ENVIRONMENTAL PROTECTION AGENCY

[40 CFR Part 423]

EFFLUENT LIMITATIONS GUIDELINES AND STANDARDS FOR THE STEAM ELECTRIC POWER GENERATING POINT SOURCE CATEGORY

Notice of Proposed Rule-Making

Notice is hereby given that effluent limitations guidelines for existing sources and standards of performance and pretreatment standards for new sources set forth in tentative form below are proposed by the Environmental Protection Agency (EPA) for the steam electric power generating category pursuant to sections 301, 304 (b) and (c), 306(b), 307(c) and 501(a) of the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251, 1311, 1314 (b) and (c), and 1316(b), 1317(c) and 1361(a), 86 Stat. 816 et seq.; Pub. L. 92-500 (the Act).

(a) *Legal authority*—(1) *Existing point sources*. Section 301(b) of the Act requires the achievement by not later than July 1, 1977, of effluent limitations for point sources, other than publicly owned treatment works, which require the application of the best practicable control technology currently available as defined by the Administrator pursuant to section 304(b) of the Act. Section 301 (b) also requires the achievement by not later than July 1, 1983, of effluent limitations for point sources, other than publicly owned treatment works, which require the application of the best available technology economically achievable which will result in reasonable further progress toward the national goal of eliminating the discharge of all pollutants, as determined in accordance with regulations issued by the Administrator pursuant to section 304(b) of the Act.

Section 304(b) of the Act requires the Administrator to publish regulations providing guidelines for effluent limitations setting forth the degree of effluent reduction attainable through the application of the best practicable control technology currently available and the degree of effluent reduction attainable through the application of the best control measures and practices achievable including treatment techniques, process and procedure innovations, operating methods and other alternatives. The regulations proposed herein set forth effluent limitations guidelines, pursuant to section 304(b) of the Act, for the steam electric power generating category.

(2) *New sources*. Section 306 of the Act requires the achievement by new sources of a Federal standard of performance providing for the control of the discharge of pollutants which reflects the greatest degree of effluent reduction which the Administrator determines to be achievable through application of the best available demonstrated control technology, processes, operating methods, or other alternatives, including, where practicable, a standard permitting no discharge of pollutants.

Section 306(b)(1)(B) of the Act requires the Administrator to propose regulations establishing Federal standards of performance for categories of new sources included in a list published pursuant to section 306(b)(1)(A) of the Act. The Administrator published in the FEDERAL REGISTER of January 16, 1973, (38 FR 1624) a list of 27 source categories, including the steam electric power generating category. The regulations proposed herein set forth the standards of performance applicable to new sources within the steam electric power generating category.

Section 307(c) of the Act requires the Administrator to promulgate pretreatment standards for new sources at the same time that standards of performance for new sources are promulgated pursuant to section 306. Section 423.16 proposed below provides pretreatment standards for new sources within the steam electric power generating category.

Section 304(c) of the Act requires the Administrator to issue to the States and appropriate water pollution control agencies information on the processes, procedures or operating methods which result in the elimination or reduction of the discharge of pollutants to implement standards of performance under section 306 of the Act. The report referred to below provides, pursuant to section 304 (c) of the Act, preliminary information on such processes, procedures or operating methods.

(3) *Thermal discharges*. Section 316 (a) of the Act provides a means for further consideration of thermal effluent limitations required under sections 301 and 306 of the Act. Section 316(a) states that with respect to any point source subject to the provisions of sections 301 or 306, whenever the owner or operator of any such source, after opportunity for public hearing, can demonstrate to the satisfaction of the Administrator (or, if appropriate, the State) that any effluent limitation proposed for the control of the thermal component of any discharge from such source will require effluent limitations more stringent than necessary to assure the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in and on the body of water into which the discharge is to be made, the Administrator (or, if appropriate, the State) may impose a different effluent limitation for the thermal component of the discharge than would ordinarily be required under sections 301 and 306 of the Act. Effluent limitations imposed under section 316(a) must assure the protection and propagation of a balanced indigenous population of shellfish, fish, and wildlife in and on the body of water into which the discharge is to be made.

(b) *Summary and basis of proposed effluent limitations guidelines, standards of performance and pretreatment standards for new sources*—(1) *General methodology*. The effluent limitations guidelines and standards of performance proposed herein were developed in the following manner. The point source category was first studied for the purpose of determining whether separate limitations and standards are appropriate for different segments within the category. This analysis included a determination of whether differences in raw material used, product produced, manufacturing process employed, age, size, waste water constituents and other factors require development of separate limitations and standards for different segments of the point source category. The raw waste characteristics for each such segment were then identified. This included an analysis of (1) the source, flow and volume of water used in the process employed and the sources of waste and waste waters in the plant; and (2) the constituents of all waste water. The constituents of the waste waters which should be subject to effluent limitations guidelines and standards of performance were identified.

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

The information, as outlined above, was then evaluated in order to determine what levels of technology constitute the "best practicable control technology currently available," the "best available technology economically achievable" and the "best available demonstrated control technology, processes, operating methods, or other alternatives." In identifying such technologies, various factors were considered. These included the total cost of application of technology in relation to the effluent reduction benefits to be achieved from such application, the age of equipment and facilities involved, the process employed, the engineering aspects of the application of various types of control techniques, process changes, non-water quality environmental impact (including energy requirements) and other factors.

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

The pretreatment standards proposed herein are intended to be complementary to the pretreatment standards proposed for existing sources under Part 128 of 40 CFR. The basis for such standards are set forth in the FEDERAL REGISTER of July 19, 1973, 38 FR 19236. The provisions of Part 128 are equally applicable to sources which would constitute "new sources" under section 306 if they were to discharge pollutants directly to navigable waters, except for § 128.133. That section provides a pretreatment standard for "incompatible pollutants" which requires application of the "best practicable control technology currently available," subject to an adjustment for amounts of pollutants removed by the publicly owned treatment works. Since the pretreatment standards proposed herein apply to new sources, § 423.16 below amends § 128.133 to require application of the standard of performance for new sources rather than the "best practicable" standard applicable to existing sources under sections 301 and 304(b) of the Act.

(2) *Summary of conclusions with respect to steam electric power generating category.*—(i) *Categorization.* Steam electric powerplants utilize heat released from suitable fuels to produce steam which, in turn, drives turbine generators which produce electrical energy. The used, expanded steam is condensed into water by rejecting unusable waste heat into a cooling water circuit. The condensed steam, now high-purity water, is then returned to the powerplant boiler ready for re-use. The rejected heat must be discarded to the environment.

Steam electric powerplants (stations) are comprised of one or more generating units. A generating unit typically consists of a discrete boiler, turbine-generator and condenser system; however, some units employ multiple boilers with common headers to multiple turbine-generators. Fuel storage and handling facilities, water treatment equipment, electrical transmission facilities, and auxiliary components may be a part of a discrete generating unit or may service more than one generating unit.

The characteristics of waste water cause technology for the control and erating units because factors such as age, size, etc., are not correlated with waste load or practicability of employing control technology.

While there are no formal subcategories, differences in age, size, processes employed, etc., were considered in development of limitations and are reflected in the limitations and in the dates by which the limitations must be achieved. Betreatment of heat is specific to that parameter and higher in cost than technology required to control other parameters, the guidelines for heat were developed separately. Guidelines for other parameters apply (generally) to all genheat discharges and the degree of practicability of control and treatment technology for heat are closely associated with characteristics of the individual generating units employed. The most significant factors governing the quantity of waste heat generated relative to the electrical energy produced (a measure of the process efficiency) are the characteristics of the generating process employed. The significant process factors include the raw materials (fuel) employed, the boiler design pressure and temperature, cycle characteristics such as reheat and regeneration, and the turbine characteristics. Generally the newer, larger, more-efficient units are assigned base-load service and the older, smaller, less-efficient units are used for meeting peak demands. The type of service (base-load, etc.) and remaining service life characteristics are significant factors affecting the degree of practicability of attaining effluent reductions relative to the quantities of heat generated inasmuch as they determine, in combination, the amount of corresponding electrical energy production to which the control and treatment costs are compared.

The 1970 National Power Survey, a report by the Federal Power Commission (FPC) describes base-load, intermediate, and peaking units as follows. Base-load units are designed to run more or less continuously near full capacity, except for periodic maintenance shutdowns. Peaking units are designed to supply electricity, principally during times of maximum system demand, and characteristically run only a few hours a day. Units used for intermediate service between the extremes of base-load and peaking service must be able to respond readily to swings in systems demand, or cycling. Units used for base-load service produce 60 percent, or more, of their intended maximum output during any given year, i.e., 60 percent, or more, capacity factor; peaking units less than 20 percent; and cycling units 20 to 60 percent. The FPC Form 67, which must be submitted annually by all steam electric plants (except small plants or plants in small systems), reports average boiler capacity factors for each boiler. The boiler capacity factor is indicative of the gross generation of the associated generating unit. The net generation is less than the gross generation to the extent that electricity is used by the plant itself.

The operations and economics of nuclear power generation dictate base-load service for these units in spite of the significantly larger quantities of waste heat rejected to cooling water compared to otherwise similar fossil-fueled base-load units. Similarly, all of the large high-pressure, high-temperature, fossil-fueled units have been designed for base-load service.

The base-load units placed in service in the 1960's had as of 1970 approximately 15 or more years of base-load service remaining, but eventually the installation of more economic base-load generating units may make it desirable to convert certain units to cyclic or peaking service. However, some fossil-fueled units have been initially built for cyclic or peaking service, beginning in 1960 and extending to the present. Features of units designed for cyclic or peaking service include the absence of the use of coal as a fuel, high-pressure, high-temperature steam conditions, reheat stages, and some additional feed-water heaters which are normally used with most base-load units.

Base-load units represent approximately 70 percent of the total U.S. installed capacity of steam-electric powerplants, cycling units 25 percent, and peaking units 5 percent. However base-load units account for approximately 90 percent of the total U.S. steam electric energy generation, and therefore, approximately 90 percent of total effluent heat. Cycling units account for approximately 10 percent of the total effluent heat, and peaking units less than 1 percent.

(ii) *Waste characteristics.* The known characteristics of waste water discharges from steam electric powerplants include: acidity, algicides, alkalinity, aluminum, ammonia, biochemical oxygen demand, boron, bromide, chemical oxygen demand, chloride, copper, debris, fecal coliform, fluoride, free available chlorine, heat, iron, lead, magnesium, manganese, mercury, nitrate, oil and grease, pH, phenols, selenium, sulfate, sulfite, surfactants, total chromium, total dissolved solids, total hardness, total phosphorus, total residual chlorine, total solids, total suspended solids, turbidity, vanadium and zinc.

