Title 40—Protection of the Environment

CHAPTER I—ENVIRONMENTAL PROTECTION AGENCY

[FRL 274–5]

SUBCHAPTER N—EFFLUENT GUIDELINES AND STANDARDS

PART 423—STEAM ELECTRIC POWER GENERATING POINT SOURCE CATEGORY

On March 4, 1974, the Environmental Protection Agency (EPA or Agency) published a notice of proposed rulemaking announcing its intention to establish limitations on the discharge of pollutants by existing and new point sources within the steam electric power generating category as well as pretreatment standards for new sources within that category. (39 FR 8294)

The purpose of this notice is to establish final effluent limitations and guidelines for existing sources and standards of performance and pretreatment standards for new sources in the steam electric power generating category by amending 40 CFR Chapter I, Subchapter N to add a new Part 423. This final rulemaking is promulgated pursuant to sections 301, 304 (b) and (c), 306 (b) and (c), 307(c) and 501(a) of the Federal Water Pollution Control Act, as amended, (the Act); 33 USC 1215, 1311, 1314 (b) and (c), 1316 (b) and (c), 1317(c), and 1361(a), 86 Stat. 816 et seq., Pub. L. 92–500. Regulations regarding cooling water intake structures for all categories of point sources under section 316(b) of the Act will be promulgated in 40 CFR Part 402.

The legal basis, methodology and factual conclusions which support promulgation of this regulation were set forth in substantial detail in the notice of public review procedures published August 6, 1973 (38 FR 21202) and the notice of proposed rulemaking for the steam electric power generating point source category. In addition, the regulation as proposed was supported by two other documents; (1) the document entitled "Development Document for Proposed Effluent Limitations Guidelines and New Source Performance Standards for the Steam Electric Power Generating Point Source Category" (March 1974) and (2) the document entitled "Economic Analysis of Proposed Effluent Guidelines: Steam Electric Powerplants" (March 1974). Both of these documents were made available to the public and circulated to interested persons at approximately the time of publication of the notice of proposed rulemaking.

(a) Summary of public participation.

Prior to publication of the notice of proposed rulemaking an initial draft of the Development Document was distributed to several Federal agencies, all State and Territorial pollution control agencies, industrial trade associations and conservation organizations. Comments on that draft report were solicited and over a hundred organizations, utility companies and members of the public responded. The major comments received and the Agency's response were described in the notice of proposed rulemaking (38 FR 8301–8303).

Interested persons were again invited to participate in the rulemaking by submitting written comments within 90 days of the date of publication of the proposed regulation. In response to requests for additional time the period for public comment was extended for 23 more days (39 FR 17449).

Thereafter, in order to afford an opportunity for those who had submitted comments to explain the substance of their position in detail and to determine the Agency's interpretation of and basis for its proposals, the Agency convened a public hearing on July 11 and 12, 1974, (39 FR 24030). Agency officials, and members of its technical staff, participated in two days of discussion with representatives of the utility industry and environmentalist groups.

(b) Summary of comments.

The following responded to the request for written comments contained in the notice of proposed rulemaking: United States Department of Agriculture; United States Atomic Energy Commission; United States Department of Commerce; Federal Power Commission; United States Department of the Interior; Tennessee Valley Authority; State of California; State of Colorado; State of Illinois; State of Indiana; State of Iowa; State of Maryland; State of Michigan; State of Minnesota; State of Ohio; State of New York; Commonwealth of Puerto Rico; State of Texas; State of Wisconsin; Honorable David R. Bowen; Honorable Omar Burleson; Honorable Bob Casey; Honorable Harold T. Johnson; Honorable Edmund S. Muskie; Honorable Charles Wilson; Honorable Jim Wright; Omaha Public Power District; Pacific Gas and Electric Company; Texas Electric Service Company; Mississippi Power and Light Company; Arkansas Power and Light Company; West Associates; City of Colorado Springs; Nebraska Public Power District; American Electric Power Service Corporation; The Dayton Power and Light Company; International Ozone Institute, Inc.; Virginia Electric and Power Company; City Public Service Board of San Antonio, Texas; New York Power Pool; Resources Conservation Co.; The Toledo Edison Company; Ford Motor Company; Baltimore Gas and Electric Company; Jersey Central Power and Light Company; Metropolitan Edison Company; Pennsylvania Electric Company; National Electric Reliability Council; Public Service Company of New Mexico; United Illuminating; Copper Development Association, Inc.; The Cincinnati Gas and Electric Company; Illinois Power Company; Indianapolis Power and Light Company; Tri-State Generation and Transmission Association, Inc.; Western Illinois Power Cooperative, Inc.; Alabama Electric Cooperative, Inc.; Wisconsin Public Service Corporation; N.W. Electric Power Cooperative, Inc.; American Cyanamid Company; Carolina Power and Light Company; Foote Mineral Company; Cooperative Farm Chemicals Association; Pollution and Environmental Problems; Ebasco Services Incorporated; Brazos River Authority; Mid-Continent Area Power Pool; Dr. Charles C. Coutant; Mr. Basil A. Bonk; Diamond Shamrock Chemical Company; Offshore Power Systems; Hawaiian Electric Company, Inc.; United for Survival; Mr. James R. Haring; Nalco Chemical Company; Dow Chemical U.S.A.; Dairyland Power Cooperative; St. Joseph Light and Power Company; Burns and McDonnell Engineering Company; Bethlehem Steel Corporation; The Metropolitan Water District of Southern California.

Washington Public Power Supply System; Wright Chemical Corporation; Mr. James W. Errant, Jr.; Texas Water Conservation Association; Ms. Constance A. Partious, League of Women; Mr. David Allen; Mr. David B. Harvey; Mrs. Marvin Halye; Mr. Bruce Haflich; Mr. Samuel Labouisse, Jr.; Connie Economy; Mr. Christopher A. Libby; Mr. Zachary A. Smith; Mr. Marion L. Sanford; Mr. Henry Peck; American Association of University Women; Ms. Lea P. Tonkin; Illinois Paddling Council; Portland General Electric Company; League of Women Voters; Mr. Roger H. Miller; Rohm and Haas Company; Mr. M. David Burghardt; Calgon Corporation; Stone and Webster Engineering Corporation; The Michigan Riparian, Inc.; Olin Water Services; Florida Power and Light Company; Mrs. Martha K. Rudnicki; Don and Lynda Johnson; Mr. Lawrence D. Bahr; Mr. Harry L. Stout; Betz Laboratories, Inc.; Save the Dunes Council; Mr. and Mrs. John N. Lally; United Refining Company; Mr. J. C. Berghoff; Mr. Edward G. Talbot; Mr. Harlan Sandberg; Mr. Stephen C. Grado; Mr. Scott M. Bailey; Mr. David M. Peterson; Mr. David Levine; Mr. Don Puriton; A. T. Economy and Tenya Economy; County of Monroe, New York; Mr. Steve Kraatz; Burns and Roe, Inc.; Mr. R. Fenton Rood; Alaska Center for the Environment; Mrs. Marie B. Pettit; General Electric Company; Duke Power Company; Airco Alloys and Carbide; Johnson and Anderson, Inc.; Utah Power and Light Company; Minnesota Pollution Control Agency; Middle South Services, Inc.; Natural Resources Defense Council, Inc.; Lake Michigan Federation; Mead; ECAR; Salt River Project; Houston Lighting and Power Company; Kansas City Power and Light Company; Duquesene Light; Ohio Edison Company; Louisiana Power and Light; Arizona Public Service Company; Consolidated Edison Company of New York, Inc.; Wisconsin Electric Power Company; Toledo Edison; Arkansas Electric Cooperative Corporation; Northern States Power Company; Plains Electric Generation and Transmission Cooperative, Inc.; Houghton Cluck Coughlin and Riley; Consumers Power Company; Bechtel Power Corporation; Buckeye Power Incorporated; Public Service Company of Colorado; Association of California Water Agencies; New Orleans Public Service, Inc.; Minnkota Power Cooperative, Inc.; Associated Electric Cooperative; Continental Can Company, Inc.; Niagara Mohawk Power Corpora-

tion; Columbus and Southern Ohio Electric Company; Dolph Briscoe, Governor of Texas; San Diego Gas and Electric Company; Quirk, Lawler and Matusky Engineers; Department of Water and Power of the City of Los Angeles; Basin Electric Power Cooperative; Business and Professional People for the Public Interest; Commonwealth Edison; Gulf Power Company; Atlantic City Electric; Southern Services, Inc.; Union Electric Company; E.I. duPont deNemours and Company; Tucson Gas and Electric Company; California Farm Bureau Federation; Regional Planning Council; Mr. Mayne E. Bolling; University of Texas; Mr. & Mrs. William Morlock; Ms. Alice Thornycroft; Mr. & Mrs. Fred and Peggy McAllister; Mrs. Robert Burke; Ms. Catherine Benner; Mr. Frank Lahr; Mr. & Mrs. Robert Upton; Dr. & Mrs. Dean Asasselin; Dr. & Mrs. D. Steinberg; South Texas Electric Cooperative, Inc.; Olin Brass; Eastern Iowa Light and Power Cooperative, Shoreline Garden Club; Southern California Edison Company; Mr. Lawrence C. Frederick; Edison Electric Institute; The American Public Power Association; National Rural Electric Cooperative Association; The Utility Water Act Group.

The most significant comments received, and the Agency's responses to those comments, are summarized below. The factual basis for the Agency's conclusions will be set forth in substantially greater detail than is practicable here in the "Development Document for Effluent Limitations Guidelines and New Source Performance Standards for the Steam Electric Power Generating Point Source Category" which will be published as soon as possible.

(1) Commenters urged that the Agency make explicit in the regulations that the numerical limitations on the discharge of pollutants were merely advisory and that the States or Regional Administrators retain the discretion to impose either more or less stringent limitations in individual permits based on an independent reevaluation of the factors listed in section 304(b).

The Agency does not believe that Congress intended it to promulgate only advisory rules nor that the Act envisions a wide-ranging reassessment of all of the technical, economic and environmental considerations taken into account by the Agency during this extended rulemaking process.

In the Agency's view, the Act contemplates a careful analysis of the waste water discharges of each industry and the technology available to abate these discharges to the levels prescribed in sections 301 and 306. The Agency is obligated to consider, not only technical feasibility, but the cost of achieving specific effluent reductions, and the economic and environmental consequences of doing so. On the basis of this analysis, the Agency believes, Congress intended it to establish specific and objective allowances for pollutant discharge for various subcategories within each industry, the categories themselves being defined on the basis of differences in the production methods which influence the engineering feasibility of particular treatment methods as well as the relative significance as to that subcategory of the other factors enumerated in sections 304(b) and 306. Once these determinations have been made, however, the limitations are to be applied on a uniform basis to all plants within the subcategory.

The Agency, over the past year and a half, has assembled and considered extensive information on the electric utility industry and the water pollution problems associated with generation of electric power. On the basis of this information it has prescribed varying requirements for the control of thermal and chemical pollution from plants of differing ages, sizes, present cooling technologies, and locations. To the extent that information has not been available to the Agency which could affect these limitations as applied to individual units, the limitations may be modified as to that unit in accordance with the procedure established by 40 CFR 423.12, 423.22, 423.32 and 423.42. This provision represents, in the Agency's view, a responsible reconciliation between the statutory emphasis on uniformity and the diversity inherent in a large and complex industry. To expand the flexibility afforded by this provision to the degree recommended by some industry representatives would destroy the statutory scheme of uniform treatment of similar plants and impose an insuperable and redundant burden on the resources of the Agency's regional permitting offices and those of State pollution control agencies.

(2) An industry representative contended that the term "best" technology should be interpreted to mean that which is "most productive of social good".

Sections 304 and 306 direct the Administrator first to identify the most effective technologies in reducing water pollution and thereafter take into account specified factors e.g., nonwater quality environmental effects of a standard as well as costs to the industry. The Agency has identified closed cycle evaporative cooling as a technology which is clearly the most efficient means of virtually eliminating heated water discharges. It is certainly available, since it is in widespread use in the industry at present and for both economic and environmental reasons newer plants are increasingly employing one of several alternative modes of closed cycle evaporative cooling, i.e., mechanical draft towers, natural draft towers and cooling ponds.

The Agency has, however, also given careful attention to each of the factors which the statute directs it to consider. Thus, because of the time in years that it takes to design, construct and place into operation the various types of cooling towers and because of the necessity for ensuring the reliability of electrical generation over a limited time span for a very large generating capacity that would be affected by 1977, the Agency has concluded that no additional restraint on heat represents the best practicable control technology curently available.

Moreover, taking into account factors specified in 304(b)(2), the Agency has determined closed cycle cooling to represent the best available technology economically achievable for only specific subcategories of the electric utility industry.

(3) The most fundamental criticism of the Agency's approach was that it had not estimated the improvement in national water quality attendant on conversion to closed-cycle evaporative cooling and had not attempted to assign a monetary value to that improvement. A related contention frequently advanced was that had this been done, the economic benefits of requiring most existing units to retrofit closed-cycle cooling systems would be shown to be substantially less than the costs.

The law under which the Agency has promulgated this regulation (and has or will promulgate over 50 additional sets of regulations for other industries) does not require that the ultimate social benefits which reduction in industrial pollution of the Nation's waters will produce be quantified in economic terms. The Congress, in enacting that law, made the fundamental legislative judgment that the benefits of clean water justified increasingly stringent levels of control. The statutory task of the Agency is to identify the waste treatment measures which are technologically available and to impose limitations consistent with that technology and with the considerations of cost, economic achievability, energy consumption and other environmental concerns which are specified in the Act. While a "balancing" of these considerations against the reduction of water pollution is implicit in the statutory framework, the proper balance in any case may focus on the objective degree of effluent reduction and not on a projection of the associated improvement in the physical environment, to which dollar values have been assigned.

An industry group did conduct such an exercise, the results of which were submitted to the Agency as a portion of its comments. On the basis of those results, the group recommended that the Agency subcategorize the industry so as to exclude all units for which the cost of closed-cycle cooling exceeded 1 mill per kilowatt hour. This decisional rule, which would exclude virtually all existing units from thermal control while requiring most new plants to employ closed-cycle cooling, was derived from the industry's cost benefit analysis and represented what the commenters concluded was the maximum reasonable cost which was justified by its calculation of the benefits to the aquatic environment resulting from closed-cycle cooling. This analysis consisted of a biological modeling study purporting to estimate the environmental improvement associated with reduction of thermal pollution and a related effort to (1) assign monetary values

to the predicted increase in fish populations and (2) compare this value to an estimated cost of closed cycle cooling derived from a consulting engineering firm report and estimates supplied by specific utilities.

The Agency has not adopted the suggested 1 mill per kilowatt-hour cost basis as its principal analytical tool. Discussion of the biological model during the public hearing held on July 11 and 12, 1974, revealed serious deficiencies in the methodology by which it was developed and applied. Since that model served as a basis for calculation of economic benefits attributable to the abatement of waste heat discharges, inadequacies in that analysis cast sufficient doubt on the subsequent estimate of economic benefits that the Agency could not responsibly rely upon rules derived from it in promulgating national regulations of this significance.

Moreover, there appeared to be considerable controversy as to whether the quantification of the economic value of changes in aquatic community structure employed satisfactory methods of measuring economic value and whether it included values for social benefits not comprehended by the commercial market price or imputed recreational value of certain fish species at the highest trophic level. No account was taken in either the physical or the economic study of the damage to aquatic communities from entrainment in once-through cooling systems. While this regulation is directed to the control of effluent discharges, any complete analysis of the benefits of conversion to closed-cycle cooling systems should include an estimate of these benefits which are inseparably related to the direct benefits of lowered heat discharge. Finally, the national costs of installing and operating closed-cycle cooling systems employed in the commenters' analysis were not only higher than the Agency's initial estimates but higher than the Agency's present estimate of that cost.

However, while the Agency did not develop subcategories on the basis of this specific rule, it carefully considered the cost of thermal control in determining the portions of the industry to which it should apply. Whereas the regulation as proposed would have applied to nearly half the units now operating with once-through cooling or expected to be in line by 1978 with once-through systems, the promulgated regulation will apply to less than ten percent of such units. The Agency estimates that the capital cost of its original proposal would, without accounting for exemptions under section 316(a), have aggregated by 1983 $11.8 billion, expressed in constant 1974 dollars. The comparable cost of meeting the thermal controls required by the revised regulation is estimated to be $5.2 billion. And, while particular units may be required to incur costs in excess of 1 mill per kilowatt-hour, the Agency estimates that the capital and operating cost of installing closed-cycle cooling at all plants covered by the regulation (without taking exemptions under section 316(a) into account) will average considerably less than 1 mill per kilowatt hour by 1983, expressed in constant 1974 dollars.

