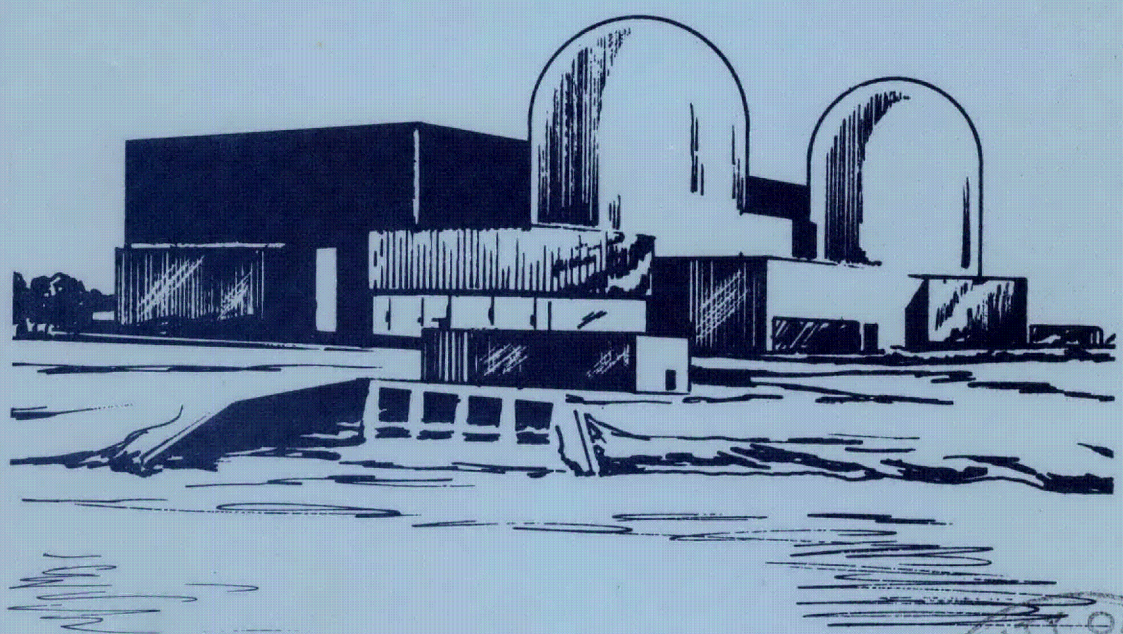
WASH – 1355

Nuclear Power Facility Performance Characteristics for making Environmental Impact Assessments



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NUCLEAR POWER FACILITY

PERFORMANCE CHARACTERISTICS

FOR MAKING

ENVIRONMENTAL IMPACT ASSESSMENTS

Directorate of Regulatory Standards
United States Atomic Energy Commission
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SECTION 1.0

INTRODUCTION

In the past, licenses to operate nuclear power plants have been granted for specific plants located on specific sites. The licensing process has involved the concurrent review of all safety and environmental issues associated with plant siting, design, construction, and operation.

Separation of the site review process from the plant review process would save substantial time and effort. It would be possible to resolve all safety and environmental issues related to site selection well in advance of a decision to locate a nuclear power station at the site. If such issues were settled for a number of potential sites, the result would be the creation of an inventory of approved or designated sites that would be available for future nuclear plants. Then, when an applicant filed for a permit to construct a nuclear plant at one of the designated sites, site preparation and limited construction activity could begin immediately.

Although site designation involves decoupling site approval from the approval of the facility, some information about the facility is required to assess and resolve environmental impact issues. If an application for designating a site is submitted before a final plant design is selected, a substitute or surrogate facility design would have to be assumed during the site review process. The site review

process involves assessments of both site suitability and environmental impact. Only the latter is discussed in this report. For purposes of impact assessment, the required information concerning the facility would include only those characteristics that can affect the site and its environs.

The objectives of this report are to identify and quantify the performance characteristics of nuclear power stations which significantly affect the environment. Models used to assess environmental impacts are not specified; however several models are presented or referenced for illustrative purposes. None of these should necessarily be regarded as the recommended approach for simulating a given impact.

To fulfill the above objectives a set of performance characteristics for a hypothetical nuclear power facility is derived from a composite of design data and expressed numerically as envelopes whose bounds describe existing technology for light-water-cooled nuclear power stations.

