, dredge mining and hydraulic mining operations shall not exceed: [Defined at a later date]

Subpart C—Aluminum Ore Subcategory

§ 440.30 Applicability: description of the aluminum ore subcategory.

The provisions of this subpart are applicable to discharges from facilities engaged in the mining of bauxite as an aluminum ore.

§ 440.31 [Reserved]

§ 440.32 Effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT).

Subject to the provisions of Subpart M, *General Provisions and Definitions*, the limitations described in the table below establish the concentration of pollutants controlled by this section, which may be discharged by a point source after application of the best practicable control technology currently available: The concentration of pollutants discharged in mine drainage from mines producing bauxite ores shall not exceed:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days
Milligrams per liter		
TSS	30	20
Fe	1.0	.5
Al	2.0	1.0
pH	(¹)	(¹)

¹ Within the range 6.0 to 9.0.

§ 440.33 Effluent limitations representing the degree of effluent reduction attainable by the application of the best available technology economically achievable (BAT).

Except as provided in Subpart M of this regulation and 40 CFR 125.30-32, any existing point source subject to this subpart must achieve the limitations described in the table below: The concentration of pollutants discharged in mine drainage from mines producing bauxite ores shall not exceed:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days
Milligrams per liter		
Fe (total)	1.0	0.5
Al	2.0	1.0

§ 440.34 New Source Performance Standards (NSPS).

Except as provided in Subpart M of this regulation, any new source subject to this subpart must achieve the NSPS described in the table below, representing the degree of effluent reduction attainable by the application of the best available demonstrated technology (BADT). The concentration of pollutants discharged in mine drainage from mines producing bauxite ores shall not exceed:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days
Milligrams per liter		
Fe (total)	1.0	0.5
Al	2.0	1.0
pH	(¹)	(¹)
TSS	30.0	20.0

¹ Within the range 6.0 to 9.0.

§ 440.35 Effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT).

Except as provided in Subpart M of this part and 40 CFR §§ 125.30-125.32, any existing source subject to this subpart must achieve the following limitations:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days
Milligrams per liter		
pH	(¹)	(¹)
TSS	30.0	20.0

¹ Within the range 6.0 to 9.0.

Subpart D—Ferroalloy Ores Subcategory

§ 440.40 Applicability: description of the ferroalloy ores subcategory.

The provisions of this subpart are applicable to discharges from:

(a) Mines producing 5,000 metric tons (5,512 short tons) or more of ferroalloy ores per year;

(b) Mines producing less than 5,000 metric tons (5,512 short tons) of ferroalloy ores per year by methods other than ore leaching;

(c) Mills processing 5,000 metric tons (5,512 short tons) or more of ferroalloy ores per year by purely physical methods including ore crushing, washing, jigging, heavy media and gravity separation, and magnetic and electrostatic separation; and

(d) Mills processing 5,000 metric tons (5,512 short tons) or more of ferroalloy ores per year by froth flotation methods. Ferroalloy metals include: molybdenum, nickel, tungsten and vanadium (recovered alone and not as a byproduct of uranium mining and mills).

§ 440.41 [Reserved]

§ 440.42 Effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT).

Subject to the provisions of Subpart M, *General Provisions and Definitions*, the following limitations establish the concentration of pollutants controlled by this section which may be discharged by a point source after application of the best practicable control technology currently available:

(a) The concentration of pollutants discharged in mine drainage from mines producing 5,000 metric tons (5,512 short tons) or more of ferroalloy bearing ores per year shall not exceed:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days
Milligrams per liter		
TSS	30	20
Cd	.10	.05
Cu	.2	.15
Zn	1.0	.5
Pb	.8	.3
As	1.0	.5
pH	(¹)	(¹)

¹ Within the range 6.0 to 9.0.

(2) The concentration of pollutants discharged in mine drainage from mines producing less than 5,000 metric tons (5,512 short tons) or discharged from mills processing less than 5,000 metric tons (5,512 short tons) of ferroalloy ores per year by methods other than ore leaching shall not exceed:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days
Milligrams per liter		
TSS	50	30
pH	(¹)	(¹)

¹ Within the range 6.0 to 9.0.

(3) The concentration of pollutants discharged from mills processing 5,000 metric tons (5,512 short tons) or more of ferroalloy ores per year by purely physical methods including ore crushing, washing, jigging, heavy media

separation, and magnetic and electrostatic separation shall not exceed:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days
Milligrams per liter		
TSS.....	30	20
Cd.....	.10	.05
Cu.....	.30	.15
Zn.....	1.0	.5
As.....	1.0	.5
pH.....	(¹)	(¹)

¹Within the range 6.0 to 9.0.