Steam electric powerplants discharge about 50 trillion gallons of waste water per year, which is roughly 15% of the total flow of waters in U.S. rivers and streams. Almost all of this water contains heat and in some cases chemicals added by the powerplants. Other waste waters from steam electric powerplants are relatively low in volume but can contain significant amounts of the full range of pollutants other than heat added by the powerplant.

(iii) *Control and treatment technology.*—(1) Heat. Thermal (waste heat) control and treatment technologies are of two general types; those which are designed to reduce the quantities of waste heat rejected from the process in relation to the quantities of electrical energy generated and those which are designed to eliminate to some degree the reliance upon a navigable water body as an intervening step leading to the ultimate transfer of the rejected heat to and beyond the atmosphere. The former type of thermal control is confined to in-process means, while the latter takes the form of external devices, other than navigable water bodies, which extract heat from the circulating cooling water after it obtains the rejected heat at the condenser. For the purpose of effluent heat reduction the latter is clearly the most cost effective over the range of significant effluent reductions.

External thermal control means take the form, on one extreme, of surface water bodies confined to the property of the powerplant; and, on the other, of configured engineering structures. Other methods between these extremes combine engineering equipment with the confined surface water bodies. The configured engineering structures (towers) are more universally applicable than means involving to any degree confined surface water bodies due to the significantly larger land areas needed for the latter.

Cooling towers are available utilizing any one, and in some cases more than one, of the following combinations of engineering characteristics: evaporative or nonevaporative, mechanical draft or natural draft, forced mechanical draft or induced mechanical draft, fan-assisted natural draft or unassisted natural draft, and crossflow or counterflow. The specific type of cooling tower most widely used at powerplants today is the crossflow, induced mechanical draft, evaporative tower. Theoretically, a cooling tower of any type could be designed to remove a part of or all of the waste heat rejected by any powerplant. In practice, however, site-dependent factors prevail which can preclude the application of any particular means for any particular powerplant and which further lead to the selection of the most appropriate means from the remaining candidates due to cost and other considerations.

Mechanical draft evaporative cooling towers are in operation in conjunction with approximately 200–300 or more steam electric generating units in the U.S. out of a total of about 3000 units at approximately 1000 plants. Natural draft evaporative cooling towers have been constructed, or are on order, for approximately 60 additional generating units. Between 50 and 100 more units employ unaugmented or mechanically augmented cooling lakes, ponds and canals. One dry (non-evaporative) cooling tower is in use in the U.S. In most cases, the external thermal control means are employed to completely recirculate the cooling water, except for the relatively small amounts discharged in the bleed, or blowdown, necessary for control of cooling water chemistry to achieve a practical degree of corrosion and scaling protection. In this manner essentially 100 percent of the waste heat rejected to the cooling water is removed and transferred directly to the atmosphere.

In establishing effluent limitations reflecting levels of technology corresponding to the best practicable control technology currently available (to be achieved no later than July 1, 1977), best available technology economically achievable (to be achieved no later than July 1, 1983), standards of performance for new sources, and pretreatment standards, it must be concluded that there is only one suitable technology available and demonstrated, evaporative external cooling to achieve essentially no discharge of heat, except for cold-side blowdown, in a closed, recirculating cooling system. The judgments involved are therefore reduced to the determination of the types of units to which the technology should be applied and when it should be applied, in the light of incremental national-scale costs versus effluent reduction benefits as well as unit-by-unit costs versus effluent reduction benefits and other factors.

In consideration of the total costs of the application of technology in relation to the effluent reduction benefits for heat, and other factors including energy and other non-water quality environmental impacts, the effluent limitations corresponding to the best practicable control technology currently available are no discharge of heat except for cold-side blowdown, for all large base-load units the construction of which is completed after July 1, 1977, as is reflected by the application of closed-cycle evaporative cooling systems. The mechanical draft evaporative cooling tower provides the basis for the analysis used to evaluate the costs, effluent reduction benefits and other factors. No limitation on heat is reflected by the best practicable control technology for cyclic and peaking units. No limitation on heat is reflected by the best practicable control technology for units with insufficient land available for mechanical draft towers, including spacing, or where salt water drift from mechanical draft towers could adversely impact neighboring land uses, provided no alternative technologies would be practicable.

In addition, for all units the construction of which has been or will be completed by July 1, 1977, no limitation on heat is reflected by the best practicable control technology, since, as more fully explained below, the limitation of no discharge of heat except for cold-side blowdown is not practically achievable by July 1, 1977, the date mandated by the Act for achievement of best practicable control technology currently available.

In consideration of the relevant factors including those required in the Act, such as the cost of achieving effluent reductions, energy and non-water quality environmental impacts, the effluent limitations corresponding to the best available technology economically achievable are no discharge of heat, except for cold-side blowdown, for all but the very oldest base-load units not covered by best practicable control technology currently available and for all cyclic and peaking units, as it reflected by the application of closed-cycle evaporative cooling systems. The mechanical draft evaporative cooling tower provides the basis for the analyses of costs and other factors. No limitation on heat is reflected by the best available technology economically achievable for units where sufficient land cannot be made available for mechanical draft towers, including spacing.

The time required for owners and operators of base-load units to complete the procedures for the consideration by the Regional Administrator of exemptions to the effluent limitations on heat, as provided by section 316(a) of the Act renders an effluent limitation of no discharge of heat except for cold-side blowdown outside the scope of best practicable control technology currently available for any unit which must achieve such limitation before July 1, 1977. An owner or operator following the procedure but failing to demonstrate that the effluent limitation proposed is excessively stringent could achieve an effluent limitation of no discharge by July 1, 1977, under only an optimistic set of conditions, if construction of the control means was not begun until after completion of the section 316(a) procedures. Hence, universal achievement of best practicable control technology currently available, as outlined above, by July 1, 1977, would not be realistic in the light of the time required for section 316(a) procedures. The Act contains no provisions which would allow for the delay of the required date for the application of section 301 effluent limitations in individual cases. However, since the Act requires that effluent limitations reflecting the application of the best available technology economically achievable by "no later than" July 1, 1983, it is concluded that these regulations can require that the effluent limitations be achieved by certain dates prior to July 1, 1983, if such dates are realistically achievable. Correspondingly, the realistic achievement of the goals of the Act would be served if dates for complete implementation of best available technology economically achievable were established that were realistic but not far past the 1977 horizon. This can be accomplished by limiting the coverage of the best practicable control technology currently available to the relatively small number of sources that would not be completed until after July 1, 1977. Since the scheduled dates for completion of construction for these sources would be distributed over the years 1977 to 1982, a no discharge limitation would be realistically achievable by the time affected sources would become operational.

Realistically achievable dates for the base-load units constructed before July 1, 1977, would be as follows:

1. Capacity of 500 MW and greater: July 1, 1978
2. Capacity 300 to 499 MW: July 1, 1979
3. Capacity 299 MW and less, except for small units: July 1, 1980
4. Small units, i.e., unit in a plant with a capacity less than 25 MW or in a system with a capacity less than 150 MW: July 1, 1983.

The proposed best practicable control technology currently available and best available technology economically achievable for heat are based on the above rationale.

In consideration of the relevant factors including those required in the Act, such as the cost of achieving effluent reductions, energy and non-water quality environmental impacts, the effluent limitations corresponding to standards of performance for new sources for heat are no discharge of heat, except for cold side blowdown, from all new sources, without variation.

(2) *Other pollutants.*—(A Best practicable control technologies currently available—a. *Cooling systems.* Chlorine concentrations in both recirculating and nonrecirculating cooling water systems are to be limited to average concentrations of 0.2 mg/l during a maximum of one 2-hour period a day and maximum concentrations of 0.5 mg/l. These limitations can be achieved by means of available feedback control systems presently in wide use in other applications. Chlorination for biological control can be applied intermittently and thus should not be applied on two or more units at the same plant simultaneously in order to minimize the maximum concentration of total residual chlorine at any time in the combined cooling water discharged from the plant. Furthermore, chlorination of individual units should be applied at times of lowest flow through the condensers to minimize the total amounts (mass) of total residual chlorine discharged. Generally chlorination is not required for more than two hours each day for each unit. However, additional chlorination may be allowed in specific cases to maintain tube cleanliness. Alternative methods of reducing the total residual chlorine in nonrecirculating condenser cooling water systems include chemical treatment, substitution of other less harmful chemicals, and use of mechanical means of cleaning condenser tubes. Mechanical cleaning is employed in some plants but its practicability depends on the configuration of the process piping and structures involved at the particular unit. Moreover, chlorine may still be discharged even with mechanical cleaning of condenser tubes, because of its continued use in maintaining biological control in other parts of the cooling system. Further removal of residual chlorine in nonrecirculating condenser cooling water systems by chemical treatment is available but is not generally practicable because of the additional costs involved to treat the large volumes of water involved.

Chemical treatment of recirculating cooling water systems would be less costly and the pollution potential of residual bisulfide chemicals added would be less significant than with nonrecirculating cooling water systems due to the smaller wastes water volumes requiring treatment. Experience in this technology is highly limited in the powerplant field; however, this is a well established technology in the water supply industry. Other technologies potentially available for recirculating cooling water systems are split stream chlorination, blowdown retention, and intermittent discharge programmed with intermittent chlorination.

The use of chemicals for control of biological growth, scaling and corrosion in evaporative cooling towers is commonplace. The types and amounts of chemicals required is highly site-dependent. Chromate addition is not generally required for corrosion control. Phosphates and zinc salts are employed in some cases. Insufficient data exists to judge what alternative chemicals for control of corrosion, etc., would be generally practicable from a cost versus effluent reduction benefit standpoint. Minimum discharge of added chemicals can be achieved by employing the best practicable technology for water treatment and water chemistry to minimize the quantities of blowdown flow required. In cases where cooling towers are planned, design for corrosion protection can eliminate the need for chemical additives for corrosion protection. Treatment of cooling tower blowdown for oil and grease removal, by chemical addition for effluent pH control, and by sedimentation for reduction of effluent total suspended solids is achievable. Effluent levels of 10 mg/l oil and grease and 15 mg/l total suspended solids are achievable based on the treatment of similar waste waters. Due to wide range of flow of waste water from recirculating cooling water systems, the effluent limitations in mass units, in any particular plant would be the products of the flow times the respective concentration levels. Costs in general would be approximately 0.1 mill/kwh in the relatively small number of cases where it would be needed.

b. *Limitation for low-volume waste waters.* Low-volume waste water sources include boiler blowdown, ion exchange water treatment, water treatment evaporative blowdown, boiler and air heater cleaning, other equipment cleaning, laboratory and sampling streams, floor drainage, cooling tower basin cleaning, blowdown from recirculating ash sluicing systems, blowdown from recirculating wet-scrubber air pollution control systems, and other relatively low volume streams. These wastes can be practicably treated collectively by segregation from higher volume wastes, equalization, oil separation, chemical addition, solids separation, and pH adjustment.