The envelopes are based only on custom-designed light-water-cooled reactors. High-temperature gas-cooled reactors, standardized designs of light-water-cooled reactors, and standardized designs of the balance of plant will be included in planned revisions to this report. It should also be noted that a number of the envelopes are based on relatively small data sets; other envelopes for which design data are incomplete have been estimated from studies reported in the technical literature. The planned revisions will remedy these shortcomings. Consequently this document is printed in loose leaf format to enable new or revised material to be readily inserted.

SECTION 2.0

HYPOTHETICAL NUCLEAR POWER FACILITY

This section summarizes the attributes used to define a hypothetical nuclear power facility. The facility is regarded as typical of most light-water-cooled nuclear power installations, but not in the sense that duplicate facilities with the same attributes will be built. Rather, the hypothetical facility is sufficiently representative to permit a reasonable assessment of environmental impact to be made on the basis of its performance characteristics.

2.1 DEFINITIONS

As applied here, a design performance characteristic is defined as any property of a nuclear power reactor facility which can affect the environmental impact of that facility. Examples of design performance characteristics include the release rates of the various facility effluents. Later in this report a complete set of design performance characteristics is identified.

The facility* is taken to encompass those major physical components of a nuclear power station which are required for normal operation or for maintaining the safety of that station. In general those components belong to one of three functional categories into which all facility systems may be placed: nuclear island, balance of plant, and condenser cooling system.

* Note that hereinafter any references or inferences made to the word "facility" apply solely to the hypothetical nuclear power station upon which this report is based.

The terms "nuclear steam supply system (NSSS)," "nuclear island," and "balance of plant (BOP)," may be used to include different sets of components for different plants. For purposes of systematizing the data of this report they are defined below.

The nuclear steam supply system includes components and piping within the reactor coolant pressure boundary and directly related auxiliary systems.

The nuclear island includes the NSSS, engineered safety features, and associated auxiliary systems, including the control building, diesel generator building, fuel building, and radwaste building.

The balance of plant is that portion of the facility exclusive of the nuclear island. Included in this category are the turbine-generator building, administration building, switchyard, intake and discharge structures, and access roads. The condenser cooling system, a subsystem of the balance of plant, is considered separately because of the variability of design and the critical role played by this system in governing environmental impact. The main condenser and any affiliated structures and systems such as cooling towers, impoundments, and discharge canal are assumed to be part of the condenser cooling system. All other cooling systems of the facility (e.g., turbine cooling system) are included under service water systems as part of the balance of plant.

The site is the area on which the facility is located and which is owned or under the control of the facility's operator. The site includes

all land, stream, and water impoundments on which public access is controlled. Transmission rights of way and dedicated transportation corridors that extend beyond the site boundary are not considered part of the site, although they are utilized by structures which belong to the balance of plant. Such structures are offsite portions of the facility, and when newly constructed, they are considered in evaluating the facility's environmental effects.

2.2 NUCLEAR STEAM SUPPLY SYSTEM (NSSS)

The facility contains two light-water-cooled reactor units fueled by enriched uranium oxide. In other words, the power source is restricted to either pressurized water reactors (PWR) or boiling water reactors (BWR). The high-temperature gas-cooled reactor (HTGR), while presently not covered in this report, has performance characteristics that differ from PWRs and BWRs. Two identifiable areas of potential differences are (1) radiological source term and release rates and (2) waste heat rejected to the environment. In both these instances the quantities involved are estimated to be less than those emitted by comparable light water reactors. Therefore, some performance characteristics listed in this document (e.g., cooling system evaporation) would tend to have values that overestimate HTGR environmental effects. As explained previously, a scaledown to accommodate the HTGR has not been completed for use in this report.

2.3 REACTOR POWER LEVEL

Under the current maximum design capacity for nuclear power reactors suggested in Regulatory Guide 1.49, each reactor possesses a core thermal power capacity of 3800 megawatts (MWt). This is about 500 MWt above the projected average power level for reactors scheduled to become operational during 1980-81. However, reactor vendors are tending to design to the recommended limit, and a reactor power level of 3800 MWt appears to be a realistic choice for the period beyond 1980.

In order to be conservative, 100 percent utilization, independent of maintenance and reactor refueling downtime, is applied to all performance characteristics that are power dependent. A conservative estimate of 33 percent thermal efficiency is made; this is representative of nuclear power facilities currently under construction but may slightly underestimate the efficiency of light water reactors for the period beyond 1980. The above reactor properties result in a net electrical generating capacity of 1250 MWe per reactor.