(4) The concentration of pollutants discharged from mills processing 5,000 metric tons (5,512 short tons) or more of ferroalloy ores per year by froth flotation methods shall not exceed:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days
Milligrams per liter		
TSS.....	30	20
Cd.....	.10	.05
Cu.....	.30	.15
Zn.....	1.0	.5
As.....	1.0	.5
pH.....	(¹)	(¹)

¹Within the range 6.0 to 9.0.

Subpart E—Uranium, Radium and Vanadium Ores Subcategory

§ 440.50 Applicability: Description of the uranium, radium and vanadium ores subcategory.

The provisions of this subpart are applicable to discharges from

(a) Mines, either open-pit or underground, from which uranium, radium and vanadium ores are produced; and

(b) Mills using the acid leach, alkaline leach, or combined acid and alkaline leach process for the extraction of uranium, radium and vanadium.

Only vanadium by-product production from uranium ores is covered under this subpart.

§ 440.51 [Reserved]

§ 440.52 Effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT).

Subject to the provisions of Subpart M, *General Provisions and Definitions*, the following limitations establish the concentration of pollutants controlled by this section which may be discharged

by a point source after application of the best practicable control technology currently available:

(a) The concentration of pollutants discharged in mine drainage from mines, either open-pit or underground, from which uranium, radium and vanadium ores are produced excluding mines using in-situ leach methods shall not exceed:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days
Milligrams per liter		
TSS.....	30	20
COD.....	200	100
Zn.....	1.0	0.5
Ra226 ¹ (dissolved).....	10	3
Ra226 ¹ (total).....	30	10
U.....	4	2
pH.....	(²)	(²)

¹Values in picocuries per liter (pCi/l).

²Within the range 6.0 to 9.0.

(b) The concentrations of pollutants discharged from mills using the acid leach, alkaline leach or combined acid and alkaline leach process for the extraction of uranium, radium and vanadium including mill-mine facilities and mines using in-situ leach methods, shall not exceed:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days
Milligrams per liter		
TSS.....	30	20
COD.....	200	100
As.....	1.0	.5
Zn.....	1.0	.5
Ra226* (dissolved).....	10	3
Ra226* (total).....	30	10
NH ₃		100
pH.....	(²)	(²)

¹Values in picocuries per liter (pCi/l).

²Within the range 6.0 to 9.0.

§ 440.53 Effluent limitations representing the degree of effluent reduction attainable by the application of the best available technology economically achievable (BAT).

Except as provided in Subpart M of this regulation and 40 CFR 125.30—125.32, any existing point source subject to this subpart must achieve the limitations: Described in the talk below. The concentration of pollutants discharged in mine drainage from mines, either open-pit or underground, that produce uranium ore, including mines using in-situ leach methods, shall not exceed:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days
Milligrams per liter		
COD.....	200	100
Zn.....	1.0	0.5
Ra 226 ¹ (dissolved).....	10.0	3.0
RA 226 ¹ (total).....	30.0	10.0
U.....	4.0	2.0

¹Values in picocuries per liter (pCi/l).

§ 440.54 New Source Performance Standards (NSPS).

Except as provided in Subpart M of this regulation any new source subject to this subpart must achieve the following NSPS representing the degree of effluent reduction attainable by the application of the best available demonstrated technology (BADT):

(a) The concentration of Pollutants discharged in mine drainage from mines, either open-pit or underground, that produce uranium ore, including mines using in-situ leach methods, shall not exceed:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days
Milligrams per liter		
COD.....	200	100
Zn.....	1.0	0.5
Ra 226* (dissolved).....	10.0	3.0
Ra 226* (total).....	30.0	10.0
U.....	4.0	2.0
pH.....	(²)	(²)
TSS.....	30.0	20.0

¹Values in picocuries per liter (pCi/l).

²Within the range 6.0 to 9.0.

(b)(1) There shall be no discharge of process wastewater from mills using the acid leach, alkaline leach or combined acid and alkaline leach process for the extraction of uranium or from mines and mills using in-situ leach methods.

(2) In the event that the annual precipitation falling on the treatment facility and the drainage area contributing surface runoff to the treatment facility exceeds the annual evaporation, a volume of water equivalent to the difference between annual precipitation falling on the treatment facility and the drainage area contributing surface runoff to the treatment facility and annual evaporation may be discharged subject to the limitations set forth in paragraph (a) of this section.

§ 440.55 Effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT).

