

NEIC

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SUMMARY

PRETREATMENT CRITERIA

*Taken from Pretreatment Standards
for Existing and New Sources
and from Various EPA Limitations-Guidelines
Development Documents*

[Current as of March 1977]

EPA-330/1-77-010

u.s. environmental protection agency
office of enforcement



ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF ENFORCEMENT
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July 1977

National Enforcement Investigations Center
Denver, Colorado

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FOREWORD

Pretreatment standards and criteria are expected to undergo considerable change in the future and those who deal with pretreatment issues should strive to keep informed of all updatings.

This Pretreatment Report has been prepared to satisfy, at least in part, a pressing need for information on pretreatment of industrial wastes -- that is, treatment before these wastes are properly received into municipal collection and disposal systems. This information has been widely requested. In connection with ongoing technical support activities on pretreatment, the Environmental Protection Agency (EPA) National Enforcement Investigations Center (NEIC), Denver, Colorado has compiled and summarized available data on pretreatment principally as found in the Code of Federal Regulations, Title 40 - Protection of the Environment, Subchapter N - Effluent Guidelines and Standards, Parts 405-460. This, in turn, was supplemented by various available USEPA Effluent Limitations Guidelines Development Documents prepared from 1973 through the present.

This Pretreatment Report covers 42 different industries, which are represented by 50 sections. Each section is divided into various subparts consisting of: Subcategorization and Description of the Industry; Nature of the Problem; Waste Parameters of Concern; Preliminary Limitations for Discharge to POTW's^{*}; and Prescribed Pretreatment Measures. Detailed industry description is provided for two reasons: 1) to summarize this information in a single EPA report; and 2) since NEIC in June 1977 published another document summarizing Limitations Guidelines for Existing Sources and New Sources across the same industry classifications, a thorough industry description will enable easier and more complete use of the June 1977 publication.

* *Publicly Owned Treatment Works*

In the Federal Register of February 2, 1977, the USEPA gave notice of intentions to issue regulations setting up mechanisms and procedures for controlling the introduction of industrial wastes into POTW's. The preamble to these general pretreatment regulations would set forth EPA's overall policy for the establishment and enforcement of pretreatment regulations. Four options were proposed giving various approaches to establishing and enforcing pretreatment requirements. These options differed mainly in terms of the degree to which industrial users of POTW's would be controlled by Federally promulgated technology-based standards vs. locally developed and applied pretreatment limits. The options also vary in terms of the particular government body (i.e. Federal, State or local) charged with primary responsibility for enforcement of applicable requirements. These options are very briefly delineated below. It is intended that one of these options will be selected in the near future as part of a National Pretreatment Strategy.

Option I - Local enforcement, monitoring and reporting would be heavily emphasized. Local agencies would be expected to require compliance with Federal technology-based standards or alternative standards where variances are approved.

Option II - Local enforcement of technology standards integrated with locally-derived water quality based pretreatment limits in lieu of Federal standards.

Option III - Local enforcement but with Federal technology-based standards for the more hazardous pollutants and the more significant industries discharging these pollutants. Local standards would apply in all other cases.

Option IV - The regulatory program would rely heavily upon the USEPA and the NPDES States, and Federal technology-based pretreatment standards would be issued.

In connection with the above notice, the USEPA in January 1977 released a three-volume document titled "Federal Guidelines and State and Local Pretreatment Programs," EPA Report MCD-43. The report provides introduction to the pretreatment problems and information on management of a control program, legal aspects of a control program, monitoring, pollutants which interfere with POTW's, and removal and pass-through of pollutants in POTW's. Volumes II and III comprise a series of useful technical appendices.

This report is a compilation of draft, interim, interim final, and final regulations, and information from the various Development Documents and other sources, current through March 1977. Where pretreatment regulations have been superseded, remanded or revoked, these changes are indicated. However, all changes in the Code of Federal Regulations may not have been incorporated in this report; therefore, such accuracy is not claimed. Much of the information contained herein is of guidance nature only. It is recommended this Report be used as a summary, or desk reference. The Federal Register should be consulted for official application of pretreatment limitations.

DAIRY PRODUCTS INDUSTRY
(40, 41, 42)
[Part 405]

SUBCATEGORIZATION OF THE INDUSTRY

The Dairy Products Industry is divided into twelve Subcategories as defined below:

- A - Receiving Stations
- B - Fluid Products
- C - Cultured Products
- D - Butter
- E - Cottage Cheese and Cultured Cream Cheese
- F - Natural and Processed Cheese
- G - Fluid Mix for Ice Cream and Other Frozen Desserts
- H - Ice Cream, Frozen Desserts, Novelties and Other Dairy Desserts
- I - Condensed Milk
- J - Dry Milk
- K - Condensed Whey
- L - Dry Whey

Subcategory A, Receiving Stations. Establishments engaged in the assembly and reshipment of bulk milk for the use of manufacturing or processing plants. Receiving stations have been further subdivided into establishments receiving more than 150,000 lb. milk daily vs. those receiving less than 150,000 lb. milk daily.

Subcategory B, Fluid Products. Manufacture of market milk, flavored milk (chocolate and others), and cream (of various fat concentrations, plain and whipped). Fluid product plants have been further subdivided into establishments receiving more than - and less than - 250,000 lb. milk equivalent daily.

Subcategory C, Cultured Products. Manufacture of cultured products, including cultured skim milk, yogurt, sour cream, and dips of various types, including cultured cream cheese dip. Cultured product plants have been further subdivided into establishments receiving more than - and less than - 60,000 lb. milk equivalent daily.

Subcategory D, Butter. Manufacture of butter, either by the churning or continuous process. Butter plants have been further subdivided into establishments processing more than - and less than - 175,000 lb milk equivalent daily.

Subcategory E, Cottage Cheese and Cultured Cream Cheese. Manufacture of cottage cheese curd and cultured cream cheese (soft), as opposed to rennet curd natural and processed cheese. Cottage cheese plants have been subdivided into establishments processing more than - and less than - 25,000 lb. milk equivalent daily.

Subcategory F, Natural and Processed Cheese. Manufacture of natural cheese (hard curd) and processed cheese. These plants have been subdivided into establishments processing more than - and less than - 100,000 lb. milk equivalent daily.

Subcategory G, Fluid Mix For Ice Cream and Other Frozen Desserts. These products are manufactured for later freezing in other plants. The fluid mix plants have been subdivided into establishments receiving more than - and less than - 85,000 lb. milk equivalent daily.

Subcategory H, Ice Cream, Frozen Desserts, etc. Manufacture of ice cream, ice milk, sherbet, water ices, stick confections, frozen novelties products, frozen desserts, melonne, puddings and other dairy product-base desserts. Ice cream and associated plants have been subdivided into establishments receiving more than - and less than - 85,000 lb. milk equivalent daily.

Subcategory I, Condensed Milk. Manufacture of condensed whole milk, condensed skim milk, sweetened condensed milk and condensed buttermilk. Condensed milk plants have been subdivided into establishments condensing more than - and less than - 100,000 lb milk equivalent daily. For the smaller size plants, the limitations documents indicate that once-through barometric condenser waters may be discharged untreated if the composite NET entrainment is less than 15 mg/l BOD₅ for any single day, and less than 10 mg/l BOD₅ as an average for 30 consecutive days.

Subcategory J, Dry Milk. Manufacture of dry whole milk, dry skim milk, and dry buttermilk. Milk drying plants have been subdivided into establishments receiving more than - and less than - 145,000 lb. milk equivalent daily.

Subcategory K, Condensed Whey. Manufacture of condensed whey and condensed acid whey. Whey condensing plants have been subdivided into establishments receiving more than - and less than - 300,000 lb. fluid raw whey daily. For the smaller size plants the limitations documents indicate that once-through barometric condenser waters may be discharged untreated if the composite NET entrainment is less than 15 mg/l BOD₅ for any single day, and less than 10 mg/l BOD₅ as an average for 30 consecutive days.

Subcategory L, Dry Whey. Manufacture of dry sweet whey and dry acid whey. Whey drying plants have been subdivided into establishments receiving more than - and less than - 57,000 lb of 40 percent dry solids daily.

NATURE OF PROBLEM

In 1970, there were approximately 5,500 dairy plants in the United States. Many are multi-product facilities. Pollutants in wastewaters from dairy product plants represent materials lost through processing of raw materials into finished products, and materials lost from ancillary operations. The former consists of milk, milk products and non-dairy ingredients such as sugar, fruit, nuts, etc. The latter consists of cleaners and sanitizers, lubricants, sanitary wastes, etc. Dairy plant wastes with the possible exception of certain lubricants, cleaners, sanitizers and concentrated wheys are relatively degradable in biological waste treatment systems. Refractive materials are generally present in fairly low concentrations.

PARAMETERS OF CONCERN

BOD	Phosphorus
COD	Nitrogen
TSS	Chlorides
pH	Temperature

The majority of phosphorous is contributed by wasted detergents. Some cleaning solutions may be recycled. Quaternary ammonium compounds used for sanitizing and certain detergents can be a source of nitrogen in dairy wastewaters. Principal sources of chloride include brine leaked from refrigerator systems and chlorine-based sanitizers.

PRELIMINARY LIMITATIONS FOR DISCHARGE TO POTW AND PRESCRIBED PRETREATMENT MEASURES

No specific pretreatment limitations have been developed for Existing and/or New dairy product establishments. It has been determined that dairy plant discharges are treatable and can be handled by biological treatment provided that suitable design and capacity have been incorporated into the POTW. Equalization of dairy wastes may be necessary in some cases. Difficulties may be experienced in attaining normal treatment efficiencies when the BOD load attributable to whey exceed 10 percent of the total POTW load received. This is especially true without proper wastes equalization. Consequently, under given situations, whey may not be a compatible pollutant at the POTW.

The best approach by dairy plants to reduce excessive surcharges and waste load to the POTW is to practice good in-plant controls and recycling of cooling waters. If the local authority requires pretreatment, this may take the form of anaerobic digestion, high-rate biological systems, stabilization ponds, aerated ponds, or chemical treatment. Anaerobic digestion may be applicable to small plants discharging low volume wastes. If dairy wastes comprise a significant portion of the total load to the POTW, it may be necessary to completely separate the whey to avoid upset of the treatment works.

Grease, fats and oils in dairy wastes generally do not pose a large problem to the municipality. Large quantities of floating fats and grease from dairy effluents could, however, adhere or cling to sewer lines and in some cases, clog sewerage systems.

GRAIN MILLING INDUSTRY
(96, 97, 98, 99, 100, 101, 102, 103)
[Part 406]

SUBCATEGORIZATION OF THE INDUSTRY

The Grain Milling Industry is divided into 10 Subcategories. Six Subcategories are devoted to grain processing including corn, wheat and rice. The remaining four subcategories cover the production of animal feeds, breakfast cereals, and wheat starch. These subcategories are described in further detail below.

- A - Corn Wet Milling
- B - Corn Dry Milling
- C - Normal Wheat Flour Milling
- D - Bulgur Wheat Flour Milling
- E - Normal Rice Milling
- F - Parboiled Rice Processing
- G - Animal Feeds
- H - Hot (Breakfast) Cereals
- I - Ready-to-eat (Breakfast) Cereals
- J - Wheat Starch and Gluten

Subcategory A, Corn Wet Milling. Processing includes the dry cleaning of the shelled corn, followed by softening of the kernels in the steeping operations, followed by wet milling. The latter serves to separate the germ, starch, gluten and hulls. Further wet processing can be used to produce corn oil, regular modified starches, corn syrup, dextrose and animal feed.

Subcategory B, Corn Dry Milling. Differs substantially from corn wet milling. After the corn is washed, only dry processing is used to produce corn meal, grits, flour, oil and animal feed.

Subcategory C, Normal Wheat Flour Milling. Preparation of wheat into ground flour or granular product is fundamentally a dry milling process, which distinguishes it from the production of bulgar flour. After cleaning with water or air, moisture is added in a tempering process with no water discharged, followed by dry milling. Dry milling in this case separates the germ and bran from the flour.

Subcategory D, Bulgar Wheat Flour Milling. Differs from normal wheat flour milling in that the wheat is parboiled, and then dried before milling.

Subcategory E, Normal Rice Milling. In contrast to corn and wheat, the product of rice processing is the whole grain rather than the flour or meal. Rough rice is cleaned and then milled to remove hulls, bran and germ. The latter may be sold separately or combined into animal mill feed. The polished rice is eventually enriched with vitamins and minerals before packaging.

Subcategory F, Parboiled Rice Processing. Parboiling differs from normal rice processing only in the soaking and cooking operations known as parboiling.

Subcategory G, Animal Feeds. Animal feeds (formula feed concentrate) are manufactured primarily using grain and grain by-products, which may be supplemented by proteins, pharmaceuticals, vitamins or mineral additives.

Subcategory H, Hot Cereals. The production of various breakfast cereals from grains, principally wheat and oats, and requiring cooking prior to normal human consumption.

Subcategory I, Ready-To-Eat Cereal. The processing of various grains and other materials (whole grain wheat, rice, corn grits, oat flour, sugar and minor ingredients) to produce various breakfast cereals normally available for human consumption without cooking.

Subcategory J, Wheat Starch and Gluten. Wheat flour is used as a raw material for production of wheat starch and gluten (protein) components through conventional processes of physical separation and subsequent refinement.

NATURE OF PROBLEM

The industry incorporates the three main grains of corn, wheat and rice. Finished products from the milling of the different grains are quite distinct. Corn milling products range from corn meal and grits to starch and syrup. Wheat milling principally produces flour for baking and other purposes, and the specialty product of bulgar wheat. Rice milling yields ordinary and parboiled rice for human consumption.

The animal feed, breakfast cereal, and wheat starch industries all utilize products from basic grain processing mills for raw materials. Grain and grain milling by-products are the chief ingredients in animal feed. The manufacture of breakfast cereals utilize both milled and whole

grain, particularly corn, wheat, oats and rice. Wheat starch manufacturing employs wheat flour as its raw material. Of all cereal grain produced in the U.S., only about 15% is used as food for human consumption. The vast majority of the grain harvested is used to feed poultry and livestock. "Complete feeds" have been replaced by "feed concentrates." The farmer mixes his own grain with the feed concentrates. Also, many manufacturers of drugs and feed ingredients have developed combinations of drugs and vitamins known as "premixes" to which protein and grain are added.

Corn wet milling uses more water and generates more waste water than any other grain milling process. Major waste streams include: condensates from steep water evaporation, cooling water from once-through barometric condensers, waste water from modified starch production, and waste water from activated carbon and ion exchange units and evaporation of syrup in the syrup refining operations. Raw waste waters from wet corn milling plants may range from 1 to 30 MGD. The BOD₅ of these wastes averages 415 lbs/1,000 Standard Bushels. The term Standard Bushel means a bushel of shelled corn weighing 56 lbs.

A large percentage of grain mills discharge to POTW's. Regarding starch and gluten mills in particular, these effluents may require special pretreatment in order to reduce waste strength prior to entering the municipal system.

PARAMETERS OF IMPORTANCE

BOD	TDS
COD	Phosphorous
TSS	Total Nitrogen
pH	Temperature

PRELIMINARY LIMITATIONS FOR DISCHARGE TO POTW AND PRESCRIBED TREATMENT MEASURES

Except for excessive peak discharges of Corn Wet Milling wastes into POTW's, which may need to be closely controlled, the Federal Regulations and accompanying EPA Development Documents for Grain Mills describe these wastes as compatible with POTW's. No pretreatment limitations have been placed upon Existing mills within Subcategories A through F, and both Existing and New mills within Subcategories G through J. Pretreatment limitations for New Sources within Subcategories A through F are not completely defined. However, they would likely approximate

limitations given for Existing Sources in these same Subcategories, which means the absence of any limitations. The one possible exception is given as follows.

For Subcategory A, Corn Wet Milling. New Sources, redefined in response to the Federal Court remand of May 5, 1975.

"Process waste water shall not be discharged to a POTW at a flow rate or pollutant mass loading rate which is excessive over any time period during the peak load at a POTW. Excessive (peak) discharges are defined as those in which the flow of BOD₅ or TSS exceed the respective values of P from the following formula, which is based upon dry weather conditions:

$$P = K (Q + R) - S$$

Where:

P = Maximum allowable Peak waste load for the New Corn Wet Milling Source to be discharged to the POTW (gallons per hour for flow, and lbs per day for BOD₅ and TSS)

Q = Average existing waste load to POTW

R = Average waste load for the New Corn Wet Milling Source to be discharged to the POTW

S = Existing peak load of POTW

K = 2, except when ratio of S/Q > 1.5 in which case K = 3

CANNED AND PRESERVED FRUITS AND VEGETABLES INDUSTRY
(10, 30, 132, 133, 134, 135)
[Part 407]

SUBCATEGORIZATION OF THE INDUSTRY

The industry has been divided into eight subcategories but some of the subcategories comprise a great number of commodities as described below:

- A - Apple Juice
- B - Apple Products
- C - Citrus Products
- D - Frozen Potato Products
- E - Dehydrated Potato Products
- F - Canned and Preserved Fruits, in turn including:

Apricots	Grape Juice-Canning	Pineapple
Caneberries	Grape Juice-Pressing	Plums
Cherries-Sweet	Olives	Raisins
Cherries-Sour	Peaches	Strawberries
Cherries-Brined	Pears	Tomatoes
Cranberries	Pickles-Fresh Pack	
Dried Fruit	Pickles-Process Pack	
	Pickles-Salt Stations	

- G - Canned and Preserved Vegetables, in turn including:

Beets	Dehydrated Vegetables	Sauerkraut-Canning
Broccoli	Dry Beans	Sauerkraut-Cutting
Carrots	Lima Beans	Snap Beans
Corn-Canned	Mushrooms	Spinach
Corn-Frozen	Onions-Creamed	Squash
Dehydrated Onion and Garlic	Peas	Potatoes

- H - Canned and Miscellaneous Specialties, in turn including:

Added Ingredients	Ethnic Foods
Baby Food	Jams and Jellies
Chips-Corn	Mayonnaise and Dressings
Chips-Potato	Soups
Chips-Tortilla	Tomato-Starch-Cheese Canned Specialties

NATURE OF PROBLEM

In 1971, 164 apple processing plants were identified and located among 28 States. Citrus is the largest fruit crop in the U.S. Some 97 citrus

plants were identified in 14 States, primarily Florida, California, Texas and Arizona. In 1972, there were 112 canned and frozen potato processing plants in 31 States. Of all potatoes processed, frozen french fries account for 45 percent, dehydrated potatoes about 20 percent, potato chips 30 percent, and canned potatoes the remaining 5 percent.

Excluding apples, citrus and potatoes, the industry operated more than 2,000 plants in 1967. Approximately 30 million tons of fruits and vegetables are processed annually. It is estimated around 55 percent of the processing plants discharge their liquid wastes to municipal sewers, 33 percent have land disposal, and 12 percent discharge to navigable waterways.

Although effluents from this industry are generally considered compatible with well designed and operated biological POTW's, judgement must be made as to the type and degree of pretreatment necessary to protect the POTW. Citrus wastes containing citrus oil may be biologically treated but only with difficulty. The oil also creates sludges that are difficult to dewater. Fruit and vegetable wastes have the potential to adversely affect POTW's in many ways:

Flow Volume: The industry is frequently characterized by high volumes of waste discharged seasonally, also having high hourly fluctuation in flow. Flow equalization may be necessary. Installation of cooling towers may serve to reduce high-volume cooling water discharges.

Organic Strength: Wastes are oftentimes high in BOD but are compatible to POTW's provided that the municipal system has sufficient capacity to handle the combined municipal and industrial waste loads. In troublesome cases, pretreatment may be necessary by the industrial plant to reduce organic loads.

Oil and Grease: Certain sectors of the industry discharge high concentrations of oil and grease. Regulation may be required to protect the collection system from stoppages and to safeguard the treatment works.

Dissolved Solids: Appreciable concentration of chlorides and other inorganic solids may be experienced by the POTW receiving certain subcategory wastes. These constituents will pass through the POTW and this condition may determine whether the municipality should accept the subject wastes.

PARAMETERS OF CONCERN

pH, Acidity, Alkalinity	COD
BOD	Nitrogen, including Ammonia N
TSS	Phosphorous
Oil/Grease	TDS
Fecal Coliforms	Temperature
Chlorides	Pesticides

pH: Low pH levels can be experienced during slicing, grinding and macerating operations. Wastewater from steam-peeled carrots and blanched prunes is acidic enough in some cases to require lime treatment before final release. Conversely lye peeling waste may require neutralization with acid prior to final discharge.

TDS, Chlorides: High chlorides in wastewaters from pickle, sauerkraut, olive and other brine processing plants may be of significance when biological treatment is utilized. Although aerobic biological systems may possibly adapt to high chlorides, concentrations should be constrained to a fairly narrow range, either by in-plant control of brine wastes or by flow equalization. Shock loads to the biological system, can substantially reduce treatment efficiency.

Other Pollutants: Agricultural chemicals and pesticides are found in wastewaters from fruit and vegetables processing plants primarily in the initial washings of raw commodities. However, they should not constitute significant pollutants.

PRELIMINARY LIMITATIONS FOR DISCHARGE TO POTW

No specific limitations have been prescribed to date.

PRESCRIBED PRETREATMENT MEASURES OR EQUIVALENT

No across-the-board unit operations are defined, although screening, flow equalization, grease removal, and possible pH control, may be implied for a number of fruit and vegetable processing plants.

Especially with citrus and potato wastewaters, three streams have been found detrimental to POTW's having secondary treatment including: spent caustic solutions from peeling operations; d'limonene from citrus peel processing operations; and oils from frying operations. Adequate control methods should be used to minimize effects of these particular wastes.

CANNED AND PRESERVED SEAFOOD PROCESSING INDUSTRY
(30, 104, 105, 106, 107)
[Part 408]

SUBCATEGORIZATION OF THE INDUSTRY

The Canned and Preserved Seafood Industry has been divided into 33 Subcategories. The various subcategories cover processing of catfish, crab, shrimp, tuna, fish meal, salmon, bottom fish, clam, oyster, sardine, scallop, herring fillet and abalone commodities. These 33 subcategories are tabulated and described below.

- A - Farm-Raised Catfish
- B - Conventional Blue Crab Processing
- C - Mechanized Blue Crab Processing
- D - Non-Remote Alaskan Crab Meat Processing
- E - Remote Alaskan Crab Meat Processing
- F - Non-Remote Alaskan Whole Crab and Crab Section Processing
- G - Remote Alaskan Whole Crab and Crab Section Processing
- H - Dungeness and Tanner Crab Processing in the Contiguous States
- I - Non-Remote Alaskan Shrimp Processing
- J - Remote Alaskan Shrimp Processing
- K - Northern Shrimp Processing in the Contiguous States
- L - Southern Non-Breaded Shrimp Processing in the Contiguous States
- M - Breaded Shrimp Processing in the Contiguous States
- N - Tuna Processing
- O - Fish Meal Processing
- P - Alaskan Hand-Butchered Salmon Processing
- Q - Alaskan Mechanized Salmon Processing
- R - West Coast Hand-Butchered Salmon Processing
- S - West Coast Mechanized Salmon Processing
- T - Alaskan Bottom Fish Processing
- U - Non-Alaskan Conventional Bottom Fish Processing
- V - Non-Alaskan Mechanized Bottom Fish Processing
- W - Hand-Shucked Clam Processing

- X - Mechanized Clam Processing
- Y - Pacific Coast Hand-Shucked Oyster Processing
- Z - Atlantic and Gulf Coast Hand-Shucked Oyster Processing
- AA - Steamed and Canned Oyster Processing
- AB - Sardine Processing
- AC - Alaskan Scallop Processing
- AD - Non-Alaskan Scallop Processing
- AE - Alaskan Herring Fillet Processing
- AF - Non-Alaskan Herring Fillet Processing
- AG - Abalone Processing

Subcategory A, Farm-Raised Catfish. Applicable to facilities processing more than 3,000 lbs raw material/day on any day during the calendar year, and all New sources.

Subcategory B, Conventional Blue Crab. Manual picking or separation of crab meat from the shell. Applicable to facilities processing more than 3,000 lb raw material/day on any day during the calendar year, and all New sources.

Subcategory C, Mechanized Blue Crab. Processing of blue crab in which mechanical picking or separation of crab meat from the shell is utilized.

Subcategories D and E, Non-Remote and Remote Alaskan Crab Meat. The processing of dungeness, tanner and King crab meat both in Subcategories D and E. Non-remote refers to population or processing centers in Alaska including but not limited to Anchorage, Cordova, Juneau, Ketchikan, Kodiak and Petersburg.

Subcategories F and G, Non-Remote and Remote Alaskan Whole Crab Sections. The processing of dungeness, tanner and King whole crab and crab sections both in Subcategories F and G.

Subcategories I and J, Non-Remote and Remote Alaskan Shrimp Processing. Self explanatory.

Subcategory K, Northern Shrimp Processing in Contiguous States. Applicable to the States of Washington, Oregon, California, Maine, New Hampshire and Massachusetts and to plants processing more than 2,000 lb raw material/day on any day during a calendar year, and all New sources.

Subcategory L, Southern Non-breaded Shrimp Processing in Contiguous States. Applicable to States of North and South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana and Texas, and to plants processing more than 2,000 lb raw material/day on any day during a calendar year, and all New sources.

Subcategory M, Breaded Shrimp Processing in Contiguous States. Applicable to plants processing more than 2,000 lb raw material/day on any day during a calendar year, and all New sources.

Subcategory O, Fish Meal Processing. Processing of menhaden on the Gulf and Atlantic coasts and processing of anchovy on the West Coast into fish meal, oil, and solubles.

Subcategory U, Non-Alaskan Conventional Bottom Fish Processing. Applicable to processing of bottom fish outside of Alaska in which unit operations are carried out predominately through manual methods. However, the use of scaling machines and/or skinning machines are considered normal in this subcategory. Commercially processed species of bottom fish include flounder, ocean perch, haddock, cod, sea catfish, sole, halibut and rockfish. Subcategory U applies to plants processing more than 4,000 lb raw material/day on any day during the calendar year, and all New sources.

Subcategory V, Non-Alaskan Mechanized Bottom Fish Processing. Refers to processing of bottom fish such as whiting and croaker.

Subcategory W, Hand-Shucked Clam Processing. Applies to plants processing more than 4,000 lb raw material/day on any day during the calendar year, and all New sources.

Subcategory Y, Pacific Coast Hand-Shucked Oyster Processing. Applicable to plants processing more than 1,000 lb of product (oyster meat after shucking)/day on any day during the calendar year, and all New sources.

Subcategory Z, and Gulf Coast Hand-Shucked Oyster Processing. Same size plant as defined for Subcategory Y.

Subcategory AA, Steamed and Canned Oyster Processing. Applies to plants processing mechanically shucked oysters.

Subcategory AB, Sardine Processing. Applies to canning of sardines or sea herring for sardines but the Subcategory does not cover the relatively new steaking operations in which cutting machines are used for preparing fish steaks.

Definitions of Subcategories not specifically cited above, are thought to be self-explanatory.
self-

NATURE OF THE PROBLEM

Quantities of waste discharged from seafood processing plants can range from 30 to 80% or more of the weight of raw material. In many cases, there is little or no pretreatment of seafood processing wastes, before final discharge. Generally, major waste sources in a seafood processing plant include: receiving, pre-processing, evisceration, pre-cooling, picking and cleaning, shucking, preserving, canning, freezing, plant cleanup and byproduct operations.

PARAMETERS OF IMPORTANCE

BOD	TKN, Ammonia and Nitrate N
COD	Phosphorous
Settleable Solids	Coliform Bacteria
TSS	Chlorides
Oil/Grease	Temperature
pH	

PRELIMINARY LIMITATIONS FOR DISCHARGE TO POTW AND PRESCRIBED TREATMENT MEASURES

No constituents in the waste discharges from seafood processing plants have been found in the concentrations measured, to interfere with, pass through, or otherwise be incompatible with well-designed and well-operated biological POTW's. It is however, suggested that these effluents should be passed through primary treatment in order to remove settleable solids and excessive oils and greases. Sodium chloride levels may also be sufficiently high to warrant dilution.

The Federal Regulations for Seafood Processing have determined that Existing Sources within all 33 Subcategories be allowed entry into municipal POTW's without pretreatment limitations. Similar definition is given for New Sources within Subcategories O through AG. Pretreatment for New Sources in Subcategories A through N appears to be the same as for Existing Sources in these same Subcategories, which is determined to be "None" although primary treatment is preferred.

BEET SUGAR PROCESSING
(30, 59, 60)
[Part 409]

SUBCATEGORIZATION OF THE INDUSTRY

The Beet Sugar Processing Industry is defined as a single Subpart, i.e., Subcategory A of the overall sugar processing industry. However, this Subcategory has been divided into different BPT and BAT effluent limitations based upon the size of plant, availability of land for waste disposal and other criteria. Beet sugar processing plants convert raw sugar beets into refined crystalline and liquid refined sugar.

NATURE OF THE PROBLEM

Fifty-three beet sugar processing factories were identified during the EPA Guidelines study of the early 1970's. Twelve of these plants were reported to be achieving zero waste discharge. Major waste streams include flume water, lime mud slurry, diffuser water, cleaning wastes and barometric condenser waters. Only a few sugar beet mills are connected to municipal sewers and waste treatment systems.

PARAMETERS OF CONCERN

BOD	COD
TSS	Total and Fecal Coliforms
pH	TDS
Temperature	Nitrogen, especially Ammonia
	Phosphorous

PRELIMINARY LIMITATIONS FOR DISCHARGE TO POTW AND PRESCRIBED TREATMENT MEASURES

The Federal Register documents appropriate to Existing and New sugar beet mills have described resulting effluents as essentially compatible to receiving POTW's. No limitations have been given. It has been determined that pretreatment is not necessary and beet sugar process wastes may thereupon be discharged directly to a POTW.

However it is noted in the 1960's, cases of municipal plant failures or at least significant deterioration were recorded when relatively large quantities of beet sugar wastes were received into the municipal system. The POTW must be both properly designed and operated to handle large BOD and TSS loads from the sugar mill, especially heavy overloads. Pretreatment would seem highly desirable when the sugar mill is large in comparison to the municipal STP.

CANE SUGAR REFINING
(56, 57, 58)
[Part 409]

SUBCATEGORIZATION OF THE INDUSTRY

The Cane Sugar Refining segment of the overall sugar processing industry is divided into two Subcategories as shown below:

Subcategory B - Crystalline Cane Sugar Refining, converting raw cane sugar into crystalline refined sugar.

Subcategory C - Liquid Cane Sugar Refining, converting raw cane sugar into liquid refined sugar.

NATURE OF THE PROBLEM

Twenty nine domestic sugar cane refineries were identified including plants on the mainland United States, in Hawaii and Puerto Rico. EPA studies in the early 1970's indicated that three refineries at that time were achieving zero discharge of pollutants to navigable waters by means of land retention; two refineries were discharging all process wastes to municipal treatment systems; and 10 additional refineries were releasing all wastes except barometric condenser waters to municipal systems. The remaining 14 plants partially treat their waste waters.

Principal water streams from cane sugar refineries include barometric condenser cooling waters, filter cake slurry, char wash water, floor wash waters, carbon slurries, truck and car washes, and ion exchange regeneration water. The filter cake stream may be handled separately in either a dry or slurry form. Both the removal of solid materials from the incoming raw cane sugar and the biological treatment of sugar cane refining wastes generate appreciable quantities of solid wastes which must be disposed of at the plant site or to landfill.

PARAMETERS OF CONCERN

BOD
TSS
pH
Temperature

COD
Total and Fecal Coliforms
TDS
Nitrogen, especially Ammonia
Phosphorous

PRELIMINARY LIMITATIONS FOR DISCHARGE TO POTW AND PRESCRIBED TREATMENT MEASURES

Regulations contained in the Federal Register of March 20, 1974 have described crystalline and liquid cane sugar refineries as discharging compatible pollutants to POTW's. It is cautioned, however that the filter cake slurry waste stream with its extremely high concentrations of BOD and TSS could in some cases interfere with the operation of publicly-owned treatment works. These situations should be controlled by the operator of the POTW. If necessary, such highly-concentrated wastes may be dry-handled and disposed of as solid waste. Process wastes from Subcategory B and C plants have been determined to be more or less amenable to treatment when directly released to a POTW.

RAW CANE SUGAR PROCESSING
(54, 55)
[Part 409]

SUBCATEGORIZATION OF THE INDUSTRY

The raw cane sugar processing segment of the sugar processing industry has been divided into five Subcategories as follows:

Subcategory D - Louisiana raw cane plants which convert sugar cane into a raw cane sugar.

Subcategory E - Florida and Texas raw cane sugar processing plants.

Subcategory F - Hilo-Hamakua Coast raw cane plants on the Island of Hawaii.

Subcategory G - Hawaiian raw cane plants not included in Subcategory F.

Subcategory H - Puerto Rico raw cane plants.

NATURE OF THE PROBLEM

Raw sugar cane is grown in four states of the U. S. including Florida, Louisiana, Texas and Hawaii, and also in the Commonwealth of Puerto Rico. There were a total of 70 to 75 raw sugar cane factories operating in the above areas in 1973-1974.

Waste water streams from raw cane sugar processing factories include barometric condenser waters, filter cake slurry, ash slurries, floor washes, excess condensates, chemical cleaning and wash waters from evaporators and vacuum pans, and cane wash waters. Contact and non-contact cooling waters represent additional waste streams together with boiler blowdowns. Pollutants which enter into the effluent streams comprise: 1) dissolved matter including sugar from the washing of sugar cane, entrainment of sugar into the vapors of the evaporators and vacuum pans which are condensed into the barometric waters, and spills which are integrated into floor washings; 2) solid materials arising from trash and extraneous matter brought into the factory with the raw cane. Solids enter into the cane wash water stream during the washing of the cane; into the filter cake slurry during clarification and filtration of the juice; and into the ash slurry stream if bagasse is burned and wet scrubbing is employed.

PARAMETERS OF CONCERN

BOD
TSS
pH
Temperature

COD
Total and Fecal Coliforms
TDS
Nitrogen, especially Ammonia
Phosphorous

PRELIMINARY LIMITATIONS FOR DISCHARGE TO POTW AND PRESCRIBED TREATMENT MEASURES

The EPA Development Document of February 1975 for the Raw Cane Sugar Industry claims that effluents from cane sugar factories contain no constituents that are known to be incompatible with a well-designed and well-operated municipal waste water treatment plant, nor any pollutants that would pass through a POTW. In general, however, municipal treatment plants are not available to the raw cane industry because the latter are predominately located in highly rural areas.

Quantity of solids in the waste waters discharged by a cane sugar factory could be substantial. A judgment may be necessary as to the amount of solids allowed to enter a municipal treatment system. Existing municipal load and total design capacity of the POTW must be considered. If it is determined that pretreatment for solids removal is necessary, primary settling should be provided at the cane sugar factory.

TEXTILES MANUFACTURING
(27, 28, 136)
[Part 410]

SUBCATEGORIZATION OF THE INDUSTRY

The textiles industry is divided into seven main subcategories described below together with additional waste load allowances for simple and complex manufacturing operations that may be applicable for certain plants in Subcategories D, E, and F. Further load allowances are given for "commission finishing." Commission finishing refers to the finishing of textile materials, 50% or more of which are owned by others, in mills that are 51% or more independent. These mills must generally process 20% or more of their commissioned production through batch, non-continuous processing in contrast to the usual continuous processing.

- A - Wool Scouring
- B - Wool Finishing
- C - Dry Processing, includes greige mills, coated fabrics, laminated fabrics, tire cord fabric felts, carpet tufting and carpet backing.
- D - Woven Fabric Finishing
- E - Knit Fabric Finishing
- F - Carpet Mills
- G - Stock and Yarn Dyeing and Finishing

NATURE OF PROBLEM

Of approximately 7,100 mills, knitting mills are the largest group numbering about 2,700, but there are also about 1,000 weaving mills of various types, and over 1,000 plants which process miscellaneous textile goods. "Wet" process plants probably account for less than 700 mills in the industry.

PARAMETERS OF CONCERN

BOD	TDS
TSS	Ammonia and total nitrogen
COD	Phosphates
Oil and grease	Color
pH, acidity,	Temperature
alkalinity	Heavy metals including
Fecal Coliforms	copper, zinc, mercury
Chromium	Toxic organic chemicals
Sulfide	Phenols

Color is found throughout the textile industry. Some colors are water soluble but others are not, such as those caused by dispersed dyes. Biodegradability is variable. Many hues are used in dyeing and these appear in the wastewaters. A common waste color is gray or black.

Chromium is widely used as an oxidant in the form of sodium dichromate in vat and sulfur dyes and as an oxidant for wool dyes. Substitutes are available but chromium is still widely used. Chromium is the most significant heavy metal in the industry. Others are employed selectively.

Other Heavy Metals include copper salts used in some dyeing operations, which can be harmful to biological treatment systems. Zinc nitrate is used as a catalyst for durable press goods. Mercury may be present but generally in relatively small quantities.

Phenols are widely used as carriers in dyeing polyesters and blends. Some natural materials such as lignins removed in scouring and some dye compositions may analyze as phenols.

Sulfides originate from sodium sulfide incorporated in one or more types of dye, and from other sulfur-containing chemicals.

Toxic Organics may be present. One such compound was Dieldrin, a moth proofing agent used in carpets but reported as no longer employed. Some carriers, particularly the chlorinated benzenes are considered toxic, and should not be used in textile manufacturing.

PRELIMINARY LIMITATIONS FOR DISCHARGE TO POTW

The Federal Register, Part 410 specifies that Pretreatment Standards for New Sources shall for incompatible pollutants be equivalent to the standards of performance for New Sources (numerical limits same as BPT). Additionally, Pretreatment for Existing Sources shall, for incompatible pollutants, be equivalent to BPT limitations.

The Development Document of January 1974 for Textiles cites as follows "The constituents of the wastewater from plants within the textile industry have been found which would interfere with, pass through, or otherwise be incompatible with a well designed and operated publicly owned activated sludge or trickling filter wastewater treatment plant. Wastewater constituents include grease from wool scouring operations, latex from carpet mills and heavy metals such as chromium used in dyes. Adequate control methods can and should be used to keep significant quantities of these materials out of the wastewater. Dye substitutes are available for many dyes containing heavy metals."

Based upon the above, 40 CFR, Part 410 stipulates that COD, total chromium, phenol, sulfide and oil and grease are waste pollutants which would interfere with the operation of POTW's, pass through such works untreated or inadequately treated or otherwise be incompatible with such treatment works. After careful consideration, it was the opinion of the EPA for existing sources that pretreatment should reduce COD, total chromium, phenol, sulfide and oil and grease to the levels required by BPCTCA.

For Subcategory A, Existing and New Sources:

Parameter	Avg. 30 Days (1b/1,000 lb product) ¹	Max. Day (1b/1,000 lb product) ¹
Oil/Grease	3.6	7.2
Total Chromium	0.05	0.10
Phenol	0.05	0.10
Sulfide	0.10	0.20
COD	69.0	138.0

For Subcategory B, Existing and New Sources:

Total Chromium	0.07	0.14
Phenol	0.07	0.14
Sulfide	0.14	0.28
COD	81.5	163.0

For Subcategory C, Existing and New Sources:

Parameter	Avg. 30 Days (1b/1,000 lb product) ²	Max. Day (1b/1,000 lb product) ²
COD	1.4	2.8

For Subcategory D, Existing and New Sources:

Total Chromium	0.05	0.10
Phenol	0.05	0.10
Sulfide	0.10	0.20
COD	30.0	60.0

But if "simple" manufacturing operations are employed (desizing, fiber preparation and dyeing), COD limitations shall be incrementally

¹ lbs. product received into mill

² lbs. final product

increased by 10 and 20 lb/1,000 lb for 30 consecutive day and max. day conditions, and if "complex" manufacturing operations are employed (simple operations plus printing, waterproofing or applying stain resistant or other fabric finishes), the above COD limitations shall be increased by 20 and 40 lb/1,000 lb, respectively.

For Subcategory F, Existing and New Sources:

Parameter	Avg. 30 Days (lb/1,000 lb product) ²	Max. Day (lb/1,000 lb product) ²
Total Chromium	0.02	0.04
Phenol	0.02	0.04
Sulfide	0.04	0.08
COD	35.1	70.2

But if "complex" manufacturing operations are employed at the carpet mill, COD limitations shall be increased by 10 and 20 lb/1,000 lb for 30 consecutive day and max. day conditions respectively over the above COD levels.

For Subcategory G, Existing and New Sources:

Total Chromium	0.06	0.12
Phenol	0.06	0.12
Sulfide	0.12	0.24
COD	42.3	84.6

PRESCRIBED TREATMENT FOR DISCHARGE TO POTW

No specific treatment practices have been cited, although pretreatment for incompatibles for existing sources is "equivalent" to BPCTA, which in turn generally consists of screening, primary treatment and secondary biological treatment. In-plant controls and recovery would partially substitute for treatment. Pretreatment limitations for New Sources on incompatibles approximates that for Existing Sources.

² Lbs final product.

CEMENT MANUFACTURING INDUSTRY
(77, 78, 79)
[Part 411]

SUBCATEGORIZATION OF THE INDUSTRY

The Cement Manufacturing Industry is divided into three Subcategories. Two of the Subcategories involve manufacturing, and the third Subcategory is for plant area runoff. These are described below:

- A - Nonleaching Subcategory
- B - Leaching Subcategory
- C - Materials Storage Piles Runoff Subcategory

Subcategory A, Nonleaching Activities. Process in which several mineral ingredients (limestone or other natural sources of calcium carbonate, silica, alumina, iron and gypsum) are used in the manufacturing of cement. Plants in this Subcategory do not contact kiln dust with water in the process, and water is not used in wet scrubbers to control kiln stack emissions.

Subcategory B, Leaching Activities. Processes in which several mineral ingredients are used in the manufacture of cement. Plants in this Subcategory contact kiln dust with water as an integral part of the process and/or water is used in wet scrubbers to control kiln stack emissions.

Subcategory B, Materials Storage Piles Runoff. Discharges resulting from runoff over materials storage piles. Stored materials include raw products, intermediate products, finished products and waste materials associated with the manufacture of cement under either Subcategory A or B.

NATURE OF THE PROBLEM

The cement manufacturing industry produces various types of Portland cement to meet given specifications. In the early 1970's, there were 51 companies with 166 cement plants in operation in the U.S. and Puerto Rico. Cement is manufactured by the continuous process, normally interrupted only to reline the kilns. Three major steps in the production process include: 1) the grinding and blending of raw materials; 2) clinker production; and 3) finish grinding.

Normal ingredients for cement include lime (calcium oxide), silica, alumina, and iron. Lime is usually the largest single ingredient.

Materials such as sand, clay, shale, iron ore and blast furnace slag are subsequently added. At "wet" cement plants, materials are ground with water and fed to the kiln in a slurry. At "dry" cement plants, raw materials are dried, ground, and fed to the kiln in a dry state. The ground raw materials fed to the kiln are heated to around 1600°C to form "clinker." The clinker along with added gypsum are ground to a fine powder representing the final product ready for shipment or use. Dust collection is achieved by means of cyclones, electrostatic precipitators, bag filters and/or wet scrubbers.

PARAMETERS OF CONCERN

pH, alkalinity	Turbidity
TSS	Aluminum
TDS	Iron
Potassium	Calcium
Sulfate	Magnesium
Temperature	Sodium
	Chlorides

PRELIMINARY LIMITATIONS FOR DISCHARGE TO POTW AND PRESCRIBED TREATMENT MEASURES

The Development Document of August 1973 indicates in general that POTW's are not available to cement plants due to a lack of sewerage facilities. If municipal connection is possible, the major troublesome pollutant would most likely be high TDS in the waste waters. It may be necessary to determine the maximum allowable load of dissolved solids to a particular POTW.

The Federal Register of February 20, 1974 indicates existing cement manufacturing plants do not require specific pretreatment, nor removal of particular pollutants before entering a POTW.

FEEDLOTS INDUSTRY
(52, 53)
[Part 412]

SUBCATEGORIZATION OF THE INDUSTRY

The Feedlots Industry is divided into two main subcategories, as described below:

Subcategory A, All Feedlots Except Ducks. This subpart applies to the following types of feedlots: beef cattle-open lots; beef cattle-housed lots; dairy cattle-stall barn (with milk room); dairy-free stall barn (with milking center); dairy cowyards (with milking center); swine-open dirt or pasture lots; swine-housed, slotted floor; swine-solid concrete floor, open or housed lot; sheep-open lots; sheep-housed lots; horses-stables (race tracks); chickens-broilers housed; chickens-layers (egg production), housed; chickens-layer breeding or replacement stock, housed; turkeys-open lots; turkeys-housed. Furthermore, limitations shall apply only to feedlot operations equal to or larger than the capacities presented below:

1,000 slaughter steers and heifers; 700 mature dairy cattle; 2,500 swine weighing over 55 pounds; 10,000 sheep; 55,000 turkeys; 100,000 laying hens or broilers when facility has unlimited continuous flow watering systems; 30,000 laying hens or broilers when facility has liquid manure handling system; 500 horses; and 1,000 animal units from a combination of slaughter steers and heifers, mature dairy cattle, swine over 55 pounds and sheep.

Subcategory B, Ducks. This subpart applies to duck feedlots equal to or larger than 5,000 ducks and covers both dry lot and wet lot operations.

Excluded from these limitations guidelines are facilities used to raise pets, small game and wild game.