Oily streams such as waste waters from boiler fireside cleaning, air preheater cleaning and miscellaneous equipment and stack cleaning would be practicably treated for separation of oil and grease, if needed, to a daily average level of 10 mg/l. Addition of sufficient chemicals to attain a pH level in the range 9 to 10 and total suspended solids of 15 mg/l in the effluent of this treatment stage would be generally practicable considering the pH levels of the untreated waste streams and the waste water flow volumes involved. Generally, the higher the pH level, with total suspended solids of 15 mg/l, the greater the effluent reduction benefits attained for the numerous chemicals removed by treatment. Examples of pollutants significantly reduced by this treatment are the following: acidity, aluminum, biochemical oxygen demand, copper, fluoride, iron, zinc, lead, magnesium, manganese, mercury, oil and grease, total chromates, total phosphorous, total suspended solids, and turbidity. Some waste water characteristics, such as alkalinity, total dissolved solids, and total hardness are increased, however. Following the above treatment it would be practicable, in a second stage, to adjust the effluent pH to a level in the range 6.0 to 9.0 in compliance with stream standards, with sedimentation to attain final daily average effluent total suspended solids levels of 15 mg/l. Effluent daily average concentrations of levels of 1 mg/l total copper and 1 mg/l total iron are achievable by the application of this technology. The effluent limitations in mass units, in any particular plant, would be the products of the collective flow of all low-volume waste sources times the respective concentration levels.

Segregation and treatment of boiler cleaning waste water and ion exchange water treatment waste water is practiced in a relatively few plants, but is potentially practicable for all plants. Oily waste waters are segregated from non-oily waste streams at some plants and the oil and grease removed by gravity separators and flotation units.

Combined treatment of waste water streams is practiced in numerous plants. However, in most cases treatment is accomplished only to the extent that self-neutralization, coprecipitation and sedimentation occur because of the joining and detention of the waste water streams. Chemicals are added during combined treatment at some plants for pH control. Most of these plants employ lagoons, or ash ponds, while a few plants employ configured settling tanks.

c. *Limitations for once-through ash and air pollution control systems.* Daily average effluent total suspended solids levels of 15 mg/l are practicably attainable as are oil and grease levels of 10 mg/l and pH values in the range 6.0 to 9.0. Due to the fact that intake water to ash sluicing and air pollution control systems is often well in excess of this level, an effluent limitation of 15 mg/l total suspended solids times the waste water flow would, in many of those cases, require the removal of large quantities of suspended solids not added by the plant. In the light of this, an effluent total suspended solids level for these streams should be limited to a daily average of 15 mg/l times the waste water flow or a number of pounds per day not in excess of the total intake to the station for these systems, whichever represents the greater number of pounds per day.

Dry processes are used by most oil-fired plants for ash handling, while only fly ash is handled dry at some coal-fired plants. Gas-fired plants have little or no ash. The extent of the practicability of employing dry processes for bottom ash handling at coal-fired plants is not known.

d. *Limitations for rainfall run-off waste water sources.* Rainfall run-off waste water sources include coal-pile drainage, yard and roof drainage, and run-off from construction activities. Effluent limitations reflect the technology of diking, oil-water separation, solids separation, and neutralization.

(B) *Best available technology economically achievable.* The best available technology economically achievable for all plants is re-use and recycle of all waste water to the maximum practicable extent, with distillation to concentrate all low-volume water wastes and to recycle water to the process, and with evaporation to dryness of the concentrated waste followed by suitable land disposal.

Re-use of waste water streams is practiced at relatively few plants, but some employ recycle of ash sluice water. Distillation concentration with recycle is currently planned for at least three plants. Some stations plan to employ re-use of cooling tower blowdown in wet-scrubber air pollution control systems. Since water quality requirements for ash sluicing and wet scrubbing are relatively low, some degree of re-use should be practicable for most plants where these operations are employed. The concept of cascading water use, i.e., recycle and re-use of water from applications requiring high quality water to applications requiring successively lower water quality, to reduce to the volume of waste water, if any, ultimately requiring evaporation or other treatment, while practicable in all cases, would generally be subject to a case-by-case analysis to determine the optimum among the various candidate systems.

Chemical treatment of blowdown from recirculating cooling water system for removal of total chromium, total phosphorus (as P) and zinc, while not currently demonstrated, could be achieved by 1983, in the relatively small number of cases where it would be needed. Corresponding effluent limitations, based on the application of this technology, are 0.2 mg/l total chromium, 5 mg/l total phosphorus (as P), and 1 mg/l zinc-total, all times the waste water flow.

Maximum effluent reductions are attainable by segregating the initial 15 minutes of run-off from a rainfall event from the remainder of the run-off, and by treating both streams separately, each stream to achieve effluent levels of 15 mg/l total suspended solids, 10 mg/l oil and grease and a pH valuve in the range of 6.0 to 9.0. Chlorination programs to achieve no discharge of total residual chlorine from recirculating cooling water systems, while not currently demonstrated, could be applied by 1983.

c. *New source standards.* In view of the current technical risks associated with the application of distillation technology to waste water recycle, chlorination programs to achieve no discharge of total residual chlorine from recirculating cooling water systems, and segregation of rainfall run-off streams, new source performance standards have been determined to be identical to the limitations prescribed for best practicable control technology currently available with the following exceptions. No discharge is allowed of corrosion inhibitors in blowdown from recirculating evaporative cooling water system, based on the availability of design technology for corrosion prevention. No discharge of total residual chlorine or other additives for biological control in main condenser tubes, based on the availability of mechanical systems to achieve biological control in main condenser tubes. No discharge of pollutants from nonrecirculating ash sluicing system, based on the availability of dry systems and of recirculating wet systems.

(iv) *Cost of technology.* (1) Effluent heat controls. The unit costs of the application of available external control and treatment technology for heat to generating units of various sizes is essentially invariant with size, over the range of present processes, due to the general availability of small modules applicable to incremental loads.

Factors affecting the incremental costs of effluent heat reductions for any particular generating unit are dependent upon the characteristics of the plant site, as follows: Available land, generating unit configuration (accessibility of existing condenser cooling system, ability of space to accommodate a new circulating cooling system), requirements imposed by nearby land uses (drift, fogging and icing, noise, structure height and appearance), climatic considerations (wind direction and velocity), wet bulb temperature, relative humidity, dry bulb temperature, equilibrium temperature of natural (surface) cooling, soil bearing characteristics, significance of regional consumptive use of water, significance of impact on regional demand availability of power to consumers, and characteristics of intake water (temperature, concentrations of dissolved materials).

The significant costs of external cooling systems themselves are determined characteristically by three major engineering design parameters: the cooling water flow rate, the rate of heat removal required, and the difference between the desired temperature of the cold water returned to the condenser and the lowest cold water return temperature theoretically achievable. Other major costs generally associated with applying external cooling in the place of systems employing no external cooling means are attributable to additional piping and pumps and to the physical alterations in the cooling system that are required by the conversion. The incremental energy (fuel) consumption costs of external cooling system are determined largely by the additional pumping energy required, the power required to drive the circulating air fans, and in most cases where the cooling water discharged from the external cooling means is recirculated to the condensers, the increase in waste heat rejected due to the process energy conversion inefficiency imposed by the resulting increased turbine exhaust pressure. A further cost of external cooling means can be the reduced margin of reserve generating capacity of a system employing the generating unit to meet peak demands for power. The reduced capacity of a unit corresponds to the energy losses incurred during full capacity operation. A further reduction in margin of reserve generating capacity of a system will occur during the time in which a unit must be shut down in order to complete the changeover to the closed-cycle cooling system. Many changeovers can be made during normal periodic shutdowns for maintenance. Incremental downtime due to changeovers may be from 30 to 90 days for each unit.

In general, the monetary and energy consumption costs of effluent heat reductions of less than 100 percent would be approximately proportional to the corresponding percentage reduction. It must be noted that, while fractional heat removals are theoretically achievable, no external cooling means have been employed to date to meet requirements based on fractional heat removals for individual units. Moreover, the application of open cooling systems to achieve significant fractional heat removals would cause more damage to organisms brought into the cooling water system than would a closed-cycle system for essentially 100 percent heat removal due to the higher volume of intake water required by the former.

The following analysis of the monetary, energy consumption and capacity loss costs of external cooling systems are based on the requirement of the guidelines that blowdown is permitted only from the cold side of the external cooling means. On the conservative assumption that all external cooling means already employed on existing units provide for blowdown from the hot side, then the incremental costs associated with requiring blowdown from the cold side of the external cooling means of these units would be a fraction of the total cost of the required external cooling means, said fraction being approximately the ratio of the present blowdown flow rate to the total flow rate through the condensers, neglecting drift loss effects. This fraction is typically less than 2 percent.

The average incremental costs of the application of mechanical draft evaporative cooling towers to base-load units to achieve no discharge of heat except for blowdown are estimated to be as follows:

1. Production costs: 14 percent of base.
2. Capital costs: 12 percent of base.
3. Fuel consumption: 2 percent of base.
4. Capacity reduction: 3 percent of base.

Incremental dollar costs for cyclic units are higher by about 20 percent, while fuel consumption and capacity reductions are the same as for base-load units. Incremental production costs for peaking units are about three times the costs for base-load units. Incremental capital costs are about 40% higher than for base-load units, and fuel consumption and capacity reductions are the same.

The average incremental costs versus effluent reduction benefits (dollars/unit heat removed) for cyclic units are about double those for base-load units, except for fuel consumption which is invariant with the degree of utilization. Average incremental costs versus effluent reduction benefits for peaking units are about three to four times those for cyclic units.

For new sources for base-load, cyclic and peaking units respectively, the average incremental production costs are

10, 11 and 28 percent of base costs; the incremental capital costs are 9, 10, and 11 percent of base costs, the fuel consumption costs are all 1 percent of base fuel consumption, and the generating capacity reduction is 0 to 2 percent of base capacity depending on whether the capability to overdesign is considered.