Except as provided in Subpart M of this part and 40 CFR 125.30-125.32, any existing source subject to this subpart must achieve the following limitations:

(a) The concentration of pollutants discharged in mine drainage from mines, either open pit or underground, that produce uranium ore, including mines using in-situ leach methods, shall not exceed:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days
Milligrams per liter		
pH.....	(¹)	(¹)
TSS.....	30.0	20.0

¹Within the range 6.0 to 9.0.

(b) The concentration of pollutants discharged in wastewater from mills using the acid leach, alkaline leach or combined acid and alkaline leach process for the extraction of uranium shall not exceed:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days
Milligrams per liter		
pH.....	(¹)	(¹)
TSS.....	30	20

¹Within the range 6.0 to 9.0.

Subpart F—Mercury Ore Subcategory

§ 440.60 Applicability: Description of the mercury ore subcategory.

The provisions of this subpart are applicable to discharges from:

(a) Mines, either open-pit or underground, that produce mercury ores; and

(b) Mills beneficiating mercury ores by gravity separation methods or by froth-flotation methods.

§ 440.61 [Reserved]

§ 440.62 Effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT).

Subject to the provisions of Subpart

M—General Provisions and Definitions, the following limitations establish the concentration of pollutants controlled by this section which may be discharged by a point source after application of the best practicable control technology currently available:

(a) The concentration of pollutants discharged in mine drainage from mines, either open-pit or underground, operated for the production of mercury ores shall not exceed the following limitations:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days
Milligrams per liter		
TSS.....	30	20
Hg.....	.002	.001
Ni.....	.2	.1
pH.....	(¹)	(¹)

¹Within the range 6.0 to 9.0.

(b)(1) There shall be no discharge of process wastewater from mills beneficiating mercury ores by gravity separation methods or by froth-flotation methods except as provided in paragraph (b)(2) of this section.

(2) In the event that the annual precipitation falling on the treatment facility and the drainage area contributing surface runoff to the treatment facility exceeds the annual evaporation, a volume of water equivalent to the difference between annual precipitation falling on the treatment facility and the drainage area contributing surface runoff to the treatment facility and annual evaporation may be discharged subject to the limitations set forth in paragraph (a) of this section.

§ 440.63 Effluent limitations representing the degree of effluent reduction attainable by the application of the best available technology economically achievable (BAT).

Except as provided in Subpart M of this regulation and 40 CFR 125.30-125.32, any existing point source subject to this subpart must achieve the following limitations:

(a) The concentration of pollutants discharged in mine drainage from mines, either open pit or underground, that produce mercury ores shall not exceed:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days
Milligrams per liter		
Hg.....	0.002	0.001

(b)(1) There shall be no discharge of process wastewater from mills beneficiating mercury ores by gravity separation methods or by froth-flotation methods.

(2) In the event that the annual precipitation falling on the treatment facility and the drainage area contributing surface runoff to the treatment facility exceeds the annual evaporation, a volume of water equal to the difference between annual precipitation falling on the treatment facility and the drainage area contributing surface runoff to the treatment facility and annual evaporation may be discharged subject to the limitations set forth in paragraph (a) of this section.

§ 440.64 New Source Performance Standards (NSPS).

Except as provided in Subpart M of this regulation any new source subject to this subpart must achieve the following NSPS representing the degree of effluent reduction attainable by the application of the best available demonstrated technology (BADT):

(a) The concentration of pollutants discharged in mine drainage from mines, either open pit or underground, that produce mercury ores shall not exceed:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days
Milligrams per liter		
Hg.....	0.002	0.001
pH.....	(¹)	(¹)
TSS.....	30.0	20.0

¹Within the range 6.0 to 9.0.

(b)(1) There shall be no discharge of process wastewater from mills beneficiating mercury ores by gravity separation methods or by froth-flotation methods.

(2) In the event that the annual precipitation falling on the treatment facility and the drainage area contributing surface runoff to the

treatment facility exceeds the annual evaporation, a volume of water equal to the difference between annual precipitation falling on the treatment facility and the drainage area contributing surface runoff to the treatment facility and annual evaporation may be discharged subject to the limitations set forth in paragraph (a) of this section.

§ 440.65 Effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT).

Except as provided in Subpart M of this regulation and 40 CFR 125.30-125.32, any existing source subject to this subpart must achieve the following limitations:

(a) The concentration of pollutants discharged in mine drainage from mines, either open pit or underground, that produce mercury ores shall not exceed:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days
Milligrams per liter		
pH	(¹)	(¹)
TSS	30	20

¹ Within the range 6.0 to 9.0.

(b)(1) There shall be no discharge of process wastewater from mills beneficiating mercury ores by gravity separation methods or by froth-flotation methods.