2.4 MULTIPLE UNITS

Based on the conclusions of Appendix A, the configuration of the facility is two reactor units with a combined electrical generating capacity of 2500 MWe. For purposes of this study the reactors are independent of one another, and their effects are treated as additive.

2.5 BALANCE OF PLANT

The only constraints or conditions placed on balance-of-plant systems or components concern the type and location of intake and discharge structures and the layout of the service water system. The intake structure is located on the shoreline of the waterbody that supplies the facility's principal water needs; it is equipped with trash racks and traveling screens. The discharge structure is a fully submerged diffuser located offshore. All liquid effluents (condenser cooling water and service water) are combined and discharged through the same exit portal. Although site conditions often dictate the type and location of intake and discharge structures, the general descriptions used here are typical of common design practice.

The service water system is nonrecirculating and independent of the condenser cooling system. Such a design is not generally representative of current design practice, especially for stations that use cooling towers. However, pursuant to the objectives of this study, the facility's service water system maximizes water usage and associated environmental impact.

2.6 CONDENSER COOLING SYSTEM

Three alternative cooling systems have been chosen to complete the facility:

1. Once-Through (Open-Cycle). Cooling water is removed from a source, pumped through a condenser to remove reject heat, and discharged to a receiving waterbody.

2. Evaporative Cooling Tower (Closed-Cycle). Condenser cooling water is circulated to a cooling tower where heat rejection takes place primarily by evaporation. A fraction of the circulating water is continuously discharged to a receiving waterbody to control chemical buildup; at the same time water is removed from a source and added to the circulating water to make up for water evaporated or discharged from the system.

3. Cooling Pond (Closed-Cycle). Condenser cooling water is circulated to a pond, impoundment, or canal where heat rejection takes place by evaporation and surface heat transfer. A fraction of total circulating water is continuously discharged to a receiving waterbody to control chemical buildup; at the same time water is removed from a source and added to the circulating water to make up for that water lost by natural and induced evaporation or discharged from the system.

The cooling tower may be either natural draft or mechanical draft type; the cooling pond is located wholly within the site boundary and subject to control by the facility operator. For the sake of simplicity of presentation, less-common cooling systems such as dry cooling towers and spray ponds are not treated in this report. The various cooling system alternatives are considered only for those impact areas which are most sensitive to cooling system design (e.g., water supply and evaporation).

2.7 SITE LOCATION

This report is concerned with the performance characteristics of land-based nuclear power facilities. Offshore and underground sites are specifically excluded. Other than the proviso that the site be a terrestrial one, no environmental limitations are placed on the facility.

The magnitude of many performance characteristics is often influenced by site specific conditions (e.g., stack height for gaseous radwastes can depend on local meteorology). However, the numerical envelope of each performance characteristic identified in this report is assumed to be broadly representative of all localities. The method by which the envelopes are derived virtually assures that diverse site conditions are factored into the results (see "Analytical Approach," p. 4-1). On occasion, specific site parameters required for determining environmental impact are identified, but, in keeping with the objectives of this report, no attempt is made to assign numerical values to them.

2.8 ACCIDENTS

The facility operates at full capacity under normal operating conditions. Accident situations arising from either external or internal causes (e.g., tornado effects, failure of a vital component) and the possible consequences of accidents are not addressed in this effort.

2.9 LEGAL CONSIDERATIONS

In certain instances the requirement to comply with existing statutes or regulations sets an upper limit on the value of a given performance characteristic. For example, the AEC has set strict rules and regulations dealing with the radiological impacts of nuclear power stations. Controls in other impact areas are exercised by other agencies of the Federal government such as the Environmental Protection Agency (EPA) and State and local agencies.

Legal constraints at the State and local level are often a determining factor as to the maximum value of many performance characteristics, but delineation of these constraints is beyond the scope of this document. Such considerations do, in fact, fall within the realm of site-specific conditions. However, for those cases in which a design performance characteristic has a well-defined limit set by Federal statute or regulation applicable uniformly to the entire nation, the facility's design envelope does not exceed that limit.