The above costs for non-new sources do not reflect the exemptions from the no discharge limitation for units for which insufficient land is available for the construction of mechanical draft evaporative cooling towers or for which salt water drift precludes their use. The analyses on which the cost estimates are based assume the application of state-of-the-art technology for drift elimination, but do not assume purchase of land. The factors of adverse climate, fogging and icing, and noise, while possibly adding marginal costs where additional levels of technology are required for control, are not national-scale factors. Since the overall costs and the land availability and saltwater drift factors are based on mechanical draft evaporative cooling towers, with incremental costs for plume abatement, etc. if required, the potential aesthetic factors associated with the tall structure of natural draft towers, with spray ponds, with cooling ponds, or with cooling tower plumes have been indirectly taken into account.

While the mechanical draft evaporative cooling tower was selected as a model for the cost analyses because of its widespread use and more universal applicability, this in no way precludes the actual use of other technologies to achieve the effluent limitations. The costs of other external evaporative systems for effluent heat reduction are generally comparable to the costs of mechanical draft evaporative cooling towers. Site-dependent factors, however, could tend to increase some costs and lower others significantly depending on the location involved. Costs that would be incurred and corresponding effluent reduction benefits for units already planning or employing closed-cycle cooling systems would be zero or relatively insignificant depending upon whether the blowdown is from the cold-side or not. However, in the case of hot-side blowdown, the costs versus effluent reduction benefits related to achieving cold-side blowdown would be approximately in the same proportion as the costs versus effluent reduction benefits for achieving closed-cycle cooling for an otherwise similar unit with an open cooling system.

(2) *Controls on pollutants other than heat.* Due to the wide range of water volumes required from plant to plant for the individual unit operations involved, and further, due to the wide range (from plant to plant) of costs per unit volume of water treated, which are further related to the effluent reductions obtained, the costs vary widely for the removal of specific pollutants to various degrees. For example, boiler fireside chemical cleaning volumes vary from 24,000 gal to 720,000 gal per cleaning, with cleaning frequencies ranging from 2 to 8 times per year. The operating costs of chemical precipitation treatment for copper and iron removal to 1 mg/l effluent concentration and for chromium removal to an effluent of 0.2 mg/l range from $0.10 to $1.30/1000 gal. Furthermore, there are approximately 10 or more separate unit operations which are sources of waste water at power generating plants, each with its station-specific flow rate and waste water characteristics, as well as cost peculiarities. Site-related factors concerning the practicability of various re-use practices make these practices even more difficult to cost, due to the added complexities involved.

The incremental costs of controlled additions of chlorine, in the cases where chlorine is required for biological control, are less than 0.01 mill/kwh. In the relatively few cases where chromates are added for corrosion control and where other less harmful chemicals and methods can provide effective corrosion control the incremental costs are less than 0.01 mill per kilowatt hour.

The incremental cost of mechanical cleaning to replace some fraction of the total required chlorine additives is approximately 0.01 mill/kwh for existing stations and considerably less for new units whether at new or existing plants.

Cost esitmates based on the combined treatment of selected low-volume streams for oil and grease separation, equalization, chemical precipitation, solids separation, and further based on generalizations with respect to the cost of land, construction, site preparation and with respect to the waste water volume, indicate an approximate cost of 0.1 mill per kilowatt hour depending upon the plant's generating capacity and utilization. The highest costs are associated with the smaller plants and peaking plants which generally have the highest basic generating cost. In general, the entire incremental cost should be felt by individual plants since this type of complete chemical treatment is not generally employed.

Sedimentation of ash sluicing water, cooling tower blowdown, etc., would cost typically about 7 cents/1000 gal, with the incremental cost in mills/kwh being related to the quantities of water treated. Since many plants already have some type of sedimentation facility, the incremental costs of improved sedimentation performance if required will be some fraction of the cost cited.

In the few cases where it would be required chemical treatment for removal of phosphorus, total chromium or zinc from cooling tower blowdown would cost about $1/1000 gal treated. Incremental costs of dry ash handling systems where mechanically feasible are less than 0.01 mill/kwh for existing stations converting from wet systems and are considerably less for new sources.

Recirculating ash sluicing systems require sedimentation discussed above plus pumps, piping and a blowdown system. Incremental costs above sedimentation are less than 0.01 mill/kwh for existing plants and considerably less for new plants.

The cost of evaporation in configured equipment is approximately 1.4 dollars/1000 gal. The corresponding incremental cost in mills/kwh is related to the quantities of waste water requiring evaporation. Costs would be significantly less in climates where solar evaporation in ponds could be employed.

The incremental costs of equipment design for corrosion protection are normally largely offset by other cost benefits such as reduced costs of chemicals. The net incremental costs for both lined cooling tower components and stainless steel or titanium condenser tubes would be less than 0.1 mill/kwh total, even in the case where new or old copper alloy condenser tubes were retrofitted, due to the high offsetting salvage value of copper. Replacement of existing cooling tower components would be more expensive however.

Because of the wide range of opportunities and associated incremental costs of achieving no discharge of pollutants from waste water sources other than cooling water systems and rainfall run-off (based on the technology of maximum recycle with evaporation of the final effluent) a model plant is employed as a basis for considerations of this higher level of technology. The features of the model plant are selected to produce conservatively high incremental costs of applying this technology, i.e. the determined costs would be at a level higher than would be expected for almost all other plants. The model plant would have such adverse characteristics that recycle of all water (except that used in ash sluicing systems or in wet-scrubber air pollution control systems) would not be practicable except after distillation. Distillation is much more costly than the chemical addition and sedimentation treatments which would be used in most cases. Ash sluicing water and wet-scrubber water would be recycled after sedimentation (or filtration) for solids removal. The model plant would have to distill blowdown from ash sluicing for recycle to other processes, however, the quantities of water distilled would be less than the feed intake to the system of low quality waste waters from other sources by the amount of evaporation during sluicing and the amount of moisture removed in the ash. Therefore, the assumption of the presence of wet ash sluicing is consistent with the conservative approach of the cost analysis. Similar considerations pertain to wet-scrubber air pollution control systems. Non-solar evaporation is further assumed.

The incremental costs for achieving no discharge of pollutants, exclusive of cooling water, and rainfall run-off, for the model station as previously stated are approximately 0.3 mills per kilowatt-hour for a 100 megawatt capacity base-load plant, 0.5 mills per kilowatt-hour for a cyclic plant and 1.5 mills per kilowatt-hour for a peaking plant. These costs are about 5, 6, and 12 percent of production costs, respectively. Costs for smaller plants would be generally higher and costs for larger plants would be generally lower. Costs would be less for plants in climates suitable for solar evaporation. Cost would be generally less for nuclear plants and for gas-fired plants because there is no requirement for water related to ash handling. From an overall standpoint, costs would be generally lower than the costs for the model plant due to the conservative assumptions employed in the model. Full recycle of blowdown from evaporative recirculating cooling water systems would be significantly more costly.

(v) *Energy and Other non-water quality environmental impacts.*—(1) *Energy.* The incremental energy (fuel) consumption costs of mechanical draft evaporative cooling towers applied to existing units are typically about 1 to 2 percent of the energy generated or fuel consumed. Corresponding costs of unassisted natural draft cooling towers and of spray canals and ponds are lower by an increment of approximately ½ percent or less. Fuel consumption costs for unaugmented cooling lakes are lower by about ½ percent. The energy costs of mechanical draft dry (nonevaporative) cooling towers are higher by an increment of more than 2 percent. Energy (fuel) consumption costs of applying these closed-cycle cooling systems to new units would be less due to the opportunity provided for overall optimization of the process as well as the cooling system.

A typical existing generating unit to which mechanical draft evaporative cooling towers would be applied for essentially 100 percent reduction of effluent heat would be reduced in generating capacity by about 3 to 4 percent of its former capacity during part of the year. Reduced capacity corresponding to other types of cooling employed at existing units would be approximately proportional to the fuel consumption cost percentages cited above. For new units no capacity loss would occur since the unit would be oversized to make up for this factor.

Energy requirements for technologies reflecting the application of the best available technology economically achievable for pollutants other than heat are less than 0.2 percent of the total plant output.

Reduced margins of reserve capacity due to lost generating capacity could be significantly offset by delayed retirements, but not without some added generating costs due to the relative inefficiency of the older units. The installation of combustion turbines to replace lost capacity can be accomplished relatively quickly. Eventually the lost capacity could be replaced by the construction of new highly-efficient base-load units.

Potentially, the construction of additional transmission lines and other efforts to achieve higher degrees of regional and national reliability coordination could completely offset the reduced margins of reserve capacity due to lost generating capacity. Furthermore, citizen and other user efforts to reduce consumption during the brief periods of peak demand could significantly lessen the impact of reduced reserve margins. The above factors are especially significant in the case of the numerous units in small plants and systems where the engineering design manpower requirements would be high relative to the heat removals achieved, the availability of capital would be somewhat lower due to the smaller amounts and higher risks involved, and the possible impact of reduced reserve capacity would be larger due to the relatively limited extent of the systems.

(2) *Other non-water quality environmental impacts.* Non-water quality environmental impacts of external thermal control technology include possible effects of salt water drift (droplet carryover from evaporative towers and spray systems), increased fogging or water consumption with evaporative systems, noise if mechanical draft towers are adjacent to populated areas, and increased aesthetic impacts due to the size of natural draft towers and visible plumes from all evaporative towers. The potential effects of salt water drift have been taken into account by the exemption provided in the guidelines from the no discharge requirements in instances in which it is likely to present a significant problem. However, in the limited number of cases where it would be required, technology is available to reduce or eliminate drift, fogging, visible plumes and noise effects, and water consumption rights are available where required, each at incremental costs above standard evaporative cooling systems for closed-cycle cooling.

The non-water quality impacts of technologies available to achieve limitations on pollutants other than heat are negligible with respect to air quality, noise, water consumption and aesthetics. Solid waste disposal problems associated with achieving the limits required by best practicable control technology currently available are similarly insignificant. Systems with evaporation and recycle of waste water, which may be required to attain the effluent reductions required for best available technology economically achievable will not generally create significant amounts of solid waste. If recycle of blowdown from evaporative recirculating cooling systems were to be employed, however, considerable volumes of solid waste may be generated. In most cases these are nonhazardous substances requiring only minimal custodial care. However, some constituents may be hazardous and may require special consideration. In order to ensure long term protection of the environment from these hazardous or harmful constituents, special consideration of disposal sites may be made. All landfill sites where such hazardous wastes are disposed should be selected so as to prevent horizontal and vertical migration of these contaminents to ground or surface waters. In cases where geologic conditions may not reasonably ensure this, adequate legal and mechanical precautions (e.g., impervious liners) should be taken to ensure long term protection to the environment from hazardous materials. Where appropriate the location of solid hazardous materials disposal sites should be permanently recorded in the appropriate office of legal jurisdiction.