(2) In the event that the annual precipitation falling on the treatment facility and the drainage area contributing surface runoff to the treatment facility exceeds the annual evaporation, a volume of water equal to the difference between annual precipitation falling on the treatment facility and the drainage area contributing surface runoff to the treatment facility and annual evaporation may be discharged subject to the limitations set forth in paragraph (a) of this section.

Subpart G—Titanium Ore Subcategory

§ 440.70 Applicability: description of the titanium ore subcategory.

The provisions of this subpart are applicable to discharges from

(a) Mines obtaining titanium ores from lode deposits;

(b) Mills beneficiating titanium ores by electrostatic methods, magnetic and physical methods, or flotation methods; and

(c) Mines engaged in the dredge mining of placer deposits of sands containing rutile, ilmenite, leucoxene,

monazite, zircon, and other heavy metals, and the milling techniques employed in conjunction with the dredge mining activity (milling techniques employed include the use of wet gravity methods in conjunction with electrostatic or magnetic methods).

§ 440.71 [Reserved]

§ 440.72 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT).

Subject to the provisions of Subpart M-General Provisions and Definitions, the following limitations establish the concentration of pollutants controlled by this section which may be discharged by a point source after application of the best practicable control technology currently available:

(a) The concentration of pollutants discharged in mine drainage from mines obtaining titanium ores from lode deposits shall not exceed:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days
Milligrams per liter		
TSS	30	20
Fe	2.0	1.0
pH	(¹)	(¹)

¹ Within the range 6.0 to 9.0.

(b) The concentration of pollutants discharged from mills beneficiating titanium ores by electrostatic methods, magnetic and physical methods, or flotation methods shall not exceed:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days
Milligrams per liter		
TSS	30	20
Zn	1.0	0.5
Ni	0.2	0.1
pH	(¹)	(¹)

¹ Within the range 6.0 to 9.0.

(c) The concentration of pollutants discharged in mine drainage from mines engaged in the dredge mining of placer deposits of sands containing rutile, ilmenite, leucoxene, monazite, zircon, or other heavy metals, and the milling techniques employed in conjunction with the dredge mining activity (milling techniques employed include the use of

wet gravity methods in conjunction with electrostatic or magnetic methods) shall not exceed:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days
Milligrams per liter		
TSS	30	20
Fe	2	1
pH	(¹)	(¹)

¹ Within the range 6.0 to 9.0.

§ 440.73 Effluent limitations representing the degree of effluent reduction attainable by the application of the best available technology economically achievable (BAT).

Except as provided in Subpart M of this regulation and 40 CFR 125.30-125.32, any existing point source subject to this subpart must achieve the following limitations:

(a) The concentration of pollutants discharged in mine drainage from mines obtaining titanium ores from lode deposits shall not exceed:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days
Milligrams per liter		
Fe	2.0	1.0

(b) The concentration of pollutants discharged from mills beneficiating titanium ores by electrostatic methods, magnetic and physical methods, or flotation methods shall not exceed:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days
Milligrams per liter		
Zn	1.0	0.5

(c) The concentration of pollutants discharged in mine drainage from mines engaged in the dredge mining of placer deposits of sands containing rutile, ilmenite, leucoxene, monazite, or zircon and the milling techniques employed in conjunction with the dredge mining activity (milling techniques employed include the use of wet gravity methods in conjunction with electrostatic or magnetic methods) shall not exceed:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days
Milligrams per liter		
Fe.....	2.0	1.0

§ 440.74 New source performance standards (NSPS).

Except as provided in Subpart M of this regulation any new source subject to this subpart must achieve the following NSPS representing the degree of effluent reduction attainable by the application of the best available demonstrated technology (BADT):

(a) The concentration of pollutants discharged in mine drainage from mines obtaining titanium ores from lode deposits shall not exceed:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days
Milligrams per liter		
Fe.....	2.0	1.0
pH.....	(¹)	(¹)
TSS.....	30.0	20.0

¹Within the range 6.0 to 9.0.

(b) The concentration of pollutants discharged from mills beneficiating titanium ores by electrostatic methods, magnetic and physical methods, or flotation methods shall not exceed:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days
Milligrams per liter		
Zn.....	1.0	0.5
pH.....	(¹)	(¹)
TSS.....	30.0	20.0

¹Within the range 6.0 to 9.0.

(c) The concentration of pollutants discharged in mine drainage from mines engaged in the dredge mining of placer deposits of sands containing rutile, ilmenite, leucosene, monazite, zircon and the milling techniques employed in conjunction with the dredge mining activity (milling techniques employed include the use of wet gravity methods in conjunction with electrostatic or magnetic methods) shall not exceed:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days
Milligrams per liter		
Fe.....	2.0	1.0

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days
pH.....	(¹)	(¹)
TSS.....	30.0	20.0

¹Within the range 6.0 to 9.0.