2.10 SUMMARY

The following set of attributes has been used to define the hypothetical facility for which design performance characteristics are to be evaluated:

1.	Reactor	light-water-cooled (BWR or PWR)
2.	Operating efficiency	100% of design capacity
3.	Reactor fuel	enriched UO_2

4.	Thermal capacity	3800 MWt per unit
5.	Number of units	2
6.	Thermal efficiency	33%
7.	Operating condition	normal
8.	Condenser cooling system	3 designs
9.	Service water system	nonrecirculating
10.	Intake	shoreline structure with traveling screens
11.	Discharge	offshore, submerged diffuser for all liquid effluents

SECTION 3.0

MAJOR ENVIRONMENTAL EFFECTS OF FACILITY OPERATIONS

This section provides background information descriptive of the rationale used in deciding which design performance characteristics are most important for purposes of estimating potential environmental impacts. The discussion should not be interpreted as guidance for design criteria. Details of engineering design required to ensure the compatibility between a nuclear power station and a site are not addressed.

Potential radiological impacts are discussed under the headings "Radiation Exposure" and "Radwaste Disposal Burden." The potential nonradiological impacts and their sources are listed in Table 1, each major impact listed is discussed in the text.

3.1 RADIATION EXPOSURE

The two principal sources of radiation exposure to humans and biota from a normally operating nuclear power station are (1) radioactive material in gaseous, liquid, or solid form in effluents from the radwaste treatment systems and (2) direct radiation from onsite plant components. Both sources must fall within the radiation limits set by the AEC and documented in 10 CFR Part 20, "Standards for Protection Against Radiation," and meet the criterion "as low as practicable" (ALAP) for radioactive material in nuclear power reactor effluents (10 CFR Parts 20 and 50). These Federal standards bound the amounts of radioactive material which may be released from a light-water-cooled

TABLE 1
MAJOR NONRADIOLOGICAL IMPACTS FROM NUCLEAR POWER FACILITIES

Major Impact	Facility Property (Cause of Impact)
Air Quality	Combustion Products
	Drift
Weather Modification	Water Vapor
	Airborne Heat
Availability of Water Resources	Water Supply
	Water Consumption
Water Quality	Residual Chemicals
	Waterborne Heat
Damage to Aquatic Species	Intake Hydraulics
	Cooling Water Circulation
Land Modification	Land Requirement
	Site Preparation
Quality of Life	Noise
	Viewability
	Labor Force

nuclear power reactor and the doses to the public from radioactive releases. Hence, they are overriding considerations in dealing with radiation exposure.

3.1.1 Radioactive Materials in Effluents

The amount of exposure to radiation from the effluents of a nuclear power plant is determined by site meteorological conditions, site boundary distances, quantities and characteristics of radioactive materials released, land use, topographic features of the site, and other factors. Of these, only the release rates of radioactive materials (i.e., source term) can be regarded as design performance characteristics of the hypothetical facility. Acceptable bases for establishing the facility's source term are presented under "Nuclear Island Systems."

3.1.2 Direct Radiation

Major sources of direct radiation from an operating light-water power reactor facility include internal plant components (e.g., turbine-generator and other steam-bearing components) and radwaste storage tanks.

Storage tanks for radioactive wastes are located either underground or in shielded structures at a majority of nuclear power stations. The offsite radiation exposure from such tanks is very small, and they are not considered a factor in assessing the environmental impact of direct radiation from the facility.

The direct radiation from radioactive components is a design performance characteristic of the facility. The characteristic is evaluated under "Nuclear Island Systems."

3.2 RADWASTE DISPOSAL BURDEN

Those radioactive wastes not released directly to the environment comprise a disposal burden for the facility. In general such wastes are concentrated, solidified, if they are not already in solid form, packaged in shielded containers, and shipped to an offsite burial ground. Since the preparation and handling of solid radwastes is a closely supervised internal operation of the facility, the radiation exposure hazard at the site boundary from such material is considered nil. As an environmental impact solid radwaste is important only to the extent that it places a disposal burden on the power facility and associated waste burial grounds.

3.2.1 Solid Radwaste

For purposes of this report, only those solid wastes generated by the liquid radwaste treatment system along with certain compressible dry wastes are considered solid radwaste. Spent fuel rods and other highly radioactive components that require special handling do not belong to the continuous waste disposal burden produced during normal reactor operation, and they are not treated here.