(vi) *Economic impact including impact on U.S. fuel consumption.* The proposed effluent limitations are based on the technological capabilities of steam electric powerplants. Section 316(a) of the Act allows for exemptions to the proposed limitations on heat, in a case-by-case basis, based on the consideration of environmental need.

It has been estimated, based on an analytical model of the cooling capacity of U.S. rivers and from a survey of EPA regional personnel, that approximately one-half to two-thirds of the steam electric powerplants (by capacity) not already achieving "no thermal discharge" are not now in violation of present or projected thermal environmental criteria. Of the remainder, "no discharge" thermal controls corresponding to generally one-half of the capacity at each plant would be warranted during certain parts of the year, based on environmental considerations. It is further estimated that generally thermal controls would be needed during 3-4 months of the year, or approximately 30 percent of the time, scattered, in the aggregate, year round.

Approximately 20 percent of existing steam electric powerplants already achieve "no thermal discharge." A significantly larger percentage (over 50 percent) of plants that are not considered "new sources" under the definitions of the Act but will begin initial operation in the period 1974–1982 are already committed to closed cooling systems.

By 1980 approximately 30 percent of all U.S. energy uses has been projected to be through electrical generation. The electrical generation processes have been projected by one source to be comprised of approximately 40 percent coal-fueled, 25 percent nuclear, 15 percent oil-fueled, 15 percent gas-fueled and 5 percent hydro and geothermal plants. Approximately 50 percent of all coal is projected to go to powerplants, 15 percent of all natural gas, and 10 percent of all oil.

Incremental fuel consumption due to closed cooling water systems at steam electric powerplants is due to the power required to drive the pumps and fans (if they are employed) in the closed system and to the reduced energy conversion efficiency brought about by changes in steam condensing pressures. Generally the increased fuel consumption relative to base fuel consumption would be approximately 1 percent for pumps and fans (if they are employed) and 1 percent for changing steam pressures. Mechanical draft evaporative cooling towers are the most widely used means for achieving closed-cycle cooling. They employ both pumps and fans. Other means commonly employed use no fans (natural draft towers, spray canals, cooling ponds) or no additional pumping (cooling ponds). Environmentally-based thermal effluent limitations may be met by open-cycle systems, that cause no loss in energy conversion efficiency due to changing steam pressures and which use the preceding means and others.

Assuming equal environmentally-based thermal controls regardless of fuel, no net changes in generating distribution among the fuels used and use of mechanical draft cooling towers (highest fuel consumption) the above numbers translate into a 0.12 percent increase in nuclear fuel consumption to meet thermal controls, a 0.06 percent increase in total U.S. coal consumption, a 0.02 percent increase in total U.S. natural gas consumption and a 0.01 percent increase in total U.S. oil consumption, by 1980.

The estimated economic impact by 1983, of the proposed effluent limitations guidelines, considering the estimated effect of exemptions to be allowed through appeals under section 316(a) of the Act are as follows:

1. Total capital required is $12.0 billion which is 3.3 percent of the base capital required.
2. Cost to consumers would reach $4.1 billion per year, which is 3.6 percent of the base cost to consumers.
3. Price increase by 0.9 mills per kwh, or 7.2 percent of base production costs.
4. Fuel consumed would reach a level equivalent to 9 million tons of coal per year, or 0.2 percent of U.S. consumption for all purposes.
5. Capacity loss of 3,300 MW, or 0.4 percent of U.S. generating capacity.

Similarily for new sources, between 1985 and 1990, the above costs, respectively, are $11.8 billion (2.0 percent base), $1.7 billion per year (0.7 percent base), 0.05 mills per KWH (1.4 percent base production costs), 8 million tons per year (0.12 percent base), and 3,100 MW (0.25 percent base).

A report entitled "Development Document for Proposed Effluent Limitations Guidelines and New Source Performance Standards for the Steam Electric Power Generating Point Source Category" details the analysis undertaken in support of the regulations being proposed herein. The report is available for inspection in the EPA Information Center, Room 227, West Tower, Waterside Mall, 4th and M Streets, S.W., Washington, D.C., at all EPA regional offices, and at State water pollution control offices. A supplementary analysis prepared for EPA of the possible economic effects of the proposed regulations is also available for inspection at these locations. Copies of both of these documents are being sent to persons or institutions affected by the proposed regulations, or who have placed themselves on a mailing list for this purpose (see EPA's Advance Notice of Public Review Procedures, 38 FR 21202, August 6, 1973). An additional limited number of copies of both reports are available. Persons wishing to obtain a copy may write EPA Information Center, Environmental Protection Agency, Washington, D.C. 20460, Attention: Mr. Phillip B. Wisman. (A-107)

On June 14, 1973, the Agency published procedures designed to insure that, when certain major standards, regulations, and guidelines are proposed, an explanation of their basis, purpose and environmental effects is made available to the public. (38 FR 15653) The procedures are applicable to major standards, regulations and guidelines which are proposed on or after December 31, 1973, and which prescribe national standards of environmental quality or require national emission, effluent or performance standards and limitations.

The Agency determined to implement these procedures in order to insure that the public was apprised of the environmental effects of its major standards setting actions and was provided with detailed background information to assist it in commenting on the merits of a proposed action. In brief, the procedures call for the Agency to make public the information available to it delineating the major nonenvironmental factors affecting the decision, and to explain the viable options available to it and the reasons for the option selected.

The procedures contemplate publication of this information in the FEDERAL REGISTER, where this is practicable. They provide, however, that where, because of the length of these materials, such publication is impracticable, the material may be made available in an alternate format.

The report entitled "Development Document for Proposed Effluent Limitations Guidelines and New Source Performance Standards for the Steam Electric Power Generating Point Source Category" contains information available to the Agency concerning the major environmental effects of the regulation proposed below, including:

(1) The pollutants presently discharged into the National waterways by steam electric generating plants and the degree of pollution reduction obtainable from implementation of the proposed guidelines and standards (see particularly sections IV, V, VI, IX, X, and XI);

(2) The anticipated effects of the proposed regulations on other aspects of the environment including air, solid waste disposal and land use, and noise (see particularly section VIII); and

(3) Options available to the Agency in developing the proposed regulatory system and the reasons for its selecting the particular levels of effluent reduction which are proposed (see particularly sections VI, VII, and VIII).

The supplementary report entitled "Economic Analysis of Proposed Effluent Guidelines Steam Electric Power Generating Category" contains an estimate of the cost of pollution control requirements and an anlysis of the possible effects of the proposed regulations on prices, production levels, employment, and international trade. In addition, the above described Development Document describes, in section VIII, the cost and energy consumption implications of the proposed regulations.

The two reports described above in the aggregate exceed 500 pages in length and contain a substantial number of charts, diagrams, and tables. It is clearly impracticable to publish the material contained in these documents in the FEDERAL REGISTER. To the extent possible, significant aspects of the material have been presented in summary form in foregoing portions of this preamble. Additional discussion is contained in the following analysis of comments received and the Agency's response to them. As has been indicated, both documents are available for inspection at the Agency's Washington, D.C. and regional offices and at State water pollution control agency offices. Copies of each have been distributed to persons and institutions affected by the proposed regulations or who have placed themselves on a mailing list for this purpose. Finally, so long as the supply remains available, additional copies may be obtained from the Agency as described above.

When regulations for the steam electric power generating category are promulgated in final form, revised copies of the Development Document will be available from the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402. Copies of the Economic Analysis will be available through the National Technical Information Service, Springfield, Virginia 22151.

(c) *Summary of public participation.* Prior to this publication, the agencies and groups listed below were consulted and given an opportunity to participate in the development of the effluent limitations guidelines and standards of performance for the steam electric power generating category. All participating agencies have been informed of project developments. An initial draft of the Development Document was sent to all participants and comments were solicited on that report. The following are the principal agencies and groups consulted: (1) Effluent Standards and Water Quality Information Advisory Committee (established under section 515 of the Act); (2) all State and U.S. Territory Pollution Control Agencies; (3) the Edison Electric Institute; (4) American Public Power Association; (5) Atomic Industrial Forum; (6) Tennessee Valley Public Power Association; (7) The American Society of Mechanical Engineers; (8) Hudson River Sloop Restoration, Inc.; (9) The Conservation Foundation; (10) Environmental Defense Fund, Inc.; (11) Natural Resources Defense Council; (12) The American Society of Civil Engineers; (13) Water Pollution Control Federation; (14) National Wildlife Federation; (15) The Isaac Walton League of America; (16) U.S. Department of the Interior; (17) U.S. Department of Commerce; (18) U.S. Department of the Treasury; (19) U.S. Department of Agriculture; (20) U.S. Water Resources Council; (21) U.S. Atomic Energy Commission; (22) U.S. Department of Defense; (23) Tennessee Valley Authority;

and (24) U.S. Department of Housing and Urban Development.