§ 440.75 Effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT).

Except as provided in Subpart M of this regulation and 40 CFR 125.30-125.32, any existing source subject to this subpart must achieve the following limitations:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days
Milligrams per liter		
pH.....	(¹)	(¹)
TSS.....	30.0	20.0

¹Within the range 6.0 to 9.0.

Subpart H—Tungsten Ore Subcategory

§ 440.80 Applicability: description of the tungsten ore subcategory.

The provisions of this subpart are applicable to discharges from (a) mines that produce tungsten ore and (b) mills that process tungsten ore by either the gravity separation or froth-flotation methods.

§ 440.81 [Reserved]

§ 440.82 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT).

Tungsten ore is included in the BPT regulation for the Ferroalloy Ores subcategory (40 CFR 440.42).

§ 440.83 Effluent limitations representing the degree of effluent reduction attainable by the application of the best available technology economically achievable (BAT).

Except as provided in Subpart M of this regulation and 40 CFR 125.30-125.32, any existing point source subject to this subpart must achieve the following limitations:

(a) The concentration of pollutants discharged in mine drainage from tungsten mines shall not exceed:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days
Milligrams per liter		
Cd.....	0.10	0.05
Cu.....	0.30	0.15
Zn.....	1.0	0.5

(b) The concentration of pollutants discharged from mills shall not exceed:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days
Milligrams per liter		
Cd.....	0.10	0.05
Cu.....	0.3	0.15
Zn.....	1.0	0.5

§ 440.84 New source performance standards (NSPS).

Except as provided in Subpart M of this regulation any new source subject to this subpart must achieve the following NSPS representing the degree of effluent reduction attainable by the application of the best available demonstrated technology (BADT):

(a) The concentration of pollutants discharged in mine drainage from tungsten mines shall not exceed:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days
Milligrams per liter		
Cd.....	0.10	0.05
Cu.....	0.30	0.15
Zn.....	1.0	0.05
pH.....	(¹)	(¹)
TSS.....	30.0	20.0

¹Within the range of 6.0 to 9.0.

(b) The concentration of pollutants discharged from mills shall not exceed:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days
Milligrams per liter		
Cd.....	0.10	0.05
Cu.....	0.3	0.15
Zn.....	1.0	0.5

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days
pH.....	(¹)	(¹)
TSS.....	30.0	20.0

¹ Within the range 6.0 to 9.0.

§ 440.85 Effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT).

Except as provided in Subpart M of this regulation and 40 CFR 125.30—125.32, any existing source subject to this subpart must achieve the following limitations:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
Milligrams per liter		
pH.....	(¹)	(¹)
TSS.....	30.0	20.0

¹ Within the range 6.0 to 9.0.

Subpart I—Nickel Ore Subcategory

§ 440.90 Applicability: description of the nickel ore subcategory.

The provisions of this subpart are applicable to discharges from:

- (a) Mines that produce nickel ore and
- (b) Mills that process nickel ore.

§ 440.91 [Reserved]

§ 440.92 Effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT).

Nickel ore is included in the ferroalloy ores subcategory (see Subpart D).

§ 440.93 Effluent limitations representing the degree of effluent reduction attainable by the application of the best available technology economically achievable (BAT). [Reserved]

§ 440.94 New source performance standards (NSPS). [Reserved]

§ 440.95 Effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT). [Reserved]

Subpart J—Vanadium Ore Subcategory (Mined Alone and Not as a Byproduct)

§ 440.100 Applicability: description of the vanadium ore subcategory

The provisions of this subpart are applicable to discharges from:

(a) Mines that produce vanadium ore (recovered alone and not as a byproduct of uranium mining and mills) and

(b) Mills that process vanadium ore (recovered alone, not as a byproduct of uranium mining and mills).

§ 440.101 [Reserved]

§ 440.102 Effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT).

Vanadium ore (recovered alone and not as a byproduct of uranium mining and mills) is included in the ferroalloy ores subcategory (see Subpart D).

§ 440.103 Effluent limitations representing the degree of effluent reduction attainable by the application of the best available technology economically achievable (BAT). [Reserved]

§ 440.104 New source performance standards (NSPS). [Reserved]

§ 440.105 Effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT). [Reserved]

Subpart K—Antimony Ore Subcategory

§ 440.110 Applicability: description of the antimony ore subcategory.

The provisions of this subpart are applicable to discharges from:

- (a) Mines that produce antimony ore and
- (b) Mills that process antimony ore.