There are two forms of solid wastes: "wet" and "dry". Wet wastes include evaporation concentrates, resin bead slurries, and other radioactive sludges accumulated by the radwaste treatment system. A binding material such as cement is commonly used to transform liquid

wastes to solids. Because of their radioactivity, wet solid wastes may have to be stored onsite for a certain length of time to allow for decay. Dry solid wastes consist of ventilation filters, rags, paper, clothing, and other miscellaneous items. Because their level of contamination is quite low, dry wastes can be compressed and packaged for immediate disposal. Nearly all solid wastes are packaged in 55-gallon drums.

Two performance characteristics are sufficient to describe radwaste disposal burden: (1) radioactivity, the annual average radioactivity contained in solid radwastes shipped from the facility, and (2) volume, the annual average number of 55-gallon drums needed to contain the wastes. Design envelopes for each of these characteristics are presented under "Nuclear Island Systems".

The radioactivity content and volume of solid wastes generated by nuclear power stations are highly variable parameters. In addition to the obvious dependencies on reactor type and size, the activity and volume of solid waste will depend on the design and efficiency of the treatment system, operating procedures, coolant leakage rates, corrosion rates, and so forth. The uncertainty introduced by these factors is probably not significant for total radioactivity, but they may greatly affect the total volume.

3.3 AIR QUALITY

Aside from gaseous radioactive effluent, nuclear power stations discharge few substances with the potential for affecting offsite ambient air quality. The only other airborne effluents that belong to

this impact category are combustion products and the salt fraction of drift from the condenser cooling system. (Note that airborne heat and water vapor emitted by the facility are not defined as pollutants under existing laws with respect to air quality.)

3.3.1 Combustion Products

Fossil fuel combustion products are created by the intermittent operation of two nonnuclear components: (1) diesel generators and (2) auxiliary steam boilers. These components supply electrical power and process steam during outages of the NSSS; otherwise they are operated only for the periodic testing required of backup systems.

Typical combustion products produced by the burning of diesel fuel and Number 2 fuel oil include:

1. Particulates
2. Sulfur dioxide (SO_2)
3. Carbon monoxide (CO)
4. Hydrocarbons
5. Nitrogen oxides (NO_x)

The relative proportions of these differ for the two components.

Those design performance characteristics needed for estimating the environmental effects from the release of combustion products include the rate of fuel consumption for each facility component, the utilization rate of each component, and the release elevation. The above characteristics are evaluated under "Nuclear Island Systems." Various atmospheric dispersion models are available for calculating the offsite distribution of gaseous emissions (for example, see "Meteorology and Atomic Energy," [1]).

3.3.2 Drift

That fraction of the circulating cooling water exhausted to the atmosphere as water droplets is called drift. In the case of the facility, cooling towers are the only cooling option capable of generating drift.

Upon exiting from a tower, drift rises in response to the updraft generated by the tower and then descends to the ground while being transported by the ambient wind. Depending on prevailing meteorological conditions the water droplets may nucleate or coalesce into a fine mist or rain or they may evaporate before reaching the ground.

Drift has the same composition as the circulating cooling water. Because of evaporative losses, closed-cycle evaporative cooling systems concentrate circulating cooling water. The ratio of salt concentration in the circulating water to the average concentration of dissolved solids in the makeup water is referred to as the concentration factor. (Note that chemical additives also contribute to the salt burden, but they are not included in the concentration factor as defined here.) The rate of drift evaporation varies with (1) salt concentration, which regulates vapor pressure, (2) droplet size, and (3) ambient relative humidity [2]. Deposition of salt-bearing drift leaves behind a salt residue that may damage vegetation or materials and equipment subject to corrosion.

The areal extent and intensity of salt drift depend on a combination of facility parameters and meteorological conditions at the site. These have been summarized by Roffman et al. [3] and are listed in Table 2. Those factors associated with the design and operation of

TABLE 2
FACTORS AFFECTING DISPERSION AND DEPOSITION OF DRIFT
FROM NATURAL-DRAFT AND MECHANICAL-DRAFT TOWERS
(Taken from Roffman, et al [3])

Factors associated with the design and operation of the cooling tower	Factors related to atmospheric conditions	Other Factors
Volume of water circulating in the tower per unit time Salt concentration in the water Drift rate Mass size distribution of drift droplets Moist plume rise influenced by tower diameter, height and mass flux	Atmospheric conditions including humidity, wind speed and direction, temperature, and stability class which affect plume rise dispersion and deposition. Tower wake effect which is especially important with mechanical draft towers Evaporation and