The capital and operating costs of even the revised thermal limitations are large in absolute terms. The Agency nevertheless, has concluded that they are reasonable in light of the environmental risks of heat addition to aquatic systems, the recent dramatic increase in both size and waste heat rejection of individual generating units, and the projected expansion of national generating capacity.

(4) Some commenters observed that heat is a fundamental property of matter and should not be directly regulated. Instead, they suggested that the relevant concept is water temperature: specifically, the temperature of the receiving water body.

"Heat" is specifically defined as a pollutant by section 502(6) of the Act. While the effect of heat on aquatic systems is typically investigated in terms of alterations in the receiving water temperature, the cause of those alterations is the addition of water whose internal energy, or heat content, has been increased by its passage through condensers. The performance of technology in reducing the heat rejected to receiving waters is easily and uniformly measured in units which express the heat content, i.e., BTU's or Joules.

In any event, the regulations do not proscribe the discharge of heat in absolute terms, but rather in relation to the heat added by the powerplant. The significance of discharges of water at the specified temperature, in terms of impact on the aquatic community at any particular site, may of course be the subject of inquiry in proceedings under section 316(a) of the Act which, unlike this regulation, is designed to assess the environmental impact of the heated discharge in specific instances.

(5) Many of the comments asserted that the Agency's subcategorization of the industry was inadequate. In essence, the commenters asserted that the Agency had not taken into account a variety of factors which could, at specific locations, increase the cost of complying with the proposed thermal limitations or entail significant adverse effects on other aspects of the environment.

The Agency has reviewed the bases on which the thermal limitations were determined to be applicable to units with differing operating characteristics, climatic conditions, and site related features. Additional distinctions among units have been made as a result of this review. A very large number of factors were suggested as potential criteria for exemption from thermal control. To address them in an orderly manner requires that those which serve explicitly or implicitly as a basis for distinctions in the applicability of the requirement for closed-cycle evaporative cooling be discussed first.

(A) AGE

The cost, expressed in relation to power generated, is inversely related to the number of years of service life remaining for a particular generating units. That is, the shorter the remaining useful life over which the cost of the cooling system may be amortized, the greater will be the percentage of the capital cost charged against each unit of power generated. Moreover, the shorter the remaining useful life, the less heat will be rejected to the environment particularly since many older units traditionally operate only during periods of higher demand. Accordingly, the capital cost expressed as a function of units of heat removed will be greater for older plants.

In addition, however the absolute cost of retrofitting existing once-through units with closed-cycle cooling is substantially greater than is the cost of installing cooling equipment at new units. An exemption cast in terms of remaining service life accomodates this disparity but does so only in the most extreme cases.

In order to avoid the additional costs of conversion of older units to closed-cycle cooling to the maximum degree consistent with the protection of the environment, the Agency has expanded the exemption based on age. No unit placed into operation before January 1, 1970 will be required to meet the limitations on the discharge of heat. Of the units placed into operation between January 1, 1970 and January 1, 1974 only the largest baseload units (i.e., those of 500 megawatt capacity or greater) will be subject to control.

The Agency was urged to exempt all existing units from thermal control, requiring closed-cycle cooling only of new units. Because of the long lead times required for design and construction of powerplants, particularly nuclear units, and the definition of the terms "new source" and "construction" in section 306 of the Act, this would have resulted in confining applicability of the regulation to units which will not commence operation until the end of the decade. Moreover, the units placed into service since the start of this year and those scheduled for completion during the next several years are typically large units. Adopting a "new source" cutoff would exempt units exceeding 1000 megawatts, some of which will still be operating, and discharging heat, past the year 2000. In view of the extended periods of time during which these plants would be operating and discharging heat, the Agency concluded that they should remain subject to thermal control.

(B) SIZE

There are a very large number of small units (defined by the Federal Power Commission as units in plants of 25 megawatts or less and in systems of 150 megawatts total capacity or less). Yet these systems and units represent only a very small percentage of the total installed generating capacity in the United States. Moreover, the potential for higher costs due to site specific peculiarities at any given unit could be expected to be balanced by more favorably located units in a larger utility system. In very small systems, this expectation of counterbal-

ancing unit costs is less justifiable and the costs of meeting the thermal limits may not be economically achievable. On this basis the Agency proposed an exemption from the thermal limitations defining best practicable control technology currently available for existing small units and systems.

The exemption has been extended to apply to the thermal limits required by the best available technology economically achievable, in order to preclude the necessity of retrofitting such small units.

The promulgated regulation makes a second distinction based on rated capacity, or size. The effect of the revision to the regulation described above is to exempt from controls on thermal discharge all units operating before January 1, 1974, except for units of 500 megawatts or greater. In the case of such very large units, the regulation imposes control on those placed into operation on or after January 1, 1970. An analysis of a survey of 60 plants submitted by an industry representative during the comment period indicates that the capital cost of retrofitting units placed into service after January 1, 1970, is inversely correlated with size. That is, the cost on a per kilowatt basis of installing a mechanical draft cooling tower at a large unit, other factors being equal, is typically less than that incurred by smaller units.

A 500 megawatt capacity unit's costs are approximately the average costs of all units included in the survey; costs will decline below the average as the size of the unit increases.

Units of this size which are now less than five years old may be expected to be operating for another 30 years. In view of this extensive remaining service life, the relatively lower retrofitting costs, and the larger volumes of heated water discharged, the Agency has concluded that the largest units coming on line since 1970 should be included while smaller units, of comparable age, should not.

(C) Capacity Utilization

All generating units do not produce power at their full capacity at all times. There are three major classifications of powerplants based on the degree to which their rated capacity is utilized on an annual basis. Baseload units are designed to run at near full capacity almost continuously. Peaking units are operated to supply electricity during periods of maximum system demand. Units which are operated for intermediate service between the extremes of baseload and peaking are termed cycling units.

Generally accepted definitions term units generating 60 percent or more of their annual capacity as baseload, those generating less than 20 percent as peaking, and those between 20 and 60 percent as cycling.

Most large units (over 300 megawatts capacity) are baseload units. Baseload units provide approximately 80 to 90 percent of the Nation's electric power and, account, therefore, for approximately the same percentage of waste heat. Because of their large size and high level of utilization, uncontrolled heated discharges from these units are generally considered to pose the greatest environmental risk. And because of their greater power output, the costs of retrofitting cooling systems to baseload units is considerably lower in mills per kilowatt hour than costs for peaking or cycling units.

Peaking units account for less than one percent of total effluent heat from the industry. Moreover, the cost per unit of production for thermal control is three to four times that of baseload costs. On this basis, commenters urged the Agency to exclude existing peaking and cycling units from thermal control and the Agency essentially has done so in the regulation promulgated today.

Though there is no explicit exemption based on capacity utilization, the combined effect of the exemptions predicated on age and size will effectively exclude almost all existing units operating at substantially reduced capacity factors.

Capacity utilization is related to age. With few exceptions, units begin operation as baseload units. As they become older and relatively less efficient, they are replaced by newer more efficient baseload units and reduced to cycling service. As they near the end of their service life they are employed as peaking units. By confining the coverage of the thermal limitations to units less than nine months old (except for those of 500 megawatts capacity or greater), the Agency has, in effect, excluded low capacity utilization units. Virtually all units which have come on line since January 1, 1970 which are in excess of 500 megawatts capacity are intended to be operated as baseload units at the time the conversion to closed-cycle must be effected.

(D) Units With Existing Closed-Cycle Cooling Systems

Some commenters suggested that units with existing closed-cycle systems employing hot-side blowdown be exempted from the requirement of cold-side blowdown.

The Agency agrees that incremental costs of converting to cold-side blowdown for units which already have closed-cycle systems employing hot-side blowdown is not justified in light of the small reduction in thermal discharge that would ensue.

(E) Salt Drift

Although the environmental effects of saltwater cooling towers vary from case to case depending on the sensitivity of local environment and diverse local meteorological conditions, experience with existing saltwater cooling towers indicates that environmental problems would be confined to areas in close proximity to the cooling tower. One study showed that about 70 percent of all drift mass fell within 400 feet downwind of a typical saltwater mechanical draft tower, well within the boundaries of most powerplants. The same study showed that even under the most adverse conditions, all drift droplets that would reach the ground would do so within 1000 feet downwind. The subject of this study was an eight-cell crossflow mechanical draft tower designed to cool 134,000 gallons per minute of water with the same chemical composition and salinity as seawater. The plant was located on an estuary or bay, two miles from the ocean. The drift rate was 0.004 percent of the circulating water.

Airborne drift from this tower plus natural background salt nuclei from the sea exceeded conservative damage thresholds for foliar injury for distances up to 2200 feet downwind of the tower. The background salt nuclei contributed over 75 percent of the salt mass causing damage at this distance from the tower. Moreover, the fractional increase in airborne salt concentrations due to drift at 2200 feet was insignificant as compared with normal variations in the background level caused by changes in atmospheric wind conditions.

Obviously, local plant life in areas potentially affected by salt drift from towers must be capable of withstanding these natural airborne salt levels if they are to survive. Other possible recipients of incremental salt drift would likewise be affected by the natural ambient levels.

The additional cost of drift eliminators does not represent a significant increment to total cooling system cost and should be reflected in the cost estimates supplied by the industry for plants representing over 12 percent of the Nation's total generating capacity.

Potentially significant environmental damage over and above that from ambient conditions may be expected to be confined to areas in proximity to the tower and in the prevailing downwind direction. The regulation therefore provides an exemption where land not owned by the plant is located within 500 feet downwind of every practicable mechanical draft tower site using saline intake water and where no alternative closed cycle mode (such as natural draft towers which have significantly less drift loss) is practicable.

(F) Land Availability

Some comments urged that the Agency liberalize its exemption from thermal control for units which do not have sufficient land on which to construct the necessary evaporative cooling system, suggesting that where the costs of making land available raise the total cost of installing closed-cycle cooling above 1 mill per killowatt-hour the exemption should apply. Others recommended that, in order not to reward utilities for poor site planning, the determination of sufficient land include property within two miles of the unit whether owned by the utility or not, if it could be acquired.

The size of the evaporative cooling tower required is related to the generating capacity of the unit. Taking into account the other factors which can influence tower size (such as heat rate,

climatic conditions, etc.) the Agency has determined that 28 acres per 1000 megawatts generating capacity is ample land on which any existing plant can construct a mechanical draft cooling tower, the cooling system which is most universally applicable and which provides the basis for the Agency's cost estimates. This conservative area-to-capacity standard is based on Federal Power Commission estimates of mechanical draft cooling tower land requirements and the Agency's review of mechanical draft cooling tower land use requirements at nuclear units, including sufficient allowances for construction and spacing between towers.

In determining whether sufficient land is available at a particular site the regulations require consideration of reassignment of present land uses (parking areas, for example) as well as the practicability of alternate evaporative cooling systems. Natural draft towers, for example, require less than 40 percent of the land needed for mechanical draft towers. The judgment of whether or not the reassignment of existing land is practicable cannot be reduced to a single cost per unit of output figure as suggested.

Moreover, in many cases adjoining land may be purchased at reasonable cost as an alternative to reassignment of existing land uses. Nevertheless, adjacent land costs could, in some instances, materially increase the cost of installing closed cycle systems. Hence, the promulgated regulations do not predicate the exemption from thermal limitations on the acquisition of neighboring land. Instead it is based solely on land owned or controlled by the owner or operator of the plant as of the date of proposal of this regulation.

(G) AIRCRAFT SAFETY

Some comments urged the consideration of the possible hazard to aircraft of steam plumes issuing from cooling towers.

An examination of this potential hazard indicated that it is unlikely that an existing powerplant which will be required to install a recirculated cooling water system would pose a hazard to commercial aircraft during periods of takeoff and landing. However, the vulnerability of aircraft during this portion of the flight pattern requires special consideration of cases where a substantial hazard may be shown to exist. The promulgated regulation reflects this consideration.

(6) The proposed regulation was criticized for not indicating the relative priorities assigned to installing technology to comply with thermal limitations, and the land use requirements of other pollution control equipment such as chemical waste treatment and flue gas desulfurization systems.

The promulgated regulation predicates the obligation to comply with thermal limitations on the availability of sufficient land to construct and operate closed cycle cooling systems. No comparable potential exemption from chemical waste discharge requirements is needed or afforded. The Agency expects that power companies, confronted with this regulatory pattern, will construct or expand chemical treatment systems as a matter of first priority. The determination of sufficiency of land for thermal control systems will be made taking into account the land required for the chemical system, subject to the overall evaluation of the potential for land use reassignment.

(7) Some commenters urged that the Agency exempt units discharging into oceans or coastal waters. Two reasons were advanced. First, because of the greater dissipative capacity of oceans, heat discharges were said to be less likely to cause environmental damage. Second, the requirements of closed cycle cooling would exacerbate fresh water shortages which could be expected in certain coastal areas by the year 2000 during extreme low flow conditions.

No water shortage appears evident, or likely to ensue, by the end of the century in Washington, Oregon, Northern California, most Gulf Coast States, or the Atlantic Coast. Moreover, the projection of increased fresh water consumption was predicated on conversion of all existing coastal plants from once-through saline systems to fresh water evaporative towers and adoption of fresh water towers by all new ocean sited plants. Such an assumption is unrealistic, however, since salt water towers are presently in operation and available to coastal plants in arid areas. Use of saline water in evaporative towers would, of course, have no effect on the supply of fresh water.

On the other hand, there is evidence to suggest that the discharge of heat into marine waters at sufficient depth and distance from biologically sensitive shoreline zones may pose considerably less of a threat to the environment than do thermal discharges into rivers, lakes, and estuaries. But if the compatibility of thermal discharges with the environmental integrity of aquatic communities at particular sites can be demonstrated, a modification of the limitations on heat may be made through the procedures established by the Agency to implement section 316(a).

(8) Some commenters suggested that the Agency's jurisdiction under the Act does not extend to all artificially created lakes and ponds used as cooling water sources by powerplants and that the Agency should confine the regulation to those in which a significant vested public interest exists.

The Act applies to all "waters of the United States" and the legislative history indicates that the jurisdictional terms were to be given the broadest possible constitutional interpretation. Under controlling decisions of the United States Supreme Court, some man made cooling water bodies may constitute navigable waters for the purpose of water pollution control.

On the other hand, however, the Agency recognized in the proposed regulation that artificial ponds built for cooling and located on the property of the utility constitute an acceptable process technology for the control of heat. In response to criticisms of the lack of clarity of the proposal, the regulation has been revised to make clear that existing units otherwise subject to a "no discharge" limitation on heat may discharge heat into existing cooling lakes and ponds. Definitions of each term have also been provided which differentiate between "cooling ponds" (artificial water bodies constructed by means other than impounding the flow of navigable water) and "cooling lakes" (artificial water bodies whose construction does entail blockage of navigable water flows). While new units whose cooling system involves creation of an "on stream" cooling lake would remain subject to the limitations on heat discharge from the condenser into such a projected impoundment, the provisions of section 316(a) would be available to such units. Chemical discharge into artificial water bodies which constitute navigable waters under the Act must comply with the limitations on pollutants other than heat.

(9) Some commenters noted that the proposed regulations did not provide an explicit exemption from the limitations on heat for offshore powerplants and and suggested that a separate category for such plants be established. No offshore plants are presently in operation or under construction. That being the case, the Agency anticipates that selection of suitable locations will insure that the thermal discharges from once-through or modified cooling systems at such plants are compatible with the criteria of section 316(a) of the Act and that exemptions under that section for properly sited offshore plants would be forthcoming.

(10) Some commenters questioned the propriety of requiring compliance with limitations defining the degree of thermal effluent reduction attainable by the "best available technology economically achievable," in advance of 1983. In addition, the proposed regulation was claimed to endanger system reliability, particularly during the winter of 1977–78 when reserve capacity would be reduced because the outage time necessary to tie-in to closed cycle systems would exceed that required for normal maintenance. Since all units are required to comply with the same schedule, commenters claimed that in many cases purchase of replacement capacity from other systems within the same grid would not be possible. Other commenters suggested extension in the compliance dates in order to allow sufficient time for construction of natural draft cooling towers where these are a preferable alternative to mechanical draft towers. Still others criticized the Agency for imposing no restrictions whatsoever by 1977 and urged that the schedule as proposed be adhered to.