§ 440.111 [Reserved]

§ 440.112 Effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT). [Reserved]

§ 440.113 Effluent limitations representing the degree of effluent reduction attainable by the application of the best available technology economically achievable (BAT). [Reserved]

§ 440.114 New source performance standards (NSPS); effluent limitations. [Reserved]

§ 440.115 Effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT). [Reserved]

Subpart L—Copper, Lead, Zinc, Gold, Silver, Platinum, and Molybdenum Ores Subcategory

§ 440.120 Applicability.

The provisions of this subpart are applicable to discharges from:

(a) Mines that produce copper, lead, zinc, gold, silver, platinum, or molybdenum bearing ores, or any combination of these ores from open-pit or underground operations other than placer deposits;

(b) mills that use the froth-flotation process alone or in conjunction with other processes, for the beneficiation of copper, lead, zinc, gold, silver, platinum, or molybdenum ores, or any combination of these ores;

(c) mines and mills that use dump, heap, in-situ leach or vat-leach processes to extract copper from ores or ore waste materials;

(d) mills that use the cyanidation process to extract gold or silver; and

(e) mines or mines and mills that use gravity separation methods (including placer or dredge mining or concentrating operations, and hydraulic mining operations) to extract gold ores, silver ores, or platinum ores.

§ 440.121 [Reserved]

§ 440.122 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology (BPT).

Copper, lead, zinc, gold, silver and platinum ores are included in the BPT regulation for the Base and Precious Metals subcategory (40 CFR 440.22). Molybdenum ore is included in the BPT regulation for the Ferroalloy Ores subcategory (40 CFR 440.42).

§ 440.123 Effluent limitations representing the degree of effluent reduction attainable by the application of the best available technology economically achievable (Bat).

Except as provided in Subpart M of this regulation and 40 CFR 125.30—125.32, any existing point source subject to this subpart must achieve the following limitations:

(a) The concentration of pollutants discharged in mine drainage from mines that produce copper, lead, zinc, gold, silver, platinum, or molybdenum bearing ores or any combination of these ores from open-pit or underground operations other than placer deposits shall not exceed:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days
Milligrams per liter		
Cu.....	0.30	0.15
Zn.....	1.5	0.75
Pb.....	0.6	0.3
Hg.....	0.002	0.001
Cd.....	0.10	0.05

(b) The concentration of pollutants discharged from mills that use the froth-flotation process alone, or in conjunction with other processes, for the beneficiation of copper, lead, zinc, gold, silver, platinum or molybdenum ores or any combination of these ores shall not exceed:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days
Milligrams per liter		
Cu.....	0.30	0.15
Zn.....	1.0	0.5
Pb.....	0.6	0.3
Hg.....	0.002	0.001
Cd.....	0.10	0.05

(c)(1) There shall be no discharge of process wastewater from mine areas and mills processes and areas that use dump, heap, in-situ leach or vat-leach processes to extract copper from ores or ore waste materials except as provided in paragraph (c)(2) of this section.

(2) In the event that the annual precipitation falling on the treatment facility and the drainage area contributing surface runoff to the treatment facility exceeds the annual evaporation, a volume of water equal to the difference between annual precipitation falling on the treatment facility and the drainage area contributing surface runoff to the

treatment facility and annual evaporation may be discharged subject to the limitations set forth in paragraph (a) of this section.

(d)(1) There shall be no discharge of process wastewater from mills that use the cyanidation process to extract gold or silver except as provided in paragraph (d)(2) of this section.

(2) In the event that the annual precipitation falling on the treatment facility and the drainage area contributing surface runoff to the treatment facility exceeds the annual evaporation, a volume of water equal to the difference between annual precipitation falling on the treatment facility and the drainage area contributing surface runoff to the treatment facility and annual evaporation may be discharged subject to the limitations set forth in paragraph (a) of this section.

(e) The concentration of pollutants discharged in mine drainage or discharged from mines and mills beneficiating gold, silver, or platinum ores by gravity separation methods including mining of placer deposits, dredge mining and hydraulic mining operations shall not exceed: (Reserved)

§ 440.124 New source performance standards (NSPS).

Except as provided in Subpart M—General Provisions and Definitions, any new source subject to this subsection must achieve the following NSPS representing the degree of effluent reduction attainable by the application of the best available demonstrated technology (BADT):

(a) The concentration of pollutants discharged in mine drainage from mines that produce copper, lead, zinc, gold, silver, platinum or molybdenum bearing ores or any combination of these ores from open-pit or underground operations other than placer deposits shall not exceed:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days
Milligrams per liter		
Cu.....	0.30	0.15
Zn.....	1.5	0.75
Pb.....	0.6	0.3
Hg.....	0.002	0.001
Cd.....	0.10	0.05
pH.....		
TSS.....	30.0	20.0

¹ Within the range 6.0 to 9.0.