The following organizations and individuals responded with comments: (1) Effluent Standards and Water Quality Information Advisory Committee; (2) Arizona State Department of Health; (3) the Honorable Mike McCormack; (4) Mississippi Power and Light Company; (5) Northeast Utilities; (6) U.S. Department of the Treasury; (7) Atomic Industrial Forum, Inc.; (8) Delaware River Basin Commission; (9) Northern States Power Company; (10) Mid-Continent Area Power Pool Coordination Center; (11) Baltimore Gas and Electric Company; (12) Montana-Dakota Utilities Company; (13) Edison Electric Institute; (14) E. B. Puspley; (15) West Texas Utilities Company; (16) U.S. Atomic Energy Commission; (17) U.S. Water Resources Council; (18) Southern Electric Generating Company; (19) Consumers Power Company; (20) American Electric Power Service Corporation; (21) Virginia Electric and Power Company; (22) Duke Power Company; (23) Commonwealth Edison; (24) Southern Services, Inc.; (25) Public Service Electric and Gas Company; (26) John Eric Edinger, Ph.D.; (27) Union Electric Company; (28) Tennessee Valley Authority; (29) Los Angeles Department of Water and Power; (30) Bechtel Power Corporation; (31) North Central Missouri Electric Cooperative, Inc.; (32) New York Power Pool; (33) U.S. Department of Agriculture; (34 Gulf Power Company; (35) Mississippi Power Company; (36) Texas Electric Service Company; (37) Consolidated Edison Company of New York, Inc.; (38) Georgia Power Company; (39) NUS Corporation; (40) Alabama Power Company; (41) Arkansas Power and Light Company; (42) Texas Power and Light Company; (43) Resources Conservation Corporation; (44) American Public Power Association; (45) National Advisory Committee on Oceans and Atmosphere; (46) Tennessee Valley Public Power Association; (47) Southern California Edison Company; (48) Detroit Edison; (49) New Orleans Public Service, Inc.; (50) Southwestern Electric Power Company; (51) Allegheny Power Service Corporation; (52) City Public Service Board of San Antonio; (53) Southern Central Power Company; (54) U.S. Department of Defense; (55) U.S. Department of Commerce; (56) Interlakes, Inc.; (57) Florida Power and Light Company; (58) Dallas Power and Light Company; (59) Federal Power Commission; (60) Natural Resources Defense Council, Inc.; (61) Cajun Electric Power Corporation, Inc.; (62) Pacific Gas and Electric Company; (63) Golden Valley Electric Association, Inc.; (64) Hudson River Fisherman's Association; (65) Tampa Electric Company; (66) North Pine Electric Corporation, Inc.; (67) Carteret-Craven Electric Membership Corporation; (68) Public Service Company of New Hampshire; (69) Roanoke Electric Membership Corporation; (70) Plains Electric Generation and Transmission Cooperative, Inc.; (71) Tri-County Rural Electric Cooperative, Inc.; (72) Union Rural Electric Association, Inc.; (73) South Texas Electric Cooperative, Inc.; (74) Western Illinois Power Cooperative, Inc.; (75) Burns and Roe, Inc.; (76) Association of Illinois Electric Cooperatives; (77) Rural Electric Convenience Cooperative Company; (78) People's Cooperative Power Association, Inc.; (79) Jefferson Davis Electric Cooperative, Inc.; (80) Edgecombe-Martin County Electric Membership Corporation; (81) Burke Divide Electric Cooperative; (82) Renville Sibley Cooperative Power Association; (83) State of Alaska Department of Environmental Conservation; (84) State of California Water Resources Control Board; (85) State of Colorado Department of Health; (86) Georgia Department of Natural Resources; (87) State of Hawaii Department of Health; (88) Illinois Environmental Protection Agency; (89) Kentucky Department of Natural Resources and Environmental Protection; (90) State of Maryland Department of Natural Resources; (91) State of Michigan Department of Natural Resources; (92) State of Nebraska Department of Environmental Control; (93) North Carolina Department of Natural and Economic Resources; (94) South Carolina Department of Health and Environmental Control; (95) Texas Water Quality Board; (96) Crawford Electric Cooperative; (97) Utah Power and Light Company; (98) Dixie Electric Membership Corporation; (99) State of Ohio Environmental Protection Agency; (100) Newberry Electric Cooperative, Inc.; (101) Basin Electric Power Cooperative; (102) Pennsylvania Department of Environmental Resources; (103) U.S. Department of the Interior; (104) Ebasco Services, Inc.; (105) Jo-Carroll Electric Cooperative, Inc.; (106) Missouri Clean Water Commission; (107) Pierce-Pepin Electric Cooperative; and (108) Tri-County Electric Cooperative.

The primary issues raised in the development of these proposed effluent limitations guidelines and standards of performance and the treatment of these issues herein are as follows:

(1) Many groups questioned the characterization of all heat as a pollutant. Section 502(b) of the Act, however, includes heat within the definition of "pollutant". The effects of transference of heat to water on the physical and chemical equilibrium of the aquatic environment are well documented. See the report on thermal discharges submitted to Congress by the Administrator in July, 1973 pursuant to section 104(t) of the Act. Because of the availability of demonstrated technology to substantially eliminate thermal discharges from steam electric generating plants, the Agency has determined to include effluent limitations on heat.

(2) Many groups questioned the advisability of nationally uniform effluent limitations prescribing no discharge of heat (except blowdown) in view of the costs required compared to the benefits received from thus protecting the aquatic environment. Sections 304(b) and 306 of the Act require the Administrator to provide nationally uniform technology-based effluent limitations guidelines. A separate provision of the Act, Section 316 (a), affords an opportunity for individual dischargers to obtain exceptions to these uniform technology-based standards upon a showing that less stringent limitations on heat will still adequately protect the aquatic environment. The Agency intends to propose regulations implementing Section 316(a) in conjunction with the issuance of the regulations proposed below.

(3) Many commenters questioned the use of thermal units of heat discharged rather than the temperature of the discharged stream as the basis for the standard, since environmental considerations are generally based on temperature. The application of a technology-based standard is more appropriately described by characteristics relevant to the quantities of pollutant requiring reduction and the technology for achieving that effluent reduction, rather than criteria for environmental judgments. In the case of waste heat from steam electric powerplants, heat rather than temperature more suitably satisfies this requirement. A more extended technical discussion of the alternative thermal parameters, and the reasons for selecting heat appears at Section BVI of the Development Document.

(4) Many comments questioned the lack of consideration of nonrecirculating condenser cooling systems with "mixing zones" as a candidate technology to provide the basis for the guidelines and standards. These systems do not reduce the quantities of heat discharged in the effluent. Moreover, since a substantial number of units presently employ external cooling means (typically evaporative cooling towers) which virtually eliminate the discharge of heated effluent, mixing zones simply cannot be characterized as the "best practicable technology currently available" much less as the "best available technology economically achievable".

(5) It was suggested that helper systems to achieve partial removal of effluent heat should be considered. Helper systems have been applied only to meet discharge temperature requirements based on environmental criteria. In accomplishing this the effluent heat removals vary considerably throughout the year. No helper system has been designed and operated to achieve a steady level of effluent heat reduction year round. Furthermore, in many cases the application of these systems to achieve significant heat removals would cause more damage to organisms brought into the cooling water system than would a closed-cycle system for essentially 100 percent heat removal due to the higher intake water requirement.

(6) Other factors (such as the type of coal used, and raw water quality) were suggested as appropriate bases for further subcategorization. The industry has not been subcategorized on the basis of these factors nor are they intended as

grounds for variances from the generally applicable limitations because their effects are mainly on quantities of residuals rather than on effluent reduction levels achievable or the costs associated with various levels of reduction.

(7) The validity of the cost estimates for replacing an existing nonrecirculating cooling water system with a closed-cycle system was questioned. Since very few such replacements have actually been made, since various accounting systems were used for reporting costs, and since there were differences in site-related factors in each case, the existing hard data encompass a wide range of total costs. Numerous cost estimates have been made by industry for the purposes of environmental impact statements and for other purposes. These estimates also encompass a wide range of total costs. The EPA estimates are correlations based on all available data. The actual costs may vary significantly from unit to unit but the variabilities would be smaller from plant to plant and from system to system. Furthermore, the EPA judgments pertain only to the affected units and not to all units, as is assumed in some industry estimates.

(8) Industry representatives and other groups suggested that the Agency, in developing the effluent limitations guidelines, should consider the costs of implementing the guidelines in relation, not only to the effluent reduction benefits thereby achieved, but also to the imputed environmental benefits attributable to such reductions. The Agency has estimated and carefully considered the relationship between cost and effluent reduction in specifying the effluent limitations guidelines. Section 304(b)(1)(B) requires no additional analysis. Moreover, while it is not feasible to quantify in economic terms, particularly on a national basis, the costs resulting from the discharge of heat and other pollutants from electric generating plants to our Nation's waterways, these pollutants can have substantial and damaging impacts on the quality of water and therefore on its capacity to sustain healthy populations of wildlife, fish and other aquatic wildlife and on its suitability for industrial, recreational and drinking water supply uses.

(9) Some reviewers felt that the discharge of total dissolved solids could be eliminated by the application of available technology involving recycle of waste water with concentration and evaporation to dryness of the final effluents. Technology is demonstrated and available for treating cooling tower blowdown in this manner. However, the total dissolved solids discharge in cooling tower blowdown are primarily in the same amount as contained in the intake to the station for the purposes of cooling tower make-up water. Furthermore, the large quantities of solids removal resulting from application of this technology would require suitable land disposal. On the other hand, application of this technology to low volume waste water other than cooling system blowdown would remove significant quantities of pollutants added by the operation of the plant. While concentration and evaporation of the "chemical" waste is not generally practiced in the steam electric generating industry, the technology necessary is transferable, based upon the wide application of related technology in the chemical processing industry.

(10) Some reviewers felt that effluent limitations should be imposed on certain heavy metals, such as mercury and lead. Effluent standards were not set for these parameters since the generally applicable technologies available to attain the effluent limitations proposed for pH, total suspended solids, total copper, total iron, etc., will adequately remove these constituents as well as those for which effluent standards are proposed.

(11) Some reviewers questioned whether a requirement that all large base-load plants achieve no discharge of heat by 1977 could be met, considering factors of equipment availability and time necessary for design and construction of facilities. Cooling tower construction itself would probably present no significant obstacle due to use of field erection practices rather than assembly line production. The availability of the engineering manpower required by the suppliers of cooling towers could, however, prove limiting. The proposed regulations should alleviate this problem since the requirements for attainment of no heat discharge take effect for generating units of various capacities over a period of several years. Moreover, the market could be expected to attract new suppliers able to meet the increased demand. Demand for towers could be offset, of course, to the extent that alternative means such as cooling ponds prove feasible.

(12) Some reviewers felt that no serious effort had been made to determine whether zero discharge of heat or the mechanical draft cooling towers which may be employed to achieve it represent the optimum use of all resources. The Act does not require such an analysis; to some extent the basic judgment that discharges of pollutants to the Nation's waters should be reduced to levels attainable by specified levels of technology has already been made by Congress in enacting the 1972 Amendments to the Act.

It should be emphasized that the technical basis of the proposed effluent limitations for heat is closed-cycle evaporative cooling with blowdown. Because of their more universal applicability, mechanical draft cooling towers were selected to provide a basis for the overall cost analysis, fuel consumption analysis, non-water quality environmental impact analysis, economic impact analysis and the site-by-site evaluation of factors of land availability, salt water drift and other factors. Any otherwise environmentally acceptable means (and there are several alternatives) can be applied by the discharger to meet the imposed effluent limitations.