The Agency believes that there is clear statutory authority to impose the requirements of section 301(b)(2)(A) earlier than 1983 if the technology is

available. The dates specified in the Act are ultimate deadlines: not the earliest dates by which technological progress may be required. It would be consistent with neither the language of the Act, nor its legislative history, for the Agency to sanction the discharge of pollutants for nine more years if a class or category of dischargers has the capability, both economic and technical, to reduce that discharge by an earlier date.

The Agency is convinced that the electric utility industry has both the economic and technological capability to install closed cycle cooling systems on those units whose thermal discharges are controlled by this regulation and to do so by the compliance date established. The estimates of reduced reserve capacity submitted were, the Agency believes, over-stated since they assume that no units would obtain exemptions under section 316(a). Moreover, significant revisions to the proposed regulation have been made to insure that the required conversion to closed-cycle is realistic and that compliance with it entails no risk to the continued reliable supply of electric power. First, the number of units potentially subject to it has been reduced drastically. Second, the date by which the largest units are subjected to control has been extended by two years; the compliance date now being nearly seven years in the future. Finally, the permit issuing authority is authorized to defer compliance for an additional two years if, despite the above described revision, compliance by all units in a related system could, by virtue of outages during tie-in to the cooling system, seriously impact system reliability. This will permit each utility to plan, design, and construct off-stream cooling systems at the optimum time in accordance with planned maintenance schedules as well as in consideration of reliability factors.

(11) A related comment was that the Agency should not impose limitations under best available technology economically achievable in advance of the National Study Commission Report required by section 315 of the Act.

There is no conflict between the promulgated regulation and the report of the National Study Commission, which is to be submitted to Congress in October, 1975. While that study is an integral part of the Act's program to reduce water pollution dramatically by 1983, its existence does not preclude establishing the "best available" standards effective in advance of that date. There will be sufficient time for any "mid-course corrections" to be made by the Congress in the regulation of thermal pollution from the electric power industry, without the industry's having committed itself to any significant capital expenditures for thermal pollution abatement due to these regulations.

(12) Several comments observed that the cost per unit of production of installing closed cycle cooling varies as a function of numerous factors. Some of these factors (such as fuel type, back-end loading, heat rate and flow rate) pertain to the mode of operation and other physical characteristics of the unit. Other factors (such as wet-bulb temperature and intake water temperature) relate to climatic or geographic conditions encountered at particular sites. Still other factors, while also related to local conditions, concern the potentially adverse impacts (such as noise generation, fogging and water consumption) which may be significant in individual instances. If unaddressed, the combined impact of the factors were said to impose physical, though not necessarily economically evident, costs on the local environment. If steps were taken to alleviate the problem, on the other hand, abatement of the environmental deficit would entail direct monetary costs on the utility. A rule was suggested which would exempt any unit at which the sum of these factors imposed costs in excess of 1 mill per kilowatt-hour.

The Agency has reviewed the significance of each of these factors considered independently as well as their aggregate impact. A summary of its conclusions as to the collective significance of site dependent factors and each individual variable follows.

(A) Site-Dependent Factors in General

During the comment period, industry representatives supplied two sets of data on the cost of installation of mechanical draft cooling towers. The first was a report of an engineering firm experienced with the construction of cooling towers. Its estimate of the capital cost of retrofitting, on a per kilowatt basis, was only slightly higher than that used in the Agency's original cost estimates of the proposed regulation.

The second was based on a survey of 60 plants, in several utility systems, which represent approximately 12 percent of the total steam electric generating capacity in the United States. The average capital cost of this survey was significantly higher than the previous industry estimate; the disparity being accounted for by the commenter on the ground that the higher estimates reflected additional costs attributable to site-specific factors. The variability of the plant by plant costs reported in the latter survey approximates a normal distribution and ranges from about $9 per kilowatt to about $81 per kilowatt. The median of the sample and the capacity weighted average cost is $21.9 per kilowatt. The Agency adjusted its cost estimates of the economic impact of the final regulation to a figure closely approximating this industry-estimated cost. Only three of the plants reported per kilowatt costs significantly above the average value (in excess by 100 percent or more.) The few exceptions with extraordinarily high cost per kilowatt represent about 3 percent of the generating capacity covered by the sample. Since the extensive sample of cost estimates from individual plants addresses all site dependent factors in most instances, and includes to some extent costs corresponding to the factors addressed specifically below, EPA has determined that the sample adequately depicts the effects of the total of the site dependent factors that materially influence the costs of achieving the effluent limitations on heat. While the estimated costs of implementing thermal controls at three of the plants were reported to reflect costs in excess of twice the median cost, these incremental cost factors would not significantly affect the economic achievability of the effluent limitations. Favorable and unfavorable site-dependent factors may be expected to counterbalance one another, when applied across the several units at individual plants and the numerous plants in an electrical generating system. Hence, the average of the cost estimates reported in the 60 plant sample represents a realistic estimate of the retrofitting costs likely to be encountered by any utility system. Even in the extraordinary case of the one plant in the 60 plant sample reporting a cost estimate of $81 per kilowatt, the incremental cost (above that within which 95 percent of plants estimated costs reflecting site specific factors) would not affect the economic achievability of the thermal limitations. For example, the abnormal incremental costs at that site ($37 per kilowatt) would add about 1 mill per kilowatt-hour to the cost of electricity generated by that unit. Unusual compliance costs could impact the numerous small units or small systems more severely. Consequently, these units have been exempted categorically from the effluent limitations on heat.

(B) Type of Generation

In general, nuclear units reject more waste heat to condenser cooling water than do comparable fossil-fueled units. The Agency recognizes that the costs of installing thermal control technology are greater for units which reject more waste heat. Nevertheless, the cost differential due to type of generation is approximately equivalent to the additional waste heat discharged by nuclear plants and is within the range of costs reflecting the normal variability among site-dependent factors in general as discussed above. In either case, the costs per unit of heat removed by close cycle cooling would be the same. Therefore, no distinction need be made between nuclear and fossil-fueled units.

Conversion of a nuclear unit from once-through cooling to a closed cycle system may entail associated modifications to the radioactive waste disposal system. Units employing once-through cooling normally discharge treated liquid radioactive wastes to the large volumes of non-recirculating cooling water, relying on dilution in that stream to meet water quality standards on the discharge of radioactive materials. The volume of the blowdown from closed cycle cooling may not provide sufficient dilution for this practice to be continued. However, in three cases in which closed cycle cooling systems were backfitted to nuclear powerplants, none of the additional costs for radioactive

waste system modification were directly attributed to the closed cycle backfit by the U.S. Atomic Energy Commission in its final environmental statement. Since the Agency has received no specific cost information concerning radioactive waste system modification due to closed-cycle cooling system backfitting, no incremental costs for this potential modification have been included in the Agency's cost estimates.

(C) FLOW RATE

The cost of closed-cycle cooling equipment and the total cost of generation are higher for units with higher flow rates, all other factors being equal. Flow rates for a particular unit can be reduced to some degree without significant incremental cost to achieve the reduced flow. In the cost analysis submitted to the Agency in support of the proposed subcategorization criteria, the cooling equipment costs for the cases of highest flow rate, all other factors being equal, were less than 10 percent higher than the average cost of all cases with various flow rates. Total generation costs were less than approximately 10 percent higher for the cases with the highest flow rates. In the cost analysis for the worst combination of intake temperature, wet-bulb temperature, and flow rate, the equipment cost exceeded the average equipment cost by 52 percent. These variations in equipment cost are within the range of variations in cost that are anticipated considering the numerous factors that combine, some favorably and some unfavorably, at each site to determine the final cost of thermal control implementation. A 10 percent cost differential is within the range of costs reflecting the normal variability among site-dependent factors in general as discussed above. Therefore, no distinction need be made for this factor.

(D) HEAT RATE

Units with high heat rates would be the most costly to control due to the high incremental fuel cost associated with the increased inefficiency attributable to thermal controls. While no specific exemption is provided, exemptions based on age and size will exclude most of the units with high heat rates.

(E) INTAKE TEMPERATURE

EPA recognizes that units with high intake water temperature will incur higher costs, all other factors being equal. This factor, however, is significant mainly during the months when the high intake water temperatures occur and also for those units for which high levels of blowdown flow are necessary, thus requiring relatively large quantities of makeup water. It is not as significant a factor for most units which require normal quantities of makeup water flow. In the cost analysis submitted to the Agency in support of the proposed subcategorization criteria, this factor all other factors being equal, added a maximum of 20 percent in the most extreme case to the average total thermal control equipment cost. This 20 percent cost differential is within the range of costs reflecting the normal variability among site-dependent factors in general as discussed above. Therefore, no distinction need be made for this factor.

(F) WET-BULB TEMPERATURE

EPA tested the significance of wet-bulb temperature as a factor by costing various types of evaporative cooling systems considering four geographic locations representative of the range of wet-bulb temperatures in the United States. The cost of cooling equipment at the most unfavorable location based on wet-bulb temperature was 25 percent higher than the average cost of all locations tested for conditions otherwise identical. In the cost analysis submitted to the Agency in support of the proposed subcategorization criteria, this factor, all other factors being equal, added a maximum of 24 percent to the total thermal control equipment cost for the average of subcases covered for the most costly case analyzed. This 24 percent cost differential is within the range of costs reflecting the normal variability among site-dependent factors in general as discussed above. Therefore, no distinction need be made for this factor.

(G) BACK-END LOADING

The back-end loading of a unit is the maximum steam flow which the unit can pass through the last stage blades of the low pressure turbine expressed as a percentage of the maximum steam flow through the last stage blades which the turbine is capable of accepting.

In the cost analysis submitted to the Agency in support of the proposed subcategorization criteria, this factor, all other factors being equal, added a maximum of 22 percent to the total thermal control equipment costs compared to the average of the cases covered. The maximum cost reflected the cost for a unit with a back-end loading of approximately 15 percent. Generation costs in mills per kilowatt-hour for the worst case of a 15 percent back-end loading were estimated to be about 1 mill per kilowatt-hour. This 22 percent differential in equipment costs is within the range of costs reflecting the normal variability among site-dependent factors in general, as discussed above. The worst case generation cost is in the range recommended by industry, therefore, no distinction need be made for this factor.

(H) PLUME ABATEMENT

Cooling towers can produce visible plumes consisting of minute water droplets. Plumes are normally not a problem unless they reach the ground and obstruct vision or cause icing conditions. Under normal conditions, cooling tower plumes rise due to their initial velocity and buoyancy and rarely intersect the ground before they are mixed with the ambient air and dissipated. However, under adverse climatic conditions (i.e., high humidity and low temperature), the moisture could produce a fog condition if it were trapped in the lower levels of the atomsphere during an inversion, i.e., a period of high atmospheric stability. In almost all cases, natural draft towers are less likely to cause fogging problems than mechanical draft towers. Even with mechanical draft towers, in most cases fogging or icing would be on-site (i.e., within 1000–2000 ft of the tower). Plume abatement technology, e.g., wet-dry cooling towers, is currently available. While wet-dry towers are more costly than conventional wet towers, the Agency has accounted for the cost of employing plume abatement in specific cases in its estimate of the cost of cooling tower construction. This estimate is based on cost data supplied by industry. The industry estimates, in turn, were developed from a sample of 60 plants and units and the costs for 18 of the units in the sample reflected the use of wet-dry towers. Hence, no specific exemption based on the potential for plume generation is warranted except where the plume presents a substantial hazard to aircraft flight paths.

(I) NOISE ABATEMENT COSTS

EPA recognizes that incremental costs would be incurred in cases where mechanical draft cooling towers may require noise control. Little information is available on the cost of implementing noise control procedures on powerplant cooling towers principally because it has rarely been necessary to employ these measures, even though powerplants with cooling towers exist in areas of high population density. It is doubtful that there will be a significant need for this technology as a result of this regulation, since many plants in areas of high population density will be exempted because of the lack of sufficient land for closed-cycle cooling systems, because of the salt drift exemption, or because of the exemptions based on age or size. Furthermore, alternative thermal control technologies may be employed that are generally quieter than mechanical draft cooling towers. In the only case cited by commenters, a plant in West Germany was reputed to have incurred twice the normal capital cost for cooling towers due to the installation of noise control equipment. This is a most unusual case indeed. The plant cited is in West Berlin, a politically land locked community isolated from outside power sources. Increased demand and a paucity of available sites required that a new plant be constructed in close proximity to residences in an area of high population density, hence, the need for noise abatement technology. Furthermore, it is significant that cooling towers were employed with noise suppressors in order to take advantage of the site while accommodating the need to reduce noise to locally required levels.

(J) MISCELLANEOUS FACTORS

Certain additional site-dependent factors have been suggested by commenters which should be considered in subcategorization for effluent limitations on heat because they can materially affect cost; existing system layout, soil conditions, site geology, and topography. While it is

acknowledged that these factors may affect case-by-case costs, the costs attributable to these and other site-dependent factors have been assumed in the computation of the economic costs of thermal control.

(13) Some commenters observed that closed cycle cooling systems have side effects which may be controlled by other environmental regulations such as noise ordinances, air quality standards and land use restrictions and urged that the Agency exempt units for which the expense of complying with these strictures increases the total cost of installing closed cycle cooling above 1 mill per kilowatt-hour.

The Agency is not aware of any instances in which air quality standards have required imposition of technology to control droplet emissions from cooling towers below those presently achieved by good tower design and drift eliminators. Nor was the Agency supplied with evidence indicating that any existing plant now employing once-through cooling is subject to municipal ordinances or state laws requiring noise suppression equipment. There are no federal environmental regulations on noise emission from powerplants or cooling devices. Nor was the Agency advised of any local zoning ordinances which, while permitting construction of a powerplant and the associated stacks, would preclude construction of a cooling tower.

(14) The proposed regulation was criticized by some commenters on the ground that installation of closed cycle cooling systems at most units in the industry would increase the amount of freshwater consumed.

All evaporative heat rejection systems consume water. Even once-through systems result in water consumption by evaporation during the transfer of heat from the receiving water body to the atmosphere. Consumptive use of water by mechanical draft towers exceeds that of once-through systems by approximately 50–75 percent. Evidence received by the Agency suggested that were all existing and new plants covered by the proposed regulation to install close cycle cooling, the increase in water consumption by the year 2000 over that which would be consumed by extrapolation of the 1970 mix of cooling systems to the generating capacity expected to be on line in that year, would approximate 8.5 billion gallons per day. This projected increase, which was based on the assumption that no plants would qualify for an exemption under section 316(a) of the Act during the next 25 years, was conceded to be relatively insignificant compared to the total water available in the United States during average flow conditions. Federal Power Commission supplied estimates of water consumption attributable to closed cycling cooling suggest that the actual consumption may be significantly lower.

However, for certain regions, the projected increase when compared to the 10 and 20 years drought conditions, would increase water deficits assumed to exist even in the absence of closed cycle consumptive use. The regions of most concern are southern California and the Texas Gulf.

Much of the 3.8 percent increase in deficit for California under the 20 year low flow conditions appears to be attributable to the assumption that coastal plants will convert to freshwater rather than saline towers. The deficiencies of this assumption have been discussed previously. In addition, however, the final regulation has been revised to exempt most units constructed before 1974 from thermal control. Virtually all presently operating coastal units (which represent nearly half of the present generating capacity in California) will thus be exempt. To the extent that expansion of generating capacity is composed of new coastal units, the utility is free to select sites at which the discharge would protect the balanced indigenous aquatic community, thus qualifying for exemptions under section 316(a) and avoiding any consumptive use of freshwater. Moreover, saltwater cooling towers could be used at coastal sites with the result that no freshwater would be consumed.

In other arid regions, such as Texas, use of closed cycle evaporative cooling systems (both towers and cooling ponds) is already widespread for technological rather than environmental reasons, since the availiable surface water supply is not adequate for once-through cooling to be effective. Much of the increase in the projected consumptive use appears attributale to the assumption that cooling towers would have to be constructed at existing man made cooling lakes and offstream cooling ponds. The regulation has been revised to make clear that cooling lakes and ponds meeting certain specifications are considered acceptable heat abatement mechanisms and that towers need not be constructed if such a system is in operation.

(15) Many comments were received to the effect that the Agency's estimate of the captial and operating costs of closed cycle cooling was understated and that its analysis of the economic impact of the regulation was therefore inaccurate. The most significant of these claimed deficiencies are discussed in the following section.

(A) The Agency's capital cost estimates for installing cooling towers at non-nuclear plants were based on a survey of existing plant costs. It was pointed out that the capital cost for one plant in the survey represented the cost of an open cycle diffuser previously in operation at that plant. Commenters placed the true cost of the spray canal retrofitted to this plant at $28 million rather than the figure of $6.8 million used by EPA. Using the higher figure would increase the average costs reported by the plants actually retrofitted with closed-cycle cooling systems from $14 per kilowatt to $18 per kilowatt.

The Agency has recalculated costs of backfitting mechanical draft towers and higher per kilowatt costs have been employed in this analysis.

(B) Commenters criticized the Agency's failure to include a capital cost for new generating capacity to replace existing generating capacity lost during outages for tie-in of closed cooling systems.

Powerplants normally place generating units out of service on a scheduled basis for periods of a month or more in order to perform necessary maintenance. Units may also be shut down from time to time for unplanned maintenance. When units are shut down, the lost generating capacity is supplied by somewhat less efficient units within the system or by purchase of power from outside the system. The installation of new generating capacity in a system takes into account, on a projected basis, the user demand in its service area and such additional factors as scheduled outages and probabilities of unscheduled outages. A well-engineered retrofit design could be scheduled for tie-in to an existing system in from one week to five weeks of actual unit outage time. The regulation has been revised to exclude most existing units from thermal control and to defer the date of conversion for the remaining affected units from 1978 to 1981. Moreover, the final regulation incorporates commenters' suggestions for flexibility in further extending compliance dates in order to avoid adversely impacting regional reliability. The Agency has determined that tie-in outages can be scheduled concurrently with planned maintenance in such a manner that one month outage time would be required in addition to normal maintenance and that replacement power during this period can be supplied by the system's cycling units. Since no net loss in generating capacity need occur for closed-cycle tie-ins, there is no need for capital expenditures to be debited against outages during construction.

(C) Similiarly, comments suggested that the Agency had underestimated the operating cost of replacement capacity, principally by employing pre-embargo fuel prices.

The fuel costs employed by the Agency in calculating the operating cost of replacement capacity have been revised to reflect the best estimate of future fuel prices, $7.00 per barrel of oil and $12.50 per ton of coal (in constant 1974 dollars). EPA assumed a heat rate of 12,500 BTU per kilowatt hour and a fuel mix of 80 percent coal and 20 percent oil in calculating the industrywide economic impact of replacement capacity operating costs.

(D) An industry representative claimed that the Agency had underestimated the incremental cost of closed-cycle cooling because it had assumed that an unrealistically high percentage of plants would use closed-cycle cooling regardless of whether or not they were required to do so by these regulations.

Approximately 65 percent of the capacity now under construction is committed to close-cycle cooling. Based on a review of information submitted to the Agency by industry representatives, EPA estimated that 50 percent of units now planning to install closed-cycle cooling were doing so for economic, rather than

environmental considerations. The costs incurred by these units should not be included in the costs and economic impacts attributable to these regulations.

(E) Industry representatives contended that in order to raise the capital needed to finance water pollution treatment systems, a higher rate of return on both debt and equity would be required and that this additional cost of capital would increase the operating revenues required by the regulations.

The Agency has reevaluated its rate of return assumptions as follows: The Agency has assumed a cost of long-term debt of 8.0 percent, rather than 7.5 percent. Required rate of return on common equity is assumed to be 14.0 percent rather than 12.0 percent. The return rates are based on those used by the Technical Advisory Committee on Finance for the National Power Survey. Since the regulations will increase the capital requirements of the utility industry by less than four percent, without taking into account the exemptions received under section 316(a), they should not themselves raise the required rate of return on either debt or common equity.

(F) Some commenters suggested that, for the purposes of the base-line cost estimates, the costs of compliance with other environmental regulations associated with the FWPCA, the Clean Air Act of 1970, or any state or local requirements be included and, furthermore, that an annual inflation rate of greater than 5 percent should have been used. Base-line costs estimated for the power generating industry which reflect the needs for additional capital, generation costs, costs to consumers, energy consumption, etc., which would ensue without consideration of the effects of these regulations were prepared by EPA for the purpose of evaluating the industry-wide costs of compliance with the regulations.

In consideration of these comments and additional data, several base line cost estimating assumptions were modified as follows: (a) capital requirements were based on current projections of a 5.5 percent growth rate in capital expenditures for the industry over the next decade; (b) an annual inflation rate of 10.6 percent was assumed for fossil plants and 15.5 percent for nuclear plants for the 1970–75 period. Corresponding figures for the 1976–80 period were 8.0 and 8.2 percent respectively; (c) while the costs of compliance with other environmental regulations were not quantified and included in the baseline, the Agency considered the additional costs to the industry attributable to complying with these requirements in revising the thermal limitations.

(g) A commenter contended that because of the difficulty in accurately assessing the effect of section 316(a), the economic feasibility of the thermal limitations contained in this regulation should be determined without regard to exemptions which are expected to ensue under that section.

The Agency originally estimated that units representing 80 percent of existing capacity and 50 percent of new capacity would receive exemptions under section 316(a). The final regulation has been substantially modified and, as promulgated, applies to a much smaller percentage of presently operating units. Those which are covered are the largest new units, those over 500 megawatts rated capacity, which discharge the largest volumes of heat and will do so for the rest of the century. Accordingly, since the units which remain subject to these regulations are those which it is reasonable to anticipate will pose the greatest degree of environmental risk, the percentage of exemptions assumed has been correspondingly reduced. The Agency has calculated the capital and operating costs of the regulations under the assumption that no plants will receive exemptions and under the assumption that units representing low environmental risks will obtain an exemption from thermal control. The Agency recognizes the difficulty of precisely estimating the effect of section 316(a) given the particularized nature of proceedings under that section. The estimate reflects its best current projection and is based on a random sample of 180 plants with 455 units representing one-seventh of the total generating capacity in 1978. Plants and units within the sample represent a distribution of varying ages, sizes, capacity utilization rates, and locations. The methodology of the sampling will be described in detail in the "Economic Analysis of the Effluent Limitations for Steam Electric Powerplants" which will be published by the Office of Planning and Evaluation as soon as possible.

In summary, the assumptions used in estimating the percentage of capacity located on rivers which would be likely to receive exemptions are that no units which at full capacity withdraw greater than 70 percent of the average stream flow would receive exemptions and that 50 percent of units which at full capacity withdrew between 30 percent and 70 percent of the average flow would not receive an exemption. Units representing 50 percent of the capacity located on estuaries and lakes other than cooling lakes were assumed not to receive an exemption.

(h) A related comment was that the economic analysis should include the costs of compliance with alternate effluent limitations which may be imposed under section 316(a), such as "helper" towers, diffusers, discharge canals and other partially closed cycle systems.

The Agency has taken these costs into account in its assumptions as to the units which would receive exemptions under section 316(a). The "high risk" units (those described in the preceding paragraph) were assumed to receive no exemption and thus to employ closed cycle mechanical draft cooling towers on a continuous year-round basis. In fact, some such units could receive partial exemptions, i.e.; modified restrictions on heated discharge—which could be met by open or partially open cooling systems in conjunction with "helper" or "trimming" towers during all or some portion of the year. The costs of such modified systems would be less than those of continuous operation of a mechanical draft tower or, if they were not in some unusual instance, the cost of that tower would be the maximum cost incurred since it would certainly meet any modified thermal limitations. The EPA cost estimates are therefore conservatively high since they are based on the most costly technological alternative in cases where partial exemptions may be obtained under section 316(a).

(i) The Agency's capital cost estimates for retrofitting cooling towers were said to be understated because of a failure to consider the additional costs imposed by specific site dependent factors such as unusual geological or topographical conditions or the need in individual instances to install additional equipment to abate noise, control plumes, etc.

The Agency has revised its capital cost estimates to account for the presence of these factors, as previously explained. The increased retrofitting costs are consistent with an industry survey which includes incremental costs attributable to site dependent factors.

Closed cycle evaporative cooling consumes about 50 percent more water than does once-through cooling systems. While this incremental water consumed does have an associated cost in some States it is only in arid regions of the United States that unit water costs themselves are significant. At a typical site in the arid regions, the cost of additional water to compensate for incremental water consumed by closed cycle cooling would be approximately 0.01 mill per kilowatt-hour of electricity generated, assuming water consumption costs of $10 per acre-foot. By comparison, the typical total costs of generation are approximately 10 mills per kilowatt-hour at this site. Even under the "worst case" assumption of a highly inefficient plant located in the area in which water costs are five times higher than those typical of arid locations, incremental water consumptions costs would represent only 0.1 mills per kilowatt-hour, or 1 percent of total generating costs.

The non-monetary, environmental effects of increased water consumption are discussed above and will be discussed at greater length in the Development Document.

(16) Several commenters suggested that chemical pollutant limitations be applied to individual low volume waste streams rather than on all low volume streams taken as one source.

On review it was ascertained that this suggestion was not only technically feasible, but would result in a higher level of effluent reduction benefits compared to total cost of application of technology to achieve the limitation. The regulations have been changed to reflect this suggestion.

(17) Some commenters contended that the limitations of total suspended solids in blowdown from recirculating cooling water systems and other waste streams should be applied on a "net" rather than a "gross" basis. That is, the limitations

should take into account the presence of pollutants in water intake supplies.

The effluent limitations have generally been developed on a gross or absolute basis. In most cases the technologies which are available to control the pollutants or pollutant parameters will achieve the effluent limitations established regardless of the presence of these pollutants in influent water. However, the Agency recognizes that in certain instances pollutants will be present in navigable waters which supply a plant's intake in significant concentrations, which may not be removed to the levels specified in the limitations, by the application of treatment technology contemplated by these regulations. Accordingly, the Agency is currently developing amendments to its NPDES permit regulations (40 CFR 125) which will specify the situations in which the permit issuing authority may allow a credit for such pollutants. The amendment will be proposed for public comment in the near future. The question of net versus gross effluent limitations for this category will be discussed in greater detail in the Development Document.

The promulgated regulations contain no limitation on suspended solids discharged in cooling tower blowdown. The Agency has removed restrictions on the discharge of suspended solids from this source because they consist almost entirely of suspended solids not added by the industrial process.

(18) Several commenters complained that certain of the proposed limitations of no discharge for best available technology economically achievable had not been fully demonstrated for general application.

The no discharge limitations on low volume wastes which were included in the original proposal have been removed from the present regulations for BATEA since the technology has not been demonstrated adequately for this industry and costs appear to be excessive at this time. Mechanical cleaning systems for maintaining condenser tube cleanliness rather than use of biocide addition to cooling water has been determined not to be adequately demonstrated for new source performance standards. While use of these no discharge technologies does not currently constitute best available technology economically achievable or best demonstrated technology, their use on a case-by-case basis may be necessary to meet effluent limitations based on water quality standards.

The limitations reflecting recycle of bottom ash sluice water have been retained for both the BATEA and new source performance standards, having been adequately demonstrated. The new source performance standard of no discharge of corrosion inhibitors, reflecting demonstrated technology of design for corrosion protection rather than chemical addition for corrosion control in closed-cycle cooling systems, has been retained in the regulation.

(19) Some commenters reported that the specific numerical limitations in the proposed regulation for total suspended solids, oil and grease, and iron and copper were impracticable to achieve.

Further analysis, stimulated in part by these comments, revealed that based on the application of available technology an adjustment of some of the numerical limitations was necessary. The specific numerical limitations in the regulations were revised as follows: the originally proposed total suspended solids limit of 15 mg/l x flow was revised to 30 mg/l x flow; the oil and grease limitation of 10 mg/l x flow was increased to 15 mg/l x flow. The originally proposed limitations on iron and copper of 1 mg/l were verified as achievable.

(20) Several comments were addressed to the definitions used in the effluent limitations for chlorine. It was suggested that the definitions of the terms "free available chlorine" and "total residual chlorine" be based on ASTM methods D–1253 and D–1427, and the use of the simpler ortho-tolidine method rather than the amperometric titration method which requires the use of a skilled technician.

Total residual chlorine is the sum of free available chlorine and combined available chlorine. EPA has issued "Guidelines Establishing Test Procedures for the Analysis of Pollutants" 38 F.R. 28758–28760 (October 16, 1973). These Guidelines list, as approved test procedures for the analysis of total residual chlorine the colorimetric and amperometric titration methods prescribed in "Standard Methods for the Examination of Water and Wastewater," 13th Edition, 1971 page 382 and in "Annual Book of Standards, Part 23, Water Atmospheric Analysis, 1972" page 238, which prescribes the ASTM methods. Free available chlorine is not addressed by the EPA Guidelines. The Agency has determined that such test procedures are to be used by permit applicants to demonstrate that effluent discharges meet applicable pollutant discharge limitations.

The procedures for total residual chlorine in polluted waters prescribed beginning at page 382 of "Standard Methods" are listed under the heading "Iodometric Method"; however, both the amperometric and starch-iodide procedures are given. Both free available chlorine and total residual chlorine can be determined by the former, but only total residual chlorine can be determined by the latter. The "Standard Methods" procedure specifically referred to by the EPA Guidelines does not describe the test for "free available chlorine." However, "Standard Methods" describes further beginning at page 112, the amperometric titration method for the determination of free available chlorine as well as total residual chlorine in natural and treated waters.

The amperometric titration method is employed by commercially available feedback control instrumentation which can be employed to achieve the prescribed effluent limitations on free available chlorine. The amperometric titration method is among the most accurate for the determination of free or combined available chlorine. The method is largely unaffected by the presence of common oxidizing agents, temperature variations, and turbidity and color, which interfere with the accuracy of the other methods. The ASTM reference for "total residual chlorine" describes the amperometric titration method under the heading "Referee Method." Two nonreferee methods are prescribed, a colorimetric method and a dilution-colorimetric method, both of which use ortho-tolidine solution as a reagent. Both free available chlorine residual and total chlorine residual can be determined by the amperometric titration and the colorimetric methods as described in the ASTM procedures but only total chlorine residual can be determined by the dilution-colorimetric method. Based on the above, the Agency has determined that the amperometric titration method described beginning at page 112 of "Standard Methods" should provide the basis for the definition of "free available chlorine" for the purpose of this regulation.

(21) Several comments suggested alternative limitations on the discharge of free available chlorine and total residual chlorine from cooling water systems. The major contentions were as follows: (a) That seawater systems require higher levels than the proposed limitations; (b) that the limitations should be applied to non-recirculating house service water systems as well as to main condenser cooling water; (c) that the limitations should be clarified; (d) that the limitations were significantly higher than water quality levels recommended for aquatic life in freshwater and in marine and estuarine waters; (e) that the two-hour period per day limit for each unit could not be attained where a plant had more than twelve units if no two units could be chlorinated simultaneously; (f) that the limitations should allow chlorination for more than one period a day provided that the total span of chlorination time did not exceed two hours a day; (g) that where two or more units share common intake and discharge conduits, the discharge of free available chlorine might be minimized by simultaneous chlorination of the units; (h) that chlorination be limited to individual units during periods of low flow through the condenser of the unit undergoing chlorination and high flow through other units; (i) that chlorine limitations be based on total residual chlorine rather than free available chlorine since it is the former that determines damage to acquatic life; (j) that ozone offered promise as a substitute for chlorine; (k) that the discharge of biocides other than chlorine be allowed but not in excess of the 96 hour TLM_{50} for natural fish species; (l) that the technology for achieving no discharge of total residual chlorine from recirculating cooling water systems had not been fully demonstrated and thus cannot be used as a basis for the standards; (m) that since mechanical means of biological control of main condensers

are not always adequate and must be supplemented by chlorination, the no discharge limitation on total residual chlorine or other biocides used for biological control in main condenser tubes of noncirculating cooling water systems is not generally achievable; (n) that requiring chlorination during periods of lowest flow through condensers was not in accordance with practical operating procedures; (o) that the no discharge chlorine limitations are not consistent with requirements for sewage treatment plants to maintain chlorine residuals; (p) that even if effective mechanical means were employed to maintain condenser tube cleanliness, chlorine addition would be required from time to time to prevent biological fouling of other parts of the cooling systems; (q) that discharge limitations on other biocides be considered; and (r) that no discharge limits on biocides would discourage development of biocides that will not have adverse environmental effects.

The Agency recognizes the significance of the effluent limitations on chlorine in view of the extremely large volume of cooling water discharged by powerplants, the large quantities of chlorine added to cooling water by powerplants, and the known adverse effects of chlorine on aquatic organisms. It is further recognized by EPA that the chlorine residuals required to maintain adequate condenser tube cleanliness and to prevent biological fouling in other parts of cooling systems and the effectiveness of means other than chlorination vary seasonally and from site-to-site largely due to widespread differences in the type and quantities of organisms encountered. Thus, rather than establishing technology-based effluent limitations on chlorine which can be met by all dischargers at all times and which would therefore of necessity be very lenient in all but the worst cases, EPA has established effluent limitations on the concentrations in which chlorine may be discharged and the times during which chlorination may be practiced, has authorized modification in these limitations if a discharger can demonstrate that compliance with them will not allow an adequate level of condenser tube cleanliness or adequate biological protection for other parts of a unit's cooling system. The establishment of generally achievable effluent limitations on chlorine does not constitute a determination by EPA that the compliance by individual dischargers with more stringent effluent limitations required to protect aquatic life would not be technically achievable while still assuring adequate biological control of powerplant cooling systems. The limitations on chlorine do not reflect mechanical means of condenser tube cleaning or chlorination and blowdown control programs for recirculating cooling water systems since these technologies have not been adequately demonstrated for industry-wide application.

(22) Several commenters addressed the general subject of corrosion inhibitors in closed-cycle cooling systems. The most significant issues raised were as follows: (a) that a no discharge limitation on corrosion inhibitors would discourage development of inhibitors having no significant adverse environmental impacts; (b) that since antiscalants could not be used, higher blowdown rates would be needed to adequately control the higher calcium sulfate concentration arising due to acid addition for scale control in cooling systems; (c) that the allowance of 5 mg/l of phosphorous is lenient considering that discharges from sewerage treatment plants into Lake Michigan are limited to 1 mg/l; (d) that for non-chromate corrosion inhibitors the discharge levels should not exceed the 96 hour TLM *50* for native fish species; (e) that a chromate limit of 5 mg/l would permit low chromate treatment for corrosion control without the addition of a chromate recovery system; (f) that a no discharge limitation on corrosion inhibitors would result in the need for expensive corrosion resistant metals, many of which are in short supply; and (g) that non-toxic corrosion inhibitors are available and in use and should not be prohibited.

The design of closed-cycle cooling systems for corrosion protection without the need for the addition of corrosion inhibitors is a fully demonstrated technology for steam-electric powerplants. Recommended construction materials for components of cooling towers in saltwater service, the most severe case for corrosion protection, include asbestos cement, certain types of concrete, paint and epoxy coatings, plastics including reinforced fiberglass and polyvinylchloride, stainless steel, silicon bronze, and pressure-treated wood. The use of these materials rather than conventional materials is estimated to add about 2 to 3 percent to the costs of saltwater cooling systems. The overall costs of closed-cycle saltwater cooling systems including the added capital cost for the condenser, can be as much as 8 to 10 percent greater than for closed-cycle freshwater cooling systems.

The development and use of non-toxic corrosion inhibitors would continue to the extent that many powerplants and other uses of closed-cycle water systems are not required to meet the no discharge effluent limitation, which applies only to new steam electric powerplants. Since design for corrosion protection does not preclude the necessity for the addition of antiscalants and other materials where needed for control of cooling system water chemistry for reasons other than corrosion inhibition, no limitation on these materials is established by these regulations. The regulation reflecting best available technology economically achievable is based on chemical treatment technology for the removal of chromium, zinc, and phosphorus from cooling tower blowdown. The effluent limitations prescribed reflect the use of alternate corrosion inhibitors and are based on generally achievable limits for chemical treatment to remove all three pollutants. Chemical treatment for phosphorus removal from sewage treatment plant effluents could be designed for phosphorus removal only, hence, lower effluent phosphorus concentrations may be achievable for sewage plants on Lake Michigan. According to NPDES permit application data, major steam electric powerplants discharge an estimated 56,000,000 pounds per year of chromium and 7,300,000 pounds per year of zinc. These amounts represent, respectively, 50 percent and 21 percent of the total amounts of these materials discharged by all major industrial dischargers combined. Hence, the importance of effluent limitations on the discharge of these pollutants from steam electric powerplants is demonstrated.

(23) Some commenters suggested that maximum design rainfall runoff, and areas requiring runoff protection, be more clearly defined and that runoff in excess of designed runoff be allowed without limitation.

The regulation has been revised to more clearly define rainfall runoff areas more explicitly and provides for discharge without limitation when rainfall exceeds the specified design capacity.

(24) Some commenters suggested that the regulations allow sufficient flexibility for a variety of water reuse and treatment schemes, e.g., the use of cooling tower blowdown and other reclaimed wastewater for the transport of fly ash.

It is the position of the Agency that, since available waste water treatment systems are generally effluent concentration limited, reduction in the quantities of waste water requiring treatment should be encouraged in order to reduce the amounts of pollutants discharged to receiving waters. In-plant water reuse can reduce the quantities of waste water requiring treatment and, hence, the amounts of pollutants discharged. It is also recognized by EPA that, due to the economies of scale, combining similar waste streams for treatment to remove the same pollutants is generally less costly than separate treatment of these waste streams. The employment of cost-saving alternatives in meeting the effluent limitations should not be discouraged. Therefore, the regulations provide that, where various parallel waste streams are combined for treatment or discharge, the quantity of each pollutant at the discharge and attributable to each waste source shall not exceed the limitation specified for that waste source. Such a provision is designed to allow generally for combined treatment to meet the same effluent limitations that would be applied if the waste streams were treated separately. Furthermore, the regulations allow for a variety of possible combinations for treatment or discharge of waste streams, so long as the quantity of each controlled pollutant attributable to each waste source does not exceed the specified limitation for that waste source.

(25) Some commenters suggested that, based on cost considerations, small plants and plants scheduled to be retired within six years following the BATEA compliance date be exempted from the BATEA requirements of the proposed guidelines for pollutants other than heat.

The proposed BATEA limitations were based on a significantly more costly technology than that upon which the final regulations are based. EPA recognizes that the cost of equipment is greater in relation to the generating capacity of the plant for a small plant than for a large plant. However, technological means for achieving the BATEA limitations on pollutants other than heat are available which require lower capital expenditure than the treatment models used by EPA to estimate the costs for achieving the BATEA limitations. Operating costs for meeting BATEA would reflect the extent of the operation of the plant in any case, as would the pollutant discharges that would ensue. Therefore, costs do not justify a general exemption of either old or small plants from the BATEA limitations on pollutants other than heat.

(26) Some commenters suggested that the regulations for chemical pollutants should permit a discharger to proceed directly to a system to meet the 1983 standards by an accelerated date, even if this precludes meeting the 1977 effluent limitations by July 1, 1977. This could then avoid the wasteful backfitting required to substantially alter the best practicable (1977) treatment system to meet the 1983 limitations.

This comment was based on the proposed BATEA chemical limitations which have been significantly revised in the final regulation. The Agency has established best practicable and best available technologies to represent a logical technical progression toward meeting the goals of the Act. The treatment and control systems which provide the basis for best available technology are add-on systems which require no significant backfitting to the best practicable treatment and control technologie. Accordingly, there would be no technical reason for delaying compliance with the deadlines of the Act.

(27) Some commenters suggested that EPA had not adequately analyzed the costs for disposal of chemical wastes from treatment of powerplant effluents and waste solids such as sludge. The storage and control of the large volumes of soluble salts would have a substantial environmental impact which could be greater than the impact of discharging these salts to receiving waters.

The Agency has determined, based on the above and other factors, that the effluent limitations on low volumes waste sources should reflect the technology of chemical treatment and solids removal rather than concentration by evaporation and total recycle to achieve no discharge of pollutants. Nationally uniform application of this latter technology would have required the land disposal of the dissolved solids removed from low volume waste waters of all U.S. powerplants. The remaining sludges from the application of chemical treatment and solids removal technology require some dewatering prior to land disposal. Costs for dewatering by filtration have been considered. EPA estimates that for a typical new 1000 megawatt coal-fired plant about 5 acres of land would be required for disposal of chemical treatment sludges over the life of the plant compared to approximately 120 acres required for ash disposal. Plants with wet-scrubber air pollution control devices would require considerably more land, as a base, for disposal of sludges. All other powerpants would require typically an estimated less than one acre of land per 1000 megawatts of generating capacity for disposal of chemical treatment sludges over the life of the plant.

(28) Some commenters suggested that EPA had underestimated the costs of compliance with the proposed effluent limitations for pollutants other than heat. In support of this suggestion, additional data was submitted on the quantities of waste water from the individual waste sources requiring treatment. It was also suggested that, in support of an alternative cost analysis submitted by commenters, the installation costs for waste water treatment and control at existing plants would be best estimated at 150 percent of equipment costs rather than the 50 percent figure used in the EPA cost analysis. The incremental 100 percent would reflect the incremental costs attendant to backfitting those controls, while the 50 percent figure would reflect only installations which would not require backfitting, as would be the case for new sources. Additional information was submitted concerning the costs of modifications to once-through ash handling systems to achieve recycle of bottom ash transport water, the cost of dry fly ash handling systems, the costs of rainfall runoff control and treatment, and the additional costs that would be incurred to treat ash pond discharges in the cases where bottom ash sluice water and fly ash sluice water already are combined in the same ash pond and the resulting ash pond discharge, after incorporation of recycle to bottom ash handling, would require final treatment to meet the effluent limitations. Some of the industry-wide costs analyses submitted by commenters were based, however, on applying the worst case across the total U.S. generating capacity.

In consideration of these comments for the purpose of estimating the cost of compliance, EPA has modified the waste water flow quantities for some of the individual waste sources, has used an installation cost factor of 100 percent of equipment costs for existing plants, and has revised its estimates of the costs of meeting the effluent limitations on ash sluice transport water and on rainfall.

(29) Some comments suggested that EPA has failed to consider the benefits that would result from the chemical effluent limitations.

EPA has determined the effluent reduction benefits of the chemical limitations in coal-fired plants alone by 1990 would be the removal of approximately 280,000,000,000 pounds per year of total suspended solids (not including ash solids normally removed by ash ponds), 4,270,000 pounds per year of total iron, and 135,000 pounds per year of total copper that would otherwise be discharged. Furthermore, large amounts of other pollutants such as phosphorus, chromium, zinc and other heavy metals would also be removed. Powerplants are estimated, based on NPDES permit applications, to currently discharge approximately 5,600,000 pounds of chromium per year and 7,300,000 pounds of zinc per year, which are, respectively, 50 percent and 21 percent of the total quantities currently discharged by all major industrial dischargers in the U.S. Powerplants added, according to FPC statistics, about 3,900,000 pounds of phosphates, 42,000,000 pounds of lime, 76,000,000 pounds of caustic soda, 21,000,000 pounds of alum, and 51,000,000 pounds of chlorine chemicals to cooling water and boiler water in 1970.

(30) Some commenters suggested that the proposed limitations on chemical pollutants would impose enormous costs.

EPA has determined the nationwide costs associated with compliance with the effluent limitations on pollutants other than heat by 1983 could be as follows: the increased capital required is $1.4 billion, the increase in electrical generating costs is 0.2 mills per kilowatt hour. The increase in fuel consumption and lost generating capacity would be negligible. The Agency has concluded that the cost of installing and operating chemical treatment systems are reasonable in view of the effluent reduction benefits.

(31) Some commenters noted that the proposed regulations were not made directly applicable to discharges from electrical generating facilities using sources of heat other than coal, oil, gas, or nuclear fuel. Such sources would potentially include geothermal steam and industrial by-products such as carbon monoxide, blast-furnace gas, pitch and tar, bagasse, and wood refuse.

These regulations apply to the operation of steam electric power generating point sources by an establishment primarily engaged in the generation of electricity for distribution and sale, which generation 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 a thermodynamic medium. It is estimated that very few utility-type steam electric units are not covered by this regulation. Other electrical generating sources, such as those employed as captive operations at other industrial point sources, e.g., steel mills, chemical plants, etc., will be covered in a separate regulation.

(C) Economic Impact

The revisions to the regulation described above will significantly reduce its cost and economic impact. The Agency estimates that the regulation will increase the utility industry's capital requirements by an additional 6.6 billion dollars by 1983, without allowing for the

reduction in capital cost which may be expected as a result of exemptions from the thermal limitations obtained under section 316(a). (These and all other estimates are expressed in constant 1974 dollars). After having given effect to the number of exemptions which the Agency anticipates under that section, the comparable figure is 4.1 billion dollars.

The capital requirements attributable to thermal control are 5.2 billion, assuming no 316(a) exemptions, and 2.7 billion after taking the estimated exemptions under that section into account.

The operating expenditures during the period 1974–1983 associated with the thermal limitations are estimated to be 1.3 billion dollars and 0.8 billion dollars, before and after 316(a) exemptions, respectively, an increase of 0.4 to 0.2 percent of total industry operating expenses.

The fuel penalty associated with the thermal limitations consists of additional fuel required to operate the closed-cycle cooling system and additional fuel required per kilowatt-hour resulting from efficiency losses due to increased turbine backpressure. The combined annual fuel penalty is approximately 3 percent. In addition, there will be a transient 2.1 percent fuel penalty associated with generation of interim replacement capacity during outages for conversion to closed cycle. The fuel penalty estimated represents approximately 16 million tons of coal (a 1.6 percent increase in projected 1983 coal consumption) and 44,000 barrels per day of oil (a 0.2 percent increase in projected 1983 oil consumption). After 316(a) exemptions, the corresponding figures are reduced by about one-half.

The capital cost of construction of treatment facilities to comply with the restrictions on chemical discharges is estimated to aggregate 1.4 billion by 1983. Operating costs during this period attributable to chemical control are estimated at 2.0 billion, imposing an approximately 0.6 percent increase in the industry's total operating expenses.

The combined effect of capital and operating costs for both thermal and chemical pollution control would increase the cost of electricity to consumers by a maximum of 2.2 percent by 1983. This price increase is not expected to have a significant affect on the growth of demand for electricity. Moreover, while the capital costs are substantial in absolute terms, they represent, without accounting for expected exemptions for thermal limitations, approximately 3 percent of the capital which the industry is planning to invest over the next decade for expansion of its generation capacity. The Agency has concluded that the industry will be able to obtain sufficient additional capital to finance the expenditures for water pollution control.

The costs of complying with the water pollution control requirements are not expected to have any effect on the production of electricity nor on employment in the industry.

(d) Publication of information on processes, procedures, or operating methods which result in the elimination or reduction of the discharge of pollutants.

In conformance with the requirements of section 304(c) of the Act, a manual entitled "Development Document for Effluent Limitations Guidelines and New Source Performance Standards for the Steam Electric Power Generating Point Source Category" is being published and will be available for purchase from the Government Printing Office, Washington, D.C. 20402 for a nominal fee.

The Agency anticipates that approximately six weeks will be required to complete preparation of the final Development Document so that it accurately describes the regulation, revised as indicated above. The Development Document, of course, will be prepared on the basis of information and data now available to the Agency; no additional data will be solicited, collected or accepted. As soon as the Development Document is submitted to the Government Printing Office, copies of the text will be made available for review and duplication in the Agency's Public Information Office.

(E) Final Rulemaking

In consideration of the foregoing, 40 CFR Chapter I, Subchapter N, is hereby amended by adding a new Part 423, Steam Electric Power Generating Point Source Category, to read as set forth below.

An order of the Federal District Court for the District of Columbia entered in Natural Resources Defense Council, Inc. v. Train (Cv. No. 1609–73) required that the Administrator sign final effluent limitations guidelines for this industry category by July 26, 1974. Subsequent modifications of that order extended the date for promulgation until September 25, 1974. However, on March 15, 1974, the District Court ordered that the effective dates for regulations established by its initial order remain applicable and not be affected by extensions in the promulgation date. That initial order requires that effluent limitations guidelines establishing "best practicable control technology currently available" for this industry be effective upon publication. Accordingly, good cause is found for the final regulations promulgated below establishing best practicable control technology currently available for each subpart to be effective upon publication in the Federal Register.

The regulations establishing the best available technology economically achievable, the standards of performance for new sources and the new source pretreatment standards shall become effective on November 7, 1974.

Dated: October 2, 1974.

Russell E. Train,
Administrator.

Subpart A—Generating Unit Subcategory

Sec.
423.10 Applicability; description of the generating unit subcategory.
423.11 Specialized definitions.
423.12 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.
423.13 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.
423.14 [Reserved]
423.15 Standards of performance for new sources.
423.16 Pretreatment standards for new sources.

Subpart B—Small Unit Subcategory

423.20 Applicability; description of the small unit subcategory.
423.21 Specialized definitions.
423.22 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.
423.23 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.
423.24 [Reserved]
423.25 Standards of performance for new sources.
423.26 Pretreatment standards for new sources.

Subpart C—Old Unit Subcategory

423.30 Applicability; description of the old unit subcategory.
423.31 Specialized definitions.
423.32 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.
423.33 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.
423.34 [Reserved.]

Subpart D—Area Runoff Subcategory

423.40 Applicability; description of the area runoff subcategory.
423.41 Specialized definitions.
423.42 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.
423.43 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.
423.44 Reserved.
423.45 Standards of performance for new sources.
423.46 Pretreatment standards for new sources.

Authority: Secs. 301, 304 (b) and (c), 306 (b) and (c), 307(c) and 501(a) of the Federal Water Pollution Control Act, as amended (33 U.S.C. 1215, 1311, 1314 (b) and (c), 1316 (b) and (c), 1317(c) and 1361(a)), 86 Stat. 816 et seq.; Pub. L. 92-500.

Subpart A—Generating Unit Subcategory

§ 423.10 Applicability; description of the generating unit subcategory.

The provisions of this subpart are applicable to discharges resulting from the operation of a generating unit by an establishment primarily engaged in the generation of 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.

§ 423.11 Specialized definitions.

For the purpose of this subpart:

(a) Except as provided below, the general definitions, abbreviations and methods of analysis set forth in 40 CFR Part 401 shall apply to this subpart.

(b) The term "generating unit" shall mean any generating unit subject to the provisions of this part, except those units defined below as small, or old.

(c) The term "small unit" shall mean any generating unit subject to the provisions of this part, except a unit defined below as old, of 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.

(d) The term "old unit" shall mean any generating unit, subject to the provisions of this part, of 500 megawatts or greater rated net generating capacity which was first placed in service on or before January 1, 1970 and any generating unit of less than 500 megawatts rated net generating capacity which was first placed in service on or before January 1, 1974.

(e) The term "blowdown" shall mean the minimum discharge of recirculating water for the purpose of discharging materials contained in the water, the further buildup of which would cause concentrations in amounts exceeding limits established by best engineering practice.

(f) The term "free available chlorine" shall mean the value obtained using the amperometric titration method for free available chlorine described in "Standard Methods for the Examination of Water and Wastewater", page 112 (13th edition).

(g) The term "sufficient land" shall mean 100 sq m (1100 sq ft) or more per megawatt of nameplate generating capacity.

(h) The term "low volume waste sources" shall mean, taken collectively as if from one source, wastewater from all sources except those for which specific limitations are otherwise established in this subpart. Low volume wastes sources would include but are not limited to waste 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.

(i) The term "ash transport water" shall mean water used in the hydraulic transport of either fly ash or bottom ash.

(j) The term "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.

(k) The term "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.

(l) The term "recirculated cooling water" shall mean water which is 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.

(m) The term "cooling pond" shall mean any manmade 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.

(n) The term "cooling lake" shall mean any manmade 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.

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

(a) In establishing the limitations set forth in this section, EPA took into account all information it was able to collect, develop and solicit with respect to factors (such as age and size of plant, utilization of facilities, raw materials, manufacturing processes, non-water quality environmental impacts, control and treatment technology available, energy requirements and costs) which can affect the industry subcategorization and effluent levels established. It is, however, possible that data which would affect these limitations have not been available and, as a result, these limitations should be adjusted for certain plants in this industry. An individual discharger or other interested person may submit evidence to the Regional Administrator (or to the State, if the State has the authority to issue NPDES permits) that factors relating to the equipment or facilities involved, the process applied, or other such factors related to such discharger are fundamentally different from the factors considered in the establishment of the guidelines. On the basis of such evidence or other available information, the Regional Administrator (or the State) will make a written finding that such factors are or are not fundamentally different for that facility compared to those specified in the Development Document. If such fundamentally different factors are found to exist, the Regional Administrator or the State shall establish for the discharger effluent limitations in the NPDES permit either more or less stringent than the limitations established herein, to the extent dictated by such fundamentally different factors. Such limitations must be approved by the Administrator of the Environmental Protection Agency. The Administrator may approve or disapprove such limitations, specify other limitations, or initiate proceedings to revise these regulations.

(b) The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section, which may be discharged by a point source subject to the provisions of this subpart after application of the best practicable control technology currently available:

(1) The pH of all discharges, except once through cooling water, shall be within the range of 6.0–9.0.

(2) There shall be no discharge of polychlorinated biphenol compounds such as those commonly used for transformer fluid.

(3) The quantity of pollutants discharged from low volume waste sources shall not exceed the quantity determined by multiplying the flow of low volume waste sources times the concentration listed in the following table:

Effluent characteristic	Maximum for any one day	Average of daily values for thirty consecutive days shall not exceed
TSS	100 mg/l	30 mg/l.
Oil and Grease	20 mg/l	15 mg/l.

(4) The quality of pollutants discharged in ash transport water shall not exceed the quantity determined by multiplying the flow of ash transport water times the concentration listed in the following table:

Effluent characteristic	Maximum for any one day	Average of daily values for thirty consecutive days shall not exceed
TSS	100 mg/l	30 mg/l.
Oil and Grease	20 mg/l	15 mg/l.

(5) The quantity of pollutants discharged in metal cleaning wastes shall not exceed the quantity determined by multiplying the flow of metal cleaning wastes times the concentration listed in the following table:

Effluent characteristic	Maximum for any one day	Average of daily values for thirty consecutive days shall not exceed
TSS	100 mg/l	30 mg/l.
Oil and Grease	20 mg/l	15 mg/l.
Copper, Total	1.0 mg/l	1.0 mg/l.
Iron, Total	1.0 mg/l	1.0 mg/l.

(6) The quantity of pollutants discharged in boiler blowdown shall not exceed the quantity determined by multiplying the flow of boiler blowdown times the concentration listed in the following table:

Effluent characteristic	Maximum for any one day	Average of daily values for thirty consecutive days shall not exceed
TSS	100 mg/l	30 mg/l.
Oil and Grease	20 mg/l	15 mg/l.
Copper, Total	1.0 mg/l	1.0 mg/l.
Iron, Total	1.0 mg/l	1.0 mg/l.

(7) The quantity of pollutants discharged in once through cooling water shall not exceed the quantity determined by multiplying the flow of once through cooling water sources times the concentration listed in the following table:

Effluent Characteristic	Maximum Concentration	Average Concentration
Free available chlorine.	0.5 mg/l	0.2 mg/l.

(8) The quantity of pollutants discharged in cooling tower blowdown shall not exceed the quantity determined by multiplying the flow of cooling tower blowdown sources times the concentration listed in the following table:

Effluent Characteristic	Maximum Concentration	Average Concentration
Free available chlorine.	0.5 mg/l	0.2 mg/l.

(9) Neither free available chlorine nor total residual chlorine may be discharged from any unit for more than two hours in any one day and not more than one unit in any plant may discharge free available or total residual chlorine at any one time unless the utility can demonstrate to the regional administrator or State, if the State has NPDES permit issuing authority, that the units in a particular location cannot operate at or below this level of chlorination.

(10) In the event that waste streams from various sources are combined for treatment or discharge, the quantity of each pollutant or pollutant property controlled in paragraphs (a)(1) through (10) of this section attributable to each controlled waste source shall not exceed the specified limitation for that waste source.

§ 423.13 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section, which may be discharged by a point source subject to the provisions of this subpart after application of the best available technology economically achievable:

(a) The pH of all discharges, except once through cooling water, shall be within the range of 6.0–9.0

(b) There shall be no discharge of polychlorinated biphenol compounds such as those commonly used for transformer fluid.

(c) The quantity of pollutants discharged from low volume waste sources shall not exceed the quantity determined by multiplying the flow of low volume waste sources times the concentration listed in the following table:

Effluent characteristic	Maximum for any one day	Average of daily values for thirty consecutive days shall not exceed
TSS	100 mg/l	30 mg/l.
Oil and Grease	20 mg/l	15 mg/l.

(d) The quantity of pollutants discharged in bottom ash transport water shall not exceed the quantity determined by multiplying the flow of bottom ash transport water times the concentration listed in the following table and dividing the product by 12.5:

Effluent characteristic	Maximum for any one day	Average of daily values for thirty consecutive days shall not exceed
TSS	100 mg/l	30 mg/l.
Oil and Grease	20 mg/l	15 mg/l.

(e) The quantity of pollutants discharged in fly ash sluicing shall not exceed the quantity determined by multiplying the flow of fly ash transport water times the concentration listed in the following table:

Effluent characteristic	Maximum for any one day	Average of daily values for thirty consecutive days shall not exceed
TSS	100 mg/l	30 mg/l.
Oil and Grease	20 mg/l	15 mg/l.

(f) The quantity of pollutants discharged in metal cleaning wastes shall not exceed the quantity determined by multiplying the flow of metal cleaning wastes times the concentration listed in the following table:

Effluent characteristic	Maximum for any one day	Average of daily values for thirty consecutive days shall not exceed
TSS	100 mg/l	30 mg/l.
Oil and Grease	20 mg/l	15 mg/l.
Copper, Total	1.0 mg/l	1.0 mg/l.
Iron, Total	1.0 mg/l	1.0 mg/l.

(g) The quantity of pollutants discharged in boiler blowdown shall not exceed the quantity determined by multiplying the flow of boiler blowdown times the concentration listed in the following table:

Effluent characteristic	Maximum for any one day	Average of daily values for thirty consecutive days shall not exceed
TSS	100 mg/l	30 mg/l.
Oil and Grease	20 mg/l	15 mg/l.
Copper, Total	1.0 mg/l	1.0 mg/l.
Iron, Total	1.0 mg/l	1.0 mg/l.

(h) The quantity of pollutants discharged in once through condenser water shall not exceed the quantity determined by multiplying the flow of once through condenser water sources times the concentration listed in the following table:

Effluent Characteristic	Maximum Concentration	Average Concentration
Free available chlorine.	0.5 mg/l	0.2 mg/l.

(i) The quantity of pollutants discharged from cooling tower blowdown shall not exceed the quantity determined by multiplying the flow of cooling tower blowdown times the concentration listed in the following table:

Effluent Characteristic	Maximum Concentration	Average Concentration
Free available chlorine.	0.5 mg/l	0.2 mg/l.

	Maximum for any one day	Average of daily values for thirty consecutive days shall not exceed
Zinc	1.0 mg/l	1.0 mg/l.
Chromium	0.2 mg/l	0.2 mg/l.
Phosphorous	5.0 mg/l	5.0 mg/l.
Other corrosion inhibiting materials	Limit to be established on a case by case basis.	

(j) Neither free available chlorine nor total residual chlorine may be discharged from any unit for more than two hours in any one day and not more than one unit in any plant may discharge free available or total residual chlorine at any one time unless the utility can demonstrate to the regional administrator or state, if the state has NPDES permit issuing authority, that the units in a particular location cannot operate at or below this level of chlorination.

(k) In the event that waste streams from various sources are combined for treatment or discharge, the quantity of each pollutant or pollutant property controlled in paragraphs (a) through (j) of this section attributable to each controlled waste source shall not exceed the specified limitation for that waste source.

(l) There shall be no discharge of heat from the main condensers except:

(1) Heat may be discharged in blowdown from recirculated cooling water systems provided the temperature at which the blowdown is discharged does not exceed at any time the lowest temperature of recirculating cooling water prior to the addition of the make-up water.

(2) Heat may be discharged in blowdown from recirculated cooling water systems which have been designed to discharge blowdown water at a temperature above the lowest temperature of recirculated cooling water prior to the addition of make-up water providing such recirculating cooling systems have been placed in operation or are under construction prior to the effective date of this regulation.

(3) Heat may be discharged where the owner or operator of a unit otherwise subject to this limitation can demonstrate that a cooling pond or cooling lake is used or is under construction as of the effective date of this regulation to cool

recirculated cooling water before it is recirculated to the main condensers.

(4) Heat may be discharged where the owner or operator of a unit otherwise subject to this limitation can demonstrate that sufficient land for the construction and operation of mechanical draft evaporative cooling towers is not available (after consideration of alternate land use assignments) on the premises or on adjoining property under the ownership or control of the owner or operator as of March 4, 1974, and that no alternate recirculating cooling system is practicable.

(5) Heat may be discharged where the owner or operator of a unit otherwise subject to this limitation can demonstrate that the total dissolved solids concentration in blowdown exceeds 30,000 mg/l and land not owned or controlled by the owner or operator as of March 4, 1974, is located within 150 meters (500 feet) in the prevailing downwind direction of every practicable location for mechanical draft cooling towers and that no alternate recirculating cooling system is practicable.

(6) Heat may be discharged where the owner or operator of a unit otherwise subject to this limitation can demonstrate to the regional administrator or State, if the State has NPDES permit issuing authority, that the plume which must necessarily emit from a cooling tower would cause a substantial hazard to commercial aviation and that no alternate recirculated cooling water system is practicable. In making such demonstration to the regional administrator or State the owner or operator of such unit must include a finding by the Federal Aviation Administration that the visible plume emitted from a well-operated cooling tower would in fact cause a substantial hazard to commerical aviation in the vicinity of a major commercial airport.

(m) The limitation of paragraph (1) of this section shall become effective on July 1, 1981.

(n) In the event that a regional reliability council, or when no functioning regional reliability council exists, a major utility or consortium of utilities, can demonstrate to the regional administrator or State, if the State has NPDES permit issuing authority, that the system reliability would be seriously impacted by complying with the effective date set forth in paragraph (m) above, the regional administrator may accept an alternative proposed schedule of compliance on the part of all the utilities concerned providing, however, that such schedule of compliance will require that units representing not less than 50 percent of the affected generating capacity shall meet the compliance date, that units representing not less than an additional 30 percent of the generating capacity shall comply not later than July 1, 1982 and the balance of units shall comply not later than July 1, 1983.

§ 423.14 [Reserved]

§ 423.15 Standards of performance for new sources.

The following standards of performance establish the quantity or quality of pollutants or pollutant properties, controlled by this section, which may be discharged by a new source subject to the provisions of this subpart:

(a) The pH of all discharges, except once through cooling water, shall be within the range of 6.0–9.0.

(b) There shall be no discharge of polychlorinated biphenol compounds such as those commonly used for transformer fluid.

(c) The quantity of pollutants discharged from low volume waste sources shall not exceed the quantity determined by multiplying the flow of low volume waste sources times the concentration listed in the following table:

Effluent characteristic	Maximum for any one day	Average of daily values for thirty consecutive days shall not exceed
TSS	100 mg/l	30 mg/l.
Oil and Grease	20 mg/l	15 mg/l.

(d) The quantity of pollutants discharged in bottom ash transport water shall not exceed the quantity determined by multiplying the flow of bottom ash transport water times the concentration listed in the following table and dividing the product by 20:

Effluent characteristic	Maximum for any one day	Average of daily values for thirty consecutive days shall not exceed
TSS	100 mg/l	30 mg/l.
Oil and Grease	20 mg/l	15 mg/l.

(e) There shall be no discharge of TSS or oil and grease in fly ash transport water.

(f) The quantity of pollutants discharged from metal cleaning wastes shall not exceed the quantity determined by multiplying the flow of metal cleaning wastes times the concentration listed in the following table:

Effluent characteristic	Maximum for any one day	Average of daily values for thirty consecutive days shall not exceed
TSS	100 mg/l	30 mg/l.
Oil and Grease	20 mg/l	15 mg/l.
Copper, Total	1.0 mg/l	1.0 mg/l.
Iron, Total	1.0 mg/l	1.0 mg/l.

(g) The quantity of pollutants discharged in boiler blowdown shall not exceed the quantity determined by multiplying the flow of boiler blowdown times the concentration listed in the following table:

Effluent characteristic	Maximum for any one day	Average of daily values for thirty consecutive days shall not exceed
TSS	100 mg/l	30 mg/l.
Oil and Grease	20 mg/l	15 mg/l.
Copper, Total	1.0 mg/l	1.0 mg/l.
Iron, Total	1.0 mg/l	1.0 mg/l.

(h) The quantity of pollutants discharged in once through cooling water shall not exceed the quantity determined by multiplying the flow of once through cooling water times the concentration listed in the following table:

Effluent Characteristic	Maximum Concentration	Average Concentration
Free available chlorine.	0.5 mg/l	0.2 mg/l.

(i) The quantity of pollutants discharged in cooling tower blowdown shall not exceed the quantity determined by multiplying the flow of cooling tower blowdown sources times the concentration listed in the following table:

Effluent Characteristic	Maximum Concentration	Average Concentration
Free available chlorine.	0.5 mg/l	0.2 mg/l.
	Maximum for any one day	Average of daily values for thirty consecutive days shall not exceed
Materials added for corrosion inhibition including but not limited to zinc, chromium, phosphorous.	No detectable amount.	No detectable amount.

(j) Neither free available chlorine nor total residual chlorine may be discharged from any unit for more than two hours in any one day and not more than one unit in any plant may discharge free available or total residual chlorine at any one time unless the utility can demonstrate to the regional administrator or state, if the state has NPDES permit issuing authority, that the units in a particular location cannot operate at or below this level of chlorination.

(k) In the event that waste streams from various sources are combined for treatment or discharge, the quantity of each pollutant or pollutant property controlled in paragraphs (a) through (j) of this section attributable to each controlled waste source shall not exceed the specified limitation for that waste source.

(l) There shall be no discharge of heat from the main condensers except:

(1) Heat may be discharged in blowdown from recirculated cooling water systems provided the temperature at which the blowdown is discharged does not exceed at any time the lowest temperature of recirculated cooling water prior to the addition of the make-up water.

(2) Heat may be discharged in blowdown from cooling ponds provided the temperature at which the blowdown is discharged does not exceed at any time the lowest temperature of recirculated cooling water prior to the addition of the make-up water.

§ 423.16 Pretreatment standards for new sources.

The pretreatment standards under section 307(c) of the Act for a source within the generating unit subcategory, which is a user of a publicly owned treatment works (and which would be a new source subject to section 306 of the Act, if it were to discharge pollutants to the navigable waters), shall be the standard set forth in 40 CFR Part 128, except that,

for the purpose of this section, 40 CFR 128.133 shall be amended to read as follows:

In addition to the prohibitions set forth in 40 CFR 128.131, the pretreatment standard for incompatible pollutants introduced into a publicly owned treatment works shall be the standard of performance for new sources specified in 40 CFR 423.15 except for the following pollutants or pollutant parameters for which the following pretreatment standards are established:

Pollutant or pollutant parameter:	*Pretreatment standard*
Heat	No limitation.
Free available chlorine	Do.
Total residual chlorine	Do.

If the publicly owned treatment works which receives the pollutants is committed, in its NPDES permit, to remove a specified percentage of any incompatible pollutant, the pretreatment standard applicable to users of such treatment works shall, except in the case of standards providing for no discharge of pollutants, be correspondingly reduced in stringency for that pollutant.

Subpart B—Small Unit Subcategory

§ 423.20 Applicability; description of the small unit subcategory.

The provisions of this subpart are applicable to discharges resulting from the operation of a small unit by an establishment primarily engaged in the generation of 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.

§ 423.21 Specialized definitions.

For the purpose of this subpart:

(a) Except as provided below, the general definitions, abbreviations and methods of analysis set forth in 40 CFR Part 401 shall apply to this subpart.

(b) The term "small unit" shall mean any generating unit subject to the provisions of this part, except a unit defined below as old, of 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.

(c) The term "old unit" shall mean any generating unit, subject to the provisions of this part, of 500 megawatts or greater rated net generating capacity which was first placed in service on or before January 1, 1970 and any generating unit of less than 500 megawatts rated net generating capacity which was first placed in service on or before January 1, 1974.

(d) The term "blowdown" shall mean the minimum discharge of recirculating water for the purpose of discharging materials contained in the water, the further buildup of which would cause concentrations in amounts exceeding limits established by best engineering practice.

(e) The term "free available chlorine" shall mean the value obtained using the amperometric titration method for free available chlorine described in "Standard Methods for the Examination of Water and Wastewater", page 112 (13th Edition).

(f) The term "low volume waste sources" shall mean, taken collectively as if from one source, wastewater from all sources except those for which specific limitations are otherwise established in this subpart. Low volume wastes sources include but are not limited to waste 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, blowdown from recirculating house service water systems.

(g) The term "ash transport water" shall mean water used in the hydraulic transport of either fly ash or bottom ash.

(h) The term "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.

(i) The term "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.

(j) The term "recirculated cooling water" shall mean water which is 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.

(k) The term "cooling pond" shall mean any manmade 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.

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

(a) In establishing the limitations set forth in this section, EPA took into account all information it was able to collect, develop and solicit with respect to factors (such as age and size of plant, utilization of facilities, raw materials, manufacturing processes, non-water quality environmental impacts, control and treatment technology available, energy requirements and costs) which can affect the industry subcategorization and effluent levels established. It is, however, possible that data which would affect these limitations have not been available and, as a result, these limitations should be adjusted for certain plants in this industry. An individual discharger or other interested person may submit evidence to the Regional Administrator (or to the State, if the State has the authority to issue NPDES permits) that factors relating to the equipment or facilities involved, the process applied, or other such factors related to such discharger are fundamentally different from the factors considered in the establishment of the guidelines. On the basis of such evidence or other available information, the Regional Administrator (or the State) will make a written finding that such factors are or are not fundamentally different for that facility compared to those specified in the Development Document. If such fundamentally different factors are found to exist, the Regional Administrator or the State shall establish for the discharger effluent limitations in the NPDES permit either more or less stringent than the limitations established herein, to the extent dictated by such fundamentally different factors. Such limitations must be approved by the Administrator of the Environmental Protection Agency. The Administrator may approve or disapprove such limitations, specify other limitations, or initiate proceedings to revise these regulations.

(b) The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section, which may be discharged by a point source subject to the provisions of this subpart after application of the best practicable control technology currently available:

(1) The pH of all discharges, except once through cooling water, shall be within the range of 6.0–9.0.

(2) There shall be no discharge of polychlorinated biphenol compounds such as those commonly used for transformer fluid.

(3) The quantity of pollutants discharged from low volume waste sources shall not exceed the quantity determined by multiplying the flow of low volume waste sources times the concentration listed in the following table:

Effluent characteristic	Maximum for any one day	Average of daily values for thirty consecutive days shall not exceed
TSS	100 mg/l	30 mg/l.
Oil and Grease	20 mg/l	15 mg/l.

(4) The quantity of pollutants discharged in ash transport water shall not exceed the quantity determined by multiplying the flow of ash transport water times the concentration listed in the following table:

Effluent characteristic	Maximum for any one day	Average of daily values for thirty consecutive days shall not exceed
TSS	100 mg/l	30 mg/l.
Oil and Grease	20 mg/l	15 mg/l.

(5) The quantity of pollutants discharged in metal cleaning wastes shall not exceed the quantity determined by multiplying the flow of metal cleaning wastes times the concentration listed in the following table:

Effluent characteristic	Maximum for any one day	Average of daily values for thirty consecutive days shall not exceed
TSS	100 mg/l	30 mg/l.
Oil and Grease	20 mg/l	15 mg/l.
Copper, Total	1.0 mg/l	1.0 mg/l.
Iron, Total	1.0 mg/l	1.0 mg/l.

(6) The quantity of pollutants discharged in boiler blowdown shall not exceed the quantity determined by multiplying the flow of boiler blowdown times the concentration listed in the following table:

Effluent characteristic	Maximum for any one day	Average of daily values for thirty consecutive days shall not exceed
TSS	100 mg/l	30 mg/l.
Oil and Grease	20 mg/l	15 mg/l.
Copper, Total	1.0 mg/l	1.0 mg/l.
Iron, Total	1.0 mg/l	1.0 mg/l.

(7) The quantity of pollutants discharged in once through cooling water shall not exceed the quantity determined by multiplying the flow of once through cooling water sources times the concentration listed in the following table:

Effluent Characteristic	Maximum Concentration	Average Concentration
Free available chlorine.	0.5 mg/l	0.2 mg/l.

(8) The quantity of pollutants discharged in cooling tower blowdown shall not exceed the quantity determined by multiplying the flow of cooling tower blowdown sources times the concentration listed in the following table:

Effluent Characteristic	Maximum Concentration	Average Concentration
Free available chlorine.	0.5 mg/l	0.2 mg/l.

(9) Neither free available chlorine nor total residual chlorine may be discharged from any unit for more than two hours in any one day and not more than one unit in any plant may discharge free available or total residual chlorine at any one time unless the utility can demonstrate to the regional administrator or state, if the state has NPDES permit issuing authority, that the units in a particular location cannot operate at or below this level of chlorination.

(10) In the event that waste streams from various sources are combined for treatment or discharge, the quantity of each pollutant or pollutant property controlled in paragraphs (a) (1) through (10) of this section attributable to each controlled waste source shall not exceed the specified limitation for that waste source.

§ 423.23 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section, which may be discharged by a point source subject to the provisions of this subpart after application of the best available technology economically achievable:

(a) The pH of all discharges, except once through cooling water, shall be within the range of 6.0–9.0.

(b) There shall be no discharge of polychlorinated biphenol compounds such as those commonly used for transformer fluid.

(c) The quantity of pollutants discharged from low volume waste sources shall not exceed the quantity determined by multiplying the flow of low volume waste sources times the concentration listed in the following table:

Effluent characteristic	Maximum for any one day	Average of daily values for thirty consecutive days shall not exceed
TSS	100 mg/l	30 mg/l.
Oil and Grease	20 mg/l	15 mg/l.

(d) The quantity of pollutants discharged in bottom ash transport water shall not exceed the quantity determined by multiplying the flow of bottom ash transport water times the concentration listed in the following table and dividing the product by 12.5:

Effluent characteristic	Maximum for any one day	Average of daily values for thirty consecutive days shall not exceed
TSS	100 mg/l	30 mg/l.
Oil and Grease	20 mg/l	15 mg/l.

(e) The quantity of pollutants discharged in fly ash transport water shall not exceed the quantity determined by multiplying the flow of fly ash transport water times the concentration listed in the following table:

Effluent characteristic	Maximum for any one day	Average of daily values for thirty consecutive days shall not exceed
TSS	100 mg/l	30 mg/l.
Oil and Grease	20 mg/l	15 mg/l.

(f) The quantity of pollutants discharged in metal cleaning wastes shall not exceed the quantity determined by multiplying the flow of metal cleaning wastes times the concentration listed in the following table:

Effluent characteristic	Maximum for any one day	Average of daily values for thirty consecutive days shall not exceed
TSS	100 mg/l	30 mg/l.
Oil and Grease	20 mg/l	15 mg/l.
Copper, Total	1.0 mg/l	1.0 mg/l.
Iron, Total	1.0 mg/l	1.0 mg/l.

(g) The quantity of pollutants discharged in boiler blowdown shall not exceed the quantity determined by multiplying the flow of boiler blowdown times the concentration listed in the following table:

Effluent characteristic	Maximum for any one day	Average of daily values for thirty consecutive days shall not exceed
TSS	100 mg/l	30 mg/l.
Oil and Grease	20 mg/l	15 mg/l.
Copper, Total	1.0 mg/l	1.0 mg/l.
Iron, Total	1.0 mg/l	1.0 mg/l.

(h) The quantity of pollutants discharged in once through condenser water shall not exceed the quantity determined by multiplying the flow of once through condenser water sources times the concentration listed in the following table:

Effluent Characteristic	Maximum Concentration	Average Concentration
Free available chlorine.	0.5 mg/l	0.2 mg/l.

(i) The quantity of pollutants discharged in cooling tower blowdown shall not exceed the quantity determined by multiplying the flow of low volume waste sources times the concentration listed in the following table:

Effluent Characteristic	Maximum Concentration	Average Concentration
Free available chlorine.	0.5 mg/l	0.2 mg/l.
	Maximum for any one day	Average of daily values for thirty consecutive days shall not exceed
Zinc	1.0 mg/l	1.0 mg/l.
Chromium	0.2 mg/l	0.2 mg/l.
Phosphate	5.0 mg/l	5.0 mg/l.
Other corrosion inhibiting materials.	Limit to be established on a case by case basis.	

(j) Neither free available chlorine nor total residual chlorine may be discharged from any unit for more than two hours in any one day and not more than one unit in any plant may discharge free available or total residual chlorine at any one time unless the utility can demonstrate to the regional administrator or state, if the state has NPDES permit issuing authority, that the units in a particular location cannot operate at or below this level of chlorination.

(k) In the event that waste streams from various sources are combined for

treatment or discharge, the quantity of each pollutant or pollutant property controlled in paragraphs (a) through (j) of this section attributable to each controlled waste source shall not exceed the specified limitation for that waste source.

§ 423.24 [Reserved]

§ 423.25 Standards of performance for new sources.

The following standards of performance establish the quantity or quality of pollutants or pollutant properties, controlled by this section, which may be discharged by a new source subject to the provisions of this subpart:

(a) The pH of all discharges, except once through cooling water, shall be within the range of 6.0–9.0.

(b) There shall be no discharge of polychlorinated biphenol compounds such as those commonly used for transformer fluid.

(c) The quantity of pollutants discharged from low volume waste sources shall not exceed the quantity determined by multiplying the flow of low volume waste sources times the concentration listed in the following table:

Effluent characteristic	Maximum for any one day	Average of daily values for thirty consecutive days shall not exceed
TSS	100 mg/l	30 mg/l.
Oil and Grease	20 mg/l	15 mg/l

(d) The quantity of pollutants discharged in bottom ash transport water shall not exceed the quantity determined by multiplying the flow of bottom ash transport water times the concentration listed in the following table and dividing the product by 20:

Effluent characteristic	Maximum for any one day	Average of daily values for thirty consecutive days shall not exceed
TSS	100 mg/l	30 mg/l.
Oil and Grease	20 mg/l	15 mg/l.

(e) There shall be no discharge of TSS or oil and grease in fly ash transport water.

(f) The quantity of pollutants discharged in metal cleaning wastes shall not exceed the quantity determined by multiplying the flow of metal cleaning wastes times the concentration listed in the following table:

Effluent characteristic	Maximum for any one day	Average of daily values for thirty consecutive days shall not exceed
TSS	100 mg/l	30 mg/l.
Oil and Grease	20 mg/l	15 mg/l.
Copper, Total	1.0 mg/l	1.0 mg/l.
Iron, Total	1.0 mg/l	1.0 mg/l.

(g) The quantity of pollutants discharged in boiler blowdown shall not exceed the quantity determined by multiplying the flow of boiler blowdown times the concentration listed in the following table:

Effluent characteristic	Maximum for any one day	Average of daily values for thirty consecutive days shall not exceed
TSS	100 mg/l	30 mg/l.
Oil and Grease	20 mg/l	15 mg/l.
Copper, Total	1.0 mg/l	1.0 mg/l.
Iron, Total	1.0 mg/l	1.0 mg/l.

(h) The quantity of pollutants discharged in once through cooling water shall not exceed the quantity determined by multiplying the flow of once through cooling water times the concentration listed in the following table:

Effluent Characteristic	Maximum Concentration	Average Concentration
Free available chlorine.	0.5 mg/l	0.2 mg/l.

(i) The quantity of pollutants discharged in cooling tower blowdown shall not exceed the quantity determined by multiplying the flow of cooling tower blowdown sources times the concentration listed in the following table:

Effluent Characteristic	Maximum Concentration	Average Concentration
Free available chlorine.	0.5 mg/l	0.2 mg/l.
	Maximum for any one day	Average of daily values for thirty consecutive days shall not exceed
Materials added for corrosion inhibition including zinc, chromium, phosphorous and other.	No detectable amount.	No detectable amount.

(j) Neither free available chlorine nor total residual chlorine may be discharged from any unit for more than two hours in any one day and not more than one unit in any plant may discharge free available or total residual chlorine at any one time unless the utility can demonstrate to the regional administrator or state, if the state has NPDES permit issuing authority, that the units in a particular location cannot operate at or below this level of chlorination.

(k) In the event that waste steams from various sources are combined for treatment, or discharge, the quantity of each pollutant or pollutant property controlled in paragraphs (a) through (j) of this section attributable to each controlled waste source shall not exceed the specified limitation for that waste source.

(l) There shall be no discharge of heat from the main condensers except:

(1) Heat may be discharged in blowdown from recirculated cooling water systems provided the temperature at which the blowdown is discharged does not exceed at any time the lowest temperature of recirculated cooling water prior to the addition of the make-up water.

(2) Heat may be discharged in blowdown from cooling ponds provided the temperature at which the blowdown is discharged does not exceed at any time the lowest temperature of recirculated cooling water prior to the addition of the make-up water.

§ 423.26 Pretreatment standards for new sources.

The pretreatment standards under section 307(c) of the Act for a source within the small unit subcategory, which is a user of a publicly owned treatment works (and which would be a new source subject to section 306 of the Act, if it were to discharge pollutants to the navigable waters), shall be the standard set forth in 40 CFR Part 128, except that, for the purpose of this section, 40 CFR 128.133 shall be amended to read as follows:

In addition to the prohibitions set forth in 40 CFR 128.131, the pretreatment standard for incompatible pollutants introduced into a publicly owned treatment works shall be the standard of performance for new sources specified in 40 CFR 423.25 except for the following pollutants or pollutant parameters for which the following pretreatment standards are established:

Pollutant or pollutant parameter	*Pretreatment standard*
Heat	No limitation.
Free available chlorine	Do.
Total residual chlorine	Do.

If the publicly owned treatment works which receives the pollutants is committed, in its NPDES permit, to remove a specified percentage of any incompatible pollutant, the pretreatment standard applicable to users of such treatment works shall, except in the case of standards providing for no discharge of pollutants, be correspondingly reduced in stringency for that pollutant.

Subpart C—Old Unit Subcategory

§ 423.30 Applicability; description of the old unit subcategory.

The provisions of this subpart are applicable to discharges resulting from the operation of an old unit by an establishment primarily engaged in the generation of 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.

§ 423.31 Specialized definitions.

For the purpose of this subpart:

(a) Except as provided below, the general definitions, abbreviations and methods of analysis set forth in 40 CFR Part 401 shall apply to this subpart.

(b) The term "old unit" shall mean any generating unit, subject to the provisions of this part, of 500 megawatts or greater rated net generating capacity which was first placed in service on or before January 1, 1970 and any generating unit of less than 500 megawatts rated net generating capacity which was first placed in service on or before January 1, 1974.

(c) The term "blowdown" shall mean the minimum discharge of recirculating water for the purpose of discharging materials contained in the water, the further buildup of which would cause con-

centrations in amounts exceeding limits established by best engineering practice.

(d) The term "free available chlorine" shall mean the value obtained using the amperometric titration method for free available chlorine described in "Standard Methods for the Examination of Water and Wastewater", page 112 (13th Edition).

(e) The term "low volume waste sources" shall mean, taken collectively as if from one source, wastewater from all sources except those for which specific limitations are otherwise established in this subpart. Low volume wastes sources include but are not limited to waste 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, blowdown from recirculating house service water systems.

(f) The term "ash transport water" shall mean water used in the hydraulic transport of either fly ash or bottom ash.

(g) The term "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.

(h) The term "once through cooling water" shall mean water passed through the main cooling condensers in one or two passes for the purpose of removing waste process heat from the generating unit.

(i) The term "recirculated cooling water" shall mean water which is passed through the main condensers for the purpose of removing waste heat from the generating unit passed through a cooling device for the purpose of removing such heat from the water and then passed again through the main condenser.

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

(a) In establishing the limitations set forth in this section, EPA took into account all information it was able to collect, develop and solicit with respect to factors (such as age and size of plant, utilization of facilities, raw materials, manufacturing processes, non-water quality environmental impacts, control and treatment technology available, energy requirements and costs) which can affect the industry subcategorization and effluent levels established. It is, however, possible that data which would affect these limitations have not been available and, as a result, these limitations should be adjusted for certain plants in this industry. An individual discharger or other interested person may submit evidence to the Regional Administrator (or to the State, if the State has the authority to issue NPDES permits) that factors relating to the equipment or facilities involved the process applied, or other such factors related to such discharger are fundamentally different from the factors considered in the establishment of the guidelines. On the basis of such evidence or other available information, the Regional Administrator (or the State) will make a written finding that such factors are or are not fundamentally different for that facility compared to those specified in the Development Document. If such fundamentally different factors are found to exist, the Regional Administrator or the State shall establish for the discharger effluent limitations in the NPDES permit either more or less stringent than the limitations established herein, to the extent dictated by such fundamentally different factors. Such limitations must be approved by the Administrator of the Environmental Protection Agency. The Administrator may approve or disapprove such limitations, specify other limitations, or initiate proceedings to revise these regulations.

(b) The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section, which may be discharged by a point source subject to the provisions of this subpart after application of the best practicable control technology currently available:

(1) The pH of all discharges, except once through cooling water, shall be within the range of 6.0–9.0.

(2) There shall be no discharge of polychlorinated biphenol compounds such as those commonly used for transformer fluid.

(3) The quantity of pollutants discharged from low volume waste sources shall not exceed the quantity determined by multiplying the flow of low volume waste sources times the concentration listed in the following table:

Effluent characteristic	Maximum for any one day	Average of daily values for thirty consecutive days shall not exceed
TSS	100 mg/l	30 mg/l.
Oil and Grease	20 mg/l	15 mg/l.

(4) The quantity of pollutants discharged in ash transport water shall not exceed the quantity determined by multiplying the flow of ash transport water times the concentration listed in the following table.

Effluent characteristic	Maximum for any one day	Average of daily values for thirty consecutive days shall not exceed
TSS	100 mg/l	30 mg/l.
Oil and Grease	20 mg/l	15 mg/l.

(5) The quantity of pollutants discharged in metal cleaning wastes shall not exceed the quantity determined by multiplying the flow of metal cleaning wastes times the concentration listed in the following table:

Effluent characteristic	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
TSS	100 mg/l	30 mg/l.
Oil and Grease	20 mg/l	15 mg/l.
Copper, Total	1.0 mg/l	1.0 mg/l.
Iron, Total	1.0 mg/l	1.0 mg/l.

(6) The quantity of pollutants discharged in boiler blowdown shall not exceed the quantity determined by multiplying the flow of boiler blowdown times the concentration listed in the following table:

Effluent characteristic	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
TSS	100 mg/l	30 mg/l.
Oil and Grease	20 mg/l	15 mg/l.
Copper, Total	1.0 mg/l	1.0 mg/l.
Iron, Total	1.0 mg/l	1.0 mg/l.

(7) The quantity of pollutants discharged in once through cooling water shall not exceed the quantity determined by multiplying the flow of once through cooling water sources times the concentration listed in the following table:

Effluent Characteristic	Maximum Concentration	Average Concentration
Free available chlorine	0.5 mg/l	0.2 mg/l.

(8) The quantity of pollutants discharged in cooling tower blowdown shall not exceed the quantity determined by multiplying the flow of cooling tower blowdown sources times the concentration listed in the following table:

Effluent Characteristic	Maximum Concentration	Average Concentration
Free available chlorine	0.5 mg/l	0.2 mg/l.

(9) Neither free available chlorine nor total residual chlorine may be discharged from any unit for more than two hours in any one day and not more than one unit in any plant may discharge free available or total residual chlorine at any one time unless the utility can demonstrate to the regional administrator or state, if the state has NPDES permit issuing authority, that the units in a particular location cannot operate at or below this level of chlorination.

(10) In the event that waste streams from various sources are combined for treatment or discharge, the quantity of each pollutant or pollutant property controlled in paragraphs (a) (1) through (10) of this section attributable to each controlled waste source shall not exceed the specified limitation for that waste source.

§ 423.33 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section, which may be discharged by a point source subject to the provisions of this subpart after application of the best available technology:

(a) The pH of all discharges, except once through cooling water, shall be within the range of 6.0–9.0.

(b) There shall be no discharge of polychlorinated biphenol compounds such as those commonly used for transformer fluid.

(c) The quantity of pollutants discharged from low volume waste sources shall not exceed the quantity determined by multiplying the flow of low volume waste sources times the concentration listed in the following table:

Effluent characteristic	Maximum for any one day	Average of daily values for thirty consecutive days shall not exceed—
TSS	100 mg/l	30 mg/l.
Oil and Grease	20 mg/l	15 mg/l.

(d) The quantity of pollutants discharged in bottom ash transport water shall not exceed the quantity determined by multiplying the flow of bottom ash transport water times the concentration listed in the following table and dividing the product by 12.5:

Effluent characteristic	Maximum for any one day	Average of daily values for thirty consecutive days shall not exceed—
TSS	100 mg/l	30 mg/l.
Oil and Grease	20 mg/l	15 mg/l.

(e) The quantity of pollutants discharged in fly ash transport water shall not exceed the quantity determined by multiplying the flow of fly ash transport water times the concentration listed in the following table:

Effluent characteristic	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
TSS	100 mg/l	30 mg/l.
Oil and Grease	20 mg/l	15 mg/l.

(f) The quantity of pollutants discharged in metal cleaning wastes shall not exceed the quantity determined by multiplying the flow of metal cleaning wastes times the concentration listed in the following table:

Effluent characteristic	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
TSS	100 mg/l	30 mg/l.
Oil and Grease	20 mg/l	15 mg/l.
Copper, Total	1.0 mg/l	1.0 mg/l.
Iron, Total	1.0 mg/	1.0 mg/l.

(g) The quantity of pollutants discharged in boiler blowdown shall not exceed the quantity determined by multiplying the flow of boiler blowdown times the concentration listed in the following table:

Effluent characteristic	Maximum for any one day	Average of daily values for thirty consecutive days shall not exceed
TSS	100 mg/l	30 mg/l.
Oil and Grease	20 mg/l	15 mg/l.
Copper, Total	1.0 mg/l	1.0 mg/l.
Iron, Total	1.0 mg/l	1.0 mg/l.

(h) The quantity of pollutants discharged in once through condenser water shall not exceed the quantity determined by multiplying the flow of once through condenser water sources times the concentration listed in the following table:

Effluent Characteristic	Maximum Concentration	Average Concentration
Free available chlorine.	0.5 mg/l	0.2 mg/l.

(i) The quantity of pollutants discharged in cooling tower blowdown shall not exceed the quantity determined by multiplying the flow of low volume waste sources times the concentration listed in the following table:

Effluent Characteristic	Maximum Concentration	Average Concentration
Free available chlorine.	0.5 mg/l	0.2 mg/l.
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
Zinc	1.0 mg/l	1.0 mg/l.
Chromium	0.2 mg/l	0.2 mg/l.
Phosphate	5.0 mg/l	5.0 mg/l.
Other corrosion inhibiting materials.	Limit to be established on a case by case basis.	

(j) Neither free available chlorine nor total residual chlorine may be discharged from any unit for more than two hours in any one day and not more than one unit in any plant may discharge free available or total residual chlorine at any one time unless the utility can demonstrate to the regional administrator or state, if the state has NPDES permit issuing authority, that the units in a particular location cannot operate at or below this level of chlorination.

(k) In the event that waste streams from various sources are combined for treatment or discharge, the quantity of each pollutant or pollutant property controlled in paragraphs (a) through (j) of this section attributable to each controlled waste source shall not exceed the specified limitation for that waste source.

§ 423.34 [Reserved]

Subpart D—Area Runoff Subcategory

§ 423.40 Applicability; description of the area runoff subcategory.

The provisions of this subpart are applicable to discharges resulting from material storage runoff and construction runoff which are used in or derived from units subject to the limitations in subparts A, B, or C of this part.

§ 423.41 Specialized definitions.

For the purpose of this subpart:

(a) Except as provided below, the general definitions, abbreviations and methods of analysis set forth in 40 CFR Part 401 shall apply to this subpart.

(b) The term "material storage runoff" shall mean the rainfall runoff from or through any coal, ash or other material storage pile.

(c) The term "construction runoff" shall mean the rainfall runoff from any construction activity and any earth surface disturbed by such activity from the inception of the construction until construction is complete and any disturbed earth is returned to a vegetative or other cover commensurate with the intended land use.

(d) The term "10 year, 24 hour rainfall event" shall mean a rainfall event with a probable recurrence interval of once in ten years as defined by the National Weather Service in Technical Paper No. 40, "Rainfall Frequency Atlas of the United States," May 1961, and subsequent amendments, or equivalent regional or State rainfall probability information developed therefrom.

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

In establishing the limitations set forth in this section, EPA took into account all information it was able to collect, develop and solicit with respect to factors (such as age and size of plant, utilization of facilities, raw materials, manufacturing processes, non-water quality environmental impacts, control and treatment technology available, energy requirements and costs) which can affect the industry subcategorization and effluent levels established. It is, how-

ever, possible that data which would affect these limitations have not been available and, as a result, these limitations should be adjusted for certain plants in this industry. An individual discharger or other interested person may submit evidence to the Regional Administrator (or to the State, if the State has the authority to issue NPDES permits) that factors relating to the equipment or facilities involved, the process applied, or other such factors related to such discharger are fundamentally different from the factors considered in the establishment of the guidelines. On the basis of such evidence or other available information, the Regional Administrator (or the State) will make a written finding that such factors are or are not fundamentally different for that facility compared to those specified in the Development Document. If such fundamentally different factors are found to exist, the Regional Administrator or the State shall establish for the discharger effluent limitations in the NPDES permit either more or less stringent than the limitations established herein, to the extent dictated by such fundamentally different factors. Such limitations must be approved by the Administrator of the Environmental Protection Agency. The Administrator may approve or disapprove such limitations, specify other limitations, or initiate proceedings to revise these regulations.

(a) Subject to the provisions of paragraph (b) of this section, the following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section, which may be discharged by a point source subject to the provisions of this subpart after application of the best practicable control technology currently available:

Effluent characteristic:	*Effluent limitations*
TSS	Not to exceed 50 mg/l.
ph	Within the range 6.0 to 9.0.

(b) Any untreated overflow from facilities designed, constructed and operated to treat the volume of material storage runoff and construction runoff which is associated with a 10 year, 24 hour rainfall event shall not be subject to the limitations in subparagraph (a) of this section.

§ 423.43 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

(a) Subject to the provisions of paragraph (b) of this section, the following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section, which may be discharged by a point source subject to the provisions of this subpart after application of the best practicable control technology currently available:

Effluent characteristic:	*Effluent limitations*
TSS	Not to exceed 50 mg/l.
ph	Within the range 6.0 to 9.0.

(b) Any untreated overflow from facilities designed, constructed and operated to treat the volume of material storage runoff and construction runoff which results from a 10 year, 24 hour rainfall event shall not be subject to the limitations in paragraph (a) of this section.

§ 423.44 [Reserved]

§ 423.45 Standards of performance for new sources.

(a) Subject to the provisions of paragraph (b) of this section, the following standards of performance establish the quantity or quality of pollutants or pollutant properties, which may be discharged by a new source subject to the provisions of this subpart:

Effluent characteristic:	*Effluent limitations*
TSS	Not to exceed 50 mg/l.
ph	Within the range 6.0 to 9.0.

(b) Any untreated overflow from facilities designed, constructed and operated to treat the volume of material storage runoff and construction runoff which results from a 10 year, 24 hour rainfall event shall not be subject to the ph and TSS limitations stipulated in paragraph (a) of this section.

§ 423.46 Pretreatment standards for new sources.

The pretreatment standards under section 307(c) of the Act for a source within the area runoff subcategory, which is a user of a publicly owned treatment works (and which would be a new source subject to section 306 of the Act, if it were to discharge pollutants to the navigable waters), shall be the standard set forth in 40 CFR Part 128, except that, for the purpose of this section, 40 CFR 128.133 shall be amended to read as follows:

In addition to the prohibtions set forth in 40 CFR 128.131, the pretreatment standard for incompatible pollutants introduced into a publicly owned treatment works shall be the standard of performance for new sources specified in 40 CFR 423.45; *Provided*, That, if the publicly owned treatment works which receives the pollutants is committed, in its NPDES permit, to remove a specified percentage of any incompatible pollutant, the pretreatment standard applicable to users of such treatment works shall, except in the case of standards providing for no discharge of pollutants, be correspondingly reduced in stringency for that pollutant.

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