(b) (1) There shall be no discharge of process wastewater from mills that use the froth-flotation process alone, or in conjunction with other processes, for the

beneficiation of copper, lead, zinc, gold, silver, platinum or molybdenum ores or any combination of these ores except as provided in paragraph (b)(2) of this section.

(2) In the event that the annual precipitation falling on the treatment facility and the drainage area contributing surface runoff to the treatment facility exceeds the annual evaporation, a volume of water equal to the difference between annual precipitation falling on the treatment facility and the drainage area contributing surface runoff to the treatment facility and annual evaporation may be discharged subject to the limitations set forth in paragraph (a) of this section.

(c) (1) There shall be no discharge of process wastewater from mine areas and mills processes and areas that use dump, heap, in-situ leach or vat-leach processes to extract copper from ores or ore waste materials except as provided in paragraph (c)(2) of this section.

(2) In the event that the annual precipitation falling on the treatment facility and the drainage area contributing surface runoff to the treatment facility exceeds the annual evaporation, a volume of water equal to the difference between annual precipitation falling on the treatment facility and the drainage area contributing surface runoff to the treatment facility and annual evaporation may be discharged subject to the limitations set forth in paragraph (a) of this section.

(d) (1) There shall be no discharge of process wastewater from mills that use the cyanidation process to extract gold or silver except as provided in paragraph (d)(2) of this section.

(2) In the event that the annual precipitation falling on the treatment facility and the drainage area contributing surface runoff to the treatment facility exceeds the annual evaporation, a volume of water equal to the difference between annual precipitation falling on the treatment facility and the drainage area contributing surface runoff to the treatment facility and annual evaporation may be discharged subject to the limitations set forth in paragraph (a) of this section.

(e) The concentration of pollutants discharged from mines and mills beneficiating gold, silver, or platinum ores by gravity separation methods including mining of placer deposits, dredge mining and hydraulic mining operations shall not exceed: [Defined at a later date]

§ 440.125 Effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT).

Except as provided in Subpart M of this regulation and 40 CFR 125.30—125.32, any existing source subject to this subpart must achieve the following limitations:

(a) The concentration of pollutants discharged in mine drainage from mines that produce copper, lead, zinc, gold, silver, platinum or molybdenum bearing ores or any combination of these ores from open-pit or underground operations, except gold placer mines, shall not exceed:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days
Milligrams per liter		
pH	(¹)	(¹)
TSS	30.0	20.0

¹ Within the range 6.0 to 9.0.

(b) The concentration of pollutants discharged from mills that use froth-flotation process alone, or in conjunction with other processes, for the beneficiation of copper, lead, zinc, gold, silver, platinum, or molybdenum ores, or any combination of these shall not exceed:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
Milligrams per liter		
pH	(¹)	(¹)
TSS	30.0	20.0

¹ Within the range 6.0 to 9.0.

(c)(1) There shall be no discharge of process wastewater from mines and mills that extract copper from ores or ore waste materials by the dump, heap, in-situ leach or vat-leach processes except as provided in paragraph (c)(2) of this section.

(2) In the event that the annual precipitation falling on the treatment facility and the drainage area contributing surface runoff to the treatment facility exceeds the annual evaporation, a volume of water equal to the difference between annual

precipitation falling on the treatment facility and the drainage area contributing surface runoff to the treatment facility and annual evaporation may be discharged subject to the limitations set forth in paragraph (a) of this section.

(d)(1) There shall be no discharge of process wastewater from mills that use the cyanidation process to extract gold or silver except as provided in paragraph (d)(2) of this section.

(2) In the event that the annual precipitation falling on the treatment facility and the drainage area contributing surface runoff to the treatment facility exceeds the annual evaporation, a volume of water equal to the difference between annual precipitation falling on the treatment facility and the drainage area contributing surface runoff to the treatment facility and annual evaporation may be discharged subject to the limitations set forth in paragraph (a) of this section.

Subpart M—General Provisions and Definitions

§ 440.130 Applicability.

Abbreviations and methods of analysis set forth in 40 CFR 401 shall apply to Part 440 except as provided in these general provisions and definitions. The general provisions and definitions in this subpart apply to all subparts of Part 440.

§ 440.131 General Provisions.