(13) Many comments referred to the important question of increased consumption of fuel. To the extent that fuel consumption is a national problem, pollution control should not have to bear a burden of justification any more stringent than other uses. In any case, the maximum fuel consumption required to implement the proposed standards is approximately 0.2 percent of the national level of fuel consumption.

(14) Industry groups felt that the application of evaporative cooling devices to base-load units could not be achieved by 1977 without serious disruption of the national power supply. No definition of "serious disruption" was offered. As discussed above, postponed retirement of older units, installation of combustion turbines for replacement capacity, and the achieving of a higher level of reliability coordination than is presently planned could all serve to offset increments of reduced reserve margin resulting from application of evaporative cooling systems. Moreover, the regulation as proposed does not require all base-load units to achieve no discharge by 1977. Instead, as explained above, the no discharge requirement becomes effective over a period of six years commencing in July 1977.

(15) Some reviewers questioned the advisability of requiring a technology that would significantly increase the national water consumption over present levels. While water consumption at individual sites might increase, it is not known that a significant national water debt would result since much of the evaporated water would precipitate through the natural water cycle.

Interested persons may participate in this rule-making by submitting written comments in triplicate to the EPA Information Center (A-107), Environmental Protection Agency, Washington, D.C. 20460, Attention: Mr. Philip B. Wisman. Comments on all aspects of the proposed regulations are solicited. In the event comments are in the nature of criticisms as to the adequacy of data which is available, or which may be relied upon by the Agency, comments should identify and, if possible, provide any additional data which may be available and should indicate why such data is essential to the development of the regulations. In the event comments address the approach taken by the Agency in establishing an effluent limitation guideline, or standard of performance, EPA solicits suggestions as to what alternative approach should be taken and why and how this alternative better satisfies the detailed requirements of sections 301, 304(b), 306 and 307 of the Act.

A copy of all public comments will be available for inspection and copying at the EPA Information Center, Room 227, West Tower, Waterside Mall, 401 M Street, S.W., Washington, D.C. A copy of preliminary draft contractor reports, the Development Document and economic study referred to above and certain supplementary materials supporting the study of the industry concerned will also be maintained at this location for public review and copying. The EPA information regulation, 40 CFR Part 2, provides that a reasonable fee may be charged June 3, 1974, will be considered. Steps previously taken by the Environmental for copying.

All comments received on or before Protection Agency to facilitate public response within this time period are outlined in the advance notice concerning public review procedures published on August 6, 1973 (38 FR 21202).

In consideration of the foregoing, it is hereby proposed to amend 40 CFR Chapter I to add a new Part 423, to read as set forth below.

Dated: February 20, 1974.

JOHN QUARLES,
Acting Administrator.

PART 423—EFFLUENT LIMITATIONS GUIDELINES FOR EXISTING SOURCES AND STANDARDS OF PERFORMANCE AND PRETREATMENT STANDARDS FOR NEW SOURCES FOR THE STEAM ELECTRIC POWER GENERATING CATEGORY

§ 423.10 Applicability; description of steam electric power generating category.

The provisions of this part are applicable to discharges resulting from the operation of 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, gas), or nuclear fuel in conjunction with a thermal cycle employing the steam-water system as the thermodynamic medium.

§ 423.11 Special definitions.

For the purposes of this part:

(a) The term "base-load unit" shall mean any unit except a generating unit that is one or more of the following:

(1) A generating unit which, according to the Federal Power Commission Form 67 Steam Electric Plant Air and Water Quality Control Data for the Year Ended December 31, 1973, had an average boiler capacity factor during the year of less than 60 percent, except in the case where the accuracy of the Form 67 data is questioned. In any case in which the average boiler capacity factor is not reported in Federal Power Commission Form 67 for the year ended December 31, 1973, or in which the accuracy of the Form 67 data is questioned, the average boiler capacity factor for that generating unit shall be determined according to the data recorded on the operating record book or log of that unit for the entire calendar year 1973.

(2) A generating unit (i) for which the average boiler capacity factor is not reported in Federal Power Commission Form 67 for the year ended December 31, 1973, and operating records are not available for the entire calendar year 1973, (ii) which has one or more of the design characteristics of non-base-load units, and (iii) which can be demonstrated by the owner or operator not to be planned to be operated to generate more than 31,600,000 kilowatt-hours (gross) per megawatt of nameplate generating capacity during the six most productive calendar years, which need not be consecutive, of its useful service life including both past and future service.

(3) A large generating unit for which a retirement date on or before July 1, 1986, is committed or proposed, as most recently reported to the Federal Power Commission by the appropriate reliability coordinating council, agreement, network, pool, or group as required annually pursuant to Federal Power Commission, Order No. 383-2, Docket No. R-362.

In the case in which said unit is in a system that is not a member of a reliability coordinating council, agreement, network, pool, or group, the retirement date for that generating unit shall be determined on the basis of evidence submitted by the owner or operator of that unit.

(4) A small generating unit for which a retirement date on or before July 1, 1989, or earlier is committed or proposed, as most recently reported to the Federal Power Commission by the appropriate reliability coordinating council, agreement, network, pool, or group as required annually pursuant to Federal Power Commission, Order No. 383-2, Docket No. R-362.

In the case in which said unit is in a system that is not a member of a reliability coordinating council, agreement, network, pool, or group, the retirement date for that generating unit shall be determined on the basis of evidence submitted by the owner or operator of that unit.

(b) The term "cyclic unit" shall mean any unit except a generating unit that is one or more of the following:

(1) A base-load unit.

(2) A generating unit which, according to the Federal Power Commission Form 67 Steam-Electric Plant Air and Water Quality Control Data for the Year Ended December 31, 1973, has an average boiler capacity factor during the year of 20 percent or less, except in the case where the accuracy of the Form 67 data is questioned. In any case in which the average boiler capacity factor is not reported in Federal Power Commission Form 67 for the year ended December 31, 1973, or in which the accuracy of the Form 67 data is questioned, the average boiler capacity factor for that generating unit shall be determined according to the data recorded on the operating record book or log of that unit for the entire calendar year 1973.

(3) A generating unit (i) for which the average boiler capacity factor is not reported in Federal Power Commission Form 67 for the year ended December 31, 1973, and operating records are not available for the entire calendar year 1973, (ii) which has one or more of the design characteristics of non-base-load units, and (iii) which can be demonstrated by the owner or operator not to be planned to be operated to generate more than 10,500,000 kilowatt-hours (gross) per megawatt of nameplate generating capacity during the six most productive calendar years, which need not be consecutive, of its useful service life including both past and future service.

(4) A generating unit for which a retirement date on or before July 1, 1989, is committed or proposed, as most recently reported to the Federal Power Commission by the appropriate reliability coordinating council, agreement, network, pool, or group as required annually pursuant to Federal Power Commission Order No. 383-2, Docket No. R-362.

In the case in which said unit is in a system that is not a member of a reliability coordinating council, agreement, network, pool, or group, the retirement date for that generating unit shall be determined on the basis of evidence submitted by the owner or operator of that unit.

(c) The term "peaking unit" shall mean any unit except a generating unit that is one or more of the following:

(1) A base-load unit or a cyclic unit.

(2) A generating unit for which a retirement date on or before July 1, 1989, is committed or proposed, as most recently reported to the Federal Power Commission by the appropriate reliability coordinating council, agreement, network, pool, or group as required annually pursuant to Federal Power Commission Order No. 383-2, Docket No. R-326. In the case in which said unit is in a system that is not a member of a reliability coordinating council, agreement, network, pool, or group, the retirement date for that generating unit shall be determined on the basis of evidence submitted by the owner or operator of that unit.

(d) The term "large unit" shall mean a unit which is both (1) a part of a plant with a rated generating capacity of 25 megawatts or more and (2) a part of an electric utility system with a generating capacity of 150 megawatts or more.

(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, otherwise, of which would cause concentration 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" 13th Edition, 1971, Method 144B, page 112.

(g) The term "design characteristics of non-baseload units" shall mean the following, provided that the unit is not coal-fired: (i) no reheat stage, (ii) fewer than five feedwater heaters, (iii) a stream throttle pressure less than 137 atm. (2000 psig), and (iv) a steam throttle temperature less than 538°C (1000°F).

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

(i) The term "intermediate-volume waste sources" shall mean blowdown from recirculating main condenser cooling water systems, waste water from nonrecirculating ash handling systems, and waste water from nonrecirculating wet-scrubber air pollution control systems.

(j) The term "low-volume waste sources" shall mean, taken collectively as if from one source, waste water from boiler blowdown, ion exchange water treatment wastes, water treatment evaporator blowdown, boiler tube cleaning, boiler fireside cleaning, air preheater cleaning, laboratory and sampling streams, floor drainage, cooling tower basin cleaning wastes, blowdown from recirculating ash handling systems, blowdown from recirculating wet-scrubber air pollution control systems, stack cleaning, miscellaneous equipment cleaning, recirculating house service water systems, and other waste sources of comparable volume.

(k) The term "small unit" shall mean a unit which is not large.

(l) The term "daily average" shall mean the average of daily values for thirty consecutive days. When waste water from the source in question is not discharged on a particular day during the thirty consecutive days, the daily value for that day shall not be included in the average.

(m) The term "FLOW" shall mean the daily flow, 1, of waste water from the source (e.g. recirculating cooling water systems, low-volume waste sources, nonrecirculating ash sluicing systems, nonrecirculating wet-scrubber air pollution control system) in question.

(n) The term "recirculating system" shall mean a system from which there is no discharge of waste water other than blowdown.

(o) The term "nonrecirculating system" shall mean a system that is not a recirculating system.

§ 423.12 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, the Environmental Protection Agency 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, costs) which can affect the industry subcategorization and effluent limitations 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.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best practicable control technology currently available by a point source subject to the provisions of this part:

(a) (1) There shall be no discharge of heat from a large base-load unit for which construction is completed on or after July 1, 1977, except that heat may be discharged in blowdown from recirculating cooling water systems provided that the temperature at which the blowdown is discharged does not exceed at any time the lowest temperature of the recirculating cooling water prior to the addition of make-up water.

(2) The limitation in paragraph (a) (1) of this section shall not apply where the owner or operator of a unit otherwise subject to it can demonstrate:

(i) That sufficient land for mechanical draft evaporative cooling towers is not available on the premises or on adjoining property under the ownership or control of the owner or operator, as of the date on which these regulations were proposed, with some amount of land use reassignment and no other available alternative evaporative cooling system is practicable, or

(ii) That total dissolved solids concentrations in available intake cooling water exceed 30,000 mg/l, and land not owned or controlled by the owner or operator is located within 150 m (500 ft) downwind (prevailing) of all practicable locations for mechanical draft cooling towers and no other alternative evaporative cooling system is practicable.

(3) The limitations in paragraph (a) (1) shall not apply to discharges from nonrecirculating house service water systems in nuclear-fueled generating units, and to waste water discharges from low-volume waste sources or intermediate volume waste sources other than blowdown from recirculating cooling water systems.

(b) There shall be no discharge of pollutants from clarification water treatment and softening water treatment.

(c) Concentrations of free available chlorine in waste water discharged from nonrecirculating and recirculating cooling water systems shall not exceed average concentrations of 0.2 mg/l and maximum concentrations of 0.5 mg/l at the outlet corresponding to an individual unit during a maximum of one 2-hour period a day. No discharge of total residual chlorine is otherwise allowed. No discharge of total residual chlorine is allowed from one unit while another unit at the same plant is being chlorinated. When it can be demonstrated by the owner or operator that higher levels of free available chlorine or more lengthy total periods of application are required to maintain a reasonable level of condenser tube cleanliness for nonrecirculating cooling water systems, discharges of amounts of free available chlorine in excess of the above limitations which are necessary to maintain such level of condenser tube cleanliness may be permitted.

(d) There shall be no discharge of polychlorinated biphenyl transformer fluid.

(e) Total iron and total copper in waste water from low-volume waste sources shall not exceed daily average amounts, mg, of 1 mg/l total copper x FLOW and 1 mg/l total iron x FLOW.

(f) (1) Total suspended solids in waste water from low-volume waste sources shall not exceed daily average amounts, mg. of 15 mg/l x FLOW or a maximum amount, mg, for any one day of 100 mg/l x FLOW.

(2) Total suspended solids in waste water from recirculating cooling water systems shall not exceed daily average amounts, mg, of 15 mg/l x FLOW or a maximum amount, mg, for any one day of 100 mg/l x FLOW.

(3) Total suspended solids in waste water from nonrecirculating ash sluicing systems and from nonrecirculating wet-scrubber air pollution control systems shall not exceed daily average amounts, mg, of 15 mg/1 x FLOW or a maximum amount, mg, for any one day of 100 mg/1 x FLOW, except that amounts, mg, in excess of the above limitations are allowed only to the extent that the amount, mg, of total suspended solids in waste water from nonrecirculating ash sluicing systems and from nonrecirculating wet-scrubber air pollution control systems does not exceed the amount, mg, of total suspended solids brought into the plant, over the same time span, for use in conjunction with the nonrecirculating ash sluicing system or the nonrecirculating wet-scrubber air pollution control system, respectively.

(4) Total suspended solids in waste water run-off from rainfall run-off sources, taken collectively as if from one source, including coal pile drainage, yard and roof drainage, and run-off from construction activities shall not exceed average concentrations of 15 mg/1 during the time span of each run-off event or a maximum concentration of 100 mg/1 at any time.

(g) The pH value of all streams discharged, with the exception of nonrecirculating cooling water, shall be in the range of 6.0 to 9.0 at all times.

(h) Waste waters discharged from the sanitary system shall meet applicable standards for publicly-owned treatment works specified in 40 CFR Part 133.

(i) No debris from the intake means shall be discharged.

(j) There is no effluent limitation on waste waters from the radiological waste system presented in this regulation.

(k) (1) Oil and grease in waste water from low-volume waste sources shall not exceed daily average amounts, mg, of 10 mg/1 x FLOW, or a maximum concentration of 20 mg/1 at any time.

(2) Oil and grease in waste water from recirculating cooling water systems shall not exceed daily average amounts, mg, of 10mg/1 x FLOW.

(3) Oil and grease in waste water from rainfall run-off sources, taken collectively as if from one source, shall not exceed daily average concentrations of 10 mg/1 during the time span of each run-off event or a maximum concentration of 20 mg/1 at any time.

(4) Oil and grease in waste waters from nonrecirculating ash sluicing systems and from nonrecirculating wet-scrubber air pollution control system shall not exceed daily average amounts, mg, of 10 mg/1 x FLOW.

(l) Where waste waters from one source with effluent limitations for a particular pollutant are combined with other waste waters (such as the combination of waste water from low-volume sources with nonrecirculating cooling water), the effluent limitation, mg (or mg/1), for the particular pollutant, excluding pH, for the combined stream shall be the sum of the effluent limitations (for concentration limits apply appropriate dilution factors) for each of the streams which contribute to the combined stream, except that the actual amount, mg (or mg/1), of the pollutant in a contributing stream will be used in place of the effluent limitation for those contributing streams where the actual amount, mg (or mg/1), of the pollutant is less than the effluent limitation, mg (or mg/1), for the contributing stream.

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

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

(a) (1) There shall be no discharge of heat, except that heat may be discharged in blowdown from the recirculating condenser cooling water system provided that the temperature at which the blowdown is discharged does not exceed at any time the lowest temperature of the recirculating cooling water prior to the addition of make-up water.

(2) The limitation set forth in subparagraph (a) (1) shall be achieved as follows:

(i) No later than July 1, 1978, by base-load units presently in operation or on which construction is completed prior to July 1, 1977, with a nameplate generating capacity of 500 megawatts or greater.

(ii) No later than July 1, 1979, by base-load units presently in operation or on which construction is completed prior to July 1, 1977, with a nameplate generating capacity of less than 500 megawatts, but greater than 299 megawatts.

(iii) No later than July 1, 1980, by all other large base-load units.

(iv) No later than July 1, 1983, by all other units, including cyclic units, peaking units and small base-load units.

(3) The limitation set forth in subparagraph (a) (1) shall not apply to units as to which the owner or operator can demonstrate that (1) sufficient land for mechanical draft evaporative cooling towers is not available on the premises, with a reasonably significant amount of land use reassignment or on adjoining properties, whether or not owned or controlled by the owner or operator, and (2) none of the available alternative evaporative cooling systems is practicable.

(4) The limitations set forth in subparagraph (a) (1) shall not apply to discharges from nonrecirculating house service water systems in nuclear-fueled units.

(b) The effluent limitations set forth in § 423.12 (c), (f) (2), (g), (h), (i), (k) (2), and (k) (3) shall apply to discharges of pollutants from recirculating and nonrecirculating cooling water, and sanitary wastes, except that no discharge is allowed of total residual chlorine from recirculating cooling water systems shall that total chromium, total phosphorus (as P), and total zinc in waste water from recirculating cooling water systems shall not exceed daily average amounts, mg, of 0.2 mg/l total chromium x FLOW, total phosphorus (as P) of 5 mg/l x FLOW and 1 mg/l of total zinc x FLOW.

(c) (1) There shall be no discharge of waste water from run-off waste sources, taken collectively as if from one source, unless the first 15 minutes of rainfall run-off are segregated from the remainder during any rainfall event.

(2) Total suspended solids and oil and grease in waste waters from the first 15 minutes of rainfall run-off from any rainfall event, taken collectively as if from one source, shall not exceed average concentrations of 15 mg/l and 10 mg/l, respectively, and maximum concentrations of 100 mg/l and 20 mg/l, respectively.

(3) Total suspended solids and oil and grease in waste waters from all but the first 15 minutes of rainfall run-off from any rainfall event, taken collectively as if from one source, shall not exceed average concentrations of 15 mg/l and 10 mg/l, respectively, and maximum concentrations of 100 mg/l and 20 mg/l, respectively.

(d) There shall be no discharge of pollutants other than those controlled by paragraphs (a), (b), and (c) of this section.

(e) There is no effluent limitation on waste waters from the radiological waste system presented in this regulation.

(f) Where waste waters from one source, with effluent limitations for a particular pollutant, are combined with other waste waters (such as the combination of waste water from low-volume waste sources with nonrecirculating cooling water), the effluent limitation, mg (or mg/l), for the particular pollutant, excluding pH, for the combined stream shall be the sum of the effluent limitations (for concentration limits apply appropriate dilution factors) for each of the streams which contribute to the combined stream except that the actual amount, mg (or mg/l), of the pollutant in a contributing stream will be used in place of the effluent limitation for those contributing streams where the actual amount, mg (or mg/l), of the pollutant is less than the effluent limitation, mg (or mg/l), for the contributing stream.

§ 423.14 [Reserved]

§ 423.15 Standards of performance for new sources.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of standards of performance by a new source subject to the provisions of this part:

(a) There shall be no discharge of heat by any new sources, except that heat may be discharged in blowdown from recirculating cooling water systems provided that the temperature at which the blowdown is discharged does not exceed at any time the lowest temperature of the recirculating cooling water prior to the addition of make-up water.

(b) The effluent limitations set forth in § 423.12(b) through (n) shall apply to discharges of pollutants other than heat, except as provided in § 423.15(c).

(c) There shall be no discharge of:

(1) corrosion inhibitors in blowdown from recirculating cooling water systems;

(2) total residual chlorine, or other chemical additives used for biological control in main condenser tubes from nonrecirculating cooling water systems;

(3) pollutants from systems providing sluicing of bottom ash from the combustion of oil or fly ash from the combustion of any fuel; or

(4) pollutants from nonrecirculating ash sluicing systems.

(d) Where waste waters from one source with effluent limitations for a particular pollutant are combined with other waste waters (such as the combination of waste water from low-volume waste soruces with nonrecirculating cooling water), the effluent limitation, mg (or mg/l), for the particular pollutant, excluding pH, for the combined stream shall be the sum of the effluent limitations (for concentration limits apply appropriate dilution factors) for each of the streams which contribute to the combined stream except that the actual amount, mg (or mg/l), of the pollutant in a contributing stream will be used in place of the effluent limitation for those contributing streams where the actual amount, mg (or mg/l), of the pollutant is less than the effluent limitation, mg (or mg/l), for the contributing stream.

§ 423.16 Pretreatment standards for new sources.

The pretreatment standards under section 307(c) of the Act, for a source within the steam electric power generating category which is an industrial user of 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 navigable waters), shall be the standard set forth in 40 CFR Part 128 except that for the purposes of this section, § 128.133 shall be amended to read as follows:

In addition to the prohibitions set forth in § 128.131 of this title, the pretreatment standards for incompatible pollutants introduced into a publicly owned treatment works by a major contributing industry shall be the standard of performance for new sources specified in § 423.15, 40 CFR, Part 423, 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 be correspondingly reduced for that pollutant.

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