PARAMETERS OF CONCERN

BOD	Total Solids
TSS	Color
pH	Turbidity
TDS	Odor
Temperature	Nitrogen, especially Ammonia N
Fecal Coliforms	Phosphorous

PRELIMINARY LIMITATIONS FOR DISCHARGE TO POTW AND PRESCRIBED TREATMENT MEASURES

The Federal Register of February 14, 1974 describes Subcategory A feedlots as generating waste materials characterized by solids, organic materials, and nutrients. In rare cases these feedlots may have a storm water discharge or overflows from a livestock watering system to a POTW. Such effluents could contain high concentrations of pollutants in runoff. Watering system releases would have low waste concentrations. Suitable capacity can be provided in the municipal treatment works to satisfactorily handle intermittent, concentrated storm discharges or continuous, low concentration livestock drinking water overflows.

Wastes from Subcategory B establishments also contain considerable solids, organic materials and nutrients. However, the concentration of these pollutants is generally low and the discharge considerably diluted.

It has been determined that wastes from Subcategory A and B feedlots are amenable to treatment in POTW's and may be discharged to such works without need for pretreatment. Consequently no pretreatment limitations have been developed for this industry.

ELECTROPLATING AND METAL FINISHING INDUSTRY
(18, 19, 20, 21, 129)
[Part 413]

SUBCATEGORIZATION OF THE INDUSTRY

The Electroplating and Metal Finishing Industry consists of six subcategories. Subcategories A, B, C include plants having essentially electroplating operations in contrast to Subcategories D, E, F plants conducting metal finishing operations.

A) Electroplating of Common Metals Subcategory. Electroplating of ferrous, non-ferrous and plastic base materials by copper, nickel, chromium, zinc, cadmium, tin, lead, aluminum and iron.

B) Electroplating of Precious Metals Subcategory. Electroplating of ferrous or non-ferrous base materials by gold, silver, indium, palladium, platinum, rhodium, ruthenium.

C) Electroplating of Specialty Metals Subcategory (Reserved). Intended to apply to electroplating by beryllium, magnesium, calcium, tellurium, rhenium, cobalt and mercury.

D) Amodizing Subcategory. A protective film is deposited onto ferrous or non-ferrous objects, usually aluminum, the latter acting as an anode.

E) Coatings Subcategory. A protective coating is applied to ferrous or non-ferrous objects by chromating, phosphating or immersion plating.

F) Chemical Etching and Milling Subcategory. Ferrous or non-ferrous materials receive etching or chemical milling, and in this process some portion of the base material is dissolved or removed.

NATURE OF PROBLEM

Metallic coatings are applied to surfaces by electrodeposition by both independent (job) platers and captive operations associated with product fabrication and assembly. Approximately 20,000 Companies are engaged in metal finishing. Approximately 3,500 of these shops provide only plating services. (Subcategories A, B, C).

An electroplating process includes cleaning, electroplating, rinsing, and drying. Cleaning generally consists of two or more steps required for removing grease, oil, soil and oxide films from the base metal surface

and providing good electroplate adhesion. Cleaning will usually involve a minimum of alkaline solution treatment followed by acid solution treatment, and then rinsing. In electroplating, metal ions in either acid, alkaline or neutral solutions are reduced onto cathode surfaces, which are the work pieces being plated. Hundreds of different electroplating solutions have been developed commercially, but only two or three types are utilized widely for copper, zinc and cadmium. Cyanide solutions are common for copper, zinc and cadmium. However non-cyanide alkaline solutions containing pyrophosphate or other chelating agents have been developed for zinc and copper. Acid sulfate solutions are also used for zinc, copper and a number of other metals. Rack plating is utilized for perhaps 90% of the surface area processed commercially.

Metal Finishing Operations (Subcategories D, E, F) are conducted by both independent (job) platers and captive operations associated with product metal finishing. Of the 15,000 to 20,000 companies involved in metal finishing, about 1,000 of these conduct processes covered by regulations for Subcategories D, E, and F.

PARAMETERS OF CONCERN

For Subcategory A, Electroplating With Common Metals:

Copper	Tin
Nickel	Iron
Chromium, hexavalent and total	TDS
Zinc	COD
Cyanide, amenable to chlorine oxidation	BOD
Cyanide, total	Oil/Grease
TSS	Turbidity
pH, acidity, alkalinity	Color
Fluoride	Temperature
Phosphate	Aluminum
Cadmium	Nitrate and Ammonia N
Lead	

For Subcategory B, Electroplating With Precious Metals:

Silver	Paladium
Gold	Platinum
Indium	Rhodium
Osmium	Ruthenium

Subcategories C through F. Parameters same as above.

PRELIMINARY LIMITATIONS FOR DISCHARGE TO POTW

I). For Subcategory A, Electroplating With Common Metals, the limitations for Existing Sources are more or less the same as BPT; and for New Sources, they are equivalent to BAT.

a) For Existing Sources -

Parameter	Avg. 30 Day (mg/m ² /operation)	Max. Day (mg/m ² /operation)
Copper	80	160
Nickel	80	160
Chromium, total	80	160
Chromium, hexavalent	8	16
Zinc	80	160
Cyanide, total	80	160
Cyanide, amenable to oxidation	8	16
Fluoride	3200	6400
Cadmium	48	96
Lead	80	160
Iron	160	320
Tin	160	320
Phosphorous	160	320
TSS	3200	6400
pH	6.0 to 9.5	

b) But for Small Existing Sources, defined as having less than 11 employees with a discharge less than 2,061 gals/hour, and a production rate less than 4.9 m²/hr/employee, the following limitations shall apply in lieu of the above limitations -

Cyanide, amenable to oxidation	8	16
Cyanide, total	80	160
pH	6.0 to 9.0	

c) Definitions for Existing and New Sources -

- The term "m²", shall mean the area acted upon by the coating process expressed in square meters.

The term, "operation," shall mean any step in the coating process which is followed by a rinse, and in which a protective film is deposited on the basic material.

Additional definitions of "Operation," for Existing and New Sources are as follows:

- The post plating steps of chromating, if followed by a rinse, phosphating and coloring, may be included under the term "operation" for the purpose of calculating effluent discharges, provided that such steps are an integral part of the plating line.
- Stripping, where followed by a rinse and conducted in conjunction with electroplating for the purpose of salvaging improperly plated parts, may be included under the term "operation" for the purpose of calculating effluent discharges.

Electroless plating on non-metallic materials for the purpose of providing a conductive surface on the base material, preceding the actual electroplating step, forming an integral step in the plating line and followed by a rinse may be included under the term "operation" for the purpose of calculating effluent discharges.

d) For New Sources -

Parameter	Avg. 30 Day (mg/m ² /operation)	Max. Day (mg/m ² operation)
Copper	40	80
Nickel	40	80
Chromium, total	40	80
Chromium, hexavent	4	8
Zinc	40	80
Cyanide, total	40	80
Cyanide, amenable to oxidation	4	8
Fluoride	1,600	3,200
Cadmium	24	48
Lead	40	80
Iron	80	160
Tin	80	160
Phosphorous	80	160
TSS	1,600	3,200
pH	6.0 to 9.5	

II). For Subcategory B, Electroplating With Precious Metals, the limitations for Existing Sources are more or less the same as BPT; and for New Sources, they are equivalent to BAT.

a) For Existing Sources -

Parameter	Avg. 30 Day (mg/m ² /operation)	Max. Day (mg/m ² /operation)
Silver	8	16
Gold	8	16
Cyanide, amenable to oxidation	8	16
Cyanide, total	80	160
Chromium, total	80	160
Chromium, hexavalent	8	16
Iridium	8	16
Osmium	8	16
Palladium	8	16
Platinum	8	16
Rhodium	8	16
Ruthenium	8	16
Phosphorous	160	320
TSS	3,200	6,400
pH	6.0 to 9.5	

b) Additional definitions of "Operation" for Existing and New Sources are as follows:

- . Stripping (see definition under Subcategory A).
- . Electroless plating (see definition under Subcategory A).

c) For New Sources -

Silver	4	8
Gold	4	8
Cyanide, amenable to oxidation	4	8
Cyanide, total	40	80
Chromium, total	40	80
Chromium, hexavalent	4	8
Iridium	4	8
Osmium	4	8
Palladium	4	8
Platinum	4	8

Rhodium	4	8
Ruthenium	4	8
Phosphorous	80	160
TSS	1,600	3,200
pH	6.0 to 9.5	

III). For Subcategory D, Anodizing, the limitations for Existing Sources are more or less the same as BPT; and for New Sources, they are equivalent to BAT.

a) For Existing Sources -

Parameter	Avg. 30 Day (mg/m ² /operation)	Max. Day (mg/m ² /operation)
Copper	45	90
Nickel	45	90
Chromium, total	45	90
Chromium, hexavalent	4.5	9
Zinc	45	90
Cyanide, total	45	90
Cyanide, amenable to oxidation	4.5	9
Fluoride	1,800	3,600
Cadmium	27	54
Iron	90	180
Tin	90	180
Phosphorous	90	180
TSS	1,800	3,600
pH	6.0 to 9.5	

b) But for Small Existing Sources, defined as having less than 11 employees with a discharge less than 2,061 gals/hour, and a production rate less than 4.9 m²/hr/employee, the following limitations shall apply in lieu of the above limitations -

Cyanide, amenable to oxidation	4.5	9
Cyanide, total	45	90
pH	6.0 to 9.0	

c) Additional definitions of Operations for Existing and New Sources are as follows:

- . Post plating steps (see definition under Subcategory A)
- . Stripping (see definition under Subcategory A).
- . Electroless plating (see definition under Subcategory A).

d) For New Sources -

Parameter	Avg. 30 Day (mg/m ² /operation)	Max. Day (mg/m ² /operation)
Copper	23	45
Nickel	23	45
Chromium, total	23	45
Chromium, hexavalent	2.3	4.5
Zinc	23	45
Cyanide, total	23	45
Cyanide, amenable to oxidation	2.3	45.
Fluoride	900	1,800
Cadmium	14	27
Iron	45	90
Tin	45	90
Phosphorous	45	90
TSS	900	1,800
pH	6.0 to 9.5	

IV). For Subcategory E, Coatings, the limitations for Existing Sources are more or less the same as BPT; and for New Sources, they are equivalent to BAT.

a) For Existing Sources -

Copper	40	80
Nickel	40	80
Chromium, total	40	80
Chromium, hexavalent	4	8
Zinc	40	80
Cyanide, total	40	80
Cyanide, amenable to oxidation	4	8
Fluoride	1,800	3,600
Cadmium	24	48
Iron	80	160
Tin	80	160
Phosphorous	80	160
TSS	1,800	3,600
pH	6.0 to 9.5	

b) But for Small Existing Sources, defined as having less than 11 employees with a discharge less than 2,061 gals/hour, and a production rate less than 4.9 m²/hr/employee, the following limitations shall apply in lieu of the above limitations -

Parameter	Avg. 30 Day (mg/m ² /operation)	Max. Day (mg/m ² /operation)
Cyanide, amenable to oxidation	4	8
Cyanide, total	40	80
pH	6.0 to 9.0	

c) Additional definitions of "Operation" for Existing and New Sources are as follows:

- . Post plating steps (see definition under Subcategory A).
- . Stripping (see definition under Subcategory A).
- . Electroless plating (see definition under Subcategory A).

d) For New Sources -

Copper	20	40
Nickel	20	40
Chromium, total	20	40
Chromium, hexavalent	2	4
Zinc	20	40
Cyanide, total	20	40
Cyanide, amenable to oxidation	2	4
Fluoride	900	1,800
Cadmium	12	24
Iron	40	80
Tin	40	80
Phosphorous	40	80
TSS	900	1,800
pH	6.0 to 9.5	

V). For Subcategory F, Chemical Etching and Milling, the limitations for Existing Sources are more or less the same as BPT; and for New Sources they are equivalent to BAT.

a) For Existing Sources -

Parameter	Avg. 30 Day (mg/m ² /operation)	Max. Day (mg/m ² /operation)
Copper	60	120
Nickel	60	120
Chromium, total	60	120
Chromium, hexavalent	6	12
Zinc	60	120
Cyanide, total	60	120
Cyanide, amenable to oxidation	9	18
Fluoride	2,400	4,800
Cadmium	36	72
Iron	120	240
Tin	120	240
Phosphorous	120	240
TSS	2,400	4,800
pH	6.0 to 9.5	

b) But for Small Existing Sources, defined as having less than 11 employees with a discharge less than 2,061 gals/hour, and a production rate less than 4.9 m²/hr/employee, the following limitations shall apply in lieu of the above limitations -

Cyanide, amenable to oxidation	4.5	9
Cyanide, total	45	90
pH	6.0 to 9.0	

c) Additional definitions of "Operation" for Existing and New Sources are as follows:

- . Post plating steps (see definition under Subcategory A).
- . Stripping (see definition under Subcategory A).
- . Electrolysis plating on non-metallic materials for the purpose of providing a conductive surface on the base material, preceeding the actual electroplating step, forming an integral step in the plating line and followed by a rinse may be included under the term "operation" for the purpose of calculating effluent discharges.

d) For New Sources -

Parameter	Avg. 30 Day (mg/m ² /operation)	Max. Day (mg/m ² /operation)
Copper	30	60
Nickel	30	60
Chromium, total	30	60
Chromium, hexavalent	3	6
Zinc	30	60
Cyanide, total	30	60
Cyanide, amenable to chlorination	5	9
Fluoride	1,200	2,400
Cadmium	18	36
Iron	60	120
Tin	60	120
Phosphorous	60	120
TSS	1,200	2,400
pH	6.0 to 9.5	

PRESCRIBED TREATMENT FOR DISCHARGE TO POTW

BPT and Pretreatment for Existing Sources emphasize both end-of-line chemical waste treatment and in-process controls. Chemical treatment includes segregation of the acid and alkali waste streams, the chromium stream, and the cyanide stream; cyanide destruction by oxidation; reduction of hexavalent chromium to the trivalent form; neutralization; and co-precipitation of metals as hydroxides or hydrated oxides together with settling to remove TSS prior to final discharge. In plant controls include reduction of dragout of concentrated solutions, use of reclaim tanks, still rinses, overall water conservation, and other feasible recovery techniques.

BAT and Pretreatment for New Sources emphasize end-of-line chemical waste treatment coupled with Best in-process controls, especially to conserve rinse waters.

SUSPENSION AND REVOCATION OF ELECTROPLATING EFFLUENT REGULATIONS AND GUIDELINES

On December 3, 1976, the Federal Register announced that certain effluent guidelines and standards for the Electroplating and Metal Finishing Industry previously published on March 28, 1974 and April 24, 1975, merited reconsideration. Thereby, certain sections of 40 CFR Part 413 were temporarily suspended or revoked. It appears most if not all of the pretreatment limitations may be in suspended status pending promulgation of new pretreatment regulations expected around mid-1977.

ORGANIC CHEMICALS MANUFACTURING INDUSTRY
(61, 62, 63, 64, 65 66)
[Part 414]

SUBCATEGORIZATION OF THE INDUSTRY

The Organic Chemicals Manufacturing Industry has been divided into four main Subcategories described below as containing a total of 67 product/process segments. Each of these Subcategories contains Phase I and Phase II organic chemicals, the compounds varying considerably in pollution consequence.

Subcategory A - Nonaqueous processes.

Subcategory B - Processes with process water contact only as steam diluent quench or vent gas absorbent.

Subcategory C - Aqueous liquid phase reaction systems.

Subcategory D - Batch and semicontinuous processes.

Subcategory A, Nonaqueous Processes. These processes have minimum contact between water and reactants or products. Water is not required as a reactant or diluent, and is not formed as a reaction product.

Subcategory A, Phase I, Major Products and Processes:

Product	Process
Cyclohexane	Hydrogenation of benzene
Vinyl Chloride	Addition of hydrochloric acid to acetylene
BTX Aromatics	Hydrotreatment of pyrolysis gasoline
BTX Aromatics	Solvent extraction from reformat

Subcategory A, Phase II, Major Products and Processes:

BTX	Fractional distillation
Cumene	Alkylation of benzene with propylene
p-xylene	Isomerization, crystallization and filtration of mixed xylenes

Subcategory B, Processes with Process Water Contact as Steam Diluent or Absorbent. Process water usage is in the form of dilution steam, direct contact quench, or as an absorbent for reactor effluent gases. Reactions are all vapor phase and carried out over solid catalysts. Most processes have an absorber coupled with steam stripping of chemicals for purification and recycle.

Subcategory B, Phase I, Major Products and Processes.

Product	Process
Ethylene and Propylene	Pyrolysis of naptha or liquid petroleum gas
Butadiene	Co-product of ethylene
Butadiene	Oxidative dehydrogenation of butylene
Butadiene	Dehydrogenation of n-butane
Methanol	Steam reforming of natural gas
Acetone	Dehydrogenation of isopropanol
Acetaldehyde	Oxidation dehydrogenation of ethanol
Vinyl Acetate	Synthesis of ethylene and acetic acid
Acetylene	Partial oxidation of methane
Ethylene Oxide	Catalytic oxidation of ethylene
Formaldehyde	Oxidation of methanol
Ethylene Dichloride	Direct chlorination of ethylene
Vinyl Chloride	Cracking of ethylene dichloride
Styrene	Dehydrogenation of ethyl benzene
Methyl Amines	Addition of ammonia to methanol
Ethyl Benzene	Alkylation of benzene with ethylene

For purposes of effluent limitations, Subcategory B, Phase I, has been further subdivided into two classes of products i.e., B 1, with lower allowable waste loads, and B 2 products with higher allowable waste loads. The B 1 products include Ethylene and Propylene; Butadiene (as a co-product of ethylene); Acetone; Ethyl Benzene; Ethylene Dichloride; Ethylene Oxide; Formaldehyde; Methanol; Methyl Amines; Vinyl Acetate; and Vinyl Chloride. The B 2 products include: Acetaldehyde; Acetylene; Butadiene (by the dehydrogenation and oxidative - dehydrogenation of butylene); and Styrene.

Subcategory B, Phase II, Major Products and Processes.

Product	Process
Adiponitrile	Chlorination of butadiene
Benzoic Acid and Benzaldehyde	Catalytic oxidation of toluene with air
Chloromethanes	Chlorination of methyl chloride and methane mixture
Diphenylamine	Deamination of aniline
Hexamethylenediamine	Hydrogenation of adiponitrile
Hexamethylenediamine	Ammonolysis of 1,6-hexanediol
Maleic Anhydride	Oxidation of benzene with hydrochloric acid
Methyl Ethyl Ketone	Dehydrogenation of sec-butyl alcohol
Phthalic Anhydride	Oxidation of o-xylene

Subcategory C, Aqueous Liquid Phase Reaction Systems. These systems comprise liquid phase reactions where the catalyst is generally in aqueous media such as dissolved or emulsified mineral salt, or acid and caustic solutions. Continuous regeneration of catalyst systems requires extensive water use. Substantial removal of spent inorganic salt by-products may also be necessary.

Subcategory C, Phase I, Major Products and Processes.

Product	Process
Phenol and Acetone	Cumene oxidation and cleavage
Oxo Chemicals	Carbonylation and condensation
Acetaldehyde	Oxidation of ethylene with air and/or oxygen
Acetic Acid	Oxidation of acetaldehyde
Methyl Methacrylate	Acetone cyanohydrin process
Ethylene Glycol	Hydration of ethylene oxide
Acrylic Acid	Synthesis with carbon monoxide and acetylene
Acrylates	Esterification of acrylic acid
Terephthalic Acid (TPA)	Nitric acid oxidation of p-xylene (Catalytic)
Terephthalic Acid (TPA)	Catalytic oxidation of p-xylene

Product	Process
Polymer Grade TPA	Purification of crude terephthalic acid
Dimethyl Terephthalate	Esterification of terephthalic acid
p-Cresol	Sulfonation of toluene
Aniline	Hydrogenation of nitrobenzene
Bisphenol A	Condensation of phenol and acetone
Caprolactam	Oxidation of cyclohexanone
Tetraethyl Lead	Addition of ethyl chloride to lead amalgam
Coal Tar Products	Coal tar distillation
Coal Tar Products	Pitch forming

For purposes of effluent limitations, Subcategory C, Phase I was further subdivided into four classes of products, i.e., C1 through C4, with increasing allowable waste loads when progressing from C 1 through C 4. The C 1 products include Acetic Acid; Acrylic Acid; Coal Tar Products (distillation); Ethylene Glycol; Terephthalic Acid (oxidation of p-xylene); and Polymer Grade Terephthalic Acid. The C 2 products include: Acetaldehyde (oxidation of ethylene with oxygen); Caprolactam; Coal Tar (pitch forming); Phenol and Acetone; and Oxo Chemicals. The C 3 Products include Acetaldehyde (oxidation of ethylene with air); Aniline; Bisphenol A; and Dimethyl terephthalate. The C 4 Products include: Acrylates; p-Cresol; Methyl Methacrylate; Terephthalic acid (nitric acid process); and Tetraethyl lead.

Subcategory C, Phase II, Major Products and Processes.

Product	Process
Ethyl acetate	Esterification of ethyl alcohol with acetic acid
Acrylonitrile	Amoxidation of propylene
p-Aminophenol	Catalytic reduction of nitrobenzene
Calcium stearate	Neutralization of stearic acid
Hydrazine solutions	The Raschig process
Isobutylene	Extraction from a mixture of C 4 hydrocarbons
Isopropanol	Hydrolysis of propylene carbohydrates
Sec-butyl alcohol	Sulfonation and hydrolysis of mixed butylenes

Subcategory D, Batch and Semi-Continuous Processes. Processes are carried out in reaction kettles equipped with agitators, scrapers, reflux condensers, etc., depending upon the nature of the operation. Many reactions are liquid phase with aqueous catalyst systems. Reactants are transferred to batch reactors by gravity flow, pumping or pressurization with air or inert gas. Much of the material handling is manual, and there is limited use of automatic process control. Filter presses and centrifuges are commonly used to separate solid products from liquid. Where drying is required, air or vacuum ovens are used. Cleaning of noncontinuous production equipment constitutes a major source of process waste water.

Subcategory D, Phase II, Major Products and Processes.

Product	Process
Citronellol and Geraniol	Citronella oil distillation
Ionone and Methylionone	Condensation and cyclization of citral
Methyl Salicylate	Esterification of salicylic acid with methanol
o-Nitroaniline	Ammonolysis of o-nitrochlorobenzene
p-Nitroaniline	Ammonolysis of p-nitrochlorobenzene
Plasticizers	Condensation of phthalic anhydride
Tannic Acid	Extraction of natural vegetable matter

NATURE OF PROBLEM

The Organic Chemicals Industry is a highly complex and integrated industry in which there are approximately 454 Companies and 665 plants manufacturing several thousand products. Synthetic organic chemicals are derivative products of petroleum, natural gas and coal, which have undergone at least one chemical conversion. The organic chemicals industry was initially dependent upon coal as the sole source of raw materials. However, over the last two decades the industry has moved rapidly from coal to petroleum-based feedstocks. In recognition of the change in raw materials, the term "petrochemical" has come into common usage. This term commonly refers to all organic chemical products derived from petroleum fractions and byproducts, or materials derived from natural gas constituents.

The organic chemicals manufacturing category consists of approximately 260 product commodities listed under SIC Code 2865 - Cyclic Intermediates, Dyes, Organic Pigments and Coal Tar Crudes; and under SIC

Code 2869 - Industrial Organic Chemicals not elsewhere identified. From this list, 40 major product/process segments were selected and incorporated into Phase I. The Phase I product/process segments represent approximately 75% of the production capacity in the organic chemicals industry. Subsequently, data were developed on 27 additional product/process segments which became known as the Phase II Study. Guideline limitations on other product/process segments will be developed in the future.

In the Phase II Organic Chemicals area, high concentrations of Cyanide which could be inhibitory to biological systems were observed particularly in the waste streams from the manufacture of hexamethylenediamine, adiponitrile and acrylonitrile. Heavy metals in significant concentrations were found in the waste streams from the following Phase II product-process segments:

Adiponitrile	Cu, Fe, Cr
Chloromethanes	Fe, Cr
Hexamethylenediamine	Zn
Maleic Anhydride	Cd
Hydrazine	Cd
Plasticizers	Cu

These metals could interfere with biological treatment systems when present in significant concentrations.

PARAMETERS OF CONCERN

BOD	Iron
COD, TOC	TDS
TSS	Sulfate
Oil/grease	Sulfides
Phenols	Chlorides
pH, acidity, alkalinity	Hardness
Cyanide	Phosphorous
Ammonia N	Calcium
Total Kjeldahl N	Magnesium
Heavy Metals including Zinc, Copper, Lead, Chromium, Cadmium, Cobalt, Nickel, Vanadium	Color
	Chlorinated hydrocarbons
	Toxicity

PRELIMINARY LIMITATIONS FOR DISCHARGE TO POTW AND PRESCRIBED TREATMENT MEASURES

The USEPA published regulations on Organic Chemicals Guidelines Limitations, especially those covering the Phase II chemicals describe effluents from these manufacturing plants as containing many hazardous substances over and above the organic byproducts specifically cited in the regulations. As more data becomes available on the severity of risk resulting from exposure to the pollutants in organic plant chemical waste streams, additional substances and product lines will be covered by effluent limitations guidelines.

Cyanide and copper were considered to be among the more deleterious substances referred to in the published Federal Register regulations of January 5, 1976. Besides toxicity of individual pollutants, the waste streams from organic chemical plants contain substances that create multiple stress on fish and other aquatic life. These wastes also introduce combinations of metals and chemicals into raw water supplies used for drinking water, the synergistic effects of which have received relatively little attention. The hazards which attach to organic chemical effluents are increased by the clustering of these plants on major rivers and waterways used as drinking water sources as well as major recreational areas.

The prevalence of organic chemicals as products, byproducts, intermediate chemicals and raw materials in the nation's waters, is considered by many to be a significant threat to human health. Certain organic chemicals, covered both by Phase I and II regulations, if present in significant quantity are acutely toxic to people and to aquatic life, cause cancer in test animals and man, bring about first-generation birth deformities, or alter genetic patterns. A majority of these organic compounds are also listed in the DHEW's Toxic Substances List of 1974.

Many synthetic organic chemicals found in drinking water supplies of the U.S. have resulted in concern that the organic problem may have initially been grossly underestimated. The House of Representatives Committee on Interstate and Foreign Commerce recently declared that.... "more than 12,000 chemical compounds are now being used commercially, not counting additional variants and fractions. About 500 new chemicals are added each year. Many of these will find their way into the Nation's drinking water supplies."

EPA has conducted recent surveys of contamination of drinking water by organic chemicals. At least 187 organic compounds have been found present in one or more randomly selected water supplies. Many of these compounds are suspect carcinogens. This list will undoubtedly grow as work continues in the analysis of drinking water and as analytical

techniques are improved for the concentration, separation, identification and measurement of organic compounds in drinking water. With few exceptions, all the organic compounds found in drinking water have also been found in the effluents of organic chemical plants under Phases I and II regulations. Many synthetic organics have their origin only in the discharges of organic chemical plants.

Examples are given below of products incorporated into Phase II guidelines limitations which have troublesome public health implications:

Cumene, p-Xylene and Adiponitrile - contained in DHEW Toxic Substances List of 1974.

Benzoic Acid - also on the TSL, and besides having high acute toxicity, causes skin effects.

Maleic Anhydride - cited as a carcinogen.

Phthalic Anhydride and Acrylonitrile - on the TSL; occupational exposure standards have been established.

Hydrazine - causes neoplastic effects, i.e., growth of different or abnormal tissues or a tumor.

Isopropanol, Butyl Alcohol, Citronellol, Ionone, Methyl Salicylate and Nitroaniline - are all toxic and on the TSL.

Tannic Acid - has neoplastic properties.

The EPA Development Documents on Organic Chemicals published in December 1973 and November 1975 made a significant distinction between manufacturing plants in Subcategories A and B vs. those in Subcategories C and D. The former group are considered likely to contain appreciable amounts of free and emulsified oils of petroleum origin in the wastewaters, whereas wastes of the latter grouping more probably will contain significant quantities of heavy metals. Fatty acid wastewaters from the manufacture of products in Subcategory D may contain free and emulsified oils primarily of animal and vegetable origin.

The manufacture of acrylonitrile (included in Subcategory C) produces a highly toxic wastewater which is very difficult to treat biologically unless pretreatment is provided for cyanide. Cyanide levels have been reported in the range of 500 to 1,800 mg/l. These wastes are usually segregated from other process effluents and disposed of by incineration or other acceptable means. They are generally not discharged to municipal collection systems. Recommended pretreatment schemes given below assume the exclusion of acrylonitrile wastes from the POTW.

Oil separation may be required when the oil content (petroleum-based), of a wastewater exceeds 100 mg/l. Animal and vegetable oils in fatty acid wastewaters should also be segregated in order to minimize solids separation problems at the municipal works.

Heavy metals, if present in harmful quantities in organic chemicals manufacturing wastes, may require pretreatment via chemical precipitation to remove and/or lower these toxic materials.

Pretreatment unit operations will generally consist of a minimum of equalization, neutralization, oil separation, and possibly phenols and/or metals reduction.

With Suspended Growth Biological System	With Fixed Growth Biological System	Physical-Chemical System
For Subcategory A and B Plants Discharging to POTW		
Oil Separation and Equalization	Oil Separation and Equalization	Oil Separation and Equalization
+ Neutralization and Chemical Precipitation	+ Neutralization and Chemical Precipitation	+ Neutralization and Chemical Precipitation
For Subcategory C and D Plants Discharging to POTW		
Equalization + Neutral- ization + Chemical Precipitation	Equalization + Neutralization	Equalization + Neutralization

The Federal Register of April 25, 1974 established that wastewaters from Subcategory A, B and C industries may be discharged to POTW's pending the above statements, except for the Subcategory C plants manufacturing Phenol and Acetone via the Cumene process, Bisphenol A, and p-Cresol manufacturing. Phenols are determined to be detrimental to POTW's if these systems are not acclimated to phenolic loads. Pretreatment for existing sources are defined as more or less equivalent to BPCTCA levels and that for New Sources equivalent to NSPS levels as shown below:

Pretreatment for Existing and New Sources:

Parameter	Avg. 30 Day (1b/1,000 lb final product)	Max. Day (1b/1,000 lb final product)
Phenol	0.020	0.045

REMAND/REVOCATION OF EFFLUENT GUIDELINES LIMITATIONS

In accordance with a decision of the U.S. Court of Appeals for the Fourth District arrived at on February 10, 1976, the USEPA has revoked all of 40 CFR, Part 414 promulgated on April 25, 1974 (i.e. Phase I) except that portion of butadiene; and also all of 40 CFR, Part 414 promulgated and proposed on January 5, 1976 (i.e. Phase II). The Agency intends to repromulgate the Regulations as soon as possible, using a more adequate base. Regardless of the revocation, the discussion given above on pretreatment should continue to be largely applicable.

INORGANIC CHEMICALS MANUFACTURING INDUSTRY
(46, 47, 48, 49, 50, 51, 130)
[Part 415]

SUBCATEGORIZATION OF THE INDUSTRY

The Inorganic Chemicals Manufacturing Industry as defined to date by the USEPA consists of 63 Subcategories covering 74 different inorganic chemical products. These are described below:

- A - Aluminum Chloride Production
- B - Aluminum Sulfate
- C - Calcium Carbide
- D - Calcium Chloride
- E - Calcium Oxide and Calcium Hydroxide
- F - Chlorine and Sodium or Potassium Hydroxide
- G - Hydrochloric Acid
- H - Hydrofluoric Acid
- I - Hydrogen Peroxide
- J - Nitric Acid
- K - Potassium Metal Production
- L - Potassium Dichromate
- M - Potassium Sulfate
- N - Sodium Bicarbonate
- O - Sodium Carbonate
- P - Sodium Chloride
- Q - Sodium Dichromate and Sodium Sulfate
- R - Sodium Metal
- S - Sodium Silicate
- T - Sodium Sulfite
- U - Sulfuric Acid
- V - Titanium Dioxide
- W - Aluminum Fluoride
- X - Ammonium Chloride
- Y - Ammonium Hydroxide (reserved)
- Z - Barium Carbonate (reserved)
- AA - Borax Production
- AB - Boric Acid
- AC - Bromine
- AD - Calcium Carbonate
- AE - Calcium Hydroxide
- AF - Carbon Dioxide Production (reserved)
- AG - Carbon Monoxide and Byproduct Hydrogen
- AH - Chrome Pigments
- AI - Chromic Acid
- AJ - Copper Sulfate
- AK - Cuprous Oxide (reserved)
- AL - Ferric Chloride

AM - Ferrous Sulfate (reserved)
 AN - Fluoride Production
 AO - Hydrogen
 AP - Hydrogen Cyanide
 AQ - Iodine
 AR - Lead Monoxide
 AS - Lithium Carbonate
 AT - Manganese Sulfate (reserved)
 AU - Nickel Sulfate
 AV - Strong Nitric Acid (reserved)
 AW - Oxygen and Nitrogen production
 AX - Potassium Chloride
 AY - Potassium Iodide
 AZ - Potassium Permanganate (reserved)
 BA - Silver Nitrate
 BB - Sodium Bisulfite (reserved)
 BC - Sodium Fluoride
 BD - Sodium Hydrosulfide (reserved)
 BE - Sodium Hydrosulfite (reserved)
 BF - Sodium Silicofluoride
 BG - Sodium Thiosulfate (reserved)
 BH - Stannic Oxide
 BI - Sulfur Dioxide Production (reserved)
 BJ - Zinc Oxide (reserved)
 BK - Zinc Sulfate

Subcategory A, Aluminum Chloride. Formed by reaction of gaseous chlorine with molten aluminum.

Subcategory B, Aluminum Sulfate. Formed by reaction of bauxite ore with sulfuric acid.

Subcategory C, Calcium Carbide. Reaction of calcium oxide with carbon in uncovered high-temperature furnaces.

Subcategory D, Calcium Chloride. Produced by the brine extraction process.

Subcategory E, Calcium Oxide and Calcium Hydroxide. Made from calcining various types of limestone in continuous vertical or rotating kilns.

Subcategory F, Chlorine and Sodium or Potassium Hydroxide. Chlorine is produced by the electrolysis of sodium or potassium brines. Sodium hydroxide and potassium hydroxides are byproducts. Chlorine is formed by one of two methods: the mercury cell process and the diaphragm cell process.

Subcategory G, Hydrochloric Acid. Manufacturing utilizes the direct reaction of chlorine with hydrogen, or hydrochloric acid is obtained as a byproduct of organic chlorination reactions.

Subcategory H, Hydrofluoric Acid. Hydrofluoric acid is produced by the reaction of fluorospar with sulfuric acid in a furnace.

Subcategory I, Hydrogen Peroxide. Manufactured by three processes: 1) the electrolytic process; 2) oxidation of alkyl hydroanthraquinones; and 3) as a byproduct in making acetone from isopropyl alcohol. Limitations guidelines are applicable only for the first two processes.

Subcategory J, Nitric Acid. Produced by the catalytic oxidation of ammonia to nitrogen dioxide which in turn is reacted with water vapor under pressure to obtain nitric acid.

Subcategory K, Potassium Metal. Results from the reaction of potassium chloride with sodium vapors.

Subcategory L, Potassium Dichromate. Results from the reaction of sodium dichromate dihydrate solution with potassium chloride.

Subcategory M, Potassium Sulfate. A naturally-occurring potassium magnesium sulfate ore is reacted with potassium chloride to yield potassium sulfate.

Subcategory N, Sodium Bicarbonate. Sodium carbonate is reacted with water and carbon dioxide under pressure to yield sodium bicarbonate.

Subcategory O, Sodium Carbonate (Soda Ash). Produced by the Solvay process, or by the mining of trona (sodium sesquicarbonate). The Solvay process reacts ammonia and carbon dioxide in a brine solution to yield sodium bicarbonate. Heating converts the bicarbonate to carbonate. Ammonia can be recovered by adding slaked lime to the used liquor.

Subcategory P, Sodium Chloride. Produced by solution brine mining; by solar evaporation of sea water; or by conventional mining of rock salt. Effluent limitations apply only to the first two processes.

Subcategory Q, Sodium Dichromate and Sodium Sulfate. These chemicals are prepared by calcining chrome ore, sodium carbonate and lime, which is followed by leaching with water.

Subcategory R, Sodium Metal. The metal is generated during the electrolysis of fused sodium chloride, i.e. the Downs cell process.

Subcategory S, Sodium Silicate. Soda ash or anhydrous sodium hydroxide is reacted with silica to yield sodium silicate.

Subcategory T, Sodium Sulfite. The reaction of sulfur dioxide with soda ash.

Subcategory U, Sulfuric Acid. The sulfur burning contact process is used in both single and double adsorption plants. The effluent limitations are not applicable to plants burning sulfides, or recovering sulfuric acid from waste streams of other processes such as oil refining or metallurgical operations.

Subcategory V, Titanium Dioxide. Produced by the sulfate process and by the chloride process. The effluent limitations are not applicable to processes in which beneficiation of raw ilmenite ore and chlorination are inseparably combined in the same process step.

Subcategory W, Aluminum Fluoride. Formed by the reaction of hydrated alumina with hydrogen fluoride.

Subcategory X, Aluminum Chloride. Guidelines cover the formation of aluminum chloride by reacting anhydrous ammonia with hydrogen chloride gas; or by extracting aluminum chloride from waste mother liquors using the Solvay process in producing sodium carbonate.

Subcategory AA, Borax. Produced by mining and extraction from borax ore, and also by the Trona process.

Subcategory AB, Boric Acid. Made by reacting borax and sulfuric acid. Boric acid is also produced by the Trona process utilizing liquid-liquid solvent extraction-evaporative crystallization operations.

Subcategory AC, Bromine. May be produced by the Trona process, or by extraction from well brines.

Subcategory AD, Calcium Carbonate. Produced by various processes. One process involves reaction of slaked lime with carbon dioxide. Other methods react selected waste streams from the Solvay process used to manufacture sodium carbonate.

Subcategory AE, Calcium Hydroxide. Reaction of calcium oxide with water.

Subcategory AG, Carbon Monoxide and Byproduct Hydrogen. Methane, air and water are catalytically reacted to form a mixture of carbon monoxide, carbon dioxide, and hydrogen. The carbon monoxide and hydrogen are separated and purified.

Subcategory AH, Chrome Pigments and Iron Blues. A number of pigments are included in the chrome pigments subcategory. Iron blues are formed by reaction of ferrous sulfate with sodium ferrocyanide in the presence of ammonium sulfate. Chrome pigment wastewaters usually contain chromium, lead, zinc, iron, cyanide, dissolved sodium salts and acetates.

Subcategory AI, Chromic Acid. Waste liquors from sodium dichromate manufacturing are reacted with sulfuric acid to yield chromic acid.

Subcategory AJ, Copper Sulfate. Copper sulfate can be produced from a pure copper raw material or from impure copper sources. A pure copper raw material is reacted with sulfuric acid, air and water. A waste stream from a copper refinery may also be fed to an oxidizer tank and reacted with copper shot, steam and air to yield copper sulfate.

Subcategory AL, Ferric Chloride. Produced from waste pickle liquor by reacting with iron, chlorine and sometimes hydrochloric acid.

Subcategory AN, Fluoride. Formed from the electrolysis of hydrogen fluoride. The reaction either involves direct electrolysis of liquid hydrofluoric acid, or an electrolysis of fused salts containing potassium acid fluoride.

Subcategory AO, Hydrogen. Generally obtained from the refining and purification of crude hydrogen obtained as refinery byproduct gas.

Subcategory AP, Hydrogen Cyanide. Manufactured by the Andrussov process and also derived as a byproduct of acrylonitrile manufacturing. Hydrogen cyanide receives refining and purification in both processes.

Subcategory AQ, Iodine. Obtained from brine solutions containing iodide.

Subcategory AR, Lead Monoxide. Produced by the thermal oxidation of lead.

Subcategory AS, Lithium Carbonate. Manufactured by the Trona process and/or from spodumene ore. The latter involves reacting the ore with sulfuric acid. In the Trona process, a solid residue is reclaimed from potassium chloride and bromine production. This residue is withdrawn as dilithium sodium phosphate which in turn is reacted with sulfuric acid yielding lithium sulfate. Lithium sulfate is reacted with sodium carbonate to give the desired end product.

Subcategory AU, Nickel Sulfate. Produced from pure nickel, from nickel oxide and from impure nickel substances. The pure metal or pure oxide is digested in sulfuric acid. When impure nickel is used, the sulfuric acid reaction solution must be treated with oxidizers to remove impurities.

Subcategory AW, Oxygen and Nitrogen. Process involves distillation of liquefied air. Air is compressed, cooled and then separated into nitrogen and oxygen by distillation.

Subcategory AX, Potassium Chloride. Produced by the Trona process and/or by extraction from sylvite ore which is a potassium chloride-sodium chloride mineral. In the Trona process, a brine solution is concentrated and potassium chloride recovered. When sylvite ore is used, it is ground and converted into a brine solution from which potassium chloride is reclaimed.

Subcategory AY, Potassium Iodide. Potassium hydroxide is reacted with iodine.

Subcategory BA, Silver Nitrate. Silver is dissolved in nitric acid.

Subcategory BC, Sodium Fluoride. Two processes are used. Anhydrous hydrofluoric acid is reacted with sodium carbonate and sodium fluoride eventually recovered. Also, sodium silicofluoride can be reacted with sodium hydroxide and sodium fluoride separated and purified.

Subcategory BF, Sodium Silicofluoride. Fluorosilicic acid is reacted with sodium chloride. Sodium silicofluoride is alternately manufactured by reacting impure phosphoric acid containing fluorides with sodium carbonate.

Subcategory BH, Stannic Oxide. Two processes are available. In a dry process, metallic tin is thermally reacted with oxygen. In the second process, tin is recovered from scrap materials and subsequently oxidized.

Subcategory BK, Zinc Sulfate. Sulfuric acid is reacted with crude zinc-containing materials.

NATURE OF THE PROBLEM

In many inorganic chemical manufacturing processes, wet scrubbers are used to control air pollution. The scrubbing solution is generally treated and may be reused. Operations for treating process wastewater in the inorganic chemicals manufacturing industry include settling, filtration, chemical coagulation, ion exchange, carbon adsorption and evaporation. Some treatment processes may generate large volumes of sludge in turn creating a substantial solid waste problem. Landfill or lagoon sites of adequate size and good design may be essential.

PARAMETERS OF CONCERN

Primary Parameters include:

pH, Acidity, Alkalinity	Cadmium
COD, TOC	Iron
TSS	Lead
Chromium	Mercury
Arsenic	Cyanide
Fluoride	

Parameters of slightly less importance:

Oil/Grease	Chlorinated Hydrocarbons
Boron	Cyclic Hydrocarbons
TDS	Temperature
Ammonia N	Aluminum
Nitrate and Nitrite N	Selenium
Fluoride	Copper
Chloride	Manganese
Sulfate	Molybdenum
Sulfite	Nickel
Phosphate	Tin
Phenols	Titanium
Silicates	Vanadium
Barium	Zinc
	Silver

PRELIMINARY LIMITATIONS FOR DISCHARGE TO POTW AND PRESCRIBED TREATMENT MEASURES

For Subcategories A through U, Pretreatment for Existing Sources has been established equivalent to BPCTCA limitations and Pretreatment for New Sources has been made equivalent to New Source Performance Standards. It is further indicated where the effluent limitation guidelines based on BPCTCA are not defined for incompatible pollutants (such as TDS), no pretreatment will be required for such incompatible pollutant unless pursuant to 40 CFR 128, the wastes interfere with the operation or performance of the POTW, or pretreatment is required by local or law. As best as can be determined, pretreatment criteria are those shown below:

For Subcategory A, Existing and New Sources of Aluminum Chloride Production

No discharge allowed.

For Subcategory B, Existing and New Sources of Aluminum Sulfate Production.

Essentially no discharge except for low frequency runoff. No limitations are given for incompatibles.

For Subcategory C, Existing and New Sources of Calcium Carbide Production.

No discharge.

For Subcategory D, Existing Sources of Calcium Chloride Production.

Discharge allowed. No limitations given for incompatible pollutants.

For Subcategory D, New Sources of Calcium Chloride Production.

No discharge.

For Subcategory E, Existing and New Sources of Calcium Oxide and Calcium Hydroxide Production.

See explanation under Subcategory B.

For Subcategory F, Existing Chlorine Production Source, Mercury Cell Process.

Parameter	Avg. 30 Day (1b/1000 lb final product)	Max Day (1b/1000 lb final product)
Mercury	.00014	.00028

For Subcategory F, Existing Chlorine Production Source, Diaphragm Process.

Lead	.0025	.005
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For Subcategory F, New Chlorine Production Source, Mercury Cell Process.

Mercury	.00007	.00014
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For Subcategory F, New Chlorine Production Source, Diaphragm Process.

Lead	.00004	.00008
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For Subcategory G, Existing and New Sources of Hydrochloric Acid Production.

No discharge.

For Subcategory H, Existing Sources of Hydrofluoric Acid Production.

Fluoride	.18 and up to 30 mg/l)	.36 (and up to 60 mg/l)
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For Subcategory H, New Sources of Hydrofluoric Acid Production.

Parameter	Avg. 30 Day (1b/1000 lb final product)	Max Day (1b/1000 lb final product)
Fluoride	0.12 and up to 25 mg/l)	0.24 (and up to 50 mg/l)

For Subcategory I, Existing Sources of Hydrogen Peroxide Production by Oxidation of Alkyl Hydroanthraquinones.

TOC	0.22	0.44
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For Subcategory I, Existing Sources of Hydrogen Peroxide Production by Electrolytic Process.

Cyanide, amenable to chlorine oxidation	.0002	.0004
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For Subcategory I, New Sources of Hydrogen Peroxide Production by Oxidation of Alkyl Hydroanthraquinones.

No discharge.

For Subcategory I, New Sources of Hydrogen Peroxide Production by Electrolytic Process.

See explanation under Subcategory B.

For Subcategory J, Existing and New Sources of Nitric Acid Production.

No discharge.

For Subcategory K, Existing and New Sources of Potassium Metal Production.

No discharge.

For Subcategory L, Existing and New Sources of Potassium Dichromate Production.

No discharge.

For Subcategory M, Existing and New Sources of Potassium Sulfate Production.

See explanation under Subcategory B.

For Subcategory N, Existing and New Sources of Sodium Bicarbonate Production.

No discharge.

For Subcategory O, Existing Sources of Sodium Carbonate Production.

Discharge allowed. No limitations given for incompatibles.

For Subcategory O, New Sources of Sodium Carbonate Production.

No discharge.

For Subcategory P, Existing Sources of Sodium Chloride Production.

Discharge allowed. No limitations given for incompatibles.

For Subcategory P, New Sources of Sodium Chloride Production.

No discharge.

For Subcategory Q, Existing and New Sources of Sodium Dichromate and Sodium Sulfate Production.

Parameter	Avg. 30 Day (1b/1000 lb final product)	Max Day (1b/1000 lb final product)
Chromium, hexavalent	.0005	.009
chromium, total	.0044	.0088

For Subcategory R, Existing Sources of Sodium Metal Production.

Discharge allowed. No limitations given for incompatibles.

For Subcategory R, New Sources of Sodium Metal Production.

See explanation under Subcategory B.

For Subcategory S, Existing Sources of Sodium Silicate Production.

Discharge allowed. No limitations given for incompatibles.

For Subcategory S, New Sources of Sodium Silicate Production.

See explanation under Subcategory B.

For Subcategory T, Existing Sources of Sodium Sulfite Production.

Parameter	Avg. 30 Day (1b/1000 lb final product)	Max Day (1b/1000 lb final product)
COD	1.7	3.4

For Subcategory T, New Sources of Sodium Sulfite Production.

No discharge.

For Subcategory U, Existing and New Sources of Sulfuric Acid Production.

No discharge.

For Subcategory V, Existing Sources of Titanium Dioxide Production by the Chloride Process.

Iron	0.36	0.72
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For Subcategory V, Existing Sources of Titanium Dioxide Production by the Sulfate Process.

Iron	1.7	3.4
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For Subcategory V, New Sources of Titanium Dioxide Production by the Chloride Process.

Iron	0.18	0.36
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For Subcategory V, New Sources of Titanium Dioxide Production by the Sulfate Process.

Iron	0.42	0.84
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For Subcategory W, Existing Sources of Aluminum Fluoride.

Aluminum	0.17	0.34
Fluoride	0.34	0.68

For Subcategory W, New Sources of Aluminum Fluoride.

Aluminum	0.017	0.034
Fluoride	0.034	0.068

For Subcategory X, Existing and New Sources of Ammonium Chloride.

Ammonia N	0.5	1.0
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For Subcategory AA, Existing and New Sources of Borax Production.

<u>Parameter</u>	<u>Pretreatment Standard</u>
Boron as B	1 mg/l
Arsenic as As	1 mg/l

Residual brine and depleted liquors may be returned to the body of water from which the process brines were originally withdrawn.

For Subcategory AB, Existing and New Sources of Boric Acid Production by Trona Process.

Arsenic as As	0.5 mg/l
Boron as B	1.0 mg/l

Residual brine and depleted liquors may be returned to the body of water from which the process brines were originally withdrawn.

For Subcategory AB, Existing and New Sources of Boric Acid Production From Ore Mined Borax.

<u>Parameter</u>	<u>Avg. 30 Day (1b/1000 lb. final product)</u>	<u>Max. Day (1b/1000 lb final product)</u>
Arsenic	.0014	.0028

For Subcategory AC, Existing and New Sources of Bromine Production.

<u>Parameter</u>	<u>Pretreatment Standard</u>
Free Bromine (molecular)	0.1 mg/l

Residual brine and depleted liquors may be returned to the body of water from which the process brines were originally withdrawn.

For Subcategory AD, Existing and New Sources of Calcium Carbonate Production.

No Limitations.

For Subcategory AE, Existing and New Sources of Calcium Hydroxide.

No Limitations.

For Subcategory AG, Existing Sources of Carbon Monoxide and Byproduct Hydrogen Production.

Parameter	Avg. 30 Day (1b/1000 lb final product)	Max. Day (1b/1000 lb final product)
COD	0.25	0.5

For Subcategory AG, New Sources of Carbon Monoxide and Byproduct Hydrogen Production

COD	0.125	0.25
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For Subcategory AH, Existing Sources of Chrome Pigments Production.

Chromium, total	0.034	0.10
Chromium, hexavalent	0.0034	0.01
Lead	0.14	0.42
Zinc A+	0.27	0.72
Cyanide A++	0.0034	0.01
Cyanide	0.034	0.10
Iron	0.27	0.72

For Subcategory AH, New Sources of Chrome Pigments Production.

Chromium, total	0.017	0.051
Chromium, hexavalent	0.0017	0.0051
Lead	0.033	0.099
Zinc A+	0.67	0.20
Cyanide A++	0.0017	0.0051
Cyanide	0.017	0.051
Iron	0.067	0.20

For Subcategory AI, Existing and New Sources of Chromic Acid Production.

Parameter	Pretreatment Standard
Total Chromium	0.5 mg/l

+ Zinc limitation is based on production of Zinc yellow.
 ++ Cyanides amenable to chlorination.

For Subcategory AJ, Existing and New Sources of Copper Sulfate Production Using Pure Copper Raw Material

Parameter	Avg. 30 Day (lb/1000 lb. final product)	Max. Day (lb/1000 lb. final product)
Copper	0.0002	0.0006

For Subcategory AJ, Existing Sources of Copper Sulfate Production from Impure Copper.

Copper	0.001	0.003
Nickel	0.002	0.006
Selenium	0.0005	0.0015

For Subcategory AJ, New Sources of Copper Sulfate Production from Impure Copper.

Copper	0.00046	0.0014
Nickel	0.00046	0.0014
Selenium	0.00023	0.00069

For Subcategory AK, Existing and New Sources of Ferric Chloride Production.

Parameter	Pretreatment Standard
Iron	4 mg/l

For Subcategory AN, Existing and New Sources of Fluorine Production.

Fluoride	20 mg/l
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For Subcategory A0, Existing and New Sources of Hydrogen Production.

Oil/Grease	100 mg/l
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For Subcategory AP, Existing Sources of Hydrogen Cyanide Production by Andrussow Process.

Parameter	Avg. 30 Day (1b/1000 lb. final product)	Max. Day (1b/1000 lb. final product)
Cyanide	0.025	0.05
Cyanide, amenable to chlorine oxidation	0.0025	0.005
Ammonia as N	0.18	0.36

For Subcategory AP, Existing Sources of Hydrogen Cyanide Production from Acrylonitrile Wastes.

Parameter	Pretreatment Standard
Cyanide	0.5 mg/l
Cyanide, amenable to chlorine oxidation	0.05 mg/l

For Subcategory AP, New Sources of Hydrogen Cyanide Production by Andrussow Process.

Parameter	Avg. 30 Day (1b/1000 lb. final product)	Max. Day (1b/1000 lb. final product)
Cyanide	0.0023	0.0046
Cyanide, amenable to chlorine oxidation	0.00023	0.00046
Ammonia as N	0.016	0.032

For Subcategory AP, New Sources of Hydrogen Cyanide Production from Acrylonitrile Wastes.

Parameter	Pretreatment Standard
Cyanide	0.5 mg/l
Cyanide, amenable to chlorine oxidation	0.05 mg/l
Ammonia as N	30.0 mg/l

For Subcategory AQ, Existing and New Sources of Iodine Production.

No Limitations.

For Subcategory AR, Existing and New Sources of Lead Monoxide Production.

Parameter	Avg. 30 Day (1b/1000 lb. final product)	Max. Day (1b/1000 lb. final product)
Lead	0.015	0.030

For Subcategory AS, Existing and New Sources of Lithium Carbonate Production.

No Limitations.

For Subcategory AU, Existing and New Sources of Nickel Sulfate Production from Pure Materials.

Parameter	Pretreatment Standard
Nickel	2 mg/l

For Subcategory AU, Existing and New Sources of Nickel Sulfate Production from Impure Raw Materials.

Parameter	Avg. 30 Day (1b/1000 lb. final product)	Max. Day (1b/1000 lb. final product)
Nickel	0.002	0.006

For Subcategory AW, Existing and New Sources of Oxygen and Nitrogen Production.

Parameter	Pretreatment Standard
Oil/Grease	100 mg/l

For Subcategory AX, Existing and New Sources of Potassium Chloride Production.

No Limitations.

For Subcategory AY, Existing Sources of Potassium Iodide Production.

Parameter	Avg. 30 Day (1b/1000 lb. final product)	Max. Day (1b/1000 lb. final product)
Sulfide	0.005	0.015
Iron	0.005	0.015
Barium	0.003	0.009

For Subcategory AY, New Sources of Potassium Iodide Production.

Sulfide	0.0036	0.0069
Iron	0.0036	0.0069
Barium	0.0023	0.011

For Subcategory BA, Existing Sources of Silver Nitrate Production.

Silver	0.003	0.009
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For Subcategory BA, New Sources of Silver Nitrate Production.

Silver	0.0015	0.0045
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For Subcategory BC, Existing and New Sources of Sodium Fluoride Production.

Parameter	Pretreatment Standard
Fluoride	20/mg/l

For Subcategory BF, Existing and New Sources of Silicofluoride Production.

Parameter	Avg. 30 Day (1b/1000 lb. final product)	Max. Day (1b/1000 lb. final product)
Fluoride	0.25	0.50

For Subcategory BG, Existing and New Sources of Stannic Oxide Production.

No Limitations.

For Subcategory BK, Existing and New Sources of Zinc Sulfate Production.

<u>Parameter</u>	<u>Pretreatment Standard</u>
Cadmium	1.0 mg/l

REMAND AND REVOCATION OF INORGANIC CHEMICALS MANUFACTURING EFFLUENT
REGULATIONS AND GUIDELINES

n November 23, 1976, the Federal Register announced that certain effluent guidelines and standards for the Inorganic Chemicals Production Industry merited reconsideration and/or change. Thereby, certain sections of 40 CFR Part 415 were withdrawn or temporarily suspended. Regarding pretreatment standards, the following revisions were made effective by the USEPA.

A. Pretreatment Standards for Existing Sources.

Subcategories W - Aluminum Fluoride; AH-Chrome Pigments; AP-Hydrogen Cyanide; and BF-Sodium Silicofluoride have been withdrawn.

B. Pretreatment Standards for New Sources.

Subcategories G-Hydrochloric Acid; H-Hydrofluoric Acid; I-Hydrogen Peroxide; J-Nitric Acid; O-Sodium Carbonate; R-Sodium Metal; S-Sodium Silicate; U-Sulfuric Acid; V-Titanium Dioxide; W-Aluminum Fluoride; AH-Chrome Pigments; AP-Hydrogen Cyanide; and BF-Sodium Silicofluoride have either been remanded and/or revoked.

PLASTICS AND SYNTHETICS MATERIALS MANUFACTURING INDUSTRY
(156, 157, 158, 159, 160, 161, 162)
[Part 416]

SUBCATEGORIZATION OF THE INDUSTRY

The Plastics and Synthetics Manufacturing Industry involves a diverse series of processing and products as described below. Twenty-one subcategories have been established to date by the USEPA with additional subcategories scheduled for adoption in the future. The 21 subcategories are described below:

- A - Polyvinyl Chloride Manufacturing
- B - Polyvinyl Acetate
- C - Polystyrene
- D - Polypropylene
- E - Polyethylene
- F - Cellophane
- G - Rayon
- H - Acrylonitrile - Butadiene - Styrene (ABS) and Styrene - Acrylonitrile (SAN) Resin Copolymers
- I - Polyester
- J - Nylon 66
- K - Nylon 6
- L - Cellulose Acetate
- M - Acrylics
- N - Ethylene - Vinyl Acetate Copolymers
- O - Polytetrafluoroethylene
- P - Polypropylene Fiber
- Q - Alkyds and Unsaturated Polyester Resins
- R - Cellulose Nitrate
- S - Polyamide (Nylon 6/12)
- T - Polyester Resins (Thermoplastic)
- U - Silicones

Subcategory A, Polyvinyl Chloride. Includes plants employing polymerization reaction of vinyl chloride by bulk polymerization, suspension polymerization, or emulsion polymerization.

Subcategory B, Polyvinyl Acetate. Polymerization of polyvinyl acetate and associated processes.

Subcategory C, Polystyrene. Refers to plants utilizing the polymerization reaction of styrene by suspension polymerization or by bulk polymerization, and the processing associated with polystyrene manufacturing.

Subcategory D, Polypropylene. Applies to the polymerization reaction of polypropylene and processes associated with the manufacture of polypropylene.

Subcategory E, Polyethylene. Includes plants producing low-density polyethylene by the polymerization of ethylene; and the manufacture of high-density polyethylene by the polymerization of ethylene by the solvent process or by the polyform process.

Subcategory F, Cellophane. The processing of wood pulp to produce cellophane together with associated manufacturing.

Subcategory G, Rayon. The processing of wood pulp to produce rayon and associated manufacturing.

Subcategory H, Acrylonitrile-Butadiene-Styrene (ABS) and Styrene-Acrylonitrile (SAN) Resin Copolymers. Includes plants utilizing polymerization of acrylonitrile, butadiene and styrene, together with the various associated processing to make ABS and SAN resins.

Subcategory I, Polyesters. Refers to plants utilizing polymerization of dihydric alcohol and terephthalic acid or dimethyl terephthalate, and subsequent processing for the manufacture of polyester fibers.

Subcategory J, Nylon 66. Polymerization of hexamethylene diamine and adipic acid together with associated processing for the manufacture of nylon 66 resin and/or the fiber.

Subcategory K, Nylon 6. Refers to the polymerization of caprolactum and the various associated processing used to make nylon 6 resin and/or the fiber.

Subcategory L, Cellulose Acetate. Processing of wood pulp with acetic acid and acetic anhydride, together with the various associated processing for the manufacture of cellulose acetate fibers and/or the resins.

Subcategory M, Acrylics. Polymerization of acrylonitrile and the copolymerization of acrylonitrile and vinylidene chloride and/or vinyl chloride to make acrylic resins and fibers.

Subcategory N, Ethylene-Vinyl Acetate. Reaction of vinyl acetate and ethylene monomers by polymerization in order to produce ethylene vinyl acetate copolymers.

Subcategory O, Polytetrafluoroethylene. The manufacture of granular and fine powder grades of polytetrafluoroethylene together with the production of the monomer from the precursor, chlorodifluoromethane.

Subcategory P, Polypropylene Fibers. Applies to plants manufacturing polypropylene fibers from polypropylene.

Subcategory Q, Alkyds and Unsaturated Polyester Resins. Involves complex polymerization processing.

Subcategory R, Cellulose Nitrate. Fibrous cellulose is reacted with a mixture of sulfuric and nitric acids to manufacture cellulose nitrate.

Subcategory S, Polyamide (Nylon 6/12). Production of Nylon 6/12.

Subcategory T, Polyester Resins (Thermoplastic). The manufacturing of saturated polyester polymers based on poly (ethylene terephthalate) and poly (butylene terephthalate), together with associated processing.

Subcategory U, Silicones. Applicable to plants manufacturing silicone fluids, greases, emulsions, rubber and resins.

NATURE OF PROBLEM

The plastics and synthetics industry is more or less comprised of three segments: manufacture of raw materials or monomers; conversion of monomers into resin or plastic material; and the conversion of this plastic material into plastic items such as toys, synthetic fibers, packaging film, adhesives, paints, etc. The effluent guidelines for the plastics and synthetics industry mainly cover the manufacturing of the plastic or synthetic resins. However, they also include the production of synthetic fibers such as nylon, polyester, and acrylic fibers; and man-made cellulosic fibers including rayon and cellulose film, namely cellophane. The synthetic fibers have been growing in importance whereas the cellulosic fibers are declining in use.

In the plastics and synthetics industry, the major oil companies and others have integrated from oil and monomer raw material production into resin manufacture. A number of chemical companies have also integrated back to raw materials and forward into end products. In many cases, a given facility will produce monomer, polymers and the end products. The large volume commodity resins, generally comprise part of a petrochemical complex which may include production of the monomer (such as ethylene), and the production of end products (such as film). Because of dependency on petroleum and gas feedstocks, many petrochemical plants are located on the Gulf coast. The petrochemical complexes may ship their intermediate products to resin and plastic manufacturers located closer to the market areas.

Polymerization in very simplistic terms, involves the splitting of a double carbon bond hydrocarbon monomer and rearrangement to form a

long-chain polymer compound with normal carbon bond linking. Catalysts and modifiers are employed to initiate and control the polymerization reaction. Upon leaving the reactor, the polymer contains unreacted monomer and various contaminants and byproducts. The latter are vacuum distilled, condensed, recovered and/or sent to the sewer. Processes for removal and/or recovery of catalyst may generate significant process wastes.

Subcategories A Through M. Cellophane involves viscose preparation from wood pulp and alkali cellulose, film casting and coating. In rayon manufacturing, the processes basically comprise viscose preparation from wood pulp and fiber spinning. Polyester fiber is made from the molten fiber passed through a spinnerette and then cooled, and formed into staples or coils. Nylon fibers are manufactured in the form of staple bales, continuous yarn or textile filaments. Acrylic fibers are made through both wet and dry spinning methods and shipped in staple form.

Subcategories N Through U. Ethylene-vinyl acetate copolymers are often made in facilities manufacturing polyethylene. In the final process step, the EVA pellets are remelted, combined with additives and repelletized. Many of the uses of the EVA final product involve direct contact with food. Polytetrafluoroethylene is the most important of the fluorocarbon polymers, and is polymerized from the monomer, tetrafluoroethylene. The monomer is generated via a continuous process based on pyrolysis of chlorodifluoromethene. In polypropylene fiber manufacture, polypropylene flake is colored, melted and extruded as pellets. The pellets are passed through a spinnerette, cooled and drawn and converted into monofilaments, fibers or film. Polypropylene fiber is employed in carpets and for various textile needs. The alkyd and unsaturated polyester resins differ principally in that for the alkyds the acid component is supplied by long chain unsaturated acids vs. phthalic and maleic anhydrides used in the unsaturated polyesters. Alkyd resins are mainly used in paint formulations and molding compounds. The unsaturated polyester resins are mainly used in the manufacture of plastic reinforced with glass and metallic fibers, etc. Cellulose nitrate or nitrocellulose generates wastewater containing acids and alcohols lost from processing. Nylon 6/12 (DuPont) resins are produced in somewhat similar fashion as Nylon 66 above except that sebacic acid is used rather than adipic acid. The Thermoplastic saturated polyester resins mostly used for molding materials, are formed from polymerization using ethylene glycol and either dimethyl terephthalate (DMT) or terephthalic acid (TPA). Silicones encompass a wide variety of products with complex processing. Typical operations at a single silicone plant may include production of methyl chloride, varied methyl chlorosilanes and other chlorosilanes, the hydrolysis of dimethyl dichlorosilane, a range of silicone resins, elastomer products, and specialties comprising surfactants, coupling

agents, fluorosilicones, etc. Solvents, acids, heavy metals, and fluorides may be generated in silicone manufacturing wastewaters.

Available data show that treated effluents from plastics and synthetics manufacturing plants generally have relatively high COD/BOD ratios denoting large amounts of refractory residual remaining after conventional treatment. This seems to be especially true of acrylic plants and treatment of waste from this type of manufacturing represents one of the most difficult situations in the industry. Waste equalization appears to be a prerequisite for satisfactory treatment of plastics and synthetics manufacturing effluents.

PARAMETERS OF CONCERN

Primary parameters include:

BOD	Zinc
COD	Phenolic compounds
TSS	Chromium
pH, Alkalinity, Acidity	

Other important parameters comprise:

Iron	Nitrogenous compounds
Aluminum	TDS
Nickel	Oil/Grease
Vanadium	Color
Titanium	Turbidity
Molybdenum	Phosphates
Cobalt	Sulfides
Copper	Magnesium
Cadmium	Antimony
Cyanide	Temperature
Mercury	Manganese
Fluorides	Polychlorinated organics
Lead	Toxic compounds

PRELIMINARY LIMITATIONS FOR DISCHARGE TO POTW

For Subcategories A Through F, i.e. Polyvinyl Chloride, Polyvinyl Acetate, Polystyrene, Polypropylene, Polyethylene and Cellophane Manufacturing, Existing Sources. No limitations presently prescribed for process wastes to POTW's.

For Subcategories G Through M, i.e. Rayon, ABS and SAN Resin Copolymers, Polyester, Nylon 66, Nylon 6, Cellulose Acetate and Acrylics, Existing Sources. Limitations not yet established for these subcategories.

For Subcategories N and O, i.e. EVA Copolymers and Polytetrafluoroethylene, Existing Sources. No limitations presently prescribed for process wastes to POTW's.

For Subcategory P, Polypropylene Fibers, Existing Sources. No limitations prescribed except for oil and grease with a Pretreatment Standard of 100 mg/l.

For Subcategory Q Through T, i.e. Alkyds and Unsaturated Polyester Resins, Cellulose Nitrate, Nylon 6/12 and Polyester (Thermoplastic) Resins, Existing Sources. No limitations presently prescribed for process wastes to POTW's.

For Subcategory U, Silicones, Existing Sources. No limitations prescribed except for Copper with a Pretreatment Standard of 1 mg/l.

For Subcategories A Through U, i.e. All Subcategories, New Sources. Limitations not yet established.

REVOCATION AND SUSPENSION OF REGULATIONS FOR THE PLASTICS AND SYNTHETIC MANUFACTURING INDUSTRY

The 40 CFR Part 416, Federal Register publication of May 19, 1975 suspended the entire Acrylics Subcategory (Subcategory M) together with applicable limitations. On March 10, 1976, the U.S. Court of Appeals for the 4th Circuit further remanded Subcategories A through M and the effluent limitations guidelines and the new source performance standards to the EPA for reconsideration. Doubt was also cast on Subcategories N through U, and their associated effluent limitations guidelines and new source performance standards. Proposed pretreatment standards for existing sources in all established subcategories were similarly determined to be rescinded.

SOAP AND DETERGENT MANUFACTURING
(29, 30, 31, 32)
[Part 417]

SUBCATEGORIZATION OF THE INDUSTRY

The Soap and Detergent Manufacturing Industry is divided into 19 Subcategories. Subcategories A - H are essentially soap and soap product manufacture, and Subcategories I through S are detergent product manufacture.

- A - Soap Manufacturing by Batch Kettle
- B - Fatty Acid Manufacturing by Fat Splitting
- C - Soap Manufacturing by Fatty Acid Neutralization
- D - Glycerine Concentration
- E - Glycerine Distillation
- F - Manufacture of Soap Flakes and Powders
- G - Manufacture of Bar Soaps
- H - Manufacture of Liquid Soaps
- I - Oleum Sulfonation and Sulfation
- J - Air/SO₃ Sulfation and Sulfonation
- K - SO₃ Solvent and Vacuum Sulfonation
- L - Sulfamic Acid Sulfation
- M - Chlorosulfonic Acid Sulfation
- N - Neutralization of Sulfuric Acid Esters and Sulfonic Acids
- O - Manufacture of Spray Dried Detergents
- P - Manufacture of Liquid Detergents
- Q - Manufacturing of Detergents by Dry Blending
- R - Manufacturing of Drum Dried Detergents
- S - Manufacture of Detergent Bars and Cakes

PARAMETERS OF CONCERN

BOD	TDS
COD	Nitrogen
TSS	Phosphorous
Surfactants (MBAS)	Boron
Oil/Grease	Sodium Salts
pH, Acidity, Alkalinity	Sulfate
Zinc	Barium

PRELIMINARY LIMITATIONS FOR DISCHARGE TO POTW

In early guidelines documents, COD, oil and grease and surfacants were described as incompatible pollutants to POTW's. This was subsequently changed with oil and grease and surfactants said to be removed through adequately designed and operated POTW's. COD pretreatment limitations were deleted for some subcategories and retained for others. Whereas surfactants and other compounds expressed as COD in most subcategories were determined to be relatively biodegradable, concern was especially raised over wastes from the production of industrial and institutional detergents. The latter materials are highly refractive and may thusly adversely affect POTW's through bacteriostatic or bacteriocidal effects, or pass through POTW's without significant reduction. Consequently, COD pretreatment limitations were retained for spray dried and liquid detergent, and dry blending and drum-dried detergent manufacturing.

For Subcategories A through N and Subcategory S, Existing and New Sources:

Wastewaters are considered to contain no incompatibles and therefore may be discharged to POTW's without pretreatment. No pretreatment limitations are given.

For Subcategory O, Spray Dried Detergents, Existing Sources:

COD - Where more than 25 percent of the annual production is represented by final products having a COD: BOD₅ ratio greater than 4, the allowable COD discharge shall be restricted to 2.5 lb/1,000 lb anhydrous product for that portion of the production representing final products with a COD: BOD₅ ratio equal to or greater than 4. For that portion of the production representing final products with a COD: BOD₅ ratio less than 4, the incremental COD discharge shall be restricted to 8.0 lb/1,000 lb anhydrous product.

For Subcategory O, Spray Dried Detergents, New Sources:

COD - Where waste streams have a COD: BOD₇ ratio of 10 or less, or the streams have a COD content of 2.4 lb/1,000 lb anhydrous product or less, no pretreatment limitations are given.

Where waste streams have a COD: BOD₇ ratio greater than 10 and a COD content of more than 2.4 lb/1,000 lb anhydrous product, COD pretreatment limits are:

- 1) With normal operation of spray drying towers:

Avg. 30 Day (lb/1,000 lb anhydrous product)	Max. Day (lb/1,000 lb anhydrous product)
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0.04

0.08

- 2) For air quality restricted operation of spray drying tower, but only when high rate of wet scrubbing is necessary which produces more waste than can be recycled to process:

0.25

0.50

- 3) For fast turnaround operation of a spray tower when the number of turnarounds over any 30 day period exceeds 6, the maximum daily allowable waste load shall be sum of 1) or 2) directly above plus the appropriate value of 0.07 lb/1,000 lb anhydrous product. Also, the avg. 30 day allowable load shall be the number of turnarounds in excess of 6 multiplied by 0.07 lb/1,000 lb anhydrous product and prorated to 30 days plus the value contained in either 1) or 2) above.

For Subcategory P, Manufacture of Liquid Detergents, Existing Sources:

COD - Where more than 25 percent of the annual production is represented by final products having a COD: BOD₅ ratio greater than 4, the allowable COD discharge shall be restricted to 1.0 lb/1,000 lb anhydrous product for that portion of the production representing final product with a COD: BOD₅ ratio equal to or greater than 4. For that portion of the production representing final products with a COD: BOD₅ ratio less than 4, the incremental COD discharge shall be restricted to 4.0 lb/1,000 lb anhydrous product.

For Subcategory P, Manufacture of Liquid Detergents, New Sources:

COD - Where waste streams have a COD: BOD₇ ratio of 10 or less or the streams have a COD content of 1.1 lb/1,000 lb anhydrous product or less, no pretreatment limitations are given.

COD - Where waste streams have a COD: BOD ratio greater than 10 and a COD content of more than 1.1 lb/1,000 lb anhydrous product, COD pretreatment limits are:

1) With normal liquid detergent operations:

Avg 30 Day (1b/1,000 lb anhydrous product)	Max. Day (1b/1,000 lb anhydrous product)
0.22	0.44

2) For fast turnaround operation of automated fill lines, when the number of turnarounds exceeds 8 over any 30 day period, the maximum daily allowable waste loads shall be the sum of 1) directly above plus the appropriate value of 0.07 lb/1,000 lb anhydrous product. Also, the avg. 30 day allowable load shall be the number of turnarounds in excess of 8 multiplied by 0.07 lb/1,000 lb anhydrous products and prorated to 30 days plus the value contained in 1) above.

For Subcategory Q, Manufacture of Detergents by Dry Blending, Existing Sources:

COD - Where more than 25 percent of the annual production is represented by final products having a COD: BOD₅ ratio greater than 4, the allowable COD discharge shall be restricted to 0.25 lb/1,000 lb anhydrous product for that portion of the production representing final products with a COD: BOD₅ ratio equal to or greater than 4. For that portion of the production representing final products with a COD: BOD₅ ratio less than 4, the incremental COD discharge shall be restricted to 0.50 lb/1,000 lb anhydrous product.

For Subcategory Q, Manufacture of Detergents by Dry Blending, New Sources:

COD - Where waste streams have a COD: BOD₇ ratio of 10 or less or the streams have a COD content of 0.26 lb/1,000 lb anhydrous product or less, no pretreatment limitations are given.

Where waste streams have a COD: BOD₇ ratio of 10 or more and a COD content of more than 0.26 lb/1,000 lb anhydrous product, COD pretreatment limits are:

Avg 30 Day (1b/1,000 lb anhydrous product)	Max. Day (1b/1,000 lb anhydrous product)
0.07	0.14

For Subcategory R, Manufacture of Drum Dried Detergents, Existing Sources:

COD - Where more than 25 percent of the annual production is represented by final products having a COD: BOD₅ ratio greater than 4, the allowable COD discharge shall be restricted to 0.15 lb/1,000 lb anhydrous product for that portion of the production representing final products with a COD: BOD₅ ratio equal to or greater than 4. For that portion of the production representing final products with a COD: BOD₅ ratio less than 4, the incremental COD discharge shall be restricted to 0.30 lb/1,000 lb anhydrous product.

For Subcategory R, Manufacture of Drum Dried Detergents, New Sources:

COD - Where waste streams have a COD: BOD₅ ratio of 10 or less or the streams have a COD content of 0.20 lb/1,000 lb anhydrous product or less, no pretreatment limitations are given.

Where waste streams have a COD: BOD₅ ratio of 10 or more and a COD content of more than 0.20 lb/1,000 lb anhydrous product, COD pretreatment limits are:

Avg. 30 Day (lb/1,000 lb anhydrous product)	Max. Day (lb/1,000 lb anhydrous product)
0.05	0.10

PRESCRIBED TREATMENT FOR DISCHARGE TO POTW

No specific pretreatment systems have been defined for soap and detergent plants discharging to municipal sewers. However, the EPA Development Document on Soap and Detergent Manufacturing emphasizes caution with respect to fats and oils from both soap and detergent plants. Other areas of caution include the manufacture of industrial cleaners and potentially high zinc levels in wastes throughout the industry.

Fats and oils in wastes from soap plants, if excessive, should be passed through gravity-type separators or well-designed fat traps. This type of pretreatment should remove at least 90% of the free oils which are reported as the main source of problems in both municipal sewers and treatment plants. Fats and oils from detergent plants behave more like hydrocarbons encountered in the organic chemical industry rather than the natural fats. Detergent-type fats are consequently less biodegradable.

Zinc concentrations greater than 5 mg/l can exert adverse effect upon biological POTW's. Should zinc problems arise, alkaline precipitation pretreatment may be employed. Certain industrial cleaners contain

phosphoric acid, hydrofluoric acid and certain organics such as the chlorinated benzenes. Release of phosphates and fluorides may possibly be controlled by in-house measures. Chlorinated organics should be restricted and/or controlled to a very close degree because of toxicity to man and deleterious effects to waste treatment plants and receiving waters.

The Federal Register of February 20, 1975 discusses pretreatment to reduce COD loads from New Sources in the Soap and Detergent Industry. Such measures may include installation of on-site storage to eventually facilitate recycling of wastewater and materials back into the process. Reasonable use of in-plant controls, especially when formulations contain large amounts of refractory organic materials, will further reduce COD loads to prescribed levels.

FERTILIZER MANUFACTURING INDUSTRY
(182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 196)
[Part 418]

SUBCATEGORIZATION OF THE INDUSTRY

The fertilizer industry has been divided into seven distinctly different subcategories which have different pollutants, waste treatment technologies and waste management problems. These subcategories are described below:

A - Phosphate Subcategory. Applicable to plants manufacturing sulfuric acid by sulfur burning, and the manufacture of wet process phosphoric acid, normal superphosphate, triple superphosphate and ammonium phosphate. The manufacture of phosphoric acid includes phosphate rock grinding, acid attack of phosphate rock, phosphoric acid concentration, and phosphoric acid clarification. All of these operations usually occur in a single complex separate from nitrogen fertilizer products.

B - Ammonia Subcategory. Applicable to plants manufacturing (anhydrous) ammonia. Ammonia is manufactured by high temperature - high pressure gaseous reactions. Adequate treatment of the primary waste constituent, ammonia, can only be accomplished by treatment separate from other operations in a nitrogen fertilizer complex, i.e. ammonia stripping, and hence these activities are classed in a single subcategory.

C - Urea Subcategory. Applicable to plants manufacturing urea. The synthesis of urea is characterized by high pressure gaseous reactions.

D - Ammonium Nitrate Subcategory. Applicable to plants manufacturing (anhydrous) ammonium nitrate. Liquid ammonia and nitric acid are mixed in a low pressure vessel and subsequently water is removed by flash vaporization.

E - Nitric Acid Subcategory. Applicable to plants producing nitric acid used as an intermediate for the manufacture of fertilizer or for other intermediates. Nitric acid is essentially produced via the oxidation of ammonia at elevated temperatures.

F - Ammonium Sulfate Subcategory. Applicable to plants producing ammonium sulfate by the "Synthetic" process and by coke oven byproduct recovery. This subcategory does not apply to ammonium sulfate as a byproduct of caprolactum manufacturing. In the synthetic process, virgin ammonia and sulfuric acid are directly combined. Coke oven ammonium sulfate is produced from ammonia reclaimed from the coking of coal by absorption with sulfuric acid.

G - Mixed and Blend Fertilizer Production Subcategory. Applicable to plants producing mixed fertilizer and blend fertilizer. "Mixed fertilizer" manufacturing refers to a process which mixes wet and/or dry straight fertilizer materials, mixed fertilizer materials, fillers and additives progressing through chemical reactions to give a certain formulation. "Blend fertilizer" manufacturing refers to a process which mixes dry, straight and mixed fertilizer materials to a given N-P-K formulation.

NATURE OF PROBLEM

The Fertilizer Industry manufactures three types of nutrient products: 1) the nitrogen fertilizers including ammonia, urea, ammonium nitrate and ammonium sulfate; 2) the phosphate fertilizers including phosphoric acid, normal superphosphate and triplephosphate; and 3) combination fertilizer comprising the ammonium phosphates, "Mixed" fertilizers, and "Blend" fertilizers.

In the Phosphate Subcategory, processing requires large amounts of cooling waters. Leaks in heat exchange equipment cause escape of sulfuric acid. Waste pollutants from phosphates and sulfuric acid manufacturing include low pH, phosphorous, fluorides, cadmium, arsenic, vanadium and uranium. Cadmium is a major pollutant found in raw wastewaters from phosphate subcategory plants. Phosphoric acid used for fertilizers is produced by adding a strong acid, usually sulfuric, to phosphate ores. The ore is not pure and abundant fluorides and trace amounts of cadmium, arsenic, vanadium and uranium will be leached out by the acid. Fluorine is volatilized in processing and collected via water scrubbers. Large amounts of byproduct gypsum formed in the reaction are sluiced to gypsum ponds. The wastewaters from the scrubbers are usually sent to this same pond. When phosphoric acid is concentrated, impurities will be volatilized and collected within the barometric condenser waters. Escaping gases from the production of superphosphates and ammonium phosphates are treated by wet scrubbers. Phosphorous and fluorides are present in these waters. Ammonia is found in ammonium phosphate scrubber waters.

In the Ammonia Subcategory, nitrogen waste will be present as ammonia. Highly varying pH levels and oil and grease are important pollutants. The principal process wastewater results from the condensation of excess steam used in the primary reformer. Ammonia in the condensate originates from recycle of purge gas, from feed air containing ammonia, and from ammonia inadvertently formed in the shift converter. Because cryogenic equipment is used, condensate about the pipes, etc., can absorb ammonia from leaks in seals. Ammonia also emanates from absorption in cooling towers of various ammonia emissions. Oil and grease are mainly derived as drippings from pumps and high-pressure compressors.

In the Urea Subcategory, nitrogen waste is characterized by ammonia and organic nitrogen mixed with urea. Highly varying pH levels are also experienced. Following high-pressure gaseous reactions, the pressure is reduced and ammonia, carbon dioxide and ammonium carbamate are flashed from the urea product. These flashed gases receive water scrubbing. This scrub liquor together with condensates from the urea concentration step, result in a waste containing urea, ammonium carbamate, ammonia and carbon dioxide. Prill tower operations are responsible for increased loads of ammonia and urea. Fine dust from prill towers and/or urea pan granulators will enter the liquid waste collection systems via rain water and wash waters.

In the Ammonium Nitrate Subcategory, nitrogen waste is characterized by ammonia and nitrates. Flash vaporization of water from the dilute nitric acid is a major process wastewater. The nitric acid-ammonia reaction is highly exothermic, and large quantities of water with ammonia, nitric acid, nitrates and nitrogen dioxide are evaporated. Air scrubbing transfers these pollutants to the water phase. As for urea, prilling of ammonium nitrate causes a fine dust which can enter the liquid waste collection systems via wash waters and rain waters.

In the Nitric Acid Subcategory, nitrogen waste is characterized mainly by nitrates. The oxidation of ammonia at elevated temperatures generates little or no process wastewaters. Leaks and spills are reported as the only sources of pollution from nitric acid manufacturing.

In the Ammonium Sulfate Subcategory, major waste sources include contaminated water, closed loop tower waters, crystal wash waters, process condensates, spills and leaks, and miscellaneous. Contaminated waters mostly refer to barometric condenser waters coming off the saturator-crystallizers and excess waters withdrawn from the plant recirculated water system(s).

Mixed and Blend Fertilizer processing is represented by a significantly large number of establishments in the U.S. Waste streams can include contaminated water, process waters, spills and leaks, and miscellaneous. Contaminated water in most cases will encompass liquors from the wet scrubbing of drier and/or ammoniator exhaust gases. Contaminated water is usually bled out of the closed loop recirculation system serving the scrubbers.

In summary, principal wastewaters in fertilizer production are from manufacturing operations including product washdown and purification, closed loop tower blowdowns, process condensates, wet scrubbing effluents, spills and leaks, and various runoff.

PARAMETERS OF CONCERN

pH, Acidity, Alkalinity	TDS
Ammonia Nitrogen	Phosphorous, phosphates
Organic Nitrogen	Sulfates
Nitrates, Nitrites	Cadmium
Fluorides	Arsenic
COD	Vanadium
TSS	Uranium
Hardness	Radium-226
Oil and Grease	Temperature
	Phenols

PRELIMINARY LIMITATIONS FOR DISCHARGE TO POTW

For Subcategory A, Phosphate Production, Existing Sources

Pretreatment limitations have been equated to BPT limitations which are described below.

I. Process wastewaters are prohibited from discharge. However for (process) wastewaters from a calcium sulfate storage pile runoff facility operated separately or in combination with a water recirculation system, there shall be no discharge except when there is an excess over and above a surge capacity equal to the runoff from a 10-year, 24-hour rainfall event; or when extremely unusual precipitation events cause the water level to rise into the surge capacity in which case the wastewater must be treated and discharged whenever the water level equals or exceeds the mid-point of the surge capacity.

The following concentrations shall be adhered to for excess storage pond waters:

Pollutant	Avg. 30 Day mg/l	Max. Daily mg/l
Total Phosphorus as P	35	105
Fluoride	25	75
TSS	50	150
pH	6.0 to 9.5	

But the above TSS limits may be waived when process waters are chemically treated and then settled in order to meet the other pollutant limits.

II. "Contaminated non-process wastewaters" are defined as: "any water including precipitation runoff which, during manufacturing or processing, comes into incidental contact with any raw material, intermediate product, finished product, byproduct or waste product by means of: 1)

precipitation runoff; 2) accidental spills; 3) accidental leaks caused by the failure of process equipment and which are repaired or the discharge of pollutants therefrom contained or terminated within the shortest reasonable time which shall not exceed 24 hours after discovery or when discovery should reasonably have been made, whichever is earliest; and 4) discharges from safety showers and related personal safety equipment, and from equipment washings for the purpose of safe entry, inspection and maintenance; provided that all reasonable measures have been taken to prevent, reduce, eliminate and control to the maximum extent feasible such contact, and provided further that all reasonable measures have been taken that will mitigate the effects of such contact once it has occurred." For these contaminated non-process waters, the following concentrations shall be adhered to:

Pollutant	Avg. 30 Day mg/l	Max. Daily mg/l
Total Phosphorus as P	30	105
Fluoride	25	75
pH	6.0 to 9.5	

For Subcategory A, Phosphate Production, New Sources

There shall be no discharge of process wastewater pollutants.

For Subcategory B, Ammonia Production, Existing Sources

Pretreatment limitations have been equated to BPT limitations which are described below.

Pollutant	Avg. 30 Day lb/l,000 lb anh. ammonia	Max. Daily lb/l,000 lb anh. ammonia
Ammonia as N	0.0625	0.1875
pH	6.0 to 9.0	

For Subcategory B, Ammonia Production, New Sources

Pretreatment limitations have not yet been specified.

For Subcategory C, Urea Production, Existing Sources

Pretreatment limitations have been equated to BPT limitations which are described below. Limitations are applicable to the manufacture of urea. Discharge from shipping losses and precipitation runoff are excluded.

I. Manufacturing operations in which urea is "prilled" or granulated.

Pollutant	Avg. 30 Day 1b/1,000 lb urea product	Max. Daily 1b/1,000 lb urea product
Ammonia as N	0.46	0.92
Organic nitrogen as N	0.55	1.03
pH	6.0 to 9.0	

II. Manufacturing operations in which urea is produced as a solution product.

Pollutant	Avg. 30 Day 1b/1,000 lb urea product	Max. Daily 1b/1,000 lb urea product
Ammonia as N	0.43	0.85
Organic nitrogen as N	0.27	0.50
pH	6.0 to 9.0	

For Subcategory C, Urea Production, New Sources

Pretreatment limitations have not yet been specified.

For Subcategory D, Ammonium Nitrate Production, Existing Sources

Pretreatment limitations have been equated to BPT limitations which are described below. Limitations are applicable to the manufacture of ammonium nitrate. Discharges from shipping losses and precipitation runoff are excluded.

Pollutant	Avg. 30 Day 1b/1,000 lb ammonium nitrate	Max. Daily 1b/1,000 lb ammonium nitrate
Ammonia as N	0.35	0.66
Nitrate as N	0.36	0.66
pH	6.0 to 9.0	

For Subcategory D, Ammonium Nitrate Production, New Sources

Pretreatment limitations have not yet been specified.

For Subcategory E, Nitric Acid, Existing Sources

Pretreatment limitations have been equated to BPT limitations which are described below. Limitations are applicable to the manufacture

of nitric acid in concentrations up to 68%. Discharge from shipping losses are excluded. In the regulations, certain terms are defined. "Shipping losses" refer to the discharges from loading tank cars or tank trucks; discharges from cleaning tank cars or tank trucks; and discharges from air pollution control scrubbers designed to control emissions from loading or cleaning tank cars or tank trucks. The term "shipped liquid ammonia" refers to liquid ammonia commercially shipped for which the Department of Transportation requires 0.2% minimum water content. The term "non-contact cooling water" shall mean water which is used in a cooling system designed so as to maintain constant separation of the cooling medium from all contact with process chemicals but which may on the occasion of corrosion, cooling system leakage or similar cooling system failure contain small amounts of process chemicals,...."

I. Nitric acid production in which all raw material ammonia is in the gaseous form.

Pollutant	Avg. 30 Day lb/1,000 lb nitric acid on the basis of 100% HNO_3	Max. Daily lb/1,000 lb nitric acid on the basis of 100% HNO_3
Ammonia as N	0.0007	0.007
Nitrite as N	0.044	0.33
pH	6.0 to 9.0	

II. Nitric Acid production in which all raw material ammonia is in the shipped liquid form.

Pollutant	Avg. 30 Day lb/1,000 lb nitric acid on the basis of 100% HNO_3	Max. Daily lb/1,000 lb nitric acid on the basis of 100% HNO_3
Ammonia as N	0.0008	0.08
Nitrate as N	0.044	0.33
pH	6.0 to 9.0	

III. Non-Contact Cooling Water Limitations.

Parameter	Limitation
pH	6.0 to 9.0

For Subcategory E, Nitric Acid, New Sources.

Limitations are applicable to the manufacture of nitric acid in concentrations up to 68%. Discharges from shipping losses are excluded.

I. Nitric Acid production in which all raw material ammonia is in the gaseous form.

Pollutant	Avg. 30 Day lb/1,000 lb nitric acid on the basis of 100% HNO_3	Max. Daily lb/1,000 lb nitric acid on the basis of 100% HNO_3
Ammonia as N	0.00045	0.0045
Nitrate as N	0.023	0.17

II. Nitric acid production in which all raw material ammonia is in the shipped liquid form.

Pollutant	Avg. 30 Day lb/1,000 lb nitric acid on the basis of 100% HNO_3	Max. Daily lb/1,000 lb nitric acid on the basis of 100% HNO_3
Ammonia as N	0.008	0.08
Nitrate as N	0.023	0.17

III. Non-contact cooling water limitations.

Parameter	Limitation
pH	6.0 to 9.0

For Subcategory F, Ammonium Sulfate Manufacturing, Existing and New Sources

Pollutant	Pretreatment Standard
Ammonia as N	30 mg/l
pH, BOD, TSS	No limitations

For Subcategory G, Mixed and Blend Fertilizer Production, Existing and New Sources

Pollutant	Pretreatment Standard
Ammonia as N	30 mg/l
Total Phosphorous as P	35 mg/l
pH, BOD, TSS, Nitrates	No limitations

In summary, the waste waters from fertilizer plants, if passed to conventional secondary treatment municipal plants may not be amenable to reduction of wastewater pollutants, and furthermore, could cause severe adverse impact on proper functioning of the POTW. Accordingly, pretreatment criteria especially for ammonia nitrogen, should be relatively stringent.

SUSPENSION AND REVOCATION OF CERTAIN FERTILIZER EFFLUENT REGULATIONS AND GUIDELINES

On June 23, 1975, the Federal Register effectively suspended the whole of Subcategory D (Ammonium Nitrate) effluent limitations and regulations including pretreatment stipulations.

The Federal Register publication of March 25, 1977 made subsequent changes on pretreatment limitations for the Fertilizer Industry. Specifically, for Subcategories A and E, respectively, the Phosphate and Nitric Acid Subcategories, pH limits were revoked for Existing and for New Sources. It was determined that maintaining pH levels in the 6-9 range from the subject plants was not completely reasonable.

PETROLEUM REFINING INDUSTRY
(197, 198, 199, 200)
[Part 419]

SUBCATEGORIZATION OF THE INDUSTRY

The Petroleum Refining Industry has been divided into six major subcategories described as follows:

A - Topping Subcategory. Applies to facilities which produce petroleum products by topping and catalytic reforming whether or not the facility includes other processes in addition to topping and catalytic reforming. This subcategory is not applicable to facilities having thermal processes such as coking, visbreaking, and catalytic cracking operations.

Specialized definitions are given for "runoff", "ballast", "feedstock", "once-through cooling water", and units of measurement shown below. These definitions are important in terms of additional waste load allocations permitted under BPT, BAT and New Source regulations.

Runoff - refers to the flow of storm water.

Ballast - refers to the flow of wastes from a ship, which are treated at the refinery.

Feedstock - refers to the crude oil and natural gas liquids fed to the topping units.

Once-through Cooling Waters - refers to discharges that are used for the purpose of heat removal and that do not come into direct contact with any raw material, intermediate, or finished product.

M gal. - shall mean one thousand gallons; M bbl. shall mean one thousand barrels. One barrel is equivalent to 42 gallons.

B - Cracking Subcategory. Applies to facilities which produce petroleum products by topping and cracking, whether or not the facility includes any other processes in addition to topping and cracking. This subcategory is not applicable to facilities having processes specified under Subcategories C, D or E.

Specified definitions are the same as for Subcategory A plants.

C - Petrochemical Subcategory. Applies to facilities which produce petroleum products by topping, cracking and petrochemical operations, whether or not the facility includes any processes in addition to topping, cracking and petrochemical operations. This subcategory is not applicable to facilities having processes specified under Subcategories D and E. Specialized definitions are the same as for Subcategory A plants

to which is added the term "petrochemical operations." Petrochemical operations are defined as the production of second generation petrochemicals, i.e., alcohols, ketones, cumene, styrene, etc., or first generation petrochemicals and isomerization products, i.e. BTX, olefins, cyclohexane, etc., when 15 percent or more of refinery production comprises first generation petrochemicals and isomerization products.

D - Lube Subcategory. Applies to facilities which produce petroleum products by topping, cracking and lube oil manufacturing processes, whether or not the facility includes any processes in addition to topping, cracking and lube oil manufacturing. This subcategory is not applicable to facilities having processes specified under Subcategories C and D. Specialized definitions are the same as for Subcategory A plants.

E - Integrated Subcategory. Applies to facilities which produce petroleum products by topping, cracking and lube oil manufacturing processes, and petrochemical operations, whether or not the facility includes any process in addition to topping, cracking, lube oil manufacturing processes and petrochemical operations. Specialized definitions are the same as for Subcategory C plants.

In terms of providing general understanding of petroleum refining processing, the following description of processes may be helpful:

Distillation - separates hydrocarbon molecules by differences in their physical properties, i.e., boiling points.

Cracking - the breaking down of high molecular weight hydrocarbons to lower weight hydrocarbons.

Polymerization and Alkylation - the rebuilding of hydrocarbon molecules.

Isomerization and Reforming - the rearranging of molecular structures.

Solvent Refining - the separation of hydrocarbon molecules by differences in solubility in other compounds.

Desalting and Hydrotreating - the removal of impurities occurring in the feedstocks.

Miscellaneous Operations - these include the removal of impurities from finished products by various treating and finishing processes, et. al.

NATURE OF PROBLEM

As of January 1973, a total of 247 operating petroleum refineries were reported in the United States having a combined crude oil processing capacity of 14 million barrels/day. Individual plants ranged in capacity from 200 to 434,000 barrels/day. Because of crude supply limitations, most new refinery capacity is being designed to handle higher sulfur crudes. This trend leads to increased sour water stripping, desalting, more sour heavy bottoms, and greater efforts to reduce sour gas emissions and general problems of corrosion through the refinery.

Ammonia, sulfide and phenol at a refinery originate from sour water waste streams. Sour waters are produced when steam is used as a stripping medium in the various cracking processes at a refinery.

Oil and grease may be generated by a wide variety of operations at a refinery, including pad washings, tank bottom washings, and contaminated storm runoff.

Chromium is primarily associated with cooling tower blowdown when chromium compounds are employed as corrosion inhibitors in the refinery cooling water systems.

PARAMETERS OF CONCERN

BOD	Zinc
COD	TDS
Oil/Grease	TSS
Sulfides	TOC
Ammonia N	Temperature
pH, Acidity, Alkalinity	Chlorides
Phenols	Fluorides
Chromium, total and hexavent	Phosphates
	Other Metals

PRELIMINARY LIMITATIONS FOR DISCHARGE TO POTW AND PRESCRIBED TREATMENT MEASURES

Pretreatment Standards for Existing Plants Within Subcategories A Through E. (That for New Sources have not yet been clearly defined).

Parameter	Daily Max. Value
Ammonia as N	100 mg/l
Oil/Grease	100 mg/l
pH	Shall not be lower than 5.0 in order to minimize corrosive structural damage, unless the POTW is specifically designed to accommodate the given conditions.

It is recognized at relatively low concentrations in biological treatment, ammonia may serve usefully as a nutrient. At excessively high levels however, ammonia will inhibit the biological process and pass through the POTW untreated.

Phenolic compounds are said to be biodegradable by acclimated biota. Many POTW's can accept phenol-containing industrial wastes without upset. In cases where a POTW cannot handle phenolic wastes of a specific refinery, a maximum daily phenol limitation of 0.35 mg/l has been developed as guidance.

Chromium pretreatment limits have not been established. However, when chromium is judged to cause detrimental effect upon POTW's a daily maximum total chromium limit of 1.0 mg/l can be attained and is cited as guidance. It is suggested that cooling tower blowdown be segregated, and hexavalent chromium be reduced to trivalent chromium using sulfur dioxide, followed by waste settling.

Sulfides in refinery wastewaters can interfere with successful operation of POTW's and cause corrosion in concrete waste conveyance pipelines. When sulfides are judged to cause significant detrimental effect upon POTW's, a daily maximum sulfide limit of 3.0 mg/l can be attained and is cited as guidance to POTW's.

It is reported that pretreatment limitations for the Petroleum Refining Industry will generally require implementation of control and pretreatment technology similar to that practiced by direct dischargers in the industry. This includes sour water strippers for removing ammonia from sour water waste streams; and dissolved air flotation (DAF) units or equivalent methods, in addition to API separators, for removing oil and grease content. Also, sufficient waste equalization should be strongly considered in all pretreatment systems.

IRON AND STEEL MAKING SEGMENT OF IRON AND STEEL INDUSTRY
(12, 208, 209, 210)
[Part 420]

SUBCATEGORIZATION OF THE INDUSTRY

Twelve Subcategories described as Subcategories A through L have been defined for the Iron and Steel Making Segment of the Iron and Steel Industry. Fourteen other subcategories are included under the Hot Forming and Cold Finishing Segment of the Iron and Steel Industry which are described in another section of this report. It is noted that Subcategories G, K and L and their accompanying pretreatment limitations below encompass alloy and stainless steel in addition to customary carbon steel.

- A) Byproduct Coke subcategory
- B) Beehive Coke subcategory
- C) Sintering subcategory
- D) Blast Furnace (Iron) subcategory
- E) Blast Furnace (Ferromanganese) subcategory
- F) Basic Oxygen Furnace (semi-wet air pollution controls) subcategory
- G) Basic oxygen Furnace (wet air pollution controls) subcategory
- H) Open Hearth Furnace subcategory
- I) Electric Arc Furnace (semi-wet air pollution controls) subcategory
- J) Electric Arc Furnace (wet air pollution controls) subcategory
- K) Vacuum Degassing subcategory
- L) Continuous Casting and Pressure Slab Molding subcategory

Subcategory A, Byproduct Coke - Coke making operations conducted by the heating of coal in slot-type ovens in the absence of air to produce coke.

Subcategory B, Beehive Coke - Coke making operations conducted by the heating of coal with the admission of air in controlled amounts. Beehive coking operations do not have accompanying byproduct plants.

Subcategory C, Sintering - A sinter plant conducts heating of iron bearing wastes (mill scale and dust from blast and steel making furnaces) together with fine iron ore, limestone and coke-fines in an ignition furnace in order to produce a special agglomerate or sinter. This latter is charged into the blast furnace.

Subcategory D, Blast Furnace (Iron) - Comprises the making of iron in which iron ore is reduced to molten iron within a blast furnace.

Subcategory E, Blast Furnace (Ferromanganese) - Iron/manganese ores are reduced to molten ferromanganese in a blast furnace. Ferromanganese differs from Subcategory D (Iron blast furnace) in requiring higher operating temperatures in the blast furnace, which in turn is said to produce higher concentration of pollutant parameters, notably cyanides, in the gas washing waters.

Subcategory F, Basic Oxygen Furnace (with semi-wet air pollution controls) - Carbon steel is manufactured in a basic oxygen furnace equipped with a semi-wet dust collection system. With the semi-wet system a spark box or a spray chamber using slightly more water than can be evaporated is used to condition the gases for further cleaning, producing a highly contaminated but relatively small volume of waste water.

Subcategory G, Basic Oxygen Furnace (with wet air pollution controls) - Carbon steel is manufactured in a basic oxygen furnace equipped with a wet dust collection system. With the wet system high energy scrubbers or wet gas washers are used to cool and to condition furnace gases, producing much larger volumes of moderately-contaminated waste waters than are found for the semi-wet systems.

Subcategory H, Open Hearth Furnace - Carbon steel is manufactured in an open hearth furnace equipped with wet dust collection systems.

Subcategory I, Electric Arc Furnace (with semi-wet air pollution controls) - Carbon steel is manufactured in electric arc furnaces equipped with semi-wet dust collection systems. With the semi-wet system, a spark box or a spray chamber using slightly more water than can be evaporated is used to condition the gases for further cleaning in a precipitator or baghouse. A relatively small volume of contaminated waste water may be produced, depending upon the degree of excess spray water employed.

Subcategory J, Electric Arc Furnace (with wet air pollution controls) - Carbon steel is manufactured in electric arc furnaces equipped with wet furnace off-gas dust collection. With the wet system, high energy scrubbers or wet gas washers are used to cool and to condition furnace gases, producing much larger volumes of moderately-contaminated waste waters than are found for the semi-wet systems.

Subcategory K, Vacuum Degassing - Degassing operations comprise application of a vacuum to molten steel to further refine the steel product. Degassing removes hydrogen, carbon and oxygen and

any other volatile alloys from the steel, along with minute particles of iron oxide. These gases together with exhaust steam, are condensed by direct contact with cooling water, producing a contaminated waste water.

Subcategory L, Continuous Casting and Pressure Slab Molding -
The continuous formation of a primary steel shape (such as a slab, billet or bloom) from molten steel by casting through a water cooled mold. Most of the water serving the continuous casting operations is used for mold and machine cooling. The latter represent noncontact systems on closed recycle with no contamination. Dirty process waters originate from open spray methods. Pressure slab molding is the casting of a slab in a mold by a bottom pouring method.

NATURE OF PROBLEM

Approximately 92 percent of the 1972 total U.S. annual steel ingot production was produced by 15 major steel corporations. This also represented 22.5 percent of the world total of 625 million ingot tons of steel produced in 1972. Steel production in 1969 was a record 141 million ingot tons. In 1972, approximately 65 million tons of coke, 83 million tons of iron, and 134 million tons of steel, were manufactured.

Three series of operations are involved in the production of steel. Coal is first converted to pure carbon, coke. Secondly, coke is combined with iron ore and limestone in a blast furnace to produce iron. Thirdly, iron is purified into steel in either an open hearth, basic oxygen, or electric arc furnace. Further refinements include degassing, etc. Steel not cast into ingot molds can be cast in a process called continuous casting. The sintering plant as part of the present day integrated steel mill has the main function of agglomerating and recycling (waste) fines back to the blast furnace.

Characteristics of wastes from the various Subcategories and the identified sources of pollutants are described as follows:

A) By Product Coking - Major pollutants include ammonia, BOD, cyanides, phenols, oils and grease, sulfides, TSS (and varying pH). Major waste sources comprise excess ammonia liquor resulting from the condensation of moisture originally present in the raw coal before coking; wastes from the light oil recovery system; overflows from the final cooler recycle system; condensates from desulfurizers; effluents from baro-meter condensers; and indirect cooling waters. Additional waste sources may include coke wharf drainage, quench water overflow, and coal pile runoffs. Beyond conventional waste treatments, additional technology for reducing waste at by-product coke plants includes steam stripping of ammonia liquor, dephenolization, and desulfurization.

B) Beehive Coke - Important pollutant parameters are ammonia, BOD, cyanides, phenols, TSS and heat. In comparison to byproduct coking, wastewater quantities from beehive coking are considerably lower since the bulk of the volatile waste components (unfortunately) are allowed to escape to the atmosphere. Process water contacts the coke materials during the quenching operation carrying along fine particles of coke and dissolving various residues from the product.

c) Sintering - Significant pollutants include TSS, oil and grease, sulfides and fluorides. Sinter plants built in the 1950's are more likely to have wet scrubbers vs. plants constructed more recently. Main pollutants associated with a wet system are TSS washed out of the process gases; oils and greases from mill scale which are vaporized during sintering then scrubbed out; sulfides from coke fines; and fluorides from fluorspar and limestone found in flue dusts from the steelmaking processes. The pollutants will vary depending upon the various blends of iron bearing dust and mill scale, coke fines and limestone constituting a typical sinter burden.

D) Blast Furnace (Iron) - Major pollutants are TSS, cyanides, phenols, ammonia, sulfides (and varying pH). Main waste sources include the waters used for contact cooling of blast furnace gases and the scrub waters used to wash blast furnace gases free of fine particulates so as to permit their use as a fuel. TSS, in the waste waters originate with these fines from the gases. Cyanides, phenols and ammonia originate with the coke material charged to the blast furnace especially if the coke had been quenched with contaminated waters. Sulfides are produced as hydrogen sulfide gas caused by the reducing atmosphere in the blast furnace. Fluorides occur in the gas streams from the decomposition of raw materials charged to the furnace which are easily transferred to the gas washer waters.

E) Blast Furnace (Ferromanganese) - Pollutants include TSS, cyanides, phenols, ammonia, sulfides, manganese (and varying pH). The two main waste sources are the waters used for cooling the blast furnace gases, and the waters for scrubbing the gases free of fine particulates to permit their use as fuel. TSS in the waste waters originate with these particulates which are relatively high in manganese. Cyanides, phenols and ammonia originate from the coke material charged to the furnace. Sulfides are produced as hydrogen sulfide gas caused by the reducing atmosphere in the blast furnace.

F) Basic Oxygen Furnace (semi-wet air pollution controls)
Pollutant parameters principally comprise TSS and fluorides, both of which are scrubbed out of the BOF gas streams during water contact. Varying pH may also constitute a problem.

G) Basic Oxygen Furnace (wet air pollution controls) - Pollutants and waste sources are the same as described above for Subcategory F.

H) Open Hearth Furnace - Known pollutants include TSS, fluorides, zinc, nitrates, and varying pH. These contaminants are scrubbed out of the furnace gas streams during water contact.

I) Electric Arc Furnace (semi-wet air pollution controls)
Important pollutants are TSS, zinc and fluorides, all of which are scrubbed out of the furnace gas streams during water contact.

J) Electric Arc Furnace (wet air pollution controls) - Pollutants and waste sources are the same as described above for Subcategory I.

K) Vacuum Degassing - Known significant constituents in the waste waters comprise TSS, zinc, manganese, lead, nitrates (and varying pH). These contaminants originate from the water scrubbing of the gases under vacuum.

L) Continuous Casting and Pressure Slab Molding - Major pollutants include TSS, oil and grease (and varying pH). These contaminants are derived from the contact cooling of the cast materials and the washing and cleaning of the molds.

PARAMETERS OF CONCERN

pH, Acidity, Alkalinity*	TDS
Ammonia*	Turbidity
BOD*	Beryllium
Cyanide, total*	Chlorides
Oil/Grease*	COD
Phenols*	Color
Sulfides*	Heat
TSS*	Mercury
Manganese*	TKN
Fluorides*	Sulfates
Zinc*	Thiocyanates
Nitrates*	TOC
Lead*	Sodium
Aluminum	Potassium
Hardness	Phosphorous

Most significant pollutants.

PRELIMINARY LIMITATIONS FOR DISCHARGE TO POTW AND PRESCRIBED TREATMENT MEASURES

For Subcategories A through L, Existing and New Sources.

No specific limitations have been prescribed to date for Existing and New sources in the Iron and Steel Industry connected to POTW's. However, the Federal regulations and the EPA Development Document for the Iron and Steel Making Segment of the Iron and Steel Industry describe wastewaters from Subcategories A through L as containing high concentration of ammonia, oil/grease, cyanide, sulfides, phenols, fluorides, nitrates, lead, zinc and manganese all of which could interfere with the successful operation of POTW's, pass through such works untreated or inadequately treated, or otherwise be incompatible with the POTW. Therefore, such process waste waters should receive special consideration by the operator of the POTW, and are subject to future regulation.

HOT FORMING, COLD FINISHING AND SPECIALTY STEEL
SEGMENT OF IRON AND STEEL INDUSTRY
(11, 12, 206, 207)
[Part 420]

SUBCATEGORIZATION OF THE INDUSTRY

Fourteen Subcategories described as Subcategories M through Z have been defined for the Hot Forming and Cold Finishing Segment of the Iron and Steel Industry. The first twelve subcategories, i.e. Subcategories A through L have been previously incorporated under the Steel Making Segment of the Iron and Steel Industry. Pretreatment limitations for the Steelmaking Segment are given in another section of this report. The subcategories and limitations below cover both carbon steel and specialty steel hot forming and cold finishing operations.

- M) Hot Forming, Primary
- N) Hot Forming, Section
- O) Hot Forming, Flat
- P) Pipes and Tubes
- Q) Pickling, Sulfuric Acid, Batch and Continuous
- R) Pickling, Hydrochloric Acid, Batch and Continuous
- S) Cold Rolling
- T) Hot Coating, Galvanizing
- U) Hot Coating, Terne
- V) Miscellaneous Runoffs
- W) Combination Acid Pickling, Batch and Continuous
- X) Scale Removal, Kolene and Hydride
- Y) Wire Pickling and Coating
- Z) Continuous Alkaline Cleaning

Subcategory M, Hot Forming, Primary - Operations involving reduction of hot steel ingots into slabs and blooms by rolling and associated processes.

Subcategory N, Hot Forming, Section - Operations involving reduction of hot steel blooms into various shapes and sizes of products including billets, bars, rods and sections.

Subcategory O, Hot Forming, Flat - Operations involving the reduction of hot steel slabs into plates, strips and sheet steel or skelp.

Subcategory P, Pipes and Tubes - Operations producing welded or seam-less pipe or tube, either by welding hot or cold skelp, or by piercing hot blooms.

Subcategory Q, Pickling, Sulfuric Acid Batch and Continuous - Operations involving the immersion of rods, wire, strip or similar steel products in a sulfuric acid bath and subsequent rinsing.

Subcategory R, Pickling, Hydrochloric Acid Batch and Continuous - Operations involving the immersion of rods, wires, strip or similar steel products in a hydrochloric acid bath with rinsing and associated absorber vent and fume hood scrubbers.

Subcategory S, Cold Rolling - Operations involving the size reduction and improvement in surface or mechanical properties of unheated steel with associated rolling and cooling oils and solutions.

Subcategory T, Hot Coat, Galvanizing - Operations involving the immersion of steel strip or pipe in a bath of molten zinc; and associated processes.

Subcategory U, Hot Coat, Terne - Operations involving the immersion of steel in a bath of molten lead and tin, and associated processes.

Subcategory V, Miscellaneous Runoffs - Runoff from coal, limestone, and ore storage piles and discharges from castings and slagging operations.

Subcategory W, Combination Acid Pickling, Batch and Continuous - The pickling of specialty steel in a nitric acid and hydrofluoric acid bath, with or without a sulfuric acid or hydrochloric acid bath used in-line with the nitric-hydrofluoric acid bath. After immersion in the acid bath(s), the steel is rinsed.

Subcategory X, Scale Removal, Kolene and Hydride - The removal of scale from alloy or stainless steel by immersion in a bath of a molten salt such as kolene or hydride.

Subcategory Y, Wire Pickling and Coating - The pickling of alloy or stainless steel wire and the coating of the wire (with copper or another metal) to assist in further drawing of the wire.

Subcategory Z, Continuous Alkaline Cleaning - The removal of rolling oil or other material from alloy or stainless steel in a continuous process involving the electrolysis of the steel in an alkaline solution.

NATURE OF PROBLEM

Hot steel working differs considerably from cold finishing operations. Essentially hot working of steel involves the deformation of steel at elevated temperatures of 2150°F to 2450°F whereas cold finishing processes are carried out at far lower temperatures, i.e. less than 1000°F. Hot forming operations require relatively large pieces of

machinery and auxiliary equipment. Generally cold finishing processes deal with much small steel sizes and do not utilize relatively large equipment. Cold finishing processes are used to impart certain surface characteristics to the steel products. Similarly, pickling and coating are surface preparation procedures and do not involve any of the principal forming or shaping operations.

Pickling processes clean the metal surface by chemical means, i.e. with acids. Coating operations serve to cover the surface of the steel with another metal in order to impart special surface characteristics such as corrosion resistance. Pickling and coating processes may be either batch or continuous type. The principal coating materials include tin, chromium, copper, lead and zinc.

Principal wastewater characteristics include oil and grease and TSS from hot forming and cold rolling processes; and tin, lead, chromium, copper and zinc from coating operations. Certain operations particularly steelmaking, pickling and hot coating processes require the use of wet gas cleaning equipment which create unique liquid scrubbing effluents.

Characteristics of wastes from the various subcategories and the identified sources of pollutants are described as follows:

M) Hot Forming, Primary - TSS, oil and grease are derived from washing scale from the surface of the steel with water. Water is also used to transport scale through the flumes below the mill lines. The oils and greases principally originate from hydraulic and lubricating systems. Additional wastewaters are generated from scarfing operations which include the flush water to remove the hot scale from the product generated by the scarfer; sprays to protect against heat and flying scale particles; and wet scrubbing effluents for removal of fume and smoke generated by scarfing.

N) Hot Forming, Section - TSS, oil and grease principally coming from washing scale off the surface of steel with water, and other water used to transport scale through the flumes beneath the mill lines.

O) Hot Forming, Flat - TSS, oil and grease principally coming from washing scale off the surface of steel with water, water used to transport scale through the flumes beneath the mill lines, and other water for cooling the strip on the runout table.

P) Pipes and Tubes - TSS, oil and grease contained in roll spray cooling waters, cooling bed and spray quench waters.

Q) Pickling, Sulfuric Acid, Batch and Continuous - TSS, dissolved iron and low pH's associated with spent, concentrated waste pickle liquor and dilute solutions from the dunk and spray rinsing of pickled products. Wastewaters are also generated by fume scrubbers.

R) Pickling, Hydrochloric Acid, Batch and Continuous - TSS, dissolved iron and low pH's associated with the same type of pickling operations as for Subcategory Q. The operations of hydrochloric acid regeneration plants represents an additional potential waste source.

S) Cold Rolling - TSS, oil and grease caused by the dumping of spent rolling solutions used to provide cooling and lubrication to the rolls and the products. These wastes contain oil and grease in the form of water soluble oils as well as tramp oils from mill equipment lubricating systems.

T) Hot Coatings, Galvanizing - TSS, oil and grease, zinc, chromium and varying pH in wastes from cleaning, chemical treatment and acid, alkaline or neutral rinses applied to the products before and after coating together with spent baths and other solutions from the coating operations. Wet fume hood scrubbers may also be present generating a waste scrubbing effluent.

U) Hot Coatings, Terne - TSS, oil and grease, lead, tin and varying pH levels resulting from various cleaning or coating rinses utilized on the products before and after coating. Wet fume hood scrubbers may also be present generating additional waterborne waste.

V) Miscellaneous Runoffs, Storage Piles, Casting and Slagging - TSS is reported as the main pollutant.

W) Combination Acid Pickling, Batch and Continuous - TSS, chromium, iron, fluorides and nickel associated with spent concentrated waste pickle liquors and dilute solutions from the dunk and spray rinsing of pickled products. Wastewaters are also generated by fume scrubbers.

X) Scale Removal, Kolene and Hydride - TSS, chromium, iron, cyanide (and possible pH problems) resulting from the removal of scale by molten salt baths and ensuing dunk or spray rinsing.

Y) Wire Pickling and Coating - TSS, chromium, iron, cyanide, fluorides, nickel, copper, and low pH's resulting from pickling and coating operations. Wastewaters may consist of spent concentrated solutions and dilute rinses.

Z) Continuous Alkaline Cleaning - TSS, chromium, iron, nickel and high pH's resulting from the cleaning of alloy or stainless steel strip for the removal of oils and greases. Wastes may consist of spent concentrated solutions and dilute rinses.

PARAMETERS OF CONCERN

pH, Acidity, Alkalinity	Magnesium
Aluminum	Manganese
Ammonia N	Mercury
Beryllium	Molybdenum
BOD	Nickel
Cadmium	Nitrogen
Calcium	Odor
Chlorides	Oil and Grease
Chromium, hexavalent and total	Phenols
Cobalt	Phosphates
Color	Selenium
COD	Sulfates
Copper	Sulfide
Cyanide, free and total	Sulfite
Flow	TDS
Fluoride	Temperature
Hardness	Thiosulfate
Iron, dissolved, ferrous and total	Tin
Lead	Titanium
	TOC
	TSS
	Tungsten
	Turbidity
	Zinc
	Zirconium

PRELIMINARY LIMITATIONS AND PRESCRIBED PRETREATMENT FOR DISCHARGE TO POTW

In the EPA Development Document for the Hot Rolling and Cold Finishing Segment of the Iron and Steel Industry, it is reported that pickle liquor generally can be discharged to public sewers but only in limited quantities. Furthermore these liquors should be at least partially neutralized with soda ash, caustic soda or ammonia prior to release. In certain cases, such discharges could impose unnecessarily excessive loads upon the municipal system. Recovery of byproducts is possible by the industry.

Proposed pretreatment regulations for existing and new sources in the iron and steel industry are given in the Federal Register, 40 CFR, dated March 29, 1976 as follows:

- M) Hot Forming, Primary Subcategory
For Existing and New Sources: Oil/Grease - 100 mg/l.
- N) Hot Forming, Section Subcategory
For Existing and New Sources: Oil/Grease - 100 mg/l.
- O) Hot Forming, Flat Subcategory
For Existing and New Sources: Oil/Grease - 100 mg/l.
- P) Pipe and Tube Subcategory
For Existing and New Sources: Oil/Grease - 100 mg/l.
- Q) Pickling, Sulfuric Acid Subcategory
For Existing and New Sources: Dissolved iron - 50 mg/l.
Oil/Grease - 100 mg/l
- R) Pickling, Hydrochloric Acid Subcategory
For Existing and New Sources: Dissolved iron - 50 mg/l.
Oil/Grease - 100 mg/l
- S) Cold Rolling Subcategory
For Existing and New Sources: Dissolved iron - 50 mg/l.
Oil/Grease - 100 mg/l.
- T) Hot Coating, Galvanizing Subcategory
For Existing Sources:

Pollutant	Avg. (1b/1000 lb. final product)	Max. Day (1b/1000 lb. final product)
Zinc	.0125	.0375
Chromium	.0075	.0225
Oil/Grease	100 mg/l	100 mg/l

For plants with wet fume hood scrubbing, add the following limitations to existing sources:

Zinc	.0125	.0375
Chromium	.0075	.0225

For New Sources:

Zinc	.0050	.0150
Chromium	.0005	.0015
Oil/Grease	100 mg/l	100 mg/l

For plants with wet fume hood scrubbing, add the following limitations to new sources.

Pollutant	Avg. 30 Day (1b/1000 lb. final product)	Max. Day (1b/1000 lb. final product)
Zinc	.0050	.0150
Chromium	.0005	.0015

U) Hot Coating, Terne Subcategory
For Existing Sources:

Tin	.01250	.03750
Lead	.00125	.00375
Oil/Grease	100 mg/l	100 mg/l

For Plants with wet fume hood scrubbing as part of the coating operation, add the following limitations to existing sources.

Tin	.01250	.03750
Lead	.00125	.00375

For New Sources:

Tin	.00500	.01500
Lead	.00063	.00189
Oil/Grease	100 mg/l	100 mg/l

For Plants with wet fume hood scrubbing as part of the coating operation, add the following limitations to new sources.

Tin	.00500	.01500
Lead	.00063	.00189

V) Miscellaneous Runoffs Subcategory
For Existing and New Sources: Oil/Grease - 100 mg/l

W) Combination Acid Pickling, Batch and Continuous Subcategory.
For Continuous Operations, Existing and New Sources:

Diss. Chromium	.0021	.0063
Diss. Nickel	.0010	.0030
Diss. Iron	50 mg/l	50 mg/l
Oil/Grease	100 mg/l	100 mg/l

For Batch Pipe and Tube Operations, Existing and New Sources:

Pollutant	Avg. 30 Day (1b/1000 lb. final product)	Max. Day (1b/1000 lb. final product)
Diss. Chromium	.0015	.0045
Diss. Nickel	.0007	.0021
Diss. Iron	50 mg/l	50 mg/l
Oil/Grease	100 mg/l	100 mg/l

For Other Batch Operations, Existing and New Sources:

Diss. Chromium	.0004	.0012
Diss. Nickel	.0002	.0006
Diss. Iron	50 mg/l	50 mg/l
Oil/Grease	100 mg/l	100 mg/l

For Subcategory W the term "product" refers to the steel material that is pickled in a combination of nitric and hydrofluoric acid.

X) Scale Removal, Kolene and Hydride Subcategory For Ketone, Existing and New Sources:

Cyanide	.0005	.0015
Diss. Chromium	.0010	.0030
Diss. Iron	50 mg/l	50 mg/l
Oil/Grease	100 mg/l	100 mg/l

For Hydride, Existing and New Sources:

Cyanide	.0013	.0039
Diss. Chromium	.0025	.0075
Diss. Iron	50 mg/l	50 mg/l
Oil/Grease	100 mg/l	100 mg/l

Y) Wire Pickling and Coating Subcategory

For Existing and New Sources:

Diss. Nickel	.0010	.0030
Diss. Copper	.0010	.0030
Diss. Chromium	.0021	.0063
Cyanide	.0010	.0030
Diss. Iron	50 mg/l	50 mg/l
Oil/Grease	100 mg/l	100 mg/l

Z) Continuous Alkaline Cleaning Subcategory

For Existing and New Sources:

Pollutant	Avg. 30 Day	Max. Day
	(lb/1000 lb. final product)	(lb/1000 lb. final product)
Diss. Chromium	.00010	.00030
Diss. Nickel	.00005	.00015
Diss. Iron	50 mg/l	50 mg/l
Oil/Grease	100 mg/l	100 mg/l

ALUMINUM, COPPER, LEAD AND ZINC SEGMENT OF THE
NON-FERROUS METALS MANUFACTURING INDUSTRY
(145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155)
[Part 421]

SUBCATEGORIZATION OF THE INDUSTRY

The Aluminum, Copper, Lead and Zinc Segment of the Non-Ferrous Metals Manufacturing Industry has been divided into 8 Subcategories as described below:

- A) Bauxite (Aluminum) Refining Subcategory
- B) Primary Aluminum Smelting Subcategory
- C) Secondary Aluminum Smelting Subcategory
- D) Primary Copper Smelting Subcategory
- E) Primary Copper Refining Subcategory
- F) Secondary Copper Subcategory
- G) Primary Lead Subcategory
- H) Primary Zinc Subcategory

Subcategory A, Bauxite Refining. Bauxite refining is the process of extracting alumina from aluminum ore (bauxite) by the Bayer process or by combination processes. The Bayer process dissolves the alumina in a caustic solution to form sodium aluminate. The sodium aluminate is precipitated as aluminum hydroxide. The precipitate is filtered and dried and becomes purified "alumina," the raw material for the production of aluminum metal.

Subcategory B, Primary Aluminum Smelting. Primary aluminum smelting involves the electrolytic reduction of purified "alumina" to produce aluminum metal utilizing the Hall-Heroult process. Alumina is dissolved in a solution or bath of molten cryolite and other fluoride salts. The bath is kept molten in a carbon crucible. The crucible further serves as the cathode and a carbon block (or blocks) inserted into the bath serves as the anode. Electrolysis decomposes the alumina into aluminum and oxygen. The aluminum sinks to the bottom of the crucible and is captured. A primary aluminum facility typically consists of a reduction cell operation, an anode formation plant, and an aluminum casting house.

Subcategory C, Secondary Aluminum Smelting. Secondary aluminum smelting is the process of remelting, purifying and recovering aluminum-bearing scrap to produce an aluminum alloy of marketable specifications. A variety of products are manufactured. Secondary aluminum smelters recycle a moderately priced metal which otherwise would become a solid waste. Secondary aluminum smelters receive two types of scrap raw

material: 1) solids and 2) residues. The first of these includes metal borings and turnings, new clippings and forgings, old castings and sheet and aluminum containing iron. Residues comprise two subtypes: dross and skimmings from melting operations at foundries, fabricators and the primary aluminum industry; and secondly, slags formed during secondary smelting operations. "Demagging," which is the removal of excess magnesium from the melt, represents an important operation in secondary aluminum smelters. Demagging is accomplished by passing chlorine through the melt with the formation of magnesium chloride, or by mixing aluminum fluoride with the melt resulting in the formation of magnesium fluoride. Heavy fuming occurs with demagging, and extensive air scrubbing operations are generally available.

Subcategory D, Primary Copper Smelting. Includes all primary copper smelting facilities and accompanying copper refineries, if such operations may exist on-site. The basic process used by the primary copper industry, is pyrometallurgical. The primary smelter receives the copper concentrates and subjects the concentrates to roasting, smelting, and converting. Blister copper is produced. Blister copper is normally purified by fire-refining, a pyrometallurgical operation. If additional purification is necessary, an electrolytic process is used. The final product is cathode copper. Byproducts consisting of gold, silver, etc. which are actually contaminants of blister copper, are collected as "slimes" during electrolytic refining and subsequently recovered. Roasting serves to reduce sulfur and other impurities in the feed. Smelting is carried out in a reverberatory furnace or an electric furnace. The smelter provides for collection of a molten copper-iron-sulfide material called "matte," suitable for subsequent treatment in converters. In this process, slag is separated and discarded. Matte is converted to blister copper with air blowing in large, horizontal, cylindrical furnaces. Converter slag is removed and the crude copper containing varying amounts of heavy metals, arsenic and sulfur is ready for refining.

Subcategory E, Primary Copper Refining. Includes all primary copper refineries which are not operated on-site with a primary copper smelter. The blister copper described above is further refined into either fire-refined copper or anode copper. Impurities are removed, more slag produced and cuprous oxide formed. Deoxidation is accomplished by coke addition and other means. This is usually followed by electrolytic refining. In the latter process, copper is separated from its impurities by electrolytic dissolution at the anode, and deposition as the pure metal, at the cathode. Non-copper values accumulated in the "slimes" and in the solution electrolyte, are eventually recovered.

Subcategory F, Secondary Copper Facilities. Covers plants primarily engaged in the recovery of copper from new and used scrap and from residues gathered from melting operations. These residues comprise spills, slags, skimmings, etc. This subcategory includes establishments

melting and refining copper alloys obtained from secondary brass and/or secondary bronze scrap sources. Also included are establishments melting and refining copper-bearing scrap to recover principally pure (unalloyed) copper. "Primary" copper may occasionally be processed. Major operations comprise presmelting, melting, smelting, refining and alloying. Products consist of blister copper, brass or bronze ingots, fire-refined copper ingots, and electrolytically refined and cast high-grade copper commodities.

Subcategory G, Primary Lead Facilities. Includes plants primarily engaged in smelting lead from ores, and refining lead by any process. Primary lead in the U.S. is recovered entirely from sulfide ores, which are associated with other metals chiefly zinc, copper and silver. The primary lead facility receives the ore concentrate which is blended with flux and other materials, and then provides sintering, blast furnace smelting and refining operations to remove (and in some cases to recover) metallic impurities. Sintering serves to reduce the sulfur oxide content of the charge, to eliminate other undesirable impurities, and to produce an even size feed for the blast furnace. The furnace separates constituents into the desirable molten metal and slag. Drossing is usually the first step in the refining of the lead bullion as received from the blast furnace. Drossing is performed in heated kettles and promotes removal of copper. The bullion then passes through "softening" accomplished by oxidative slagging or oxidation in a reverberatory furnace. Generally two stages of slag are obtained. Softened lead is further subject to desilverizing and debismuthizing. The Parke process uses zinc metal for purposes of combining with gold and silver, which are recovered. Zinc is sequentially removed by vacuum dezincing. Debismuthizing consists of adding calcium and magnesium to form a calcium-magnesium-bismuth crust which is later processed and recovered. Final refining involves addition of sodium hydroxide and/or sodium nitrate to the lead to effect removal of residual zinc, antimony and arsenic.

Subcategory H, Primary Zinc Facilities. Includes plants primarily engaged in smelting zinc from ores, and/or refining zinc by any process. The primary zinc industry in the U.S. includes both electrolytic and pyrometallurgical retort plants. Zinc smelters receive sulfide concentrates which are blended and roasted. Roasting serves to remove sulfur, and also eliminates some of the other impurities from the zinc concentrates including lead, mercury and cadmium. Roaster off-gases are passed to sulfuric acid manufacturing. For purposes of a uniform feed, the roasting product is sintered, with off-gases treated for particulate control. Large amounts of lead and cadmium are eliminated in sintering, and the dust is recycled or recovered for cadmium and lead values. In pyrolytic reduction, the zinc oxide content is reduced in the furnace and all gases exhausted. These gases contain metallic zinc vapor and carbon monoxide. The zinc vapor is specially condensed and recovered. Residues are recycled and/or recovered for zinc or other

metal values. In electrolytic zinc production, the zinc concentrate is acid washed to remove unwanted magnesium sulfate and the roasted product is finely ground. This material is then leached with a sulfuric acid solution serving as an electrolyte. The purpose is to dissolve as much zinc as possible and precipitate iron and accompanying impurities. The pregnant solution is purified largely by addition of zinc dust which precipitates copper, cadmium, cobalt, nickel, etc. by replacement. All residuals are recovered. The electrolytic room receives the zinc laden electrolyte. Zinc is deposited onto aluminum cathodes and eventually stripped off. The final zinc products include various grades of slab zinc, zinc oxide, and zinc dust.

NATURE OF PROBLEM

Major waste sources from the aluminum, copper, lead, and zinc subcategories of the Non-Ferrous Metals manufacturing industry are described as follows:

Bauxite Refining. Bauxite refining produces about equal amounts of alumina and red mud waste and the latter represents an important solid waste disposal problem. Other wastes comprise spent liquor, condensates, barometric condenser and miscellaneous cooling waters.

Primary Aluminum Smelting. The majority of waste from primary aluminum smelting originates from wet scrubbing devices for controlling air emissions. Resulting scrub liquors contain acids, hydrocarbon tars and oils, sulfur oxides, alumina, chlorides and fluorides. Other wastes include cooling waters from casting, rectifiers, and fabrication.

Secondary Aluminum Smelting. Waste waters are generated principally from the cooling of molten aluminum alloy, the wet scrubbing of fumes during magnesium removal, and the wet milling of residues such as dross and slag. High TDS and TSS content of the waste are generally attributable to the wet milling of residues.

Primary Copper Smelting. Smelting furnace slag represents a major solid waste disposal problem at copper smelters. Sulfur oxide emissions are treated by air pollution control devices which in turn produce significant liquid waste. Air particulate control and treatment are also important at primary copper smelters. Other wastes originate from slag granulation, acid plant blowdown, and from fire-refined copper.

Primary Copper Refining. Many of the same types of waste originate from primary copper refining as found in primary copper smelting, but in lesser degree. Specific waste sources include disposal of spent electrolyte, electrolytic refinery washing, and slimes recovery.

Secondary Copper. Waste water is generated principally from six operations: cooling of molten unalloyed or alloyed copper, slag quenching and granulation, slag milling and classification, furnace exhaust scrubbing, electrolytic refining, and equipment cooling.

Primary Lead Smelting and Refining. Major waste waters from primary lead establishments include waterborne effluent from a variety of air cleaning/scrubbing devices, spent streams from blast furnace slag and slag granulation circuits, acid plant blowdowns, and various cooling waters.

Primary Zinc Smelting and Refining. Process wastes from zinc establishments include scrub waters from the cleaning of roaster off-gases, acid plant blowdowns, bleed streams from reduction furnace gas cleaning operations, metal casting cooling, excess liquors from cadmium recovery, preleaching of zinc concentrates, electrolytic purification washwater and spills, boiler blowdowns, scrub waters from auxiliary wet air pollution devices, and a variety of "non-contact" cooling waters.

The non-ferrous metals manufacturing industry is characterized by comparatively large plants but relatively limited in number. As of the early 1970's, the following plants were identified for the domestic industry: 9 bauxite refineries; 31 aluminum reduction plants; 85 plants producing secondary aluminum metal; 22 plants or properties engaged in primary smelting and refining of copper; 50 plants classified as secondary copper smelters; 7 plants or properties engaged in lead smelting and/ or refining; and 6 primary zinc establishments. In the zinc sector the pyrometallurgical plants because of significant air pollution problems and high corrective costs, are considered more vulnerable to future shutdown.

PARAMETERS OF CONCERN

Bauxite Refining:	pH, Alkalinity	COD
	TDS	Oil/Grease
	TSS	Color
	Temperature	Turbidity
	Sulfates	Trace Metals
Primary Aluminum Smelting:	pH	COD
	Fluorides	Chlorides
	TSS	Sulfates
	Oil/Grease	Temperature
	Cyanide	Trace Metals (includes
	TDS	zinc, copper and nickel)

Secondary Aluminum
Smelting:

pH	TDS
TSS	Chlorides
Oil/Grease	Magnesium
COD	Cyanide
Fluorides	Nickel
Ammonia nitrogen	Zinc
Aluminum	Cadmium
Copper	Lead
Sodium	

pH: Raw wastewater from demagging fume scrubbers is very acidic, with a pH range of 1.0 to 2.5. Metal cooling waters are less acidic with a pH range of 4.5-6.5. Residue milling wastewaters in contrast generally have a pH of 8.0-9.5.

Oil/Grease: Significantly exceed 100 mg/l in some metal cooling waters.

TSS: High levels of TSS are found in some wastewaters from metal cooling and especially, residue milling. Excessive TSS may cause blockage of sewer lines.

Aluminum: May be present in very high levels up to 200 mg/l or more, in raw demagging fume scrub wastewaters and residue milling wastewaters. Aluminum is present primarily in particulate form, and therefore relatively settleable.

Ammonia: May be present in certain residue milling waste waters in concentrations of several hundred mg/l. Ammonia was determined to be "generally" amenable to biological treatment by the POTW, if present in "limited" quantities.

Copper: Found in residue milling wastewaters. Studies show about 75% of the incoming copper may be removed by a POTW and eventually concentrated in treatment plant sludges.

Primary Copper
Smelting and
Refining:

pH, Acidity, Alkalinity	Sulfates
TSS	Chlorides
Oil/Grease	COD
Arsenic	Cyanide
Cadmium	Temperature
Copper	Nickel
Lead	Silver
Selenium	Cobalt
Zinc	Iron
TDS	Antimony
Aluminum	Tin
Chromium	Mercury

Secondary Copper:

pH	Cadmium
TSS	Nickel
Oil/Grease	Selenium
Ammonia nitrogen	Silver
Copper	Tin
Zinc	Cobalt
Aluminum	Magnesium
Iron	Antimony
Lead	Boron
COD	Fluorides
	Chromium

Copper: Most heavy metals including copper, are reported as generally not susceptible to treatment by biological means at POTW's. Past studies show approximately half of the incoming copper will pass through the POTW, and the other half is concentrated in treatment plant sludges. Copper is reported capable of causing toxic interference with biological treatment with consequent reduction in waste removal efficiencies. Copper in sludges may restrict reuse and disposal of these sludges.

Zinc: Dissolved zinc is generally considered as not being susceptible to biological treatment by POTW's. In slug doses and in the presence of copper, zinc can be toxic to biological treatment with consequent reduction in waste removal efficiency. Zinc accumulating in treatment plant sludges does not seem to restrict the reuse and/or disposal of these sludges.

Lead: This metal is considered as generally not susceptible to biological treatment by POTW's. Significant quantities of lead are said to pass through the POTW while the remainder of the lead is carried down with the sludges. Lead toxicity can lower removal efficiencies of the biological treatment plant. Lead accumulation in sludges may serve to restrict the reuse and/or normal disposal of these sludges.

Cadmium: Represents a dangerous cumulative toxicant to animals and humans, with possible mutagenic or tetratogenic properties, and with marked acute and chronic effects. Cadmium acts synergistically with other metals including copper and zinc. Cadmium is reported as generally not susceptible to biological treatment by POTW's. Significant quantities of cadmium may pass through the POTW, and the remainder concentrates in treatment plant sludges. Cadmium toxicity can significantly reduce biological treatment plant waste removal efficiencies. Cadmium accumulation in sludges can restrict the reuse and disposal of these sludges.

Primary Lead Smelting and Refining:	pH	Various metals including aluminum, antimony, cobalt
	TSS	copper, chromium, iron,
	Cadmium	magnesium, nickel, silver,
	Lead	selenium and tin.
	Zinc	
	Mercury	Other possible pollutants of concern include arsenic, cyanide, fluorides, bismuth, oil/grease, chlorides, temperature and phosphates
	TDS	
Primary Zinc Manufacture:	Sulfates	
	pH	TDS
	TSS	Sulfates
	Arsenic	Chlorides
	Cadmium	Phosphates
	Mercury	
	Selenium	Various metals including aluminum, magnesium, antimony, chromium, cobalt, iron, nickel, silver and tin.
	Zinc	
	Lead	
	Copper	Other including cyanide, temperature, etc.

PRETREATMENT LIMITATIONS FOR DISCHARGE TO POTW

The Federal Register publications and supporting Development Documents for the Non-Ferrous Metals Manufacturing Industry indicate the following pretreatment limitations:

Bauxite Refining, Subcategory A, Existing Sources (New Sources not yet clearly defined).

No discharge of process wastes to POTW except for possible overflow from impoundment ponds during months of excess precipitation.

Primary Aluminum Refining, Subcategory B, Existing Sources (New Sources not yet clearly defined).

Process waste water shall conform to the following values:

Parameter	Avg. 30 Day (1b/1000 1b product)+	Max. Day (1b/1000 1b product)+
Fluorides	1.0	2.0
TSS	1.5	3.0
pH	Allowable range of 6.0 to 9.0	

Secondary Aluminum Smelting, Subcategory C, Existing Sources (New Sources not yet clearly defined).

For Metal Cooling Waste water:

Parameter	Avg. 30 Day	Max. Day
Oil/Grease	-	100 mg/l
pH	Not less than 5.0	

For Fume Scrubbing Waste Water from Demagging operations:

Parameter	
PH	Allowable range of 5.0 to 10.0

For Residue Milling Waste Water:

Parameter	Avg. 30 Day	Max. Day
Ammonia	50 mg/l	100 mg/l
pH	Not less than 5.0	

Primary Copper Smelting, Subcategory D, Existing and New Sources.

Parameter	Pretreatment Standard
Arsenic	10.0 mg/l
Copper	0.25 mg/l
Lead	0.5 mg/l
Cadmium	0.5 mg/l
Selenium	5.0 mg/l
Zinc	5.0 mg/l

Hot aluminum metal produced.

Primary Copper Refining, Subcategory E, Existing and New Sources.

Parameter	Avg. 30 Day (1b/1000 lb product)++	Max. Day (1b/1000 lb product)++
Oil/Grease	0.02	0.04
Arsenic	0.02	0.04
Zinc	0.01	0.02
Selenium	0.01	0.02
Copper	0.0005	0.001

Secondary Copper Manufacturing, Subcategory F, Existing Sources (New Sources not yet clearly defined).

The limitations below apply to all process wastes from secondary copper mills:

Parameter	Avg. 30 Day	Max. Day
Copper	0.5 mg/l	1.0 mg/l
Cadmium	0.2 mg/l	0.4 mg/l
Oil/Grease	-	100 mg/l
pH	Not less than 5.0	

Primary Lead Facilities, Subcategory G, Existing and New Sources.

Parameter	Avg. 30 Day (1b/1000 lb product)+++	Max. Day (1b/1000 lb product)+++
Cadmium	0.0004	0.0008
Lead	0.0004	0.0008
Zinc	0.004	0.008

++ *Electrolytically refined copper.*

+++ *Lead bullion.*

Primary Zinc Facilities, Subcategory H. Existing and New Sources.

Parameter	Avg. 30 Day (lb/1000 lb product)++++	Max. Day (lb/1000 lb product)+++
Arsenic	8.0×10^{-4}	1.6×10^{-3}
Cadmium	0.004	0.008
Selenium	0.04	0.08
Zinc	0.04	0.08

PRESCRIBED TREATMENT MEASURES OR EQUIVALENT

Specifically for Secondary Aluminum, Subcategory C Facilities:

Metal Cooling Waste Waters: Treatment is required to remove excessive oil and grease and TSS before release to a POTW. Grease traps and specialized skimming equipment are identifiable technology for reduction of oil and grease. Adjustment of pH may be necessary.

Demagging Fume Scrubber Waste Water: Aluminum is the prime parameter of concern in these spent waters. Identified pretreatment technology for these effluents include pH adjustment and/or neutralization, flocculation and settling prior to release to the POTW. In lieu of POTW discharge, complete recycle of this wastewater is considered feasible and may be less expensive.

Residue Milling Waste Water. Identified pretreatment technology for the spent waters is settling, although pH adjustment and flocculation may also be necessary.

Specifically for Secondary Copper, Subcategory F Facilities:

Overall Pretreatment: Identified technology is chemical treatment consisting of controlled precipitation followed by settling. Skimming is advocated where necessary to control oil and grease levels. Mercury-laden wastes are subject to treatment with sodium sulfide, the pollutant removed by precipitation and filtering. Neutralization with lime to a pH of 8 to 11 will reduce concentrations of most metals and with proper settling, will also reduce TSS. Each metal has an optimum pH for chemical

++++ Zinc metal.

precipitation. Metals such as lead, cadmium and mercury may show lesser degrees of removal when the pH is above pH 7. Treatment will likely require pH adjustment representing a compromise between the maximum removal of copper and zinc, and that suited for maximum removal of cadmium, lead, antimony, tin, etc. Recycle and reuse of process waste water streams should be carefully considered.

Metal Cooling Waste Waters: Neutralization may not be necessary for these waters. Pretreatment if needed will involve adjustment of pH to between 8 and 10, followed by settling. Sludge removal is probable when charcoal cover is employed in the metal cooling and quenching process. Waste discharges to the POTW can be reduced or eliminated by recycling process waters.

Slag Quenching/Granulation Waste Waters and Furnace Exhaust Scrub Waters: Pretreatment comprises pH adjustment and/or neutralization, followed by waste settling. Waste streams may be treated separately or combined.

Electrolytic Refining Operations Waste Water. Identified technology consists of removal of copper by cementation with iron, followed by lime neutralization and solids settling prior to release to the POTW. Special treatment for mercury may be additionally required.

PHOSPHATE MANUFACTURING INDUSTRY
(176, 177, 178, 179, 180, 181)
[Part 422]

SUBCATEGORIZATION OF THE INDUSTRY

The Phosphate Manufacturing Industry has been divided into six major subcategories. It is defined separate from the Fertilizer Industry although intermediate products are transferred between the two industries. The first three subcategories are based upon use of phosphate ores and "dry process" phosphoric acid whereas the last three subcategories are based upon phosphate ores and/or "wet process" phosphoric acid. The six subcategories are:

- A) Phosphorous Production
- B) Phosphorous Consuming
- C) Phosphate Manufacturing
- D) Defluorinated Phosphate Rock
- E) Defluorinated Phosphoric Acid
- F) Sodium Phosphates

Subcategory A. Phosphorous Production. Refers to the smelting and reduction of phosphate ore to produce phosphorous and ferrophosphorous. Copious amounts of water are used for cooling and granulating slag, and for condensing phosphorous vapors from the furnace.

Subcategory B. Phosphorous Consuming. Elemental phosphorous is used for the manufacture of various phosphorous compounds by the "dry process". Products include phosphoric acid, phosphorous pentoxide, phosphorous pentasulfide, phosphorous trichloride and phosphorous oxychloride. Liquid phosphorous is burned, and the P_2O_5 vapors are quenched and hydrolyzed. Phosphoric acid mist is collected.

Subcategory C. Phosphate Production. Phosphates including sodium, tripolyphosphate, animal feed grade calcium phosphate, and human food grade calcium phosphate are manufactured from dry process phosphoric acid. For sodium tripolyphosphate, the acid is neutralized with caustic soda and soda ash producing a mixture of mono and di-sodium phosphates. The mixture is dried and calcined to yield the tripolyphosphate. The calcium phosphates are similarly made by the neutralization of phosphoric acid with lime giving mono, di-, or tricalcium phosphate.

Subcategory D. Defluorinated Phosphate Rock. Applies to plants practicing defluorination of phosphate rock by high temperature treatment together with wet process phosphoric acid, silica and other reagents.

Subcategory D, E and F plants use phosphate rock and importantly "wet process" phosphoric acid as starting raw materials. The distinction between "dry" and "wet" processes is provided under Nature of Problem in this report.

Phosphate rock can be processed to provide animal feed supplements, mainly the essential of calcium and phosphorous incorporated into animal foodstuffs. However the 3-4 percent fluorine content in this rock is too high for animal usage. Accordingly various proprietary processes were developed to defluorinate phosphate rock, as incorporated into Subcategory D plants.

Subcategory E. Defluorinated Phosphoric Acid. Two processes are available. The first of these involves the concentration of "wet process" phosphoric acid from a 52-54% P_2O_5 level up to a 68-72% P_2O_5 strength, i.e. superphosphoric acid. When water is evaporated from the acid, fluorine is removed generally to a sufficient degree to permit its use in the manufacture of animal feed supplements. The second method of acid defluorination relies upon an additive incorporated into the acid which facilitates fluorine removal by aeration. Defluorinated phosphoric acid may be mixed with limestone to produce dicalcium phosphate for animal feed supplement use. Otherwise, it is used for liquid fertilizer production. Superphosphoric acid is also an intermediate used in the production of dry mixed fertilizer.

Subcategory F. Sodium Phosphates. These high quality salts usually employ "wet process" phosphoric acid as a starting material, which has been derived from calcined phosphate rock. A series of operations are employed for the removal of fluosilicates, arsenic, sulfates, iron, aluminum and residual fluorine from the acid. The acid is eventually converted to a salt laden, neutralized solution. Precipitated impurities can be recovered for incorporation into fertilizer. The solution is subjected to evaporation which serves to crystallize out monosodium phosphate. Other end products include sodium meta phosphate, disodium phosphate and tri-sodium phosphate.

NATURE OF PROBLEM

Background.

The Phosphate Manufacturing Industry may be descriptively defined as the non-fertilizer phosphorous industry. The industry is almost entirely based upon the production of elemental phosphorous from mined phosphate rock. Phosphate rock in the U.S. is situated in the Tennessee, Idaho-Montana and Florida areas. The first line product derived from phosphate rock is elemental phosphorous with ferrophosphorous as a by-product. (Subcategory A plants). A large portion of the elemental phosphorous is used to manufacture high-grade phosphoric acid by the "dry" process (as opposed to the "wet" process which converts phosphate

rock directly into phosphoric acid; this lower grade wet process acid is largely used in the fertilizer industry). The remainder of elemental phosphorous is either marketed directly or converted to chemicals such as phosphorous pentoxide, phosphorous pentasulfide, phosphorous trichloride and phosphorous oxychloride (Subcategory B plants). The latter are used chiefly for synthesis in the organic chemicals industry.

Phosphoric acid is directly marketed to the food industry or to the fertilizer industry, or otherwise is used for the manufacture of two classes of phosphates: 1) the water soluble phosphates for detergents and water treatment such as sodium tripolyphosphate; and 2) the water soluble calcium phosphates used for addition to animal feeds and human foods (Subcategory C plants).

Plants in Subcategories D, E and F, i.e., Defluorinated Phosphate Rock, Defluorinated Phosphoric Acid, and high-quality Sodium Phosphates use phosphate rock and "wet process" phosphoric acid as starting raw materials. These products find their way into animal feeds as nutritive supplements, are used as fertilizer intermediates and for other needs.

Water Sources and Pollutational Characteristics.

In Phosphorous Production plants a grossly impure raw material is employed. Consequently the wastes and byproducts generated are far greater in quantity than the primary products recovered. The remainder of the industry starts with relatively pure materials and generates less unit wastes.

Electrostatic precipitators collect a dust that contains about 50 percent phosphorous pentoxide, with other solids. The calciner and wet furnace fume scrubber produce a highly acidic "phossy" liquid effluent containing sulfur dioxide, iron oxides and phosphates, sulfates and fluorides. A sludge originates in the phosphorous condenser sump. This is a mixture of dispersed phosphorous and other solids that are scrubbed from the air. This colloidal type waste is extremely harmful to aquatic organisms. A slag quenching liquor stream is also present containing high TSS and TDS, mainly sulfates and fluorides.

In Phosphorous Consumption plants, air pollution abatement systems serving casting of phosphorous pentasulfide, product purification residues, tail gas seals, vessel cleaning, and leaks and spills represent major waste sources. Chlorination is employed in production of phosphorous trichloride and phosphorous oxychloride which leads to the formation of hydrochloric acid and a difficult waste water problem.

In Phosphate Production plants, effluents are derived from wet scrubbers, spray and dust deposits, clarified waste water from centrifuges and filtrate fractions. A defluorination process in food grade phosphate production contributes large amount of TSS. The raw wastes from phosphate production contain fluoride, calcium and sodium compounds, arsenic

compounds, phosphorous, phosphoric acid, sulfurous acid, sulfuric acid, hydrochloric acid, TSS, chromates, TDS and ammonia. Large amounts of cooling waters are used by these plants, and heat is a general problem in the discharges. Some western ores contain considerable cadmium. This element does not normally appear in the phosphate manufacturing discharges. Vanadium and radium occur in some ores and are potential pollutants.

In Defluorinated Phosphate Rock production, serious waste water problems result from wet phosphoric acid production which is the same case for the production of defluorinated phosphoric acid and sodium phosphate salts i.e. Subcategories E and F. These wastes include large amounts of sulfuric acid derived from stack or tail gas scrubbing, filtration, solids washing and acid manufacturing. Also included are large quantities of solid wastes from various manufacturing together with significant amounts of gypsum and phosphate rock debris. The major wastes from plants processing defluorinated phosphate rock are the scrub effluents from cleaning gaseous effluents.

In Defluorinated Phosphoric Acid production, major wastes are the scrub effluents from wet air pollution control devices and the condensates from the acid concentration process. Other waste sources include spills, pump seal leaks, etc. The condensates contain phosphoric acid, fluorides, etc.

In Sodium Phosphates production, wastes result from various salting out processes and the solids removed via precipitation means. Phosphoric acid by the "wet process" produces a type of waste already described above. Other waste sources include pump and seal leaks, spills, etc.

Solid wastes control is very important in the phosphate industry. The waste waters and the treatment processes generate considerable volumes of hydrated fluorsiliceous and siliceous materials. These hydrated solid wastes form relatively unstable landfill deposits. In order to ensure long term protection of the environment from whatever hazardous and harmful constituents may be present, special precautions must be exercised over waste disposal sites. The landfills should be selected and designed to prevent horizontal and vertical migration of these critical constituents to ground and surface waters. Also, the location of solid hazardous materials disposal sites should be permanently and legally recorded.

PARAMETERS OF CONCERN

pH, Alkalinity, Acidity
TSS
TDS
Phosphates, phosphites

Sulfates, sulfites
Fluorides, fluorosilicates
Arsenic
Vanadium

Phosphorous, elemental phosphorous	Radium-226
Chlorides	Uranium
Cadmium	Iron
Aluminum	Calcium
Temperature	COD

Radium-226 is one of the most hazardous radioisotopes of the uranium decay series, when present in water. The human body preferentially utilizes radium over calcium when present in food or drink. Plants and animals concentrate radium, leading to a multiplier effect upon the food chain.

PRELIMINARY LIMITATIONS FOR DISCHARGE TO POTW

For Subcategory A, Phosphorous Production, Existing Sources.

Limitations have been equated to BPT limits which are:

Pollutant	Avg. 30 Day (lb/1,000 lb. product)	Max. Day (lb/1,000 lb lb product)
TSS	0.5	1.0
Total Phosphorous	0.15	0.30
Fluorides	0.05	0.10
Elemental Phosphorous	No detectable quantity 6.0 to 9.0	

For Subcategory A, Phosphorous Production, New Sources.

Limitations have not yet been defined.

For Subcategory B, Phosphorous Consuming, Phosphoric Acid, Phosphorous Pentoxide and Phosphorous Pentasulfide Manufacturing, Existing Sources.

No discharge of process waste water pollutants is allowed.

For Subcategory B, Phosphorous Consuming, Phosphorous Trichloride Manufacturing, Existing Sources.

Have been equated to BPT limitations which are:

TSS	0.7	1.4
Total Phosphorous	0.8	1.6
Arsenic	0.00005	0.0001
Elemental Phosphorous	No detectable quantity	
pH	6.0 to 9.0	

For Subcategory B, Phosphorous Consuming, Phosphorous Oxychloride Manufacturing, Existing Sources.

Have been equaled to BPT limits, which are:

TSS	0.15	0.30
Total Phosphorous	0.17	0.34
pH	6.0 to 9.0	

For Subcategory B, Phosphorous Consuming, All New Sources.

Limitations have not yet been defined.

For Subcategory C, Phosphate Manufacturing, Existing Sources.

Have been equated to BPT limits, which are:

TSS	0.06	0.12
Total Phosphorous	0.03	0.06
pH	6.0 to 9.0	

For Subcategory C, Phosphate Manufacturing, New Sources.

Limitations have not yet been defined.

For Subcategory D, Defluorinated Phosphate Rock, Existing Sources.

Pollutant	Avg. 30 Day mg/l	Max. Day mg/l
BOD, TSS, pH	No limitations	No limitations
Total Phosphorous	35	70
Fluorides	15	30

Volume restrictions are implied on wastewaters to be released to a POTW but these limitations are not clearly defined. Previously this limitation was described as an excess flow from an impoundment capable of holding a 10 year, 24 hour rainfall event or the difference between precipitation into the impoundment and evaporation from the pond water surface area. However the latter definition has since been changed.

For Subcategory D, Defluorinated Phosphate Rock, New Sources.

BOD, TSS, pH	No limitations	No limitations
Total Phosphorous	35	70
Fluorides	15	30

The volume of allowable process waste water is defined in the same manner as given above for existing sources of Defluorinated Phosphate Rock.

For Subcategory E, Defluorinated Phosphoric Acid, Existing Sources.

Pollutant	Avg. 30 Day (mg/l)	Max. Day (mg/l)
BOD, TSS, pH	No limitations	No limitations
Total Phosphorous	35	70
Fluorides	15	30

The volume of allowable process waste water is defined in the same manner as given above for existing sources of Defluorinated Phosphate Rock.

For Subcategory E, Defluorinated Phosphoric Acid, New Sources.

BOD, TSS, pH	No limitations	No limitations
Total Phosphorous	35	70
Fluorides	15	30

The volume of allowable process waste water is defined in the same manner as given above for existing sources of Defluorinated Phosphate Rock.

For Subcategory F, Sodium Phosphates, Existing Sources.

Pollutant	Avg. 30 Day (lb/1,000 lb. product)	Max. Day (lb/1,000 lb product)
BOD, TSS, pH	No limitations	No limitations
Total Phosphorous	0.40	0.80
Fluorides	0.15	0.30

For Subcategory F, Sodium Phosphates, New Sources.

BOD, TSS, PH	No limitations	No limitations
Total Phosphorous	0.40	0.80
Fluorides	0.15	0.30

PRESCRIBED PRETREATMENT MEASURES OR EQUIVALENT

With regard to flow rate to a POTW, it has been recommended that each plant in the phosphate industry be required to determine impact of its

flow upon the hydraulic capacity of the POTW collection and treatment system should the POTW be used by the industry. This analysis should include effects of a time-varying flowrate.

With respect to TSS, high concentrations of inorganic solids could overload primary sludge collectors, the primary sludge pumps, the sludge thickeners, dewatering operations, and the sludge disposal system. Furthermore these solids would provide no food for the microflora in secondary treatment and also reduce the activity of the biomass. It is recommended that the maximum concentration of suspended inorganic solids be held to 250 mg/l.

For Metals, it is noted that elemental phosphorous in phosphy waters and enriched arsenic compounds are potential substances discharged to POTW's. There is special need to pretreat waste waters for removal of these materials. It is recommended that pretreatment standards provide for zero discharge of metals or harmful materials to POTW's.

Dissolved Phosphates would affect sludge operations in POTW's. Gravity thickened sludges are generally conditioned with various chemicals. However, phosphates would react with these chemicals and be precipitated, detracting from the efficiency of these agents in properly conditioning the sludges. In the case of tertiary treatment at a POTW, phosphates are generally removed by using lime, ferric chloride or alum. Phosphate industry discharges would cause greatly increased chemical dosages and seriously impact upon the sludge handling capacity of the POTW. It is recommended that the maximum permissible phosphate concentration (as PO_4) to a POTW be held to 30 mg/l.

STEAM ELECTRIC POWER GENERATING INDUSTRY
(201, 202, 203, 204, 205)
[Part 423]

SUBCATEGORIZATION OF THE INDUSTRY

The Steam Electric Power Generating Industry has been divided into four main subcategories as described in the following paragraphs.

A) Generating Unit Subcategory.

A generating unit operated by an establishment primarily engaged in generating electricity for distribution and sale which results primarily from a process utilizing fossil-type fuel (coal, oil or gas) or nuclear fuel in conjunction with a thermal cycle employing the steam water system as the thermodynamic medium. The term "generating unit" however shall not include those units defined below as either "small" or "old."

Small Unit shall mean any generating unit (except one defined as being old) having less than 25 megawatts rated net generating capacity or any unit which is part of an electric utilities system with a total net generating capacity of less than 150 megawatts.

Old Unit shall mean any generating unit of greater than 500 megawatts rated net generating capacity placed in service on or before January 1, 1970, or any generating unit of less than 500 megawatts rated net generating capacity placed in service on or before January 1, 1974.

B) Small Unit Subcategory

A small unit operated by an establishment primarily engaged in generating electricity for distribution and sale which results primarily from a process utilizing fossil-type fuel (coal, oil or gas) or nuclear fuel in conjunction with a thermal cycle employing the steam water system as the thermodynamic medium. For further definition of Small Unit see Subcategory A directly above.

C) Old Unit Subcategory

An old unit operated by an establishment primarily engaged in generating electricity for distribution and sale which generally results primarily from a process utilizing fossil-type fuel (coal, oil or gas) or nuclear fuel in conjunction with a thermal cycle

employing the steam water system as the thermodynamic medium. For further definition of Old Unit see Subcategory A above.

D) Area Runoff Subcategory

This subcategory applies to discharges from material storage runoff and construction runoff which are used in or are derived from generating units covered under Subcategories A, B and C. Special definitions for this subcategory are given below.

Material storage runoff shall mean the rainfall runoff from or through any coal, ash or other material storage pile.

Construction runoff shall mean the rainfall runoff from any construction activity and any earth surface disturbed by such activity from the start of construction until the completion of construction and the disturbed earth is returned to a vegetative or other cover state commensurate with the intended land use.

Other definitions appropriate to all subcategories are included below:

Blowdown shall mean the minimum discharge of recirculating water for the purpose of getting rid of materials contained in these waters, the further buildup of which would cause concentrations in amounts exceeding limits established by best engineering practices.

Sufficient land shall mean 1,100 square feet or more of land per megawatt of nameplate generating capacity.

Low Volume Waste Sources shall mean wastewater from diverse sources except those for which specific limitations have been otherwise established. Low volume waste sources include but are not limited to waters from wet scrubber air pollution control systems, ion exchange water treatment systems, water treatment evaporator blowdown, laboratory and sampling streams, floor drainage, cooling tower basin cleaning wastes, and blowdown from recirculating house service water systems.

Ash transport water shall mean water employed in hydraulic transport of either fly ash or bottom ash.

Metal cleaning wastes shall mean any cleaning compounds, rinse waters, or any other waterborne residues derived from cleaning any metal process equipment including, but not limited to boiler tube cleaning, boiler fireside cleaning and air preheater cleaning.

Once-through cooling water shall mean water passed through the main cooling condensers in one or two passes for the purpose of removing waste heat from the generating unit.

Recirculated cooling water shall mean water passed through the main condensers for the purpose of removing waste heat from the generating unit, passed through a cooling device, other than a cooling pond or a cooling lake, for the purpose of removing such heat from the water and then passed again, except for blowdown, through the main condenser.

Cooling pond shall mean any man-made water impoundment which does not impede the flow of a navigable stream and which is used to remove waste heat from heated condenser water prior to returning the recirculated cooling water to the main condenser.

Cooling lake shall mean any man-made water impoundment which impedes the flow of a navigable stream and which is used to remove waste heat from heated condenser water prior to recirculating the water to the main condenser.

NATURE OF PROBLEM

Steam-electric power plants burn fuel to produce heat to generate steam, which in turn drives turbine generators for the production of electrical energy. The spent, expanded steam is condensed to water by transferring the unusable waste heat to a cooling water circuit(s). The condensed steam becomes high quality water which is returned to the powerplant boiler ready for reuse. The rejected heat is wasted to the environment.

Steam electric powerplant (stations) consist of one or more generating units. Typically, a generating unit consists of a discrete boiler, turbine-generator, and a condenser system. However some units employ multiple boilers associated with multiple turbine-generators. Fuel storage and handling, water treatment facilities, and miscellaneous components may be part of a discrete generating unit, or may service more than one generating unit.

Generally, the newer, larger, more efficient generating units are assigned base-load service; and the older, smaller, less efficient generating units are used for meeting peak demands. The type of service (whether base load, etc) and the remaining service life characteristics of the unit are important factors affecting ability in meeting effluent reductions relative to the quantities of heat generated.

The Federal Power Commission describes base-load, intermediate, and peaking units as follows. Base-load units are designed to run more or less continuously near full capacity except for periodic maintenance shutdowns. Peaking generating units are designed to provide electricity principally during periods of maximum system demand and operate only a few hours a day. Units employed for intermediate service range between the extremes of base-load and peaking service and are designed to respond readily to swings in system demand, or cycling. Net generation at any unit is less than the gross generation because electricity is used by the power plant itself.

Nuclear power generation units are almost always used for base-load service in spite of the significantly larger quantities of waste heat discarded to cooling water compared to otherwise similar fossil-fuel base-load units.

Base-load units represent approximately 70 percent of the total U.S. installed capacity of steam-electric powerplants; cycling about 25 percent; and peaking units about 5 percent. However when viewed in terms of the total U.S. steam electric energy actually produced, the base-load units account for approximately 90 percent of the real energy (and spent heat) generated; cycling units about 10 percent; and peaking units less than 1 percent.

Steam electric powerplants discharge around 50 trillion gallons of waste water per year, which amounts to about 15% of the total flow of waters in U. S. rivers and streams. Almost all of these waters contain heat and in some cases, chemicals added by the powerplants.

The general types of wastewater streams from powerplants include: 1) cooling system waste waters; 2) metal cleaning wastes; 3) boiler blowdowns; 4) ash transport waters; and 5) various low volume wastes. These are described below:

Condenser cooling systems at power plants are classified either as once-through or recirculating. In once-through cooling systems, biocides such as chlorine or hypochlorites are generally added to the system to minimize biological growth within the condenser(s) and are therefore likely discharged. In recirculating cooling systems the waters will contain: a) chemical additives to control growth of organisms (chlorine, hypochlorites, organic chromates, etc); chemical additives to inhibit corrosion (organic phosphates, chromates, zinc salts, etc); and materials present in the intake waters (but at much higher concentration due to evaporative losses).

Metal cleaning wastes are derived from the cleaning of metal process equipment. Such equipment includes boiler tubes, boiler fireside and air preheaters. Pollutants in these wastes include oil and grease, iron, copper, nickel, zinc, TSS, and chromium.

Boiler blowdown wastes usually demonstrate high pH and high TDS. Phosphates used for the precipitation of calcium and magnesium salts are generally found in boiler blowdown.

When coal and oil are burned, ash residues are created. These ashes may be transported by water to a settling pond or basin. Some or all of the water from the pond or basin may be dis-charged. Ash handling wastes derived from coal-fired plants may contain TSS, iron, aluminum, mercury, and oil and grease. Oil-fired plants can additionally produce vanadium.

Low volume wastes include ion exchange water treatment, water treatment evaporative blowdown, laboratory and sampling streams, floor drainage, cooling tower basin cleaning, ash pollution device effluent, and other aqueous power plant wastes not previously cited. These wastes contain primarily TSS and oil and grease.

Area runoff can contain TSS and oil and grease. Runoff from coal piles may also contain iron, high or low pH values, copper, zinc and manganese.

The Steam Electric Power Industry is comprised of approximately 1,300 plants throughout the contiguous U.S. Some 98 plants or 7.7 percent, are said to discharge wastewaters to POTW's. Steam Electric plants tied into POTW's are smaller on the average than plants discharging to surface streams. These plants averaged 150 MW vs. about 400 MW for the entire Steam Electric Industry. Plants connected to POTW's are also older than plants discharging to surface streams. No nuclear powered plants are believed to be connected to POTW's.

PARAMETERS OF CONCERN

pH, Acidity, Alkalinity*	Magnesium
Algicides	Manganese
Aluminum	Mercury
Ammonia N	Nitrate N
BOD	Oil/Grease*
Boron	Phenols
Bromide	Selenium
COD	Sulfates
Chlorides	Sulfites
Copper*	Surfactants
Debris	Total chromium*
Fecal Coliforms	TDS
Fluorides	Hardness
Chlorine-free available and total residual*	Phosphorous
Heat*	TSS*
	Turbidity

* Most significant pollutant parameters.

Iron
Lead
Nickel*

Vanadium
Zinc*

PRELIMINARY LIMITATIONS FOR DISCHARGE TO POTW AND PRESCRIBED TREATMENT MEASURES

The USEPA Draft Supplement for Pretreatment to the Development Document for the Steam Electric Power Generating Industry tentatively concluded that power plants discharging to POTW's are capable of pretreating effluents equivalent to BPCTCA. However, a survey of current industry practices indicated that most plants provide little pretreatment of their chemical-type wastewaters.

The USEPA has determined that control of copper, nickel and zinc associated with metal cleaning wastes at a power plant are required. Additionally, control of oil and grease from the plant's combined discharge to the POTW is required. The metals were found incompatible because they can interfere with proper operation of the POTW; they may not be adequately treated; and threats are posed both to the receiving waters and to vegetation and crops grown on soil treated with sludges from the POTW. A pretreatment standard of 1 mg/l copper was established because this level can be attained by BPT technology (lime precipitation). Limits for nickel and zinc were not imposed because they are indirectly controlled through the regulation of copper. When copper may not be present in significant quantity but nickel and zinc are found in high levels, it may be necessary for the POTW to regulate the latter metals to concentrations achievable by lime precipitation. Discharge of oil/grease of petroleum origin exceeding 100 mg/l from a power plant could interfere with the POTW or be inadequately treated. Power plants can comply with the oil/grease standard of 100 mg/l by using good housekeeping procedures and by other methods.

Pretreatment Standards for Existing Sources Within Subcategories A, B, and C (New Source Limitations not yet clearly defined).

<u>Parameter</u>	<u>Limitation</u>
Copper in metal cleaning wastes	1 mg/l Quantity of copper allowed = flow of metal cleaning wastes x 1 mg/l.
Oil/Grease in combined discharge	100 mg/l; Quantity of oil/grease allowed to POTW = combined flow x 100 mg/l
PCB's	Prohibited
pH	pH shall not be less than 5.0, unless the POTW is designed to accomodate this condition.

Pretreatment Standards for Existing Sources Within Subcategory D.
(New Source Limitations not yet clearly defined).

<u>Parameter</u>	<u>Limitation</u>
pH	pH shall not be less than 5.0 unless the POTW is designed to accomodate this condition

Treatment can lower the oil/grease content to 20 mg/l or below by using properly-designed oil skimmers. The pretreatment standard of 100 mg/l for oil and grease should be easily attainable by good housekeeping practices. Treatment of metal cleaning wastes to achieve the pretreatment standard of 1.0 mg/l copper would consist of oil and grease skimming, waste equalization, lime addition to attain a pH level of about 9, followed by settling. This treatment sequence should also significantly reduce nickel, zinc and chromate pollutant loads. Disposal of chemical sludges from the treatment works must be conducted so as to ensure long-term protection of the environment especially adjacent surface and ground waters. The recommended pretreatment technology for power facilities further includes in-plant measures to recycle and reuse waste waters at the industrial site.

FERROALLOYS MANUFACTURING INDUSTRY
(165, 166, 167, 168, 169, 170)
[Part 424]

SUBCATEGORIZATION OF THE INDUSTRY

The Ferroalloy Industry is divided into seven subcategories predicated upon type of melting furnace used, air pollution control devices available, and specific ferroalloy or metal produced. These are:

- A - Open Electric Furnaces with wet air pollution control devices subcategory
- B - Covered Electric Furnaces and other smelting operations with wet air pollution control devices subcategory
- C - Slag Processing subcategory
- D - Covered Calcium Carbide Furnaces with wet air pollution control devices subcategory
- E - Other Calcium Carbide Furnaces subcategory
- F - Electrolytic Manganese Products subcategory
- G - Electrolytic Chromium subcategory

Further description of major processing operations within each subcategory is provided below:

Subcategory A. Applies to the smelting of ferroalloys in open electric furnaces with wet air pollution control devices. Includes electric furnaces of such construction or configuration that the furnace off-gases are burned above the furnace charge level by air drawn into the system. After combustion, the gases are cleaned via a wet air pollution control device, such as a scrubber, an ESP with water, or other aqueous sprays, etc. This subcategory does not include electric furnaces which are covered, closed, sealed or semi-covered, or where the off-gases are not burned prior to collection.

Subcategory B. Applies to covered electric furnaces or other smelting operations not defined elsewhere under the ferroalloy industry, and having wet air pollution control devices. Included are those furnaces of such construction or configuration and known as covered, closed,

sealed, semi-covered or semi-closed, and in which the furnace off-gases are not combusted prior to collection and cleaning. The off-gases after collection are cleaned in a wet scrubber, wet baghouse etc. This subcategory includes non-electric furnace smelting operations such as exothermic, smelting, ferromanganese, etc., equipped with wet air pollution control devices. Furnaces which utilize dry dust collection techniques are not included.

Subcategory C. In slag conversion, either the "concentration" or the "shotting" process is used. In the first process, the slag floats to the surface of the water, and the metal particles which are eventually recovered, sink to the bottom. The concentration process is generally employed on ferrochromium slags. The shotting practice involves the granulation of molten slag in water and is usually employed with ferromanganese slags.

Subcategory D. Applies to the production of calcium carbide in covered electric furnaces which employ wet air pollution control devices. Includes electric furnaces of such construction or configuration and known as covered, closed, sealed, semi-covered or semi-closed, and in which the furnace off-gases are not combusted prior to collection and cleaning. The off-gases once collected are cleaned in a wet scrubber, wet baghouse, etc. This subcategory excludes furnaces which utilize dry dust collection techniques such as dry baghouses, etc.

Subcategory E. Applies to the production of calcium carbide in covered furnaces which do not utilize wet air pollution controls. Covered calcium carbide furnaces with wet air pollution controls are regulated under Subcategory D above. Open or uncovered calcium carbide furnaces are regulated under 40 CFR, Part 415, the Inorganic Chemicals Industry.

Subcategory F. Applies to the manufacture of electrolytic manganese products such as electrolytic manganese metal or electrolytic manganese dioxide. The processing involves leaching the metal from the ores, purification of the leach solution, plating of the product and final product preparation. Ammonia is used in the production of both electrolytic manganese and chromium, but not manganese dioxide.

Subcategory G. Applies to the manufacture of chromium metal by the electrolytic process. However, this subcategory is not applicable to the manufacture of chromium metal by aluminothermic or other methods.

NATURE OF THE PROBLEM

Ferroalloys are used for deoxidation, alloying and graphitization of steel and cast iron. In the nonferrous metal industry, silicon is used primarily as an alloying agent for copper, aluminum, magnesium and nickel. Manganese is the most widely used element in ferroalloys

followed by silicon and chromium. Other elements include molybdenum, tungsten, titanium, zirconium, vanadium, boron and columbium. The U.S. is almost entirely dependent upon commercial sources of manganese, chromium and other ores from outside the country. Ores are crushed prior to entry into the melt furnaces.

There are four major methods used to produce ferroalloy and high-purity metallic additives for steel making which are: 1) the blast furnace; 2) the electric furnace; 3) the alumino or silicothermic process; and 4) electrolytic deposition. Electric smelting furnaces produce most of the ferroalloy tonnage. The major ferroalloys produced are silicon alloys e.g. ferrosilicon; chromium alloys e.g. high carbon ferro-chromium; and manganese alloys, e.g. standard ferromanganese. Air pollution control devices are in widespread use in the industry including baghouses, wet scrubbers, and electrostatic precipitators. Accordingly, the largest source of water-borne pollutants other than thermal in the industry is the use of wet methods for air pollution control. There are some 40 plants in the U.S. which produce ferroalloys, chromium, manganese and other additive metals.

Calcium carbide is manufactured by thermal reduction of lime and coke in an electric furnace. Emissions from calcium carbide furnaces have a major impact upon water pollution in plants using wet air pollution controls. Manganese metal and chromium metal are manufactured electrolytically from ores, ferroalloy slag or ferroalloys.

Major waste sources and pollutants within the seven subcategories of the Ferroalloy Manufacturing Industry are summarized as follows:

Subcategory A. Open Electric Furnaces with wet air pollution control devices. Wet air cleaning collects particulates from furnace gases either by gas scrubbing, or by water sprays prior to electrostatic precipitators. The particulates are generally oxides of the material being smelted. With this type of furnace, most cyanide and phenol is destroyed in the combustion of the off-gases. The wastewaters contain large amounts of TSS and smaller amounts of manganese and chromium. Yet smaller quantities of phenol and oil are generally found in these effluents.

Subcategory B. Covered Electric Furnaces and other smelting operations with wet air pollution control devices. Wastes are similar to those for Subcategory A but since in covered smelting furnaces the off-gases are not combusted, this results in cyanide and phenol being present in rather significant quantities in the scrubber wastewaters.

Subcategory C. Slag Processing. The most important pollutant may be TSS, with manganese and chromium present in lesser amounts.

Subcategory D. Covered Calcium Carbide Furnaces with wet air pollution control devices. The off-gases from covered calcium carbide furnaces

usually contain about 70% carbon monoxide and lesser amounts of cyanides. Calcium carbide manufacturing and scrubbing wastes contain predominately TSS with cyanides also present. These wastes usually are of high pH.

Subcategory E. Other Calcium Carbide Furnaces. Air pollution control by plants in this subcategory may be by baghouses in conjunction with evaporative cooling, or is non-existent. Therefore, little water pollution potential is usually present.

Subcategory F. Electrolytic Manganese. The main pollutants in wastewaters from the manufacture of electrolytic ferroalloys are TSS and ammonia. Manganese is found to some extent in the spent waters from all electrolytic products. Electrolytic manganese plants appear to have two main waste streams. The first is a highly concentrated effluent referred to as strong electrolytic manganese waste derived from the hydraulic transport of filter residues to tailings ponds and which also carries small quantities of electrolyte solution (spilled or dumped). These wastes may contain several thousand mg/l TSS, manganese and ammonia, and may also have low pH. The second stream is referred to as the weak electrolytic manganese waste derived from product washing and other. This waste may contain a few hundred mg/l of TSS, manganese and ammonia.

Subcategory G. Electrolytic Chromium. Resulting wastes may contain several thousand mg/l of chromium, TSS and ammonia and have a low pH. Manganese can also be present in appreciable quantities.

PARAMETERS OF CONCERN

pH, alkalinity, acidity	Oil and Grease
Temperature	Phenols
TSS	Phosphates
Total Chromium	Iron
Hexavalent Chromium	Zinc
Cyanides	Aluminum
Manganese	Lead
TDS	Color
Ammonia-N	Calcium, Sodium,
Turbidity	Potassium, Silica

LIMITATIONS FOR DISCHARGE TO POTW

Pretreatment limitations for existing and new sources in the Ferroalloy Manufacturing Industry have been proposed as follows:

For Subcategory A, Open Electric Furnaces With Wet Air Cleaning,
Existing Sources

Have been equated to BPT limits which are:

Pollutant	Avg. 30 Days (lb/Megawatt hrs. energy consumed in furnace)	Max. Day (lb/Megawatt hrs. energy consumed in furnace)
TSS	0.352	0.703
Chromium, total	0.007	0.014
Chromium, hexavalent	0.0007	0.0014
Manganese, total	0.070	0.141
pH	6.0 to 9.0	

For Subcategory A, Open Electric Furnaces With Wet Air Cleaning, New Sources

Limitations have not yet been defined.

For Subcategory B, Covered Electric Furnaces and Other Smelting With
Wet Air Cleaning, Existing Sources

Have been equated to BPT limits which are:

TSS	0.461	0.922
Chromium, total	0.009	0.018
Chromium, hexavalent	0.0009	0.0018
Manganese, total	0.092	0.184
Cyanide, total	0.005	0.009
Phenols	0.009	0.013
pH	6.0 to 9.0	

Provided however, that for non-electric furnace smelting operations, the permitted limits shall read as lb/ton of products rather than lb/Mwh, and the limits except for pH, shall be three times the numerical values given in the above table.

For Subcategory B, Covered Electric Furnaces and Other Smelting With Wet
Air Cleaning, New Sources.

Limitations have not yet been defined.

For Subcategory C, Slag Processing, Existing Sources.

Have been equated to BPT limits which are:

Pollutant	Avg. 30 Days (lb/ton processed)	Max. Day (lb/ton processed)
TSS	2.659	5.319
Chromium, total	0.053	0.106
Manganese, total	0.532	1.064
pH	6.0 to 9.0	

For Subcategory C, Slag Processing, New Sources.

Limitations have not yet been defined.

For Subcategory D, Covered Calcium Carbide Furnaces With Wet Air Cleaning, Existing and New Sources.

Pollutant	Pretreatment Standard
TSS, pH	No limitations
Cyanide	0.5 mg/l

For Subcategory E, Other Calcium Furnaces, Existing and New Sources.

No limitations.

For Subcategory F, Electrolytic Manganese Products, specifically the production of manganese, Existing and New Sources.

Pollutant	Avg. 30 Days (lb/1,000 lb product)	Max. Day (lb/1,000 lb product)
Manganese	1.356	2.711
Ammonia-N	20.334	40.667
TSS, pH	No limitations	No limitations

For Subcategory F, Electrolytic Manganese Products, specifically the production of manganese dioxide, Existing and New Sources.

Pollutant	Avg. 30 Days (1b/1000 lb. product)	Max. Day (1b/1000 lb. product)
Manganese	0.352	0.705
Ammonia-N	5.287	10.574
TSS, pH	No limitations	No limitations

For Subcategory G, Electrolytic Chromium, Existing and New Sources.

Pollutant	Avg. 30 Days (1b/1000 lb. product)	Max. Day (1b/1000 lb. product)
Manganese	1.055	2.111
Chromium	0.053	0.106
Ammonia-N	5.276	10.553
TSS, pH	No limitations	No limitations

PRESCRIBED TREATMENT MEASURES OR EQUIVALENT

Although no pretreatment schemes have been described or formulated, it is noted that certain BPT methods may be applicable for ferroalloy companies discharging to POTW's. The latter may include neutralization, physical-chemical treatment for removal of metals and TSS, settling, sand or multi-media filtration, cyanide destruction by alkaline chlorination or other oxidation, breakpoint chlorination for phenols reduction, overall biological treatment, and possible ammonia treatment by steam stripping or breakpoint chlorination.

LEATHER TANNING AND FINISHING INDUSTRY
(25, 26, 211, 212)
[Part 425]

SUBCATEGORIZATION OF THE INDUSTRY

The Leather Tanning and Finishing Industry has been divided into seven Subcategories described below:

- A - Hair - pulp - chrome tan
- B - Hair - save - chrome tan
- C - Hair - save - nonchrome tan
- D - Retan only
- E - No beamhouse tannery
- F - Thru-the-blue
- G - Shearlings tannery

Specialized definitions used in subcategorization are provided as follows:

Hide shall mean any animal pelt or skin received by a tannery as raw material.

Finish means the final steps performed on a tanned hide including but not limited to retan, bleach, color and fatliquor.

Hair Pulp shall mean the removal of hair by means of chemical dissolution.

Hair Save shall mean the physical or mechanical removal of hair which has not been chemically dissolved.

Chrome Tan means the process of converting hide into leather using a chromium agent.

Vegetable Tan means the process of converting hide into leather using chemicals either derived from vegetable matter or equivalent synthesized chemicals.

Split means the nongrain part of a hide which results from a cut parallel to its surface.

Beamhouse is that portion of the tannery where the hides are washed, limed, fleshed, and unhaired when necessary, preparatory to the tanning process.

Tanyard or Tanhouse is that portion of the tannery in which bating, pickling, and tanning are performed on the hides or skins.

Fatliquoring is a process by which oils and related fatty substances replace natural oils lost in the beamhouse and tanyard processes. Fatliquoring regulates the softness and pliability of the leather.

Further description of plants within the various Subcategories is given as follows:

Subcategory A, Hair - pulp - chrome. Include tanneries that primarily process raw or cured cattle or other hides into finished leather, chemically dissolving the hide hair, and using chrome tanning and usually wet and dry finishing.

Subcategory B, Hair - save - chrome. Includes tanneries that primarily process raw or cured cattle or other hides into finished leather, loosening and removing at least a portion of the hide hair as a solid, and using chrome tanning and usually wet and dry finishing.

Subcategory C, Hair - save - nonchrome. Includes tanneries that primarily process raw or cured cattle or other hides into finished leather usually hair save, using less than 20% chrome tanning, using instead vegetable, alum, syntans, oils or other methods for tanning, and usually wet and dry finishing.

Subcategory D, Retan only. Includes tanneries that primarily process previously tanned hides and/or skins (including splits) into finished leather, the major wet process consisting of retanning, coloring and fatliquoring.

Subcategory E, No beamhouse. Includes tanneries that primarily process hides and/or skins, with the hair previously removed, into finished leather using either chrome or nonchrome tanning methods. Materials primarily include pickled sheepskin and cattleshides and pigskins.

Subcategory F, Thru-the-blue. Includes tanneries that primarily process raw or cured cattle or other hides through-the-blue tanned state only, with no retanning or finishing operations, using chrome tanning.

Subcategory G, Shearling. Includes tanneries that primarily process raw or cured sheep or sheep-like skins, with the wool or hair retained on the hides, into finished leather using chrome or nonchrome tanning; or a wool pullery, a plant which processes hair-on raw or cured sheep or sheep-like skin by first removing the wool and then pickling the skin for use by a sheepskin tannery (i.e. Subcategory E).

NATURE OF PROBLEM

There are approximately 200 to 210 tanneries (wet process) in operation at present time across the U.S. Another 225 to 260 firms are engaged in finishing operations (mostly dry operations) for the leather tanned at some other location. Cattle hides represent about 20 percent of the total estimated pounds of hides tanned in this country. Other types of hides include sheep, lamb, pigskin, horse, goat, etc. Currently, waste

from around 90 percent of the tanneries, constituting about 80% of the production, is discharged to municipal sewers. Tannery wastes can exhibit high strength, i.e. 2,000 to 3,000 mg/l TSS, up to 850 mg/l oil and grease, and sulfides up to 250 mg/l.

Leather tanning and finishing wastewaters contain hair, hide scraps, pieces of flesh, blood, manure, dirt, lime, surface active agents, tannins, dyes, solvents, etc. These wastes are generally characterized as having appreciable amounts of TSS, TDS, BOD, COD, oil and grease, total chromium, sulfides, total kjeldahl nitrogen, ammonia nitrogen, chlorides, alkalinity, heat, fecal coliforms, and possible pH problems. Major wastewater sources in a leather tanning and finishing plant include: washing and soaking, degreasing, unhairing, bating, pickling, tanning, retanning, coloring, fatliquoring, drying, and finishing operations. Finishing may generate various wastewaters such as wet scrubbing of buffing dust and spray booth washdowns.

Washing and soaking create spent waste streams containing dirt, manure, salts and other foreign materials. Degreasing (usually only for sheepskins and pigskins) contributes animal fats and associated waste materials from the skins, plus spent detergents or solvents. With solvent degreasing, most plants utilize a solvent recovery system. Detergents used will be dependent upon the type of hide or skin to be degreased.

Unhairing is performed by either the "hair save" or the "hair pulp" method. Hair save refers to mechanical removal of chemically-loosened hair. This hair is mostly disposed of to landfill although some may enter the plant sewer. In the hair pulp method, the hair is dissolved completely. The latter method is the most important waste source of proteinaceous organic and inorganic lime-type pollutants, characterized by wastewaters of high pH and containing substantial amounts of BOD, TSS, sulfides, alkalinity and nitrogen. Beamhouse processes which include washing through unhairing operations, typically generate up to 75 percent of the waste load expected at a complete tannery.

Bating produces inorganic calcium salts, proteinaceous hair and waste hide substances together with large amounts of ammonia nitrogen. Pickling operations are responsible for low pH wastes which also contain large amounts of salts.

Tanning is accomplished primarily using trivalent chromium salts or tannins in extracts derived from special forms of tree bark. Spent chrome tanning liquors will contain high concentrations of trivalent chromium in low pH waters together with BOD, TSS and heat. Blowdown associated with vegetable tanning is highly colored and contains substantial amounts of BOD, COD and TDS.

Retanning, coloring, and fatliquoring contribute additional trivalent chromium, vegetable tannins, synthetic tannins, natural and synthetic oils and spent acid dyes found in relatively large wastewater volumes. These wastes have moderate-to-low amounts of BOD and TSS, moderate levels of COD, and may contain significant color and heat.

Drying and the various finishing operations (such as pasting, frame washing, rewet conditioning, vacuum dryer cooling, wet scrubbing of buffing dust, spray booth washdowns, etc.) generally cause relatively small volumes of low strength wastewaters.

It is reported in POTW's properly designed to handle leather tanning and finishing wastewaters that BOD, TSS, sulfides, oil/grease and chromium loads from the tanning industry should be compatible pollutants. Almost all POTW's receiving major amounts of leather tanning and finishing wastes where sulfide problems could become severe, have implemented special measures primarily to control pH fluctuations. Sulfides are thought to be readily oxidized in secondary-type POTW's. Various municipal sewer ordinances include provisions to limit sulfide inputs to the sewer. However, where sulfide problems have occurred, they have been quite severe. Documentation is available regarding sewer crown corrosion, odors, asphyxiation and death of municipal workers, and electrical and mechanical equipment corrosion both within sewer collection systems and treatment works. High surges of oxygen demand are caused by rapid oxidation of sulfides in the system. Ammonia nitrogen is also a problem associated with leather tanning wastes. Treatment alternatives for reducing ammonia include beamhouse stream segregation and precipitation of proteins (from pulped hair) after the sulfides have been oxidized, and the possible substitution of ammonia in the bating process.

Specific effects upon POTW'S include the large pieces of scrap hide, leather trimmings, hair and other screenable solids which can clog pipes, pumps and equipment. Industrial batch processes can produce wide fluctuation in hydraulic, organic and pH loadings to the POTW. Unhairing wastewaters containing sulfides can cause odor, corrosion and hazardous gases. Disposal of POTW sludges containing undue amounts of chromium may be of special concern. Ammonia nitrogen may pass through a POTW. Pretreatment of leather tanning wastes for sulfides, chromium and/or ammonia may well be indicated in specific cases.

PARAMETERS OF CONCERN

BOD	COD
Total Chromium	Kjeldahl and Total Nitrogen
Oil/grease	Ammonia Nitrogen
TSS	Fecal Coliforms
Sulfide	Color
Chlorides	Phenols pH, Acidity and
pH, Acidity and	TDS
Alkalinity	

Total Chromium. Most leather in the U.S. is tanned with chromium salts. Evidence indicates that chromium in both the trivalent and hexavalent forms is harmful, and thusly total chromium is measured.

Sulfide. Sulfide compounds are used extensively in the beamhouse for the unhairing process and consequently are commonly found in tannery effluents. A significant portion of the alkaline sulfides contained in tannery wastewaters can be converted to hydrogen sulfide at pH's below 8.5 to 9.0, resulting in release of this gas. The gas is not only odorous but is also oxidized to sulfuric acid, causing sewer "crown" corrosion. At high concentrations, this gas can be lethal, and is a significant hazard in sewer maintenance.

PRELIMINARY LIMITATIONS FOR DISCHARGE TO POTW

For Subcategory A, Hair Pulp, Chrome Tan, limitations for existing plants; (limits for New plants have not yet been clearly defined).

Parameter	Pretreatment Standard
pH	Acceptable range of 7 to 10

For Subcategory B, Hair Save, Chrome Tan, limitations for Existing plants; (limits for New plants have not yet been clearly defined).

pH	Acceptable range of 7 to 10
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For Subcategory C, Hair Save, Non-chrome Tan, limitations for Existing plants; (limits for New plants have not yet been clearly defined).

pH	Acceptable range of 7 to 10
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For Subcategory D, Retan, limitations for Existing plants; (limits for New plants have not yet been clearly defined).

pH	Acceptable range of 6 to 10
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For Subcategory E, No Beamhouse, Subcategory, limitations for Existing plants; (limits for New plants have not yet been clearly defined).

pH	Acceptable range of 6 to 10
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For Subcategory F, Through-The-Blue, Subcategory, limitations for Existing plants; (limits for New plants have not yet been clearly defined).

pH	Acceptable range of 7 to 10
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For Subcategory G, Shearling Subcategory, limitations for Existing plants; (limits for New plants have not yet been clearly defined).

Parameter	Pretreatment Standard
pH	Acceptable range of 6 to 10

PREScribed TREATMENT FOR DISCHARGE TO POTW

Undue amounts of sulfide and chromium may be responsible for serious problems at POTW's but adequate POTW control methods are reported available to minimize effects. Non-contact cooling waters can be recycled. Spent unhairing, chrome tanning and vegetable tanning liquors can be recovered and reused as makeup. Other cases involve protein recovery from beamhouse wastewaters, and chromium recovery from tanyard wastewaters. Substitution for ammonia in the bating process can significantly reduce the amount of dissolved ammonia in tannery wastewaters.

Chromium removal may be necessary by the tannery prior to the municipal system where stringent water quality limits have been imposed on the POTW or where the POTW utilizes a sludge destruction process such as incineration, pyrolysis or wet oxidation which most likely generate hexavalent chromium which in turn cannot be properly disposed of because of lack of appropriately controlled landfill sites. Sulfide removal may be necessary by the tannery prior to the municipal system when there may be appreciable H_2S gas evolution in the sewers, or when the municipality has experienced a history of severe odor and corrosion problems in spite of various control procedures. The Federal regulations of March 23, 1977 indicate where important operational or sludge disposal problems occur or stringent water quality standards are prevailing, the local authority should be invoked to require pretreatment.

Basic pretreatment at leather tanning facilities may include waste equalization, effective fine screening and close pH control. Tanneries employ waste holding, carbonation, screening, settling, lagoons, etc. One study has recommended pretreatment consisting of waste equalization, carbonation with flue gas, followed by settling with removal of settleable solids. Chemical treatment includes use of alum, lime, iron salts or polymers, pH adjustment followed by necessary sludge handling and disposal.

(INSULATION) FIBERGLASS MANUFACTURING
(94, 95)
[Part 426]

SUBCATEGORIZATION OF THE INDUSTRY

Fiberglass Manufacturing has been defined as Subcategory A of the overall Glass Manufacturing Industry. The process is one in which glass is made either directly or indirectly, continuously fiberized, and chemically bonded with phenolic resins into a wool-like final product. Insulation fiberglass or thermal insulation fiberglass includes but is not limited to noise insulation products, air filters, and bulk wool products. These operations are referred to as a primary process as contrasted to secondary processes e.g. where waste textile fiberglass is processed into an insulation product. The term insulation fiberglass is synonymous to the descriptions-glass wool, fibrous glass, and construction fiberglass.

NATURE OF PROBLEM

Insulation fiberglass is manufactured by only three companies in the U.S. A total of 19 plants has been identified. One waste stream of particular concern is cullet cooling water. Cullet water is necessary in order to solidify molten glass from a furnace whenever the glass spinning portion of the operation is interrupted or discontinued. Cullet water can contain high levels of TSS ranging from a few hundred mg/l to tens of thousands of mg/l even after settling.

PARAMETERS OF CONCERN

BOD	Ammonia
COD	Color
Phenols	Turbidity
TSS	Oil/Grease
TDS	Temperature
pH	Dyes
	Toxicity

Phenols. Basic constituents of the binder in fiberglass are phenol, formaldehyde, urea and ammonia which react to form various mono and poly methylol phenols. Free phenols will occur in any water having contact with uncured resin. Phenols levels range from 4 mg/l in once-through process waters to several hundred mg/l in recycled waters.

COD. Fiberglass manufacturing raw waste streams may contain COD's ranging from 3,300 to 44,000 mg/l.

Dissolved Solids. TDS concentrations can be increased significantly from chain washing and wet scrubbing of air streams. Net increases of 200 mg/l TDS are reported. Gross concentrations of up to 40,000 mg/l TDS have also been observed.

PRELIMINARY LIMITATIONS FOR DISCHARGE TO POTW AND PRESCRIBED TREATMENT MEASURES

The Development Document for Fiberglass Manufacturing indicates process waste waters can contain high concentrations of phenols, formaldehyde and other hazardous materials which interfere with the operation of POTW's, pass through these works untreated or inadequately treated, or otherwise are incompatible with the treatment works. Accordingly, it has been determined that fiberglass process waste waters from existing sources shall receive pretreatment to the level required by BPCTCA, and new sources shall receive pretreatment to the level required by New Source Performance Standards. However, both BPCTCA and NSPS call for no discharge of process wastes. Two exceptions to the above pretreatment requirements are cullet waters from both existing and new sources; and wastewaters resulting from "advanced air emission control devices" at existing plants, when such waters cannot be consumed in the process.

Under BPCTCA limitations for advanced air emission control devices, the following allowances are specified:

Parameter	Avg. 30 Day (lb/1000 lb final product)	Max Day (lb/1000 lb. final product)
Phenol	0.0003	0.0006
COD	0.165	0.330
BOD*	0.012	0.024
TSS*	0.015	0.030
pH*	Range of 6 to 9	0.030

Cullet water is defined as water necessary to solidify molten glass coming off the furnace when the glass spinning portion of the operation may be discontinued for some reason. Cullet waters may contain large quantities of finely divided silica particles in suspension together with heat, but this waste has been determined to be amenable for acceptance into POTW's.

* Are likely considered compatible pollutants for POTW purposes.

FLAT GLASS, PRESSED GLASS AND BLOWN GLASS MANUFACTURING
(88, 89, 90, 91, 92 and 93)
[Part 426]

SUBCATEGORATION OF THE INDUSTRY

The Glass Manufacturing Industry is divided into 13 subcategories. Fiberglass manufacturing, which is Subcategory A of the glass industry, has been given elsewhere in this report. The remaining 12 Subcategories are discussed below. Subcategories B through E deal with primary glass manufacturing. Subcategories F and G deal with automobile window glass fabrication. Subcategories H through M cover a wide range of pressed and blown glass products.

- B - Sheet Glass Manufacturing
- C - Rolled Glass Manufacturing
- D - Plate Glass Manufacturing
- E - Float Glass Manufacturing
- F - Automotive Glass Tempering
- G - Automotive Glass Laminating
- H - Glass Container Manufacturing
- I - Machine Pressed and Blown Glass Manufacturing (Reserved)
- J - Glass Tubing (Danner) Manufacturing
- K - Television Picture Tube Envelope Manufacturing
- L - Incandescent Lamp Envelope Manufacturing
- M - Hand Pressed and Blown Glass Manufacturing

Subcategory B, Sheet Glass. Manufactured from sand, soda ash, limestone, dolomite, cullet, etc., these raw materials being mixed and melted in a furnace. The material is drawn vertically from a melting tank to form sheet glass.

Subcategory C, Rolled Glass. The same raw materials as used in Subcategory B are mixed, melted in a furnace and cooled by rollers to form rolled glass.

Subcategory D, Plate Glass. The same raw materials as used in Subcategory B are mixed, melted in a furnace, pressed between rollers, and subsequently ground and polished to form plate glass.

Subcategory E, Float Glass. Equivalent to plate glass manufacture except a molten tin bath is used after the melting furnace and no grinding or polishing is required.

Subcategory F, Automotive Glass Tempering. Mostly float glass is used, which is cut, ground, polished, bended and tempered to produce front and back windows for automobiles.

Subcategory G, Automobile Glass Lamination. Deals with the fabrication of auto windshields. Fabrication consists of inserting a vinyl plastic sheet between two layers of glass, immersing in an oil bath, and washing, cutting and seaming.

Subcategory H, Glass Containers. Includes plants which melt raw materials at their facility and mechanically process the resulting glass into glass containers.

Subcategory I, Machine Pressed and Blown Glass. Includes plants which melt raw materials at their facility and mechanically process the resulting glass into pressed or blown glass products.

Subcategory J, Glass Tubing (Danner). Includes plants which melt raw materials at their facility and produce glass tubing as the final product.

Subcategory K, Television Picture Tube Envelopes. Includes plants which melt raw materials at their facility and produce TV tube envelopes as the final product.

Subcategory L, Incandescent Lamp Envelopes. Includes plants which melt raw materials at their facility and produce incandescent lamp envelopes. Also includes plants which frost the envelopes by etching with hydro-fluoric acid.

Subcategory M, Hand Pressed and Blown Glass. Includes plants which melt raw materials at their facility and hand process the resulting glass into pressed or blown glass products.

NATURE OF THE PROBLEM

Flat Glass (Subcategories B through G)

There are a total of 36 plants owned by 11 Companies which manufacture flat glass and fabricate automobile window glass in the U.S. (Subcategories B through G). Major operations in primary glass manufacturing consist of batching raw materials, melting, forming, annealing, grinding and polishing, washing and cooling. Major operations in automobile window glass fabrication include windshield laminating and solid tempering.

Pressed and Blown Glass (Subcategories H through M).

Various plants identified by the USEPA for the manufacture of Pressed and Blown Glass in the U.S. and Puerto Rico include as follows:
 Glass Container plants - 30 Companies having 140 plants; Machine Pressed and Blown Glassware - 50 plants; Glass Tubing - 30 plants; TV Picture Tube Envelope plants - 10 establishments; Incandescent Lamp Envelope facilities - 18; Hand Pressed and Blown Glassware - approximately 50

plants. Major operations in the pressed and blown glass industry include: weighing and mixing of raw materials, melting of raw materials, forming of molten glass, annealing of formed glass products, and special finishing operations.

PARAMETERS OF CONCERN

BOD	Lead
COD	Ammonia
TSS	TDS
Oil/grease	Phosphorus
pH, acidity, alkalinity	Temperature
Fluoride	Turbidity

PRELIMINARY LIMITATIONS FOR DISCHARGE TO POTW AND PRESCRIBED TREATMENT MEASURES

Flat Glass (Subcategories B through G)

The Federal regulations indicate for Existing Sources in the Flat Glass Subcategories, that the wastewaters generally contain pollutants compatible with POTW's. The one exception is Subcategory G, i.e., Automotive Glass Lamination, which generates a wastewater high in oil. Raw wastes from the laminating process typically contain 1,000 to 2,000 mg/l of oil. The proposed regulations of February 14, 1974, require that BPCTCA limitations for oil/grease be attained as shown below. This is necessary because of the known detrimental effect of high concentration of oil on biological treatment systems, and the inability of POTW's to adequately remove oil.

For Subcategory G, Automotive Glass Lamination:

Parameter	Avg. 30 Day (lb/1,000 ft ² final product)	Max. Day (lb 1,000 ft ² final product)
Oil/Grease	0.36	0.36

Pressed and Blown Glass (Subcategories H through M)

The Federal regulations for Existing Sources in the Pressed and Blown Glass Subcategories have established limitations for mineral-type oils and fluoride in certain subcategories, and also indicate concern over lead and ammonia loads.

Animal and vegetable oils were reported as adequately removed by POTW's, whereas mineral oils are much more persistent and may pass through POTW's untreated. Consequently, only mineral-type oils have been limited. The criteria have been developed in terms of mg/l and also on the basis of lbs. of "furnace pull" which means the amount of molten glass drawn from the molten furnace(s).

For Subcategory H, Glass Container Manufacturing, Existing Sources:

Parameter	Daily Max.
Oil (Mineral)	100 mg/l

For Subcategory H, Glass Container Manufacturing, New Sources:

Parameter	Avg. 30 Day (1b/1,000 lb furnace pull)	Max. Day (1b/1,000 lb furnace pull)
Oil (mineral)	0.03	0.06

For Subcategories I and J - No limitations.

For Subcategory K, TV Picture Tube Envelope Manufacturing, Existing Sources:

Fluoride	0.07	0.14
Oil(mineral)	-	100 mg/l

For Subcategory K, TV Picture Tube Envelope Manufacturing, New Sources:

Oil (mineral)	0.13	0.26
Fluoride	0.06	0.12

For Subcategory L, Incandescent Lamp Envelope Manufacturing, Forming Operations, Existing Sources:

Parameter	Daily Max.
Oil (mineral)	100 mg/l

For Subcategory L, Incandescent Lamp Envelope Manufacturing, Forming Operations, New Sources:

Parameter	Avg. 30 Day (1b/1,000 lb furnace pull)	Max. Day (1b/1,000 lb furnace pull)
Oil (mineral)	0.115	0.230

For Subcategory L, Incandescent Lamp Envelope Manufacturing, Finishing Operations, Existing Sources:

Parameter	Avg. 30 Day (1b/1,000 lb product frosted)	Max. Day (1b/1,000 lb. product frosted)
Fluoride	0.115	0.230
Oil (mineral)	-	100 mg/l

For Subcategory L, Incandescent Lamp Envelope Manufacturing, Finishing Operations, New Sources:

Fluoride	0.052	0.104
Oil (mineral)	-	100 mg/l

For Subcategory M, Hand Pressed and Blown Glass Manufacturing, Existing Sources:

No Limitations.

For Subcategory M, Hand Pressed and Blown Glass Manufacturing; produces hand pressed or blown leaded glassware and employs HF acid finishing, New Sources:

Parameter	Avg. 30 Day mg/l	Max. Day mg/l
Fluoride	13.0	26.0

For Subcategory M, Hand Pressed and Blown Glass Manufacturing; produces non-leaded hand pressed or blown glassware and employs HF acid finishing, New Sources:

Fluoride	13.0	26.0
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For Subcategory M, Hand Pressed and Blown Glass Manufacturing; produces leaded or non-leaded pressed or blown glassware and does not use HF acid finishing, New Sources:

No Limitations.

ASBESTOS PRODUCTS
MANUFACTURING INDUSTRY
(83, 84, 85, 86, 87)

[Part 427]

SUBCATEGORIZATION OF THE INDUSTRY

The Asbestos Manufacturing Industry has been divided into eleven Subcategories. The first seven Subcategories represent industrial activities under the Building, Construction and Paper Segment of the Industry, and the last four Subcategories represent processes incorporated under the Textile, Friction Materials and Sealing Devices Segment of the Asbestos Industry. These Subcategories are described below:

- A - Asbestos Cement Pipe
- B - Asbestos Cement Sheet
- C - Asbestos Paper (Starch Binder)
- D - Asbestos Paper (Elastomeric Binder)
- E - Asbestos Millboard
- F - Asbestos Roofing
- G - Asbestos Floor Tile
- H - Coating or Finishing of Asbestos Textiles
- I - Solvent Recovery
- J - Vapor Absorption
- K - Wet Dust Collection

Subcategory A, Asbestos-Cement Pipe. Asbestos, Portland cement, silica and other ingredients are mixed and blended for the fabrication of asbestos-cement pipe.

Subcategory B, Asbestos - Cement Sheet. Asbestos, Portland cement, silica and other ingredients are mixed and blended in the manufacture of asbestos-cement sheets. Asbestos-Cement sheet laboratory tops are excluded from this subcategory.

Subcategory C, Asbestos Paper, Starch Binder. Asbestos, starch binders and other materials are used in the manufacture of starch binder type-asbestos paper.

Subcategory D, Asbestos Paper, Elastomeric Binder. Asbestos, elastomeric binders, and other materials are used in the manufacture of elastomeric binder type-asbestos paper.

Subcategory E, Asbestos Millboard. Asbestos in combination with other materials such as cement, starch, clay, lime and mineral wool are used to produce asbestos millboard.

Subcategory F, Asbestos Roofing. Asbestos paper is saturated with asphalt or coal tar followed by various surface treatments in order to manufacture asbestos roofing products.

Subcategory G, Asbestos Floor Tile. Asbestos, polyvinyl chloride resin, chemical stabilizers, limestone and other fillers are mixed for the manufacture of asbestos floor tile.

Subcategory H, Coating or Finishing of Asbestos Textiles. The process of coating or impregnating asbestos textiles with selected materials to obtain desired finished products or to eliminate the problem of airborne particles in the further handling of the textiles.

Subcategory I, Solvent Recovery. In some textiles coating and friction materials operations, the solvents driven off in drying ovens are captured by adsorption onto activated carbon. The solvents are then steam-stripped off the carbon and recovered by decanting or further distilling.

Subcategory J, Vapor Absorption. In some textiles drying operations, the solvents driven off are removed from the exhaust gases by absorption in wet scrubbers. Solvents are not recovered and they are discharged with the scrubber waters.

Subcategory K, Wet Dust Collection. Finishing operations associated with friction materials, e.g., grinding and drilling, can generate excess airborne particulates. Wet scrubbing results in additional raw waste loads.

NATURE OF THE PROBLEM

Building, Construction and Paper Segment of Asbestos Manufacturing

In the 1970's, this portion of the Asbestos Manufacturing industry was identified as consisting of 51 plant operations under 12 different companies. Asbestos is normally combined with other materials to yield manufactured products, and consequently loses its identity. Asbestos is actually a group name that refers to several serpentine minerals having different chemical composition, but similar characteristics. The most widely used variety is chrysotile. Asbestos fibers are graded on the basis of length, with the longest grade priced 10 to 20 times higher than the shorter grades. The shorter grades are normally used in the products described herein. Overall, asbestos-cement products and pipes consume about 70% of all asbestos mined.

At many asbestos product plants, there is considerable manufacture of non-asbestos products. For example, organic cellulose fiber paper is commonly made at asbestos plants. Organic cellulose manufacturing effluents often have high waste strength and may be more difficult to treat than asbestos-type wastes.

Increased concern with the health effects of asbestos fibers in the air has brought about changes that have in turn impacted upon water pollution. For example, dry processes have been converted over to wet processes, and there is increased use of water sprays to minimize dust from mining operations and slag piles. Much research has been carried out on the health effects of asbestos fibers in air. Conversely, there has been little study on the effects of fibers in water until the recent findings of asbestos-like material in the drinking water supply of the city of Duluth, Minnesota.

Textile, Friction Materials and Sealing Devices Segment of Asbestos Manufacturing.

This portion of the asbestos industry essentially deals with the manufacture of asbestos textile products including yarn, cord, rope, thread, tape, wicks and various fabrics; friction materials including brake linings, clutch facings, etc.; and asbestos-containing gaskets, packings, seals, washers, etc. In many plants producing the above products, little or no water is used in manufacturing, and liquid wastes are not generated. Wastewaters from Coating, Solvent Recovery and Vapor Absorption type plants contain a variety of synthetic organic resins, elastomers and/or solvents. The wastes from wet dust collectors are characterized by high levels of suspended solids.

PARAMETERS OF CONCERN

BOD	Oil and Grease
COD, TOC	Nitrogen
TSS	Phosphorous
pH, alkalinity acidity	Color
Temperature	Heavy Metals including: Cadmium, Chromium, Copper, Mercury, Zinc,
Phenols	Nickel, Barium
Solvents	Asbestos
	Toxicity

PRELIMINARY LIMITATIONS FOR DISCHARGE TO POTW AND PRESCRIBED
TREATMENT MEASURES

The various Federal documents on effluent limitations/guidelines have not developed specific pretreatment limitations to date on asbestos manufacturing effluents. Although these effluents may contain complex organics together with appreciable amounts of suspended solids and asbestos, the streams are reported as compatible with municipal systems and many industrial plants are discharging to POTW's with little or no pretreatment.

RUBBER PROCESSING INDUSTRY
(108, 109, 110, 111, 112, 113)
[Part 428]

SUBCATEGORIZATION OF THE INDUSTRY

The Rubber Industry has been divided into 11 Subcategories. Subcategories B, C, D include the (primary) synthetic rubber production plants. Subcategories E, F and G comprise molded, extruded and fabricated rubber plants; Subcategories H and I - reclaimed rubber plants; and Subcategories J and K - latex rubber operations. The various subcategories are described below:

- A - Tire and Inner Tube Plants
- B - Emulsion Crumb Rubber
- C - Solution Crumb Rubber
- D - Latex Rubber
- E - Small-Sized General Molded, Extruded, and Fabricated Rubber Plants
- F - Medium-Sized General Molded, Extruded, and Fabricated Rubber Plants
- G - Large-Sized General Molded, Extruded, and Fabricated Rubber Plants
- H - Wet Digestion Reclaimed Rubber
- I - Pan, Dry Digestion, and Mechanical Reclaimed Rubber
- J - Latex - Dipped, Latex Extruded, and Latex Molded Rubber
- K - Latex Foam

Subcategory A, Tire and Inner Tube Plants. Production of pneumatic tires and inner tubes.

Subcategory B, Emulsion Crumb Rubber. The manufacture of emulsion crumb rubber, other than acrylonitrile butadiene rubber. Emulsion polymerization is the traditional process for the production of synthetic rubber crumb. To an aqueous medium are added the ingredients of the reaction, emulsifiers, catalysts, activators, etc. The emulsified product is then coagulated with a combination of electrolyte and acid to form the rubber crumb.

Subcategory C, Solution Crumb Rubber. Solution polymerization is a nonaqueous process for the production of synthetic rubber crumb. Polymerization occurs in an organic solvent and the crumb rubber subsequently coagulates by the addition of hot water and agitation.

Subcategory D, Latex Rubber. Similar to emulsion crumb rubber production with the exception of the coagulation, crumb rinsing, and dewatering steps. Unlike crumb rubber production, short production runs are common.

Subcategory E, Small-Sized General Molded, Extruded, and Fabricated Rubber Plants. Refers to the production of molded, extruded and fabricated rubber items, foam rubber backing, rubber cement-dipped goods and retreaded tires in plants processing less than 8,200 lb/day raw materials.

Subcategory F, Medium-Sized General Molded, Extruded, and Fabricated Rubber Plants. Production of similar products as described for Subcategory E in plants processing between 8,200 and 23,000 lb/day raw materials.

Subcategory G, Large-Sized General Molded, Extruded, and Fabricated Rubber Plants. Production of similar products as described for Subcategory E, in plants processing greater than 23,000 lb/day raw materials.

Subcategory H, Wet Digestion Reclaimed Rubber. Rubber scrap is broken down into small particles for defibering in a digester. Defibering agents and plasticizing oils are added to facilitate chemical degradation of the fibers.

Subcategory I, Pan, Dry Digestion, and Mechanical Reclaimed Rubber. Mechanical means of defibering are used in place of chemical defibering employed by Subcategory H plants, thus avoiding defibering chemicals and dissolved fibers in the waste waters.

Subcategory J, Latex-Dipped, Latex Extruded and Latex Molded Rubber. Latex is used as a raw material in the production of latex thread, and latex-dipped or molded items.

Subcategory K, Latex Foam. The production of latex foam.

NATURE OF PROBLEM

Major waste sources from tire and tube plants (Subcategory A) include tire and inner tube production materials which come into contact with process waters and raw materials storage areas coming in contact with storm water. Major waste waters from synthetic rubber plants (Subcategories B, C, D) originate from reaction vessel cleaning in the emulsion processes, crumb washing and dewatering, and plant washdown.

Major waste sources from general molded, extruded and fabricated rubber plants (Subcategories E, F, G) include waste process solutions, wash-downs, runoff from outdoor storage sites, spills/leaks of organic solvents and lubricating oils, and vulcanizer condensates. Excess lead can originate from lead-sheathing operations and excess COD from cloth-wrapped curing.

Major waste waters from reclaimed rubber operations (Subcategories H and I) include waste process solutions, washdowns, outdoor runoff, spills and leaks, discharge from air pollution control devices, and dewatering liquor from the wet digestion process.

Waste waters from latex rubber operations (Subcategories J and K) originate as product wash and rinse waters, spills, leakage, washdown and runoff. Chromium is present in spent waters from latex-dipped and latex-molded rubber facilities. Zinc is contributed by latex foam facilities.

PARAMETERS OF IMPORTANCE

BOD	Lead
COD	Chromium
TSS	Zinc
Oil and Grease	Other Metals
Surfactants	TDS
pH, acidity, alkalinity	Temperature
	Color

PRELIMINARY LIMITATIONS FOR DISCHARGE TO POTW AND PRESCRIBED TREATMENT MEASURES

The Federal Regulations have determined for Subcategory A Rubber Processing Plants, that process waste waters are amenable for discharge to POTW's without any pretreatment. Waste waters from Subcategory B through K Plants are reported compatible to POTW's, with exceptions in pretreatment criteria as defined below:

For Subcategory A, Tire and Inner Tube Plants, Existing and New Sources.
No Limitations

For Subcategory B, Emulsion Crumb Rubber, Applicable to Existing Sources, and apparently also to New Sources.

Parameter	Avg. 30 Day (1b/1,000 lb final product)	Max. Day (1b/1,000 lb final product)
COD	8.0	12.0

For Subcategory C, Solution Crumb Rubber, Applicable to Existing Sources and apparently also to New Sources.

COD	3.94	5.91
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For Subcategory D, Latex Rubber, Applicable to Existing Sources, and apparently also to New Sources.

COD	6.85	10.27
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For Subcategories E, F and G, i.e. General Molded, Extruded, and Fabricated Rubber Plants, Applicable to Existing and New Sources.

Parameter	Avg. 30 Day (1b/1,000 lb raw materials)	Max. Day (1b/1,000 lb raw materials)
Oil/Grease	-	100 mg/l
Lead*	0.0007	0.0017

For Subcategory H, Wet Digestion Reclaimed Rubber, Existing and New Sources.

Parameter	Avg. 30 Day (1b/1,000 lb final product)	Max. Day (1b/1,000 lb final product)
Oil/Grease	-	100 mg/l
COD	6.11	14.70

For Subcategory I, Pan, Dry Digestion, and Mechanical Reclaimed Rubber, Existing and New Sources.

Oil/Grease	-	100 mg/l
COD	2.8	6.7

* Attributable to lead-sheathed hose production, wastes from which are discharged to a POTW.

For Subcategory J, Latex-Dipped, Latex-Extruded, and Latex-Molded Rubber, Existing and New Sources.

Parameter	Avg. 30 Day (1b/1,000 lb raw materials)	Max. Day (1b/1,000 lb raw materials)
Oil/Grease	-	100 mg/l
Chromium*	0.0036	0.0086

For Subcategory K, Latex Foam, Existing and New Sources.

Zinc	0.024	0.058
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The EPA Development Documents on the Rubber Processing Industry indicate the following pretreatment measures are desired for rubber processing waste waters before release to a POTW:

Tire and Inner Tube Plants (Subcategory A). Process wastes should receive separation of oils and solids in an API gravity separator together with flow equalization in order to prevent shock loads of oil, TSS, or batch dumps of dipping solutions from upsetting the POTW.

Synthetic Rubber Plants (Subcategories B, C, D). Emulsion crumb and solution crumb slurry overflow waste waters should be passed through crumb pits to remove floatable rubber crumb. Few POTW's have primary settling equipment adequate to handle large quantities of agglomerated rubber crumb solids. Waste waters from emulsion crumb and latex production facilities are invariably laden with uncoagulated latex solids. Since POTW's generally do not have coagulation capabilities, these waste waters should be at least chemically coagulated with a "sinking agent" and clarified. The following pretreatment measures apply respectively to Subcategory B, C and D rubber plants.

Emulsion Crumb Plants. Gravity separation of crumb fines in crumb pits, chemical coagulation and clarification of latex-laden waste waters, and neutralization or equalization of utility wastes.

Solution Crumb Plants. Gravity separation of crumb fines in crumb pits, and neutralization or equalization of utility wastes.

Latex Plants. Chemical coagulation of latex-laden waste waters, and neutralization or equalization of utility wastes.

* *Attributable to plants employing the chromic acid form-cleaning operation, the wastes from which are discharged to a POTW.*

General Molded, Extruded and Fabricated Rubber Products (Subcategories E, F, G). Process wastes should be passed through an API Separator for separation of oils and solids, together with an equalization basin to prevent shock loads of oil, TSS or batch dumps of dipping solutions, etc., from upsetting the POTW. In addition, waste waters containing excess lead must be treated prior to release to the POTW.

Wet Digestion Reclaimed Rubber (Subcategory H). Process wastes should be treated for separation of oils and solids followed by use of equalization. An API separator is appropriate for oil removal if the waters do not contain digested fibrous materials. If the fiber is digested along with the rubber scrap, an abundance of fibrous material will be present, which is difficult to settle. An oversize settling lagoon may be adequate prior to discharge to a POTW.

Pan, Mechanical and Dry Digestion Operations (Subcategory I). Oil and solids removal together with flow equalization.

Latex Products (Subcategories J and K). Coagulation and clarification of solids-laden wastes followed by chemical precipitation for Chromium and Zinc, if found necessary.

TIMBER PRODUCTS INDUSTRY
(2, 114, 115, 116, 117, 118, 119, 120, 121, 122, 127)
[Part 429]

SUBCATEGORIZATION OF THE INDUSTRY

The Timber Products Industry has been divided into 19 subcategories. Subcategories A through H comprise the Plywood, Hardboard and Wood Preserving Segment of the industry; Subcategories I through O - the Wet Storage, Sawmills, Particleboard and Insulation Board aspects of the industry; and Subcategories P through S include furniture and fixture manufacturing operations and plants. These subcategories are further described below.

- A - Barking Operations
- B - Veneer Manufacture
- C - Plywood
- D - Hardwood - Dry Processing
- E - Hardwood - Wet Processing
- F - Wood Preserving
- G - Wood Preserving - Steam
- H - Wood Preserving - Boultonizing
- I - Wet Storage
- J - Log Washing
- K - Sawmills and Planing Mills
- L - Finishing
- M - Particleboard Manufacturing
- N - Insulation Board Manufacturing
- O - Insulation Board Manufacturing with Steaming
or Hardboard Production
- P - Wood Furniture and Fixture Production without Wash
Spray Booth(s) or Laundry Facilities
- Q - Wood Furniture and Fixture Production without Wash
Spray Booth(s) but with Laundry Facilities
- R - Wood Furniture and Fixture Production with Water
Wash Spray Booth(s) but without Laundry Facilities
- S - Wood Furniture and Fixture Production with Water Wash
Spray Booth(s) and with Laundry Facilities

Subcategory A, Barking. Operations for removal of bark from logs. Bark-
ing is accomplished by mechanical abrasion or by hydraulic force. Ma-
terial removed by barking is generally used as a feed material to other
plants in the Timber Processing Industry.

Subcategory B, Veneer. Operations converting barked logs or heavy tim-
ber into thinner sections of wood known as veneer.

Subcategory C, Plywood. Layers of veneer are laminated to produce fin-
ished plywood. Plywood manufacturing is mostly "dry" except that water
is used in cleaning the glue application equipment.

Subcategory D, Hardwood Dry Processing. Manufacturing operations associated with finished hardboard made from chips, dust, logs, etc., using the dry matting process in forming the board mat.

Subcategory E, Hardwood Wet Processing. Manufacturing operations associated with finished hardboard made from chips, dust, logs, etc., using the wet matting process in forming the board mat. Fibers are diluted from 40 percent to less than 1.5 percent prior to mat formation.

Subcategory F, Wood Preserving. Wood preserving plants in which steaming or boultonizing is not the predominant method of conditioning, waterborne salts are used in pressure and non-pressure processes, and preserving methods are of the non-pressure type.

Subcategory G, Wood Preserving-Steam. Processes that use direct steam impingement on the wood as the predominant method of conditioning.

Subcategory H, Wood Preserving-Boultonizing. Wood preserving methods utilizing the Boulton process for conditioning stock.

Subcategory I, Wet Storage. Includes: 1) the holding of unprocessed wood, i.e., logs or roundwood with bark; 2) the holding of barked logs in self-contained bodies of water (mill ponds or log ponds); or 3) land storage of logs with water being sprayed on the wood (wet decking).

Subcategory J, Log Washing. Logs are passed through pressure sprays, the water serving to remove foreign material from the surface of the log before further processing.

Subcategory K, Sawmills and Planing Mills. Includes one or more of the following operations: log washing, bark removal other than hydraulic barking, sawing, resawing, edging, trimming, planing, and/or machining.

Subcategory L, Finishing. Consist of operations following edging and trimming, which include drying, planing, dipping, staining and coating, moisture proofing, fabrication, and by-product utilization.

Subcategory M, Particleboard Manufacturing. Particleboard refers to board products that are composed of distinct particles of wood or other lignocellulosic materials not reduced to fibers which are subsequently bonded together with an organic or inorganic binder.

Subcategory N, Insulation Bond Manufacturing. Production of insulation board where the wood material is not subject to a pressure created by the steam. Excluded is the manufacture of insulation board from bagasse.

Subcategory O, Insulation Board Manufacturing With Steaming or Hardboard Production. Production of insulation board at facilities which either steam condition the raw material before refining, or produce hardboard at the same facility. Excluded is the manufacture of insulation board from bagasse.

Subcategory P, Wood Furniture and Fixture Production Without Water Wash Spray Booth(s) or Laundry Facilities. Applies to manufacture of wood furniture and fixtures at establishments that: 1) do not utilize wash spray booths to collect and contain the overspray from spray applications of finishing materials; and 2) do not maintain on-site laundry facilities for the fabrics utilized in various finishing operations.

Subcategory Q, Wood Furniture and Fixture Production Without Water Wash Spray Booth(s) but With Laundry Facilities. Applies to manufacture of wood furniture and fixtures at establishments that: 1) do not utilize wash spray booths to collect the overspray from spray applications of finishing materials; but 2) maintain on-site laundry facilities for the fabrics utilized in various finishing operations.

Subcategory R, Wood Furniture and Fixture Production With Water Wash Spray Booth(s) but Without Laundry Facilities. Applies to manufacture of wood furniture and fixtures at establishments that: 1) utilize water wash spray booths to collect and contain overspray from spray applications of finishing materials; but 2) do not maintain on-site laundry facilities for the fabrics utilized in various finishing operations.

Subcategory S, Wood Furniture and Fixture Production With Water Wash Spray Booth(s) and With Laundry Facilities. Applies to manufacture of wood furniture and fixtures at establishments that: 1) utilize water wash spray booths to collect and contain overspray from spray application of finishing materials; and 2) maintain on-site laundry facilities for the fabrics utilized in various finishing operations.

NATURE OF PROBLEM

Plywood, Hardboard and Wood Preserving Subcategories (A through H). Comprise establishments thought to be the most significant sources of water pollution problems across the timber products industry. As of around 1970, there were 340 plywood plants in the U.S. and about 160 veneer plants. In 1973, there were 27 known hardwood manufacturing facilities of which 17 represented variations of the dry process and 10 utilized variations of the wet process. Wet or dry refers to the formation or felting of fibers to form a mat which is eventually formed into sheets or boards. The main difference is essentially that dry process fibers are suspended in air rather than in water. Wood preserving subjects round and saw cut wood products to a chemical injection process which imports fungistatic, insecticidal, and fire-resistance

properties to the wood. In 1971, a total of 390 wood preserving plants were recorded. Common preservatives are creosote, pentachloro-phenol and special formulations of water soluble inorganic chemicals including copper, chromium and arsenic. Fire retardants are generally formulations of borates, phosphates and ammonium compounds. In veneer and plywood mills, major waste sources are log conditioning, cleaning of veneer dryers, washing of glue appertanances and cooling needs. Major waste sources from hardwood mills comprise log washing, chip washing, fiber preparation, mat formation and pressing, resin system, caul washing, housekeeping and humidification. Wood preserving effluents typically have high phenolics, COD and oils including the emulsified form together with low pH.

Wet Storage, Sawmill, Particleboard and Insulation Board Subcategories (I through O). Represent a diverse group of establishments. Subcategories I and J include the handling and storage of logs. Sawmills and planing mills (Subcategory K) produce lumber products from logs. Additional operations falling under Subcategory K comprise fabrication using adhesives to join wood members, machining, etc. Finishing operations covered under Subcategory L include drying, dipping, staining and coating, and by-product conversion. Particleboard made by Subcategory M plants, is divided into low, medium and high density particleboard. Insulation board made by Subcategory N and O plants, principally include building board, insulating roof deck, roof insulation, ceiling tile, lay-in-panels, sheathings and sound deadening insulation board. In 1967, a total of 10,270 sawmills and planing mills in the U.S. was estimated. It was also reported that there were 76 particleboard plants and 18 large-sized insulation board plants in the U.S.

Wood Furniture and Fixture Subcategories (P through S). Consist of approximately 7,000 establishments which are highly diversified. More than 90 percent of these plants have less than 100 employees and are primarily located in North Carolina, the middle Atlantic, southern Atlantic, the east northcentral States, and California. Raw materials include lumber, veneer, plywood, hardwood and particle-board. Wood is dried, machined and bent to desired shape. Parts are assembled generally using glue. Finishing operations include bleaching, staining, filling, sealing, topcoating, wood graining etc. Wood finishing materials are applied by brush or roller, but most often are sprayed onto the wood utilizing dry booths or water wash spray booths. In the dry booth, air is withdrawn and passed through one or more filters or paint arresters. Especially in larger furniture factories, laundry facilities for the rags used in various finishing operations, are common. Major sources of wastewater include the water wash spray booths, laundry facilities and glue applicators which may require cleaning. Miscellaneous sources comprise bleaching, bending operations, and air pollution control devices. Generally, wastewaters from wood finishing plants are high in pH because alkaline surfactant agents are used to disperse the finishing materials. Strong detergents emanate from laundry facilities. These wastes may demonstrate relatively low biodegradability.

PARAMETERS OF CONCERN

BOD	Temperature
COD	TDS
Phenols	Phosphorous
Oil/Grease	Ammonia Nitrogen
pH	Fluorides
TSS	Boron
Zinc	Arsenic
Copper	Pentachlorophenol
Chromium	Color
Mercury	

Specifically for the Wood Preserving Segment of the Timber Products Industry (Subcategories F, G, H) the following parameters are of special importance:

pH: The pH level of wood preserving waste waters from creosote and pentachlorophenol treatments generally varies from 4 to 6 but may be lower than 4.0.

Phenols: Phenolics in waste waters originate from contact with creosote, pentachlorophenol-petroleum solutions, and from products treated with these preservatives. Principal phenolics present in the waste waters include para-, meta- and ortho-creosols, and various derivatives of these compounds. Phenolics concentrations in the waste waters range from 1 mg/l up to 600 mg/l or higher. Phenolics are "presumed" to be readily degraded by acclimated bacteria in biological POTW's.

Pentachlorophenol: PCP is soluble in water up to around 15-20 mg/l, but frequently exceeds these levels in wood preserving wastes. The fate of pentachlorophenol in POTW's has not yet been precisely determined.

Oil/Grease: Prevalent in both creosote and pentachlorophenol-petroleum solutions. May occur either in free or emulsified form in associated wastewaters. Oil/grease concentrations may range from less than 100 mg/l to much in excess of 1,000 mg/l after primary oil separation.

Copper, Chromium, Arsenic and Zinc: Constitute active ingredients in wood preserving fire retardant formulations. In addition, chromium and zinc are incorporated into fire retardant formulations.

Boron: Boric acid and sodium tetraborate constitute ingredients in commercial fire retardant mixtures used by the wood preserving industry.

Fluorides: Occur as sodium or potassium fluoride, the latter an active constituent in one type of wood preserving solution. After lime treatment, fluorides in wastewater may still be present in the range of 10 to 20 mg/l.

Nitrogen and Phosphates: Both ammonium compounds and phosphates are ingredients in fire retardants. Ammonia N and phosphates have been measured in concentrations up to 25 mg/l in the waste waters originating from wood preserving plants employing fire retardants.

PRELIMINARY PRETREATMENT LIMITATIONS FOR DISCHARGE TO POTW

Subcategories A through E Including Barking, Veneer, Plywood and Hardwood Processing. (New Source limitations are not yet clearly defined). For Existing Sources, the Federal Regulations have determined that waste waters from plants in the above subcategories are compatible and may be introduced into POTW's without the need for pretreatment. However, the pH of waste entering POTW's shall not be less than 5.0 unless the POTW is specifically designed to accomodate these pollutants.

Subcategories F, G, H, the Wood Preserving Subcategories. Proposed Federal Regulations of April 18, 1974 indicate that wastewaters from wood preserving plants may contain pollutants such as heavy metals, phenols and/or oil and grease that could interfere with the operation of POTW's, pass through such works untreated or inadequately treated, or otherwise be incompatible with such works. Accordingly, for Subcategory F, i.e. Wood Preserving, it was specified that there shall be no discharge or process waste pollutants. For Subcategories G and H, the following limitations are given and the pH of wastes to the POTW, is to be controlled at 5.0 or above.

Subcategory G, Wood Preserving - Steam, Existing Sources.

Parameter	Max. Day (mg/l)	Max. Day (grams/m ³ production)
Oil/Grease	100	20.5
Copper	5	0.62
Chromium	4	0.41
Arsenic	4	0.41

Subcategory H, Wood Preserving - Boultonizing, Existing Sources.

Oil/Grease	100	20.5
Copper	5	0.62
Chromium	4	0.41
Arsenic	4	0.41

A Draft Report on Pretreatment for the Timber Products Industry prepared by the EPA in August 1976 did not prescribe specific limitations but indicated that pollutant levels after recommended pretreatment should conform to the following values:

For Wood Preserving Subcategory Plants. Oil separation in combination with flocculation-filtration or decantation should provide:

	<u>Concn. Limit, mg/l</u>	<u>Mass Limit, g/cu.m. Product</u>
Oil/Grease	80	14.43
Pentachlorophenol	10	1.80
Copper	2.2	0.40
Chromium	2.6	0.43
Arsenic	4.1	0.74
Zinc	4.4	0.79
Boron	0.9	0.17

For Wood Preserving - Steam Subcategory Plants. Oil separation followed by a flocculation-filtration system should provide:

Oil/Grease - less than 80 mg/l, and possibly 10 mg/l.
 Pentachlorophenol - apparently 10 to 20 mg/l.
 Copper - apparently 2.2 mg/l
 Chromium - 2.6 mg/l
 Arsenic - 4.1 mg/l

For Wood Preserving - Boultonizing Subcategory Plants. Oil separation in combination with flocculation-filtration or decantation, shall provide concentration and mass limits similar to those above for Wood Preserving Subcategory Plants.

Subcategories I through O, Wet Storage, Log Washing, Sawmills and Planing Mills, Finishing, Particleboard Manufacturing, Insulation Board Manufacturing (New Source limitations are not yet clearly defined). For Existing Sources, the Federal Regulations have determined that waste waters from plants in Subcategories I through O are compatible for acceptance into POTW's, and therefore no pretreatment limitations have been specified. However the pH of wastes entering the POTW shall not be less than 5.0 unless the POTW is designed to accomodate such pollutants.

Subcategories P through S, Wood Furniture and Fixture Production. (New Source limitations are not yet clearly defined). For Existing Sources, the Federal Regulations have determined that waste waters from Subcategories P through S are compatible for acceptance into POTW's, and therefore no pretreatment limitations have been specified. However, the pH of wastes entering POTW's shall not be less than 5.0 unless the POTW is specifically designed to accomodate these pollutants.

PRESCRIBED PRETREATMENT MEASURES OR EQUIVALENT

Specifically for the Wood Preserving Segment of the Timber Products Industry (i.e. Subcategories F, G, H), all or a portion of the following treatment and control technologies and procedures have been tentatively recommended by the EPA:

- . Oil separation and the use of flocculation-filtration.
- . Segregation of waste streams, water conservation measures, elimination of leaks, flow equalization and recovery systems when applicable.
- . Biological treatment has been identified but is unlikely as pretreatment.
- . Importantly, it is noted that the Wood Preserving Subcategory i.e. Subcategory F, was described as capable of achieving no discharge of process waste water to a POTW.

UNBLEACHED KRAFT AND SEMICHEMICAL PULP/PAPER MILLS
(30, 142, 143, 144)
[Part 430]

SUBCATEGORIZATION OF THE INDUSTRY

Five Subcategories have been established for the Unbleached Kraft and Semichemical Mill Segment of the Pulp, Paper and Paperboard Industry as follows:

- A - Unbleached Kraft Mills
- B - Sodium-Based Neutral Sulfite Semi-Chemical Mills
- C - Ammonia-Base Neutral Sulfite Semi-Chemical Mills
- D - Unbleached Kraft, Neutral Sulfite Semi-Chemical (Cross Recovery) Mills.
- E - Paperboard From Waste Paper Mills

Further description of processes employed within Subcategories A through E is provided below:

- A) Unbleached Kraft Subcategory. Includes mills producing pulp and paper by the unbleached kraft process. Wood, the fiber raw material of unbleached Kraft pulp, enters the pulp mill as logs or chips. Bark is removed from the logs either by a wet or dry process. The chips are carried to a digester, a large steel pressure vessel heated by steam to approximately 150°C. The chips are cooked in either a batch or continuous operation to dissolve lignin and separate the cellulose fibers. The cooking liquor is a mixture of sodium hydroxide and sodium sulfite, which because of high costs, makes necessary a chemical recovery system. The pulp with spent cooking liquor is transferred to a brown-stock chest and then to vacuum drum washers or continuous diffusers which separate the pulp from the spent cook liquors. Paper is made by depositing from a dilute water suspension of pulp, a layer of fiber onto a fine screen which permits the water to drain through but which retains the fiber layer. This layer is removed from the wire, pressed and dried. Unbleached kraft pulp is principally used for the manufacture of linerboard and grocery sacks.
- B) Sodium-Based Neutral Sulfite Semi-Chemical Subcategory. Includes the production of pulp and paper by a neutral sulfite cooking liquor having a sodium base. NSSC mills may purchase their cook chemicals, but more commonly they prepare the cook liquors on the premises by burning sulfur and absorbing it in soda ash or ammonia. Chemical recovery in the sodium-base NSSC process is considerably more difficult

than for the Kraft process. Most mills simply evaporate and burn the spent cook liquor without recovery, but a few large sodium-base NSSC mills do have chemical recovery systems. No successful system has been developed for chemical recovery in the ammonia-based NSSC mills (Subcategory C below), and the spent liquors may be incinerated. The principal product from Subcategory B mills is corrugated paperboard.

- C) Ammonia-Base Neutral Sulfite Semi-Chemical Subcategory. Includes the production of pulp and paper by a neutral sulfite cooking liquor having an ammonia base.
- D) Unbleached Kraft, Neutral Sulfite Semi-Chemical (Cross Recovery) Subcategory. Includes the production of pulp and paper in combined unbleached Kraft and neutral sulfite semi-chemical (NSSC) mills and where the sodium-based NSSC spent liquors can be disposed of to the Kraft chemical recovery system.
- E) Paperboard From Waste Paper Subcategory. Paperboard products such as corrugated boxes, box board, newspapers, etc. can be manufactured from a wide variety of waste paper. In these mills, waste paper represents 80 percent or more of the fibrous materials incoming to the facility. Waste paper is converted to secondary fiber waste paper by adding sufficient water to dilute the materials to about 4-6 percent solids and charging with chemicals to permit a controlled feed rate to the pulper along with steam. The paper is ripped, shredded and finally defibered. The stock is then passed through centrifugal cleaners and a thickener. Reject material is dewatered for disposal, and the stock sent to the refiners which serve the paper machines.

NATURE OF PROBLEM

Major waste producing sectors include wood preparation, the pulping processes, and the paper machines. Waste sources comprise wet barking, pulp washing waters, various condensate streams in cooling and pulping, chemical recovery operations and paper production waters.

In the pulp and paper industry, the dewatering and disposal of sludges represents a major problem with high attendant costs. These sludges in past decades were primarily placed into holding basins from which free water was decanted. When a basin was full, it was simply abandoned, or if sufficient drying occurred, the cake was excavated and deposited onto marginal land. More advanced practices for better handling paper and pulp mill sludges are now employed extensively through the industry. Hopefully, these excess sludges will not enter into POTW's.

PRELIMINARY LIMITATIONS FOR DISCHARGE TO POTW AND PRESCRIBED TREATMENT MEASURES

The subject of pretreatment, for both Existing and New Sources of unbleached Kraft and semichemical pulp and paper mills has been addressed in the Federal Register publications of January 15, 1974 and May 29, 1974. However up through the present no specific limitations nor recommended pretreatment methods have been advanced for pulp and paper mill wastes in the unbleached and semichemical segment of the industry. Process waste water may be introduced into publicly-owned treatment works pending future recommendations on pretreatment.

BLEACHED KRAFT, GROUNDWOOD, SULFITE, SODA, DEINK AND
NON-INTEGRATED PULP/PAPER MILLS
(13, 14, 131, 141)
[Part 430]

SUBCATEGORIZATION OF THE INDUSTRY

Sixteen subcategories have been established for the Bleached Kraft, Groundwood, Sulfite, Soda, Deink and Non-Integrated Mill Segment of the Pulp, Paper and Paperboard Industry as follows:

- F) Bleached Kraft Dissolving Pulp
- G) Bleached Kraft Market Pulp
- H) Bleached Kraft, Paperboard, Coarse and Tissue Papers (BCT)
- I) Bleached Kraft, Fine Paper
- J) Papergrade Sulfite (Blow Pit Wash)
- K) Dissolving Sulfite Pulp
- L) Groundwood, Chemi-Mechanical (Fine Papers, Newsprint and Molded Fiber Products)
- M) Groundwood, Thermo-Mechanical (Fine Papers, Newsprint and Tissue Papers)
- N) Groundwood, Coarse, Molded Fiber and Newsprint (CMN)
- O) Groundwood, Fine Papers
- P) Soda Mills
- Q) Deink Mills
- R) Non-Integrated Fine Papers
- S) Non-Integrated Tissue Papers
- T) Non-Integrated Tissue Papers From Waste Paper
- U) Papergrade Sulfite (Drum Wash)

Further description of mills within the various subcategories is provided below:

F) Bleached Kraft Dissolving Pulp Subcategory. Includes mills which make a bleached pulp by a "full cook" process using a strong alkaline sodium hydroxide and sodium sulfide cooking liquor. A "pre-cook" operation termed pre-hydrolysis is employed. The principal product is a highly-bleached and purified dissolving pulp destined for rayon manufacture or for other needs requiring a high alpha cellulose content.

G) Bleached Kraft, Market Pulp Subcategory. Includes mills which make a bleached pulp by a "full cook" process using a strong alkaline sodium hydroxide and sodium sulfite cooking liquor. Final product is a papergrade market pulp.

H) BCT Bleached Kraft Subcategory. Includes the integrated production of bleached kraft pulp and paper. Bleached kraft is made in

a "full cook" process with a strong alkaline sodium hydroxide and sodium sulfide cooking liquor.

I) Bleached Kraft, Fine Papers Subcategory. The integrated production of bleached kraft pulp and fine paper. Bleached kraft is made in a "full cook" process with a strong alkaline sodium hydroxide and sodium sulfide cooking liquor. Fine papers comprise business, writing and printing papers.

J) Papergrade Sulfite (Blow Pit Wash) Subcategory. The integrated production of sulfite pulp and paper. Sulfite pulp is made in a "full cook" process using an acidic cook liquor of sulfites of calcium, magnesium, ammonia, or sodium. Following cooking, the spent cooking liquor is separated from the pulp in blow pits. Principal products are tissue papers, newspaper, fine papers, and market pulp.

K) Dissolving Sulfite Pulp Subcategory. Includes mills making a highly bleached and purified pulp from softwoods by a "full cook" process involving strong solutions of sulfites of calcium, magnesium, ammonia, or sodium. These pulps are used principally for the manufacture of rayon and other products requiring the virtual absence of lignin.

L) Groundwood, Chemi-Mechanical Subcategory. The integrated production of chemical-mechanical groundwood pulp and paper. A chemical cooking liquor is employed in a partial cook of the wood followed by mechanical defibration. Principal products are fine papers, newsprint and molded fiber items.

M) Groundwood, Thermo-Mechanical Subcategory. The production of thermo-mechanical groundwood pulp and paper. Groundwood is made by a brief cook utilizing steam with or without cooking chemicals such as sodium sulfite, which is followed by mechanical defibration. Principal products are market pulp, fine papers, newsprint, and tissue papers.

N) Groundwood, CMN Papers Subcategory. The integrated production of groundwood pulp and paper. The pulp is made utilizing only mechanical defibration. Principal products are coarse papers, molded fiber items, and newsprint.

O) Groundwood, Fine Papers Subcategory. The integrated production of groundwood pulp and fine papers. The pulp is made utilizing only mechanical defibration. Principal products are fine papers comprising business, writing and printing papers.

P) Soda Subcategory. The integrated production of bleached soda pulp and paper. The pulp is made by a "full cook" process with a strong alkaline sodium hydroxide cooking liquor. Principal products are fine papers comprising printing, writing and business papers, together with market pulp.

Q) Deink Subcategory. The integrated production of deinked pulp and paper. Deinked pulp is generally made from waste papers using an alkaline treatment procedure to remove contaminants such as ink and coating pigments. Principal products besides pulp are printing, writing and business papers, tissue papers, and newsprint.

R) Non-Integrated Fine Papers Subcategory. Includes mills which produce fine papers from wood pulp or deinked pulp prepared off-site. Principal products are printing, writing, business and technical papers.

S) Non-Integrated Tissue Papers Subcategory. Includes mills which produce tissue papers from wood pulp or deinked pulp prepared off-site. Principal products are facial and toilet papers, glassine, paper diapers, and paper towels.

T) Non-Integrated Tissue Papers From Waste Paper Subcategory. Includes mills which produce tissue papers from waste papers without deinking. Principal products are facial and toilet papers, glassine, paper diapers and paper towels.

U) Papergrade Sulfite (Drum) Wash) Subcategory. Integrated production of sulfite pulp and paper. The sulfite pulp is made in a "full cook" process employing an acidic cooking liquor of sulfites of calcium, magnesium, ammonia or sodium. The spent cooking liquor is then washed from the pulp on vacuum or pressure drums. Also included are belt extraction systems for pulp washing. Principal products are tissue papers, fine papers and newspapers, together with market pulp.

PARAMETERS OF CONCERN

pH, Acidity, Alkalinity	Settleable Solids
BOD	Turbidity
TSS	COD
Color	Resin Acids
Ammonia N	Polychlorinated Biphenyls
Zinc	Coliform Organisms
Temperature	Mercury

PRELIMINARY LIMITATIONS FOR DISCHARGE TO POTW

Proposed pretreatment regulations for existing and new sources in the pulp, paper and paperboard industry, Subcategories F through U, were published in the Federal Register of February 19, 1976 and subsequently modified in a recent publication of January 6, 1977.

Subcategory F - Bleached Kraft, Dissolving Pulp.

For existing and new Sources: No limitations.

Subcategory G - Bleached Kraft Market Pulp.

For existing and new Sources: No limitations.

Subcategory H - Bleached Kraft, Paperboard, Coarse, Tissue Paper.

For existing and new Sources: No limitations.

Subcategory I - Bleached Kraft, Fine Papers.

For existing and new Sources: No limitations.

Subcategory J - Papergrade Sulfite.

For existing and new Sources: Limitations not yet established.

Subcategory K - Dissolving Sulfite Pulp.

For existing and new Sources: No limitations.

Subcategory L - Groundwood, Chemi-Mechanical.

For existing Sources where Zinc Hydroxide used as bleaching agent:

Zinc, lb/1,000 lb product

Avg. 30 Day - .06

Max. Day - .12

For new Sources where Zinc Hydroxide used as bleaching agent:

Avg. 30 Day - .048

Max. Day - .095

Subcategory M - Groundwood, Thermo-Mechanical.

For existing Sources, where Zinc Hydroxide used as bleaching agent:

Zinc, lb/1,000 lb. product

Avg. 30 Day - .05

Max. Day - .105

For new Sources, where Zinc Hydroxide used as bleaching agent:

Avg. 30 Day - .0455

Max. Day - .090

Subcategory N - Groundwood, Coarse, Molded Fiber, Newsprint.

For existing Sources, where Zinc Hydroxide used as bleaching agent:

Zinc, lb/1,000 lb. product

Avg. 30 Day	-	.05
Max. Day	-	.105

For new Sources, where Zinc Hydroxide used as bleaching agent:

Avg. 30 Day	-	.0455
Max Day	-	.090

Subcategory O - Groundwood, Fine Papers.

For existing Sources, where Zinc Hydroxide used as bleaching agent:

Zinc, lb/1,000 lb. product

Avg. 30 Day	-	.048
Max. Day	-	.095

For new Sources, where Zinc Hydroxide used as bleaching agent:

Zinc. lb/1,000 lb. product

Avg. 30 Day	-	.044
Max. Day	-	.090

Subcategory P - Soda Mills.

For existing and new Sources: No Limitations.

Subcategory Q - Deink Mills.

For existing and new Sources: No Limitations.

Subcategory R - Non-Integrated Fine Papers.

For existing and new Sources: No Limitations.

Subcategory S - Non-Integrated Tissue Papers.

For existing and new Sources: No Limitations.

Subcategory T - Non-Integrated Tissue Papers from Waste Paper.

For existing and new Sources: No Limitations.

Subcategory U - Papergrade Sulfite (Drum Wash).

For existing and new Sources: Limitations not yet established.

BUILDING PAPER AND ROOFING FELT MANUFACTURING
(80, 81, 82)
[Part 431]

SUBCATEGORIZATION OF THE INDUSTRY

Building Paper and Roofing Felt Manufacturing is considered to be part of the overall Building Paper and Builders Board Industry. To date, only Subcategory A has been defined by the EPA guidelines limitations, also known as the Builders Paper and Roofing Felt Subcategory.

NATURE OF PROBLEM

Builders Paper and Roofing Felt mills produce the heavy papers used in the construction industry made from cellulose fibers in turn derived from waste paper, wood flour and sawdust, wood chips and rags. Bleaching and chemical pulping are not employed by these mills.

Builders papers are generally characterized as saturating papers, flooring paper, and deadening papers used by the construction and automotive industries. They differ from the roofing felts in thickness and possible chemical additives to the builders papers.

Dry roofing felt is a strong, highly absorbent material used as backing and support for subsequent bituminous coating. These coatings serve to waterproof the final product.

Waste loads from Builders Paper and Roofing Felt mills originate principally from the stock preparation and board manufacturing processes. Loss of fiber and miscellaneous materials occur from both the "white water" and stock cleaning rejects which are continuously discharged. Cleaning losses are also encountered. Additional waste sources may include cooling and quenching the coatings on roofing felts. Mica, talc or similar solids can be lost to the waste streams.

Fifty-six mills which produce saturated papers and/or coating or dry roofing felt were identified in the industry. The majority of the mills are located in or near metropolitan areas. It was found that up to 75 percent of the mills have access to municipal sewers and POTW's.

PARAMETERS OF CONCERN

BOD	Turbidity TSS
TSS	Color
pH	Nitrogen and Phosphorous
Settleable Solids	Polychlorinated Biphenyls
Oil/Grease	

POLYCHLORINATED BIPHENYLS (PCB's) are chemically and thermally-stable compounds contained in waste papers. Recycled office papers appear to be a main source of PCB's although recycled paperboard also shows evidence of PCB's.

PRELIMINARY LIMITATIONS FOR DISCHARGE TO POTW AND PRESCRIBED TREATMENT MEASURES.- No specific limitations have been developed to date in the Federal regulations for the discharge of builders paper and roofing felt wastewaters to municipal collection and treatment systems. The pollutants in these waste waters are considered to be chiefly organic materials and solids, and generally compatible to municipal treatment.

RED MEAT SEGMENT OF THE MEAT PRODUCTS INDUSTRY
(171, 172, 173, 174, 175)
[Part 432]

SUBCATEGORIZATION OF THE INDUSTRY

The overall Meat Products Industry has been divided into 15 subcategories including subcategories A through D covering the Red Meat Segment of the industry; subcategories E through I described as the Processor Segment of the industry; subcategory J representing the Rendering Segment; and subcategories K through O the Poultry Processing Segment of the industry. These are tabulated as follows:

- A) Simple Slaughterhouse
- B) Complex Slaughterhouse
- C) Low Processing Packinghouse
- D) High Processing Packinghouse
- E) Small Processor
- F) Meat Cutter
- G) Sausage and Luncheon Meats Processor
- H) Ham Processor
- I) Canned Meats Processor
- J) Renderer
- K) Chicken Processor
- L) Turkey Processor
- M) Fowl Processor
- N) Duck Processor
- O) Further Processing Subcategory

The Red Meat Segment of the industry consisting of four distinct subcategories is described below:

Subcategory A, Simple Slaughterhouses. A slaughterhouse is defined as a plant that slaughters animals and has as its main product fresh meat in whole, half, or quarter carcasses or smaller cut meats. A "simple slaughterhouse" refers to a slaughterhouse which accomplishes very limited by-product processing, if any, such as rendering, paunch and viscera handling, blood, hide or hair processing.

Subcategory B, Complex Slaughterhouses. A slaughterhouse that performs extensive byproduct processing, generally including at least three operations such as rendering, paunch and viscera handling, blood, hide or hair processing.

Subcategory C, Low-Processing Packinghouses. A packinghouse is defined as a plant that both slaughters animals and subsequently processes carcasses into cured, smoked, canned or other prepared meat products. A "low processing" packinghouse refers to a packinghouse that processes no more than the total animals killed at that particular plant, and normally processes less than the total kill.

Subcategory D. High-Processing Packinghouses. A packinghouse which processes both animals slaughtered at the site and additional carcasses from outside sources.

NATURE OF PROBLEM

Plants in the meat products industry range from establishments that carry out only one operation, such as slaughtering, to full-line plants that not only slaughter, but also conduct processing to varying levels, i.e. conversion of meat products into sausages, cured hams, smoked products, etc. Slaughtered animal types include cattle, calves, hogs and sheep. As of March 1973, 5990 meat slaughtering plants were recorded in the U.S. Fifteen percent of the plants in the industry account for 90 percent or more of the total production. In 1966, about 70 percent of all waste water in the meat packing industry was discharged to municipal sewers. Waste waters from meat slaughtering, packinghouses and associated facilities such as stockyards, rendering and feed manufacturing plants contain organic matter, grease, TSS and inorganic materials such as phosphates and salts. These materials enter sewers and streams as manure, curing and pickling solutions, caustic or alkaline detergents, et. al.

PARAMETERS OF CONCERN

pH	Ammonia N
BOD	TKN
COD	Nitrates, nitrites
TSS	Phosphorous
TDS	Chlorides
TVS	Temperature
Oil and Grease	
Total and Fecal Coliforms	

PRELIMINARY LIMITATIONS FOR DISCHARGE TO POTW

The 40 CFR Part 432 Federal Regulations for both existing and new sources in the meat products industry have not formulated pretreatment limitations, and thusly, these wastes may be discharged to POTW's.

PRESCRIBED PRETREATMENT FOR DISCHARGE TO POTW

The Development Document of October 1973 on the Meat Products Industry together with the Federal Register publications on meat industry wastes describe the subject effluents as containing no constituents which would interfere with, pass through, or otherwise be incompatible with well-designed and operated POTW's. However, suggestions have been made that these effluents before reaching the POTW should receive in-plant recovery for the removal of grease and gross solids. Grease can be a valuable by-product when collected and sent to rendering. Greases are collected via catch basins, grease traps or dissolved air flotation units. Solids are removed by settling or via screens-static, vibrating or rotating and generally self-cleaning types. Waste equalization is desirable. In-plant controls should emphasize the following practices:

- . Prevent waste materials from interfacing with water streams.
- . Covering and dry cleaning of livestock holding pens, careful control over drinking water troughs, and separate disposal of pen manure etc. to agricultural fields.
- . Separate collection and recovery of blood wastes.
- . Separate handling and disposal of paunch materials.
- . Precluding viscera wastes from entering plant sewers.
- . Installation of troughs under the killing room to keep blood, trimmings, bone dust and miscellaneous off the floors.
- . Wastewater from rendering should be condensed and/or evaporated for sale or disposal as "stickwater." Tankwater, greases and cracklings should receive high priority for recovery.
- . Overflows from hide culling vats or raceways should receive close control.
- . Hog scald tanks contain strong wastes which should be collected, treated, and if possible, reused.
- . Consideration should be given to special handling of spent pickling and curing liquors which contain high levels of salt and in many cases, also have high sugar content.
- . Many possibilities of water reuse and water reduction inside the meat processing plant have been demonstrated and warrant serious attention for implementation.

PROCESSOR SEGMENT OF MEAT PRODUCTS INDUSTRY
(16, 17)
[Part 432]

SUBCATEGORIZATION OF THE INDUSTRY

The Meat Products Industry consists of 15 Subcategories. The Processor Segment described herein includes five subcategories, i.e. E through I. The slaughtering of animals, rendering and poultry processing are covered elsewhere in this report.

Meat processing plants included in this segment of the industry are plants which manufacture prepared meats and meat products from purchased carcasses, meat cuts and other materials, and perform no slaughtering at the same plant site. Processing plants that produce 6,000 lbs. or less of finished product per day are categorized as Small Processors. Remaining plants are described as large processors and are further divided into four subcategories, i.e. F through I. Canned pet foods are not included in the meat processing industry.

Subcategory E. Small Processors. Refers to the production of finished meat products such as fresh meat cuts, smoked products, canned products, hams, sausages, luncheon meats or similar products by a small processor. A small processor is further defined as an operation that produces 6,000 lb/day or less of finished products.

Subcategory F. Meat Cutters. Refers to the fabrication or manufacture of fresh meat cuts such as steaks, roasts, chops, etc. by a meat cutter. A meat cutter is further defined as an operation which fabricates, cuts or otherwise produces fresh meat cuts and other finished products from livestock carcasses, at rates greater than 6,000 lb/day.

Subcategory G, Sausage and Luncheon Meat Processors. Applies to the manufacture of fresh meat cuts, sausage, bologna and other luncheon meats by a sausage and luncheon meat processor. A sausage and luncheon meat processor is defined as an operation which cuts fresh meats, grinds, mixes, seasons, smokes or otherwise produces finished products as sausage, bologna, and luncheon meats at rates greater than 6,000 lb/day.

Subcategory H. Ham Processors. Applies to the manufacture of hams alone or in combination with other finished products by a ham processor. A ham processor is defined as an operation which manufacturers finished products at rates greater than 6,000 lb/day.

Subcategory I. Canned Meat Processor. Applies to the manufacture of canned meats alone or in combination with other finished products by a canned meats processor. A canned meat processor is defined as an operation manufacturing canned meats such as stew, sandwich spreads or other finished products at rates greater than 6,000 lb/day.

NATURE OF PROBLEM

A total of 1374 meat processing plants were included in the 1967 Census of Manufacturers in the U. S. An additional 168 meat processing plants were reported under Federal inspection up through June 30, 1973. The small processing plant handling less than 6,000 lbs finished product per day, is estimated to account for 85 to 90 percent of the total number of plants, but only produces 10 to 15% of total meat processed across this Segment of the industry. In 1967, it was estimated about 70% of all meat packing and processing wastewaters found their way into municipal sewers. By 1972, 80% or more of the meat processing plants were said to be discharging to municipal sewers.

Typical operations and major water sources inside a meat processing installation include: meat materials preparation, pickling, product cooking and cooling, and canning.

PARAMETERS OF CONCERN

pH, acidity, alkalinity	Nitrogen including Ammonia N,
BOD	TKN, nitrates and nitrites
COD	Phosphorous
TSS	Chlorides
TDS	Temperature
TVS	Fecal coliforms
Oil and Grease	

Ammonia Nitrogen is but one of many forms of nitrogen-type pollutants present in meat processing wastewaters. Anaerobic decomposition of protein, which is essentially organic nitrogen, leads to the formation of ammonia. Thusly, anaerobic waste treatment lagoons or digesters can produce high levels of ammonia. Septic or anaerobic conditions in traps, holding chambers, etc. also leads to ammonia formation in wastewater. Another source of ammonia is leakage from ammonia refrigeration systems, thought to be fairly common in meat processing plants.

Nitrates and nitrites are the result of the oxidation of ammonia and organic nitrogen. Nitrates and nitrites are also ingredients in curing and pickling solutions and in processed meat formulations.

Chlorides originate from meat processing plants as salt from animal tissues, pickling and curing solutions, cleaning chemicals, blowdown waters and the salt sprinkled on processing plant floors to prevent slipping.

PRELIMINARY LIMITATIONS FOR DISCHARGE TO POTW

The 40 CFR, Part 432 Regulations of January 3, 1975 give no specific limitations for existing and new meat processing installations discharging wastes to municipal sewers.

PRESCRIBED TREATMENT FOR DISCHARGE TO POTW

The Development Document of August 1974 on Meat Processor Plant wastewater describes these effluents as containing no constituents which would interfere with, pass through, or otherwise be incompatible with well-designed and operated POTW's. It is however reported that this wastewater should pass through materials recovery operations in order to remove settleable solids and a majority of the grease. Materials recovery is accomplished by in-plant control measures and primary treatment. It is possible that grease remaining in the partially-treated effluent to a POTW can cause difficulties at the POTW. A concentration of 100 mg/l oil and grease is usually cited as the upper limit to the POTW. An air flotation system may be required in addition to catch basins. If the BOD strength of wastes going to the POTW must be reduced further, anaerobic contact, aerated lagoons and other methods, may be considered for pretreatment.

In-Plant Control methods at Meat Processor Plants generally include collection of spent pickling and curing solutions, various water conservation practices and modification of plant cleanup procedures including dry squeegeeing or scraping of affected surfaces, proper use of drain basins, minimization of water and detergents, and automation of conveyors, piping and other equipment. Primary treatment consists of one or more operations of waste flow equalization, screening, catch basins, and dissolved air flotation.

RENDERING SEGMENT OF THE MEAT PRODUCTS INDUSTRY
(15, 16, 171)
[Part 432]

SUBCATEGORIZATION OF THE INDUSTRY

Rendering has been defined as Subcategory J of the overall Meat Products Industry. This segment of the industry considers only independent rendering plants which collect animal byproducts such as bone, offal, fat and dead animals from slaughterhouses, processing plants, butcher shops, restaurants, feed lots, ranches, and process these materials into end products such as fats, oils, and solid proteinaceous meal. Heat melts the fat out of tissues, coagulates all proteins and evaporates material moisture. The end products may be either edible or inedible. Plants processing fish byproducts are not included in this study. An independent rendering plant may also cure hides as an ancillary operation.

The term "renderer" is specifically defined as an independent or off-site rendering operation, conducted separately from a slaughterhouse, packinghouse, or poultry processing plant, which manufactures at rates greater than 75,000 pounds of raw material per day. Raw material includes meat meal, tankage, animal oils, grease and tallow, but excludes marine oils, fish meal and fish oils. The term "tankage" shall mean dried animal by-product residues used in feedstuffs. The term "tallow" shall mean a material made from beef cattle or sheep fat that has a melting point of 40°C or higher.

NATURE OF PROBLEM

Of about 450 renderers encompassed by this study, approximately one-half discharge to municipal sewers; one-quarter achieve zero discharge of pollutants; and one-quarter directly discharge to surface waterways.

PARAMETERS OF CONCERN

pH. Acidity, Alkalinity	Ammonia N
BOD	TKN
COD	Nitrates, Nitrites
TSS	Phosphorous
TDS	Chlorides
TVS	Total and fecal coliforms
Oil and Grease	Temperature

Oil and Grease is a major pollutant in waste streams from rendering plants. Sources of grease are primarily the spillage of processed tallow and associated materials and the cleanup of equipment, floors, barrels and trucks. Grease forms unsightly films on water, interferes with aquatic life, clogs sewers, disturbs biological treatment processes, and can become a fire hazard. Levels of grease in raw waste will average around 1600-1700 mg/l.

Ammonia and Kjeldahl Nitrogen pollution loads are highly affected by blood losses from raw material drainage and blood and feather operations, and the degree of liquid entrainment in the cooking vapors. Typical raw waste TKN concentrations will range from 50 to 800 mg/l.

Chlorides in rendering plant wastes originate as salts from animal tissues, hide curing operations and blood. Chlorides are much higher in plants processing hides and sewerage the blood wastes.

PRELIMINARY LIMITATIONS FOR DISCHARGE TO POTW

The 40 CFR, Part 432 Regulations of January 3, 1975 provide no specific limitations for existing and new rendering sources which discharge wastes to municipal sewers.

PRESCRIBED PRETREATMENT FOR DISCHARGE TO POTW

The Development Document of August 1974 on Rendering Plant wastewaters describes those effluents as containing no constituents which would interfere with, pass through, or otherwise be incompatible with well-designed and operated POTW's. It is however reported that this wastewater should pass through materials recovery in order to remove settleable solids and a majority of the grease. Materials recovery is accomplished by in-plant measures and primary treatment. It is possible that grease remaining in the partially-treated effluent to the POTW can cause difficulty at the POTW. Trickling filters appear to be particularly sensitive. A concentration of 100 mg/l oil and grease is usually cited as the upper limit to the POTW. An air flotation system may be required of the renderer in addition to catch basins. If the BOD strength of wastes going to the POTW must be reduced, anaerobic contact, aerated lagoons and other methods, may be considered for pre-treatment.

In-Plant Control methods at rendering plants include special handling of condensables and high-strength liquid wastes, truck and barrel washings, odor control and plant cleanup and spills. Primary treatment would consist of one or more methods of waste flow equalization, screening, use of catch basins and dissolved air flotation.

POULTRY SEGMENT OF THE MEAT PRODUCTS INDUSTRY
(22, 23)
[Part 432]

SUBCATEGORIZATION OF THE INDUSTRY

For the Poultry Industry, five sub-classes are proposed:

Subcategory K. Chicken Processor. A chicken dressing plant that primarily slaughters broilers. The plant may also cut up, further process and/or render at the same plant site.

Subcategory L. Turkey Processor. A turkey dressing plant that primarily slaughters turkeys. The plant may also cut up and further process concurrently or seasonally and/or render at the same plant site.

Subcategory M. Fowl Processor. A fowl dressing plant that primarily slaughters light or heavy fowl, i.e. mature chickens. The plant may also cut up, further process and/or render at the same plant site. Geese and capon dressing plants are included in this subcategory.

Subcategory N. Duck Processor. A duck processing plant that primarily slaughters ducks. The plant may also cut up, further process and render at the same plant site.

Subcategory O. Further Processing. A poultry plant that conducts only "further processing" with any type of bird, but has no onsite slaughtering. Cooking is involved in all "further processing" plants. Various ingredients are mixed with the poultry meat and the numerous products are formed, cooked (into cut, ground, chopped breaded, etc.), packaged, and usually frozen. Plants that process eggs or manufacture such products as canned soups and TV dinners are excluded from the above subcategories.

NATURE OF PROBLEM

Principal waste sources within poultry processing are killing, breeding, scalding, defeathering, evisceration, chilling, further processing, rendering, and various condensor operations.

Wastewaters from poultry processing plants contain organic matter, grease, TSS, inorganics such as phosphates, nitrates and nitrites, and

coliform bacteria. Waste materials consist of meat and fatty tissue, offal, feathers, body fluids from the birds, blood, loss of materials from processing, preservatives, lost product ingredients and caustic or alkaline detergents.

The end products of slaughtering and eviscerating operations are ice packed or chilled ready-to-cook broilers and chickens, fresh or frozen fowl, turkeys, etc. Small game are also processed by the industry. "Further processing" leads to a variety of cooked, canned and processed poultry meat items such as pre-cooked breaded parts, roasts, rolls, patties, meat slices in gravy, canned boned chicken and various sausages.

In 1973, there were 248 Federally-inspected poultry plants that only conducted slaughtering, 288 that processed only, and 144 plants that both slaughtered and processed.

PARAMETERS OF CONCERN

BOD	Ammonia N
COD	TKN
TSS	Nitrates, nitrites
TDS	Phosphorous
TVS	Chlorides
Oil and Grease	pH
Total and Fecal Coliforms	Temperature

Grease is a major pollutant in raw wastes from poultry processing establishments. Grease forms unsightly films and layers on water, interferes with aquatic life, clogs sewers, disturbs biological processes in POTW's, and can also become a fire hazard. The concentration of grease in poultry processing raw waste waters ranges from 100 to 400 mg/l. Grease can foul municipal treatment facilities especially trickling filters, and seriously reduce their effectiveness. Thus, grease may be of great concern to municipal treatment plants.

Phosphorous in raw poultry wastewaters originates from bone meal in cutting, detergents used in cleanup, food additives, and from boiler water additives.

LIMITATIONS FOR DISCHARGE TO POTW

No specific limitations have been prescribed up to this time. Main pollutant parameters that were considered for limitation include BOD, TSS, Oil and Grease, Fecal Coliforms and pH.

PRESCRIBED PRETREATMENT MEASURES OR EQUIVALENT

No constituents have been found in poultry processing wastewaters which would interfere with, pass through, or otherwise be incompatible with a well-designed and operated biological-type POTW's. The poultry processing effluent before reaching the municipal sewer, should however be passed through byproduct recovery and in-plant primary treatment at the poultry plant in order to remove settleable solids and the majority of the grease. It is possible that greases remaining in the poultry plant effluent can cause difficulty at the POTW. Trickling filters appear especially sensitive. A concentration of 100 mg/l oil and grease is usually cited as the upper limitation for acceptance by a POTW. Achieving this level may require an effective air flotation system in addition to catch basins. If the waste strength measured as BOD₅ must be further reduced, biological unit operations including anaerobic contact, trickling filtration or aerated lagoons, can be used for pretreatment.

In-Plant Controls and byproduct recovery include one or more of the following practices.

- . Control and minimize water usage throughout the plant.
- . Stun birds during killing so as to reduce carcass movement during bleeding.
- . Confine bleeding, provide sufficient bleed time and recover all collectable blood.
- . Consider reuse of chiller water for makeup to the scalding.
- . Consider dry offal handling in lieu of waste fluming.
- . Closely monitor screening systems used for offal and feathers, and deploy backup screens if at all possible.
- . Separate and treat offal truck drainage before sewerage.
- . Use dry cleanup prior to floor and equipment washdown. This is particularly important in bleeding and cutting areas.
- . Minimize chemicals and detergents used in cleaning.
- . All spent raw materials should be routed to rendering rather than to plant sewers.
- . Segregate all overflows from the cooking sector for grease and solids recovery and/or treatment.
- . Offal and feathers in respective flow-away systems to be properly screened, collected and taken to rendering.

In-Plant primary treatment and byproduct recovery should consist of the following: flow equalization, effective screening, use of catch basins and if necessary, dissolved air flotation and electrocoagulation.

COAL MINING INDUSTRY
(73, 74, 75, 76)
[Part 434]

SUBCATEGORIZATION OF THE INDUSTRY

The Coal Mining Industry is divided into coal production and coal preparation. Mining creates both acid and alkaline drainage. Preparation involves preparation plant waste water and area wastewater around the plant. The industry has been divided into four subcategories as shown below:

- A - Coal preparation plant
- B - Coal storage, refuse storage and coal preparation plant ancillary area
- C - Acid or ferruginous mine drainage
- D - Alkaline mine drainage

NATURE OF THE PROBLEM

The Federal Regulations contained in the Federal Register, Part 434 are applicable to discharges resulting from the cleaning or beneficiation of coal of any rank including but not limited to bituminous, lignite and anthracite.

In coal preparation plants process methods generally require an alkaline media for efficient and economical operation. Therefore, process water does not dissolve significant quantities of constituents found in raw coal. Coal preparation plants generate TSS as a principal pollutant. Coal storage, refuse storage and coal preparation ancillary areas have wastes generally similar to drainage at the mine served by the preparation plant. Coal mining produces drainage which may vary in character from grossly polluted to drinking water quality. Two main types of mine drainage are found: 1) acid or ferruginous-high in acid and iron and with varying concentrations of aluminum, manganese, nickel and zinc, and usually requiring neutralization and settling; and 2) alkaline - possibly requiring settling. Water enters mines via precipitation, ground water infiltration and runoff, where it may become polluted by contact with materials in the coal, the overburden material, or the mine bottom.

PARAMETERS OF CONCERN

pH, acidity, alkalinity	TDS
Iron, dissolved and total	Sulfate
Manganese	Fluoride
Aluminum	Strontium
Nickel	Ammonia N
Zinc	TSS

PRELIMINARY LIMITATIONS FOR DISCHARGE TO POTW AND PRESCRIBED TREATMENT MEASURES

Wastewaters from the Coal Mining Industry are not characteristic of wastes considered amenable to treatment by biological means. Coal mining wastes are generally not compatible with sanitary sewage because of their potential acidic nature, metals content, and large volume rates. However, certain metallic salts such as aluminum sulfate and ferrous salts may be considered beneficial and are used in wastewater treatment as coagulants. It has been shown under controlled conditions that acid mine drainage and municipal wastes may be handled by joint treatment.

The Federal Regulations on Existing Sources of Coal Mining indicates these wastewaters, if necessary, may possibly be accepted into POTW's. However, the operator of a POTW is cautioned that certain constituents in coal mining wastewaters may interfere with the treatment works or can pass through the treatment works inadequately treated. Therefore, these waste waters should receive special consideration by the operator of the POTW and the wastes may be subject to further regulations.

For New Sources of Coal Mining, special pretreatment limitations have been prescribed for Subcategory A, coal preparation plants, and for Subcategory B, coal storage, refuse storage and coal preparation plant ancillary areas as shown below:

Subcategory A - Max. daily of 50 mg/l dissolved iron

Subcategory B - Max. daily of 50 mg/l dissolved iron

OFFSHORE AND ONSHORE OIL AND GAS EXTRACTION INDUSTRY
(137, 138, 139, 140)
[Part 435]

SUBCATEGORIZATION OF THE INDUSTRY

The Oil and Gas Extraction Industry has been divided into six subcategories, the first two relating to Offshore installations and other four to Onshore installations. Major pollutants are derived from the production of crude petroleum and natural gas, drilling of oil and gas wells, and oil and gas field exploration services. The six subcategories comprise:

- A - Near Offshore Subcategory
- B - Far Offshore Subcategory
- C - Onshore Subcategory
- D - Coastal Subcategory
- E - Beneficial Use Subcategory
- F - Stripper Subcategory

Subcategory A - Near Offshore Facilities. Includes offshore structures within State waters engaged in the production, field exploration, drilling, well completion and well treatment of oil and gas.

Subcategory B - Far Offshore Facilities. Includes offshore structures within Federal waters engaged in the production, field exploration, drilling, well completion and well treatment of oil and gas.

Subcategory C - Onshore Facilities. Includes onshore structures engaged in the production, field exploration, drilling, well completion and well treatment of oil and gas, but is not applicable to those onshore facilities defined in Subcategories D, E and F. "Onshore" means all land and water areas landward from the inner boundary of the territorial seas, including the Great Lakes.

Subcategory D - Coastal Works. Includes coastal facilities engaged in the production, field exploration, drilling, well completion and well treatment of oil and gas. The term "coastal" is interpreted as comprising all land and water areas landward from the inner boundary of the territorial seas, and bounded on the inland side by a line defined by the inner boundary of the territorial seas as defined above eastward of the point defined by 89° 45' W. Longitude and 29° 46' N Latitude and continuing as follows west of that point:

<u>Direction to West Longitude</u>	<u>Direction to North Latitude</u>
------------------------------------	------------------------------------

West, 89° 48'	North, 29° 50'
West, 90° 12'	North, 30° 06'
West, 90° 20'	South, 29° 35'
West, 90° 35'	South, 29° 30'
West, 90° 43'	South, 29° 25'
West, 90° 57'	North, 29° 32'
West, 91° 02'	North, 29° 40'
West, 91° 14'	South, 29° 32'
West, 91° 27'	North, 29° 37'
West, 91° 33'	North, 29° 46'
West, 91° 46'	North, 29° 50'
West, 91° 50'	North, 29° 55'
West, 91° 56'	South, 29° 50'
West, 92° 10'	South, 29° 44'
West, 92° 55'	North, 29° 46'
West, 93° 15'	North, 30° 14'
West, 93° 49'	South, 30° 07'
West, 94° 03'	South, 30° 03'
West, 94° 10'	South, 30° 00'
West, 94° 20'	South, 29° 53'
West, 95° 00'	South, 29° 35'
West, 95° 13'	South, 29° 28'
East, 95° 08'	South, 29° 15'
West, 95° 11'	South, 29° 08'
West, 95° 22'	South, 29° 56'
West, 95° 30'	South, 28° 55'
West, 95° 33'	South, 28° 49'
West, 95° 40'	South, 28° 47'
West, 96° 42'	South, 28° 41'
East, 96° 40'	South, 28° 28'
West, 96° 54'	South, 28° 20'
West, 97° 03'	South, 28° 13'
West, 97° 15'	South, 27° 58'
West, 97° 40'	South, 27° 45'
West, 97° 46'	South, 27° 28'
West, 97° 51'	South, 27° 22'
East, 97° 46'	South, 27° 14'
East, 97° 30'	South, 26° 30'
East, 97° 26'	South, 26° 11'

East to 97° 19' W. Longitude and Southward to the U.S.-Mexican border. Along all boundaries of the territorial seas except the Gulf of Mexico, the term "coastal" is not defined.

Subcategory E - Beneficial Use. This subcategory is applicable to onshore facilities for which produced water has a beneficial use when discharged to navigable waters. These facilities are engaged in the production, drilling, well completion and well treatment of oil and gas.

Subcategory F - Stripper Works. This subcategory is applicable to onshore facilities which produce less than 10 barrels per calendar day of crude oil and one operating at the maximum feasible rate of production in accordance with recognized conservation practices. These facilities are engaged in the production and well treatment of oil and gas.

NATURE OF PROBLEM

There are some half million producing oil wells onshore generating produced water in excess of 10 BGD. Approximately 17,000 wells have been drilled offshore in U.S. waters and there are around 11,000 operations producing both oil and gas. Offshore leasing, exploration and development will expand rapidly over the future, and offshore production will constitute an increasing proportion of the domestically-produced supplies of gas and oil.

Wastes associated with offshore and onshore oil and gas extraction facilities result from the discharge of produced water, deck drainage, drilling muds, drill cuttings, well treatment, sanitary and domestic needs and produced sands. Produced waters are those wastes generated when the natural oil-water or gas-water interfaces within the oil-gas bearing formations are disrupted. Deck drainage includes waste from platform washings, deck washings, and runoff from curbs, gutters, and drains including drip pans and work areas. Drilling muds are materials used to maintain hydrostatic pressure in the well, lubricate the drilling bit, remove drill cuttings from the well, or to stabilize the walls of the well during drilling and workover. Drill cuttings contain metals and mineral particles from drilling into subsurface geologic formations. Drill cuttings are brought to the surface of the well with drilling muds and are then separated from the muds. Well treatment wastes arise from acidizing and hydraulic fracturing to improve oil recovery. Sanitary and domestic wastes originate from toilets, showers, etc. Produced sands consist of slurried particles from hydraulic fracturing and the accumulated formation sands generated during production.

PARAMETERS OF CONCERN

Oil/Grease
Fecal Coliforms
Floating solids
Chlorine residual
BOD
TOC

Heavy metals (arsenic,
chromium, copper, lead
nickel, silver and zinc)
TDS
Chlorides
Oxygen demand
Phenolics
Toxicants

Major pollutants expected in oil and gas extraction industry wastewaters include oil and grease, residual chlorine, and floating solids. Water insoluble hydrocarbons and free floating and emulsified oils in the wastewaters can affect aquatic flora and fauna by interfering with oxygen transfer, coating bottom life and food, damaging the plumage of water fowl and animals, and causing taste and toxicity problems. Residual chlorine is important in controlling fecal coliform bacteria in sanitary wastes from offshore and onshore facilities. Floating solids derive in most part from domestic and sanitary wastes. Pollutants may settle or float, and can lead to objectionable odors.

PRELIMINARY LIMITATIONS FOR DISCHARGE TO POTW

For Subcategories A and B, Offshore Facilities. Oil and gas extraction facilities in the offshore subcategories have the option of piping their wastes to onshore treatment facilities. This method could be preferable to treatment at the offshore works.

Subcategories A and B, Offshore Facilities, Both Existing and New Sources:

Waste Source	Oil/Grease		Residual Chlorine
	Avg. 30 Day (mg/l)	Max. Day (mg/l)	Max. Day (mg/l)
Produced water	No waste discharge	No waste discharge	No waste discharge
Deck drainage	No waste discharge	No waste discharge	No waste discharge
Drilling muds	No waste discharge	No waste discharge	No waste discharge
Drill cuttings	No waste discharge	No waste discharge	No waste discharge
Well treatment	No waste discharge	No waste discharge	No waste discharge
Produced sand	No waste discharge	No waste discharge	No waste discharge
Sanitary wastes*	No limitations	No limitations	No limitations
Domestic wastes*	No limitations	No limitations	No limitations

* *There shall be no floating solids as a result of discharge of these wastes.*

For Subcategories C, D, E, F, Onshore Facilities. Limitations have been proposed only for New Sources as shown below:

BOD	-	No limitations
TSS	-	No limitations
pH	-	No limitations
Oil/Grease		100 mg/l

MINERAL MINING AND PROCESSING INDUSTRY
(67, 68, 69, 70, 71, 72)
[Part 436]

SUBCATEGORIZATION OF THE INDUSTRY

The Mineral Mining and Processing Industry has been divided into 38 discrete Subcategories which are described below. Differences in raw materials, processing, and the use of wet air pollution control devices have largely determined subcategorization. Effluent limitations have been developed to date for 21 of the 38 Subcategories.

- A - Dimension Stone (Reserved)
- B - Crushed Stone
- C - Construction Sand and Gravel
- D - Industrial Sand
- E - Gypsum
- F - Asphaltic Minerals
- G - Asbestos and Wollastonite
- H - Lightweight Aggregates (Reserved)
- I - Mica and Sericite (Reserved)
- J - Barite
- K - Fluorospars
- L - Salines from Brine Lakes
- M - Borax
- N - Potash
- O - Sodium Sulfate
- P - Trona (Reserved)
- Q - Rock Salt (Reserved)
- R - Phosphate Rock
- S - Frasch Sulfur
- T - Mineral Pigments (Reserved)
- U - Lithium (Reserved)
- V - Bentonite
- W - Magnesite

X - Datomite
 Y - Jade
 Z - Novaculite

 AA - Fire Clay (Reserved)
 AB - Attapulgite and Montmorillonite (Reserved)
 AC - Kyanite (Reserved)
 AD - Shale and Common Clay (Reserved)
 AE - Aplite (Reserved)
 AF - Tripoli
 AG - Kaolin (Reserved)
 AH - Ball Clay (Reserved)
 AI - Feldspar (Reserved)
 AJ - Talc, Steatite, Soapstone and Pyrophyllite (Reserved)
 AK - Garnet (Reserved)
 AL - Graphite

NATURE OF THE PROBLEM

More than 11,000 establishments have been identified as included within the Mineral Mining and Process Industry in the U.S. The large majority of these plants are contained within the Crushed Stone and Construction Sand and Gravel Subcategories (i.e., Subcategories B and C).

At the mine, sources of waste pollutants include surface runoff of rain-water into the mine and mine water treatment systems, ground water seepage and infiltration into the mine, and water used to transport the ore to the processing plant.

At the process plant, sources of waste include transport water, ore and product wash water, dust suppression water, classification water, heavy media separation water, flotation water, solution water, air emissions control equipment water, and equipment and floor washdown water.

BPCTCA regulations for many of the mineral mining and process subcategories specify that no discharge conditions are to be achieved at least for the process water originating from the process plant. Exemptions could be allowed during times of extreme runoff.

PARAMETERS OF CONCERN

pH, acidity, alkalinity	Asbestos
TSS	BOD
Iron	Oil and Grease
TDS	Phosphates
Sulfide	Ra-226 (Phosphate Rock Subcategory)
Turbidity	Chlorides
Sulfate	Possibility of trace constituents (including antimony, arsenic, barium, boron, cadmium, chromium, copper, cyanide, mercury, nickel, manganese, lead, selenium, tin and zinc)
Fluoride	
Temperature	

PRELIMINARY LIMITATIONS FOR DISCHARGE TO POTW AND PRESCRIBED TREATMENT MEASURES

For Pretreatment of Existing Sources in the Mineral Mining and Processing Industry and subsequent waste discharge to POTW's, the Federal Register has declared that these process wastes are generally amenable to municipal treatment and there is little or no requirement for pretreatment. However, the operator of a POTW is cautioned that some of the constituents of the process waste waters may interfere with the treatment works or pass through the treatment works inadequately treated. These process wastes may warrant special consideration by the POTW and could be the subject of future regulations.

For Pretreatment of New Sources in the Mineral Mining and Processing Industry and subsequent discharge to POTW's, regulations are the same as for existing sources above with apparent change only in Subcategory D, Industrial Sand, and in Subcategory AL, Graphite as shown below.

Limitations for Subcategory D, Industrial Sand Production:

Parameter	Avg. 30 Day (1b/1,000 lb product)	Max. Day (1b/1,000 lb product)
Total fluoride	0.003	0.006

Limitations for Subcategory AL, Graphite Production:

Parameter	Pretreatment Standard
Dissolved Iron	50 mg/l

The EPA Development Documents of October 1975 and June 1976 for the Mineral Mining and Processing Industry recommend the following pretreatment measures:

- 1) No pretreatment necessary for compatible pollutants.
- 2) Pollutants such as COD, TOC, phosphorous and phosphorous compounds, nitrogen and nitrogen compounds, and oils and greases do not require removal provided the POTW is designed to remove these pollutants and will accept them. Otherwise, pretreatment for Existing Sources should be set at the BPCTCA levels, and pretreatment for New Sources should be established at New Source Performance Standards levels. Incompatible pollutants and suspended materials laden with hazardous pollutants are subject to these same limitations.

PHARMACEUTICAL MANUFACTURING
(1, 126, 163)
[Part 439]

SUBCATEGORIZATION OF THE INDUSTRY

The Pharmaceuticals Manufacturing Industry has been divided into five subcategories as shown below:

- A - Manufacture of Fermentation Products
- B - Biological and Natural Extraction Products
- C - Chemical Synthesis Products
- D - Mixing/Compounding and Formulating
- E - Research Activities

NATURE OF PROBLEM

Available reports indicate that pollutants of special significance in the pharmaceutical industry, in addition to BOD, COD, TOC and TSS include mercury, cyanide, ammonia nitrogen, organic nitrogen and total phosphorous.

Mercury salts are used to produce medicinal products and disinfectants. Cyanides are primarily used as catalysts in chemical synthesis processes. Mercury and cyanide can exert toxic impact upon biological treatment works. High concentrations of organic and inorganic nitrogen have been observed in raw waste waters of the pharmaceutical industry. High total phosphorous concentrations are apparent in the raw wastes from some fermentation and chemical synthesis product plants.

Waste waters from some chemical synthesis and fermentation operations contain metals such as copper, nickel, mercury, cyanides, etc. together with anti-bacterial constituents, which can seriously affect biological treatment processes. A biological treatment works can be deactivated if these pollutants are present in significant quantities. Equalization of pretreated process wastes is likely necessary before release to a POTW.

PARAMETERS OF CONCERN

BOD	TSS
COD	pH
TOC	Cyanides
Metals (Fe, Cu, Ni, Hg, Ag and others)	Phenolics
Ammonia N	Oil and Grease
Organia N	Chlorinated hydrocarbons
Phosphates	TDS
	Bioassay (testing)

LIMITATIONS FOR DISCHARGE TO POTW

No specific limitations established at this time.

PRESCRIBED PRETREATMENT MEASURES OR EQUIVALENT

Equalization is generally required for pharmaceutical process wastes. Excess solvents in waste waters may be (partly) removed by gravity separation and skimming. Neutralization may be required for waste waters from specific pharmaceutical manufacturing. Odor controls are also possible.

For Fermentation and Chemical Synthesis-Type Plants. Pretreatment processes could consist of equalization, neutralization, solvent separation, chemical precipitation for metals removal, and possible cyanide oxidation.

For Extraction Product, Pharmaceutical Formulation and Research-Type Installations. Pretreatment could consist of waste equalization and neutralization.

It is further noted for purposes of calculating Raw Waste Loads applicable to NPDES discharges to receiving streams - the regulations specify that separable mycelia and solvents shall be excluded from these raw waste loads. Removal, disposal and reuse practices include physical separation and removal of separable mycelia, recovery of solvents from waste streams, incineration of concentrated solvent waste streams (including tar still bottoms), and fermentation broth concentrated and disposed of in some acceptable manner other than to the treatment system. Whereas these regulations do not preclude discharge of the above wastes to a POTW, they do strongly suggest the described practices are the most effective means of significantly reducing raw wastes whether to a POTW or to an industrial treatment works.

ORE MINING AND DRESSING INDUSTRY
(33, 34)
[Part 440]

SUBCATEGORIZATION OF THE INDUSTRY

The Ore Mining and Dressing Industry is divided into seven major subcategories based upon the particular metal ore produced or processed. These seven subcategories have been further arrayed into 22 subdivisions. The seven subcategories are described as follows:

- A - Iron Ore Subcategory
- B - Base and Precious Metals Subcategory
- C - Bauxite Ore Subcategory
- D - Ferroalloy Ores Subcategory
- E - Uranium, Radium and Vanadium Subcategory
- F - Mercury Ore Subcategory
- G - Titanium Ore Subcategory

Subcategory A, Iron Ore. Includes: 1) mines producing iron ore regardless of the type of or mode of occurrence; 2) mills beneficiating iron ores by physical and chemical separation or by physical means only; and 3) mills beneficiating iron ores by magnetic and physical separation.

Subcategory B, Base and Precious Metals. Includes: 1) mines producing copper bearing ores, lead ores, zinc ores, gold ores or silver bearing ores; 2) mills which employ the froth-flotation process for treating the above ores; 3) mines/mills which employ dump, heap, in-situ leach or vat-leach processing for extracting copper from ores; 4) mills which extract gold or copper by the cyanide process only; 5) mills which extract gold or silver by the amalgamation process alone; and 6) mines/mills beneficiating gold, silver, tin or platinum ores by gravity separation.

Subcategory C, Bauxite Ore. Applies to mines producing bauxite/aluminum ores.

Subcategory D, Ferroalloy Ores. Includes: 1) mines producing at least 5,000 metric tons of ferroalloy ores annually; 2) mines/mills producing less than 5,000 metric tons of ferroalloy ores yearly by methods other than ore leaching; 3) mills producing at least 5,000 metric tons of ferroalloy ores yearly by purely physical means; 4) mills producing at least 5,000 metric tons of ferroalloy ores yearly by froth flotation; and 5) mills processing ferroalloy ores by leaching and associated

chemical beneficiation. Ferroalloy metals include: chromium, cobalt, columbium, tantalum, manganese, molybdenum, nickel, tungsten and vanadium.

Subcategory E, Uranium, Radium Vanadium. Includes: 1) mines producing uranium, radium and vanadium ores; and 2) mills using acid, alkaline or combination leach processing for the extraction of uranium, radium and vanadium values.

Subcategory F, Mercury Ores. Includes: 1) mines producing mercury ores; and 2) mills beneficiating mercury ores by gravity separation or froth-flotation methods.

Subcategory G, Titanium Ores. Includes: 1) mines producing titanium ores from lode deposits; 2) mills beneficiating titanium ores by electrostatic methods, magnetic and physical methods, or flotation methods; and 3) mines engaged in dredge mining of deposits containing rutile, ilmenite, leucoxene, monazite, zircon, and other heavy metals, together with the milling procedures employed in conjunction with dredge mining.

NATURE OF PROBLEM

Major pollutants of ore mine drainage and mill process wastewaters comprise a variety of common and heavy metals in the solubilized form, suspended and dissolved solids, radionuclides, organic and inorganic matter, and reagents used in the milling process.

Process wastes from ore mining and milling include ore transport waters, ore and product washes, dust suppression waters, grinding and classification wastes, heavy media separation waters, and equipment and floor washes. Additional streams consist of boiler blowdown and contact and non-contact cooling waters. Raw waste loadings from ore mining and milling are unrelated, or only indirectly related to production quantities, and consequently, effluent limitations are expressed in terms of concentration rather than units of production.

PARAMETERS OF CONCERN

pH, Acidity, Alkalinity	Iron
TSS	Lead
Oil/Grease	Manganese
COD	Mercury
Cyanide	Molybdenum
Ammonia N	Nickel
Aluminum	Vanadium
Antimony	Zinc

Arsenic	Radionuclides, especially Ra-226
Beryllium	Uranium
Cadmium	Asbestos
Chromium	Flotation reagents having
Copper	potential toxicity
Fluorides	

Other potential or probable parameters include:

Barium	Carbonates
Boron	Nitrate, Nitrite
Calcium	Selenium
Magnesium	Silicate
Potassium	Tin
Strontium	Zirconium
Sodium	TDS

PRELIMINARY LIMITATIONS FOR DISCHARGE TO POTW AND PRESCRIBED TREATMENT MEASURES

The EPA Development Document of October 1975 and effluent limitations guidelines consider TSS as an incompatible pollutant to a POTW when present in high concentrations. Most wastewaters in this industry require settling in order to reduce the TSS to a level of around 500 mg/l where they may be normally accepted by a POTW. Phosphorous and nitrogen compounds and fats and greases are thought to be compatible with properly designed and operated POTW's. Otherwise, these pollutants should be pretreated to equivalent BPCTCA discharge levels. Hazardous pollutants such as cyanides, chromates, heavy metals etc. which may interfere with biological unit operations at POTW's would require pretreatment to equivalent BPCTCA levels. Waste equalization was recommended by the Development Document. Chemical treatment, settling and pH control might also constitute required pretreatment ahead of the POTW.

The Federal Register of November 6, 1975 on Ore Mining and Dressing wastes, although providing no specific limitations for Existing and New plants in the industry, nevertheless indicated that certain pollutants in process waste discharges may interfere with the POTW or pass through the treatment works inadequately treated. Therefore, these process waters should receive special consideration by the POTW, and may be the subject of further regulations.

PAVING AND ROOFING (TARS AND ASPHALT) MATERIALS INDUSTRY
(43, 44, 45)
[Part 443]

SUBCATEGORIZATION OF THE INDUSTRY

The Paving and Roofing Materials Industry is divided into four Subcategories which are described below:

- A - Asphalt Emulsions
- B - Asphalt Concrete
- C - Asphalt Roofing
- D - Linoleum and Printed Asphalt Felt

Subcategory A includes plants engaged in production of oxidized asphalt for use in both roofing and paving material. Oxidizing consists of blowing hot air through asphalt. The oxidized asphalt is stored as paving asphalt or as roofing and paving emulsions.

Subcategory B includes plants producing asphalt concrete which is asphalt mixed with crushed rock or gravel, and used for paving such as blacktop.

Subcategory C includes plants producing roofing felts, impregnated roofing felts, shingles, tar papers, impregnated siding, canal liners, expansion joints, roofing cements, etc. The process consists of saturating and coating an organic felt with asphalt. The coated felt may be subsequently covered with crushed rock.

Subcategory D includes plants producing linoleum and printed asphalt felt floor coverings. The process consists of painting or embossing a design on a saturated felt backing.

NATURE OF THE PROBLEM

Approximately 5,100 plants have been identified in the paving and roofing materials industry, most of which are contained in Subcategory B, i.e. Asphalt Concrete.

Major waste sources from paving and roofing materials plants include various cooling waters both contact and non-contact; plant area runoff; concentrated slurries from air pollution control equipment; product cooling waters which may contain the majority of pollutant loads; dried paints and inks; and cleaning waters resulting from the washdown of floor, equipment and work areas. Typical waste streams from this industry contain organic and inorganic solids (predominately

the latter), suspended and settleable matter, oils and greases principally petroleum-derived, and some potentially harmful solvents. Suggestions have been made that the potentially harmful nature of industry wastewaters resulting from contact with asphalt, tars and similar materials should possibly lead to zero discharge limitations across the industry.

PARAMETERS OF CONCERN

BOD	TDS
COD or TOC	Nitrogen
TSS	Phosphorous
Oil/Grease	Phenols
pH	Heavy Metals
Temperature	Turbidity

Suspended solids in paving and roofing plant wastewaters were found to range from less than 10 mg/l up to 35,000 mg/l. Generally, when carbonate rocks are used as raw material by the plant, a higher level of TSS occurs. A lower level occurs with igneous rock. Paving and roofing plants have reported trace amounts of one or more of the following metals in their effluents: cadmium, chromium, copper, iron, lead, nickel, zinc and aluminum. Arsenic and cyanide can originate from stone or rock used by the plants, or from other sources.

PRELIMINARY LIMITATIONS FOR DISCHARGE TO POTW AND PRESCRIBED PRETREATMENT MEASURES

The Development Document for Paving and Roofing indicates that wastewater from asphalt concrete plants may contain large amounts of suspended sand and gravel which can cause or contribute to sewer line obstruction.

The Federal Register regulations have established a maximum limit of 100 mg/l oil/grease in the discharge from both existing and new paving and roofing establishments entering municipal sewer systems. This limitation is applicable to plants in all four subcategories of the industry. No other pretreatment limitations have been developed to date.

Depending upon specific pretreatment needs dictated mostly by Regional and local authorities, paving and roofing materials plants should strongly consider good in-plant controls and water recycle augmented by oil skimming, primary settling, filtration and sludge handling and disposal. Other pretreatment may also be necessary.

PAINT FORMULATING
(35, 36, 37)
[Part 446]

SUBCATEGORIZATION OF THE INDUSTRY

The Paint Formulating Industry was described by the EPA Development Document of February 1975 on Paints and Inks and by the Federal Register of February 26, 1975 as consisting of two subcategories including: A) Oil-Based Paints and B) Water-Based Paints. This was subsequently modified by the Federal Register of July 28, 1975 which gave Final Limitations for only a single Subcategory titled "Oil Base Solvent Wash Paint." Solvent wash paints represent a subpart of the original Oil-Base Paints Subcategory.

The industry produces paints, varnishes and lacquers, which consist of film-forming binders (resins or drying oils) dissolved in volatile solvents or dispersed in water. In addition, all paint and most lacquers contain pigments and extenders (calcium carbonate, clays and silicates). The industry also produces side products such as putty, caulking compounds, sealants, paint and varnish removers and thinners. Al-based paints include all of the above items that use oil as the major carrier. Water-based paints include all of the above items that use water as the major carrier vehicle.

NATURE OF PROBLEM

Approximately 1,630 plants are represented in the paint formulating industry of which less than 200 are reported to be discharging to surface receiving waters. The remainder either discharge to municipal sewers or have no waste discharge. Sources of wastes are principally cleaning and milling equipment, cleanup of product and raw material spills and leaks from product transfer equipment. Treatment of paint manufacturing wastes leads to accumulation of solid wastes and liquid concentrates. Some of these concentrated materials may be hazardous and require special handling and disposal. Landfill sites receiving these hazardous wastes should be selected and maintained so as to prevent horizontal and vertical migration of contaminants into ground water.

PARAMETERS OF CONCERN

pH, acidity, alkalinity	Chromium
BOD	Boron
COD	Cadmium
TSS	Iron
Oil/Grease	Titanium
Mercury	Bactericides, fungicides
Lead	Special additives
Copper	Solvents

PRELIMINARY LIMITATIONS FOR DISCHARGE TO POTW AND PRESCRIBED PRETREATMENT MEASURES

The Development Document of February 1975 reported that wastewater from the manufacture of oil-base paints entering most municipal sewer systems are fairly well controlled. The wastes from water-base paint formulators have generally been accepted by municipalities and a majority of paint plants are connected to municipal sewers. Metals in paint wastes generally become part of the suspended solids. The organics in water-base paint wastes are said to be relatively biodegradable.

Many paint plants discharging to municipal systems employ waste settling as pretreatment. Physical-chemical methods may be used by other plants to meet state and local pretreatment limitations. These methods may consist of holding, chemical coagulation and settling.

The Federal Register of February 26, 1975 proposed zero discharge of process wastes from new paint installations to the POTW unless the municipality can guarantee removal of incompatible pollutants. The Federal Register of July 28, 1975 gave Final limitations for only the specialized oil-base solvent wash paint plants. It indicated for both existing and new sources that there shall be no discharge of process water pollutants to the POTW. Final pretreatment limitations for other types of paint plants await future publication.

INK FORMULATING
(35, 38, 39)
[Part 447]

SUBCATEGORIZATION OF THE INDUSTRY

The Ink Formulating Industry is divided into Oil-Base and Water-Base inks as described in the EPA Development Document of February 1975. Accordingly, the Federal Register of February 26, 1975 divided the industry into two proposed subcategories of A) Oil-Based Inks; and B) Water-Based Inks. This was subsequently modified by the Federal Register of July 28, 1975 which gave Final Limitations for a single subcategory titled "Oil Base Solvent Wash Ink." Solvent wash plants represent a subpart of the original Oil-Base Inks Subcategory.

The industry produces oil and water-base printing inks. The major components include drying oils, resins, varnish, pigments and many specialty additives. Oil-base inks use oil or solvent as the major carrier. Water-base inks use water as the major carrier vehicle.

NATURE OF PROBLEM

Less than 50 ink formulating plants discharge wastewater to surface receiving streams. The number of ink plants discharging to POTW's are thought to be far greater. A significant number of establishments are believed to approach zero discharge of process wastes. Sources of wastes are principally cleaning and milling equipment, cleanup of product and raw material spills, and leaks from product transfer equipment. Treatment of paint manufacturing wastes leads to accumulation of solid wastes and liquid concentrates. Some of these concentrated materials may be hazardous and require special handling and disposal. Landfill sites receiving these hazardous wastes should be selected and maintained in such a manner as to prevent horizontal and vertical migration of contaminants into ground water.

PARAMETERS OF CONCERN

pH, acidity, alkalinity	Chromium
BOD	Boron
COD	Cadmium
TSS	Iron
Oil/Grease	Titanium
Mercury	Bactericides, fungicides
Lead	Special additives
Copper	Solvents

PRELIMINARY LIMITATIONS FOR DISCHARGE TO POTW AND PRESCRIBED TREATMENT MEASURES

The Development Document of February 1975 reported that wastewater from the manufacture of oil-base inks entering most municipal sewer systems are controlled in reasonable degree. The wastes from water-base ink formulators have generally been accepted by municipalities and the large majority of ink plants are connected to municipal sewers. Metals in ink wastes generally become part of the suspended solids. The organics in water-base ink wastes are said to be relatively biodegradable.

Many ink plants discharging to municipal systems employ waste settling as pretreatment. Physical-chemical methods may be used by other plants to meet state and local pretreatment limitations. These methods may consist of holding, chemical coagulation and settling.

The Federal Register of February 26, 1975 proposed zero discharge of process wastes from new ink formulating plants to the POTW unless the municipality can guarantee removal of incompatible pollutants. The Federal Register of July 28, 1975 gave Final Limitations for only the specialized oil base solvent wash ink plants. It indicated for both existing and new sources that there shall be no discharge of process waste pollutants to the POTW. Final pretreatment limitations for other types of ink plants await future publication.

GUM AND WOOD CHEMICALS MANUFACTURING
(6, 193)
[Part 454]

SUBCATEGORIZATION OF THE INDUSTRY

Six types of manufacturing plants have been defined as shown below:

- A - Char and charcoal briquets
- B - Gum rosin and turpentine
- C - Wood rosin, turpentine and pine oil
- D - Tall oil rosin, pitch and fatty acids
- E - Essential oils
- F - Rosin based derivatives

NATURE OF PROBLEM

Waste sources in the gum and wood chemicals manufacturing industry include watery wastes from reactors, filtration systems, decanting systems, distillation vacuum exhaust scrubbers, caustic scrubbers, process equipment cleaning, production area washdowns, refinery area washdowns, formulation equipment cleanups, and washdowns of spills.

Gum and wood chemicals wastewaters may be characterized as having high concentrations of soluble oxygen-demanding materials, are generally acidic and deficient in nitrogen and phosphorous. Significant levels of zinc are noted in the effluents of plants within Subcategories B and F. Appreciable oil and grease are seen in the discharges of plants in Subcategories B, D and F. Separable oils should be removed from these process streams by skimming prior to being received into municipal sewers. Phenol is a significant waste parameter for installations in Subcategory F and possibly those in Subcategory D.

Certain substances may be present in gum and wood chemical wastewaters exerting inhibitory effects upon subsequent biological treatment. Because of high soluble oxygen demand, gum and wood chemical wastes may require increased oxygen transfer, solids handling and disposal capacity at the POTW. Otherwise, the industrial plant may need to provide biological pretreatment to supplement the POTW. In all cases the manufacturer should provide sufficient waste equalization and neutralization to minimize adverse impacts upon the POTW.

PARAMETERS OF CONCERN

pH, Acidity, Alkalinity
BOD
COD

Temperature
Nitrogen compounds
Phosphorous

TOC
TSS
TDS
Oil/Grease

Zinc
Sulfates
Phenols
Pesticides
Toxicity

PRELIMINARY LIMITATIONS FOR DISCHARGE TO POTW.

No specific limitations given to date.

PRESCRIBED PRETREATMENT MEASURES OR EQUIVALENT

Pretreatment unit operations which may be necessary by gum and wood chemicals manufacturing plants prior to discharge to a POTW include:

For Subcategory B, D, F Plants - Oil separation plus equalization plus neutralization plus chemical precipitation (depending upon metal content)

For Subcategory C, E Plants - Equalization plus neutralization.

PESTICIDE CHEMICALS MANUFACTURING
(8, 123, 124, 125)
[Part 455]

SUBCATEGORIZATION OF THE INDUSTRY

Five types of pesticides manufacturing establishments have been defined as shown below, Subcategory A-D Plants are involved in the direct manufacture of the active ingredient. Subcategory E comprises plants that formulate, blend, and package pesticides.

- A - Alogenated organics pesticides
- B - Organo - phosphorous pesticides
- C - Organo - nitrogen pesticides
- D - Metallo - organic pesticides
- E - Pesticide formulators and packagers

NATURE OF PROBLEM

Pesticides can affect the aquatic environment and water quality in many ways. A number of pesticides will degrade very slowly and consequently, are extremely persistent. Other pesticides will degrade rapidly, some into products that are more toxic than the parent compound, and some to harmless products. A significant number of pesticides have high potential for bioaccumulation and biomagnification in the food chain, thereby posing a serious threat to many organisms, including man.

The chlorinated organic pesticides represent a large group of chemicals having wide use, stability in the environment, toxicity to wildlife and nontarget organisms, and adverse physiological effects upon humans. This group of pesticides readily accumulates in aquatic organisms and man. They are stored in fatty tissues and not readily metabolized.

The organo-phosphorous pesticides will more rapidly hydrolyze or break down into less toxic compounds as compared to the halogenated compounds. This group exhibits a wide range of toxicity, some having high mammalian toxicity. Accumulation of these pesticides results in a dysfunction of the cholinesterase of the nervous system when ingested in small amounts over a long period of time.

The organo-nitrogen pesticides are generally less persistent in the environment than the halogenated organic pesticides. This group has a wide range of toxicity. The carbamates are especially toxic to mammals by acting on the nervous system in the same manner as the organo-chlorine pesticides.

Metallo-organic pesticides include the arsenicals, mercury compounds, and those containing zinc, manganese, tin, cadmium, lead and other metals. Toxicity of these compounds is highly variable. Arsenic is notorious for its toxicity to humans. Mercurio-organic compounds are significantly toxic and demonstrate biomagnification.

The organic pesticides cited above are notquately measured by the conventional waste parameters of BOD, COD, TOC, etc. Pesticides are frequently toxic to organisms utilized in the BOD analysis. Their reponse to the COD and TOC tests is not well known. Levels of critical pesticide pollution may in certain cases be below the detection limit of available analytical methods.

PARAMETERS OF CONCERN

pH, Acidity, Alkalinity	Ammonia N
BOD	TKN
COD	Total phosphates
TOC/TOD	Cyanide
TSS	Sulfide
TDS	Metals including Zinc, Copper,
Oil and Grease	Arsenic, Manganese, Tin
Chlorides	Cadmium, Chromium, Lead,
Phenols	Mercury, Nickel
Pesticides*	

* *Typical halogenated organic pesticides include: PCNB, Terrazole, Toxaphene, DCPA, Chlorothalonil, Chlorobenzilate, 2-4D, 2-4D-5T, PCP, Endrin, Heptachlor, MCPA, DDT. Typical organo-phosphorous pesticides include: Coumaphos, Disolfoton, Azinphosmethyl, Mathamidophos, Fensulfothion, Fenthio, Demeton, Methyl Dementon, Monitor, Diazinon, Methyl Parathion, Ethyl Parathion, Dursban, Cruformate, Ronnel, Aspon, Rabon, Vapona.*

Typical organo-nitrogen pesticides include: Benefin, Trifluralin, Isopropalin, Oryzalin, Pipron, Tebuthurion, Atrazine, Metribuzin, Benzazimide, Simazine, Propazine, Ametryne, Prometryne, Simutryne, Sumitol, Terbetryne, Prometone, Cybnazine, Dinoseb, Alachlor, Propochlor, Bromacil, Diuron, Aldicarb.

Typical metallo-organic pesticides include: DSMA, MSMA, PMA, Copper 8 Quinolate, CMP, Zineb, Tricyclohexyltin Hydroxide, Triphenyltin Hydroxide, Tributyltin Oxide, Maneb.

The BOD test is reported as sensitive to toxic materials. Therefore, if toxic materials are present in a pesticides manufacturing wastewater, the BOD value could be erroneous. This situation can be remedied by conducting a microorganism toxicity test, i.e., serially diluting the wastewater sample until the BOD value attains a plateau indicating that the waste is at a low enough concentration to no longer inhibit biological activity.

LIMITATIONS FOR DISCHARGE TO POTW

No specific limitations established at this time.

PRESCRIBED PRETREATMENT MEASURES OR EQUIVALENT

Even though the EPA Effluent Guidelines Division study cites many pesticide plants discharging to POTW's, no description is given in the August 1976 Draft Development Document of pretreatment limitations and controls before release of pesticide wastes to a POTW. Such technology will presumably be delineated in future publications.

EXPLOSIVES MANUFACTURING
(7, 194)
[Part 457]

SUBCATEGORIZATION OF THE INDUSTRY

Four types of explosives manufacturing plants have been identified as shown below. It must be recognized however that the Federal Register, Part 457, has so far only recognized plants in Subcategories A and C.

- A - Production of explosives, e.g., dynamite, nitroglycerin, RDX, HMX, TNT.
- B - Production of propellants
- C - Load, assemble and pack operations
- D - Production of initiating compounds

NATURE OF PROBLEM

Of special significance is the problem of trace amounts of the explosive products themselves. Explosives such as nitroglycerin, TNT, RDX and HMX have high potential hazard, toxicity or inhibitory impact upon biological life. Some investigators have shown nitroglycerin to be amenable to biological treatment whereas others have had little success with biological treatment.

Process wastewaters from explosives manufacturing contains high levels of soluble oxygen-demanding materials, TSS, nitrates, sulfates, organic nitrogen, carbon, trace metals and trace quantities of explosives.

Metals such as lead and mercury can be discharged in significant amounts as to disrupt biological activity. Lead concentrations of 200 mg/l have been found in explosive wastes, which would require physical/chemical precipitation as a pretreatment measure.

Trace explosives present in wastewaters being discharged to a POTW can lead to serious problems for the POTW because of the toxicity and hazardous nature of the industrial waste.

PARAMETERS OF CONCERN

pH, Acidity, Alkalinity	Nitrogen compounds including
BOD	TKN, ammonia, nitrates
COD	Sulfates
TOC	Lead
TSS	Mercury
TDS	Other metals
Oil/Grease	Trace explosives
Color	Toxicity

PRELIMINARY LIMITATIONS FOR DISCHARGE TO POTW.

Since oil/grease in high concentrations can be disruptive to POTW's under certain circumstances, a pretreatment limit of 100 mg/l oil and grease has been established for both existing and new installations in the explosives industry.

PRESCRIBED PRETREATMENT MEASURES OR EQUIVALENT

It is recommended that explosives manufacturing wastewaters be treated on site. If municipal treatment is employed, pretreatment must remove potentially hazardous explosives wastes.

Discharge of explosives manufacturing wastes to POTW's is not common. High sulfates can disrupt a biological secondary treatment system thereby requiring calcination as necessary pretreatment. Wastes high in TNT may require activated carbon absorption prior to municipal sewerage to remove the dissolved explosives and its isomers together with associated toxicity. High concentration of nitrocellulose suspended solids are disruptive to biological systems, but can be economically removed by centrifuging. Heavy metals concentrations potentially toxic to microorganisms and the activated sludge process can be reduced by physical/chemical pretreatment. Oil and grease can be reduced to 100 mg/l or lower by skimming or equivalent means.

Pretreatment for minimizing toxicity and safety hazards with explosives wastes, may consist of a minimum of waste equalization, chemical precipitation of metallics, and neutralization.

CARBON BLACK MANUFACTURING
(213)
[Part 458]

SUBCATEGORIZATION OF THE INDUSTRY

The Carbon Black Industry has been divided into four subcategories which are described below:

- A - Carbon black furnace process.
- B - Carbon black thermal process.
- C - Carbon black channel process.
- D - Carbon black lamp process.

NATURE OF THE PROBLEM

Wastewater sources from carbon black manufacturing include scrubber waters, process equipment cleanouts, production area washdowns, spill washdowns, and laundry operations.

Under best practicable control technology, carbon black furnace and thermal process plants (Subcategories A and B) are reported capable of achieving no discharge of process wastewater pollutants by virtue of recycling these wastes to the quench step. Channel and lamp black process plants (Subcategories C and D) are reported to be dry operations also resulting in no discharge of process wastewater pollutants.

PARAMETERS OF CONCERN

pH, Acidity, Alkalinity	Iron
TSS	Copper
TDS	Manganese

PRELIMINARY LIMITATIONS FOR DISCHARGE TO POTW AND PRESCRIBED TREATMENT MEASURES

For Subcategory A, furnace process, New sources (Limitations for Existing sources not yet defined).

Parameter	Pretreatment Standards
BOD ₅ , TSS	No limitations
Oil/grease	100 mg/l

For Subcategory B, thermal process, New sources (limitations for Existing sources not yet defined).

Parameter	Pretreatment Standard
BOD ₅ , TSS	No limitations
Oil/grease	100 mg/l

For Subcategory C, channel process, New sources (limitations for Existing sources not yet defined).

BOD ₅ , TSS	No limitations
Oil/grease	100 mg/l

For Subcategory D, lamp process, New sources (limitations for Existing sources not yet defined).

BOD ₅ , TSS	No limitations
Oil/grease	100 mg/l

In-process controls are important for minimizing waste loads from the carbon black industry. Good practices include minimizing and containing spills and leaks, segregating waste streams, water conservation and reuse, wastewater equalization and good housekeeping, and process operation and equipment maintenance.

New carbon black plants can minimize future waste abatement costs by including:

1. dikes, emergency holding ponds, catch basins and other containment for leaks, spills and washdowns.
2. piping, trenches, sewers, sumps and other isolation facilities to keep leaks, spills and process waters separated from cooling and sanitary waters.
3. non-contact condensers for cooling waters.
4. efficient reuse, recycling and recovery of all possible raw materials and byproducts.
5. closed cycle water utilization whenever possible.

PHOTOGRAPHIC PROCESSING
(9, 164)
[PART 459]

SUBCATEGORIZATION OF THE INDUSTRY

The photographic processing industry was not subcategorized because the pollutant loads per unit of production were found to fall in a relatively narrow range. The photographic industry as presently defined by the EPA does not include the manufacture of photographic film, photographic plates and photographic paper.

NATURE OF PROBLEM

There are around 12,500 photographic processing plants in the U. S., of which about 3,000 are amateur operations; 3,000 are "captive" labs serving business and industrial firms; 650 are major labs specializing in work for professional and industrial photographers; and the remaining plants are portrait and commercial studios. Major sources of wastewater in the photographic processing industry are photoprocessing solution overflows and wash waters. It is estimated that 95 percent of all photographic processing establishments after varying degrees of in-plant pollution abatement discharge their effluents to municipal sewerage. Certain pollutants such as silver and cyanide, which can exert toxic effects upon POTW's together with non-biodegradable materials may be contained in these releases. Therefore, in-plant measures or pretreatment to reduce these contaminants to levels acceptable to local authorities must be practiced. The yearly discharge of cyanide salts from photographic sources has been estimated at over 5 million pounds.

Silver and ferrocyanide represent the prevalent incompatible pollutants. The developer solutions, couplers and fixers become a problem if dumped in a slug to the POTW. Discharge of these materials mostly occurs during emergencies, periodic shutdowns, contamination, or exhaustion of solutions. The most practical pretreatment of incompatible pollutants involves regeneration and reuse of processing solutions. Both silver and ferrocyanide can be recovered and reused. To prevent shock loads to the municipal system, waste equalization and/or holding is advised.

PARAMETERS OF CONCERN

pH, Acidity, Alkalinity	Boron
BOD/COD/TOC	Cadmium
TSS	Chromium
Phenols	Cyanide
TDS	Ferrocyanide
Phosphorous	Silver
Nitrogen Compounds	Thiosulfate
Sulfates	Temperature

Wastewaters generated by the photographic processing industry are characterized as containing high concentrations of BOD, COD, TOC, silver and cyanide in various forms.

The Ferrocyanide ion in the photographic industry originates from the bleach used in some color processes, i.e., ferrocyanide bleach. Ferrocyanide is one of the most objectionable pollutants from photographic processing. The complexed ion is potentially harmful because it is converted to free, highly-toxic CN in the presence of sunlight. It degrades only slowly in POTW's. The ferro and ferrocyanide complexes impose a distinct threat to the environment. Fortunately, methods to recover or minimize these compounds are currently being employed by the industry.

Silver is a prevalent heavy metal in photographic processing wastewaters. It is mostly derived from either the fix or bleach-fix bath overflow. At this stage, silver is usually in a soluble complex form, e.g., silver thiosulfate, which is somewhat less toxic than ionic silver. While silver itself is not considered to be toxic, many of its salts are poisonous. Toxicity of silver to POTW's seems to be dependent upon the free silver ion concentration.

PRELIMINARY LIMITATIONS FOR DISCHARGE TO POTW

Existing sewer ordinances generally specify that cyanide discharges be maintained in the range of 0.0 to 10.1 mg/l. Pretreatment standards for New sources within the photographic processing industry are given below:

<u>Pollutant</u>	<u>30 Day Avg. Limit (lb/1000 ft² product)</u>	<u>Max. Day Limit (lb/1000 ft² product)</u>
Silver	.00034	.00067
Total Cyanide	.00170	.00340
pH	6 to 9	

PRESCRIBED PRETREATMENT MEASURES OR EQUIVALENT

Besides in-plant controls, pretreatment for New sources would include cyanide destruction, dual-media filtration and ion exchange.

General pretreatment unit operations which may be necessary by photographic processing plants prior to discharge to a suspended growth biological system, a fixed growth biological system, or to a physical-chemical system of a municipal POTW would consist of equalization, physical methods and chemical precipitation plus solids separation.

The following in-plant controls are recommended:

- 1) Silver can be recovered by any of four available methods: metallic replacement, electrolytic plating, ion exchange and chemical precipitation.
- 2) Regeneration of ferrocyanide bleach can be accomplished by oxidation with persulfate or ozone.
- 3) Developer solutions can be cleaned for reuse by ion exchange, or precipitation and extraction.
- 4) Physical wastewater carryover between the process steps can be reduced by mechanical means of using squeegees.

HOSPITALS
(5, 195)
[Part 460]

NATURE OF PROBLEM

Approximately 92 percent of the more than 7,000 hospitals in the U.S. discharge their effluents to municipal sewerage.

Sanitary wastes usually comprise a significant portion of total hospital discharges. Major sources of wastes include patient rooms, laundries, cafeterias, surgical suites, laboratories and X-ray departments. Besides the usual waste parameters, hospital effluents may contain mercury, silver, barium, beryllium, boron, and a wide range of solvents. Various anti-bacterial constituents, e.g., disinfectants, may exert toxic impacts upon subsequent biological waste treatment works. Radionuclides can be released within patient excrement. One radioisotope having wide-spread use is Iodine-131. The above-cited waste pollutants should be recovered by in-house techniques in order to eliminate them from the raw waste load. Radioactive wastes should be temporarily stored until certified safe release to the environment is possible. Hospitals discharging to municipal sewer facilities may expect additional pretreatment standards in the future.

PARAMETERS OF CONCERN

Compatible Pollutants

BOD, TSS, pH and fecal coliform bacteria are defined as compatible pollutants along with other pollutants which POTW's are designed to remove.

Incompatible Pollutants

Silver, mercury and boron together with other parameters are considered incompatible pollutants in hospital wastes and are subject to removal by in-process modification or end-of-pipe treatment methods.

PH, Acidity, Alkalinity	Ammonia N
BOD	Barium
COD	Beryllium
TOC	Mercury
TSS	Silver
TDS	Radioactivity
Oil/grease	Fecal Coliforms

PRELIMINARY LIMITATIONS FOR DISCHARGE TO POTW

Pretreatment standards for New Sources specify a limit of 100 mg/l oil and grease in the discharges to a POTW.

IN-PLANT CONTROLS

The following in-plant controls are recommended methods of dealing with hospital wastes:

- 1) X-ray units should utilize the boron-free fixer.
- 2) Stand-by controls should be installed on X-ray processing units to decrease water consumption by the processor. Water flows should be reduced to the maximum practicable extent consistent with obtaining a good final radiograph.
- 3) Silver discharge from X-ray processing should be controlled by a silver recovery system or return of the spent developer to the manufacturer.
- 4) Hospital personnel should be acutely aware of mercury pollution and disposal problems.
- 5) All radioactive waste should be contained and held pending safe disposal.

PRESCRIBED PRETREATMENT MEASURES OR EQUIVALENT

Pretreatment unit operations which may be necessary by hospitals prior to waste discharge to a suspended growth biological system, or fixed growth biological system, or to a physical-chemical system of a municipal POTW are outlined below:

Suspended Growth Biological System: Chemical precipitation (for metals) plus solids separation.

Fixed Growth Biological System: Chemical precipitation (for metals) plus solids separation.

Physical-Chemical System: Chemical precipitation (for metals) plus solids separation and oil and grease skimming.

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