(a) Existing sources which as of the date of this proposal have combined for treatment waste streams from various subparts or segments of subparts in Part 440: The quantity and quality of each pollutant or pollutant property in the combined discharge that is subject to effluent limitations shall not exceed the quantity and quality of each pollutant or pollutant property that would have been discharged had each waste stream been treated separately. The discharge flow from a combined discharge shall not exceed the volume that would have been discharged had each waste stream been treated separately.

(b) New sources that combine for treatment waste streams from various subparts or segments of subparts in Part 440: The quantity and quality of each pollutant or pollutant property in the combined discharge that is subject to effluent limitations shall not exceed the quantity and quality of each pollutant or pollutant property that would have been discharged had each waste stream been treated separately. The discharge flow from a combined discharge shall not exceed the volume that would have

been discharged had each waste stream been treated separately.

(c) Existing sources and new sources that are permitted to discharge subject to effluent limitations and that are designed, constructed, and maintained to contain or treat the maximum volume of process wastewater discharged in a 24-hour period, including the volume which would result from a 10-year, 24-hour precipitation event, or snowmelt of equal volume: Any excess wastewater discharged shall not be subject to the limitations set forth in 40 CFR 440.

(d) Existing sources which are not permitted to discharge and that are designed, constructed, and maintained to contain the maximum volume of process wastewater discharged in a 24-hour period including the volume that would result from a 10-year, 24-hour precipitation event, or snowmelt of equal volume: Any excess wastewater discharged shall not be subject to the limitations set forth in 40 CFR 440.

(e) Determining the maximum volume of wastewater which would result from a 10-year 24 hour precipitation event at any facility (in (c) and (d) above): The volume must include the volume that would result from runoff from all areas contributing runoff to the individual treatment facility, i.e. all runoff that is not diverted from the active mining area, run off which is not diverted from the mill area, and other runoff that is allowed to commingle with the influent to the treatment system.

(f) New sources that must achieve no discharge of process wastewater: Excess wastewater that results from the occurrence of a 10-year, 24-hour precipitation event or snowmelt of equal volume may be discharged and shall not be subject to the limitations set forth in 40 FR 440.

(g) When neutralization and sedimentation treatment technology to comply with the metal limitations set forth results in inability to meet the pH range of 6 to 9:

(1) The permit issuer may allow the pH level in the final effluent to slightly exceed 9.0 so that the metals effluent limitations in the permit will be achieved.

(2) For a discharge into receiving waters for which the pH (if unaltered by human activities) is or would be less than 6.0 and if approved water quality standards authorize such lower pH, the pH limitation for the discharge may be adjusted downward to the pH water quality criterion for the receiving waters if the other effluent limitations for the discharge are met.

§ 440.132 General definitions.

(a) "Active mining area" is a place where work or other activity related to the extraction, removal, or recovery of metal ore is being conducted, except, with respect to surface mines, any area of land on or in which grading has been completed to return the earth to desired contour and reclamation work has begun.

(b) "Mine" is an active mining area, including all land and property placed under, or above the surface of such land, used in or resulting from the work of extracting metal ore from its natural deposits by any means or method, including secondary recovery of metal ore from refuse or other storage piles derived from the mining, cleaning, or concentration of metal ores.

(c) "Mill" is a preparation facility within which the metal ore is cleaned, concentrated, or otherwise processed

before it is shipped to the customer, refiner, smelter, or manufacturer. A mill includes all ancillary operations and structures necessary to clean, concentrate, or otherwise process metal ore, such as ore and gangue storage areas and loading facilities.

(d) "10-year, 24-hour precipitation event" is the maximum 24-hour precipitation event with a probable recurrence interval of once in 10 years as defined by the National Weather Service and Technical Paper No. 40, "Rainfall Frequency Atlas of the U.S.," May 1961, and subsequent amendments, or equivalent regional or rainfall probability information based on the paper.

(e) "Annual precipitation" and "annual evaporation" are the mean annual precipitation and mean annual lake evaporation, respectively, as defined in *Climatic Atlas of the United*

States, U.S. Department of Commerce, Environmental Science Services Administration, Environmental Data Services, June 1968, or equivalent regional rainfall and evaporation data.

(f) "U" (Uranium) is measured by the procedure discussed in *HASL Procedure Manual*, edited by John H. Harley, HASL 300 Health and Safety Laboratory, U.S. Atomic Energy Commission, 1973, pg. EU-03, or an equivalent method.

(g) "Chrysotile asbestos" is measured by the procedure discussed in Charles H. Anderson and J. MacArthur Long, *Preliminary Interim Procedure for Fibrous Asbestos*, EPA 600/4-80-005, PB-80-152879. The procedure is also presented in Addendum A to the technical development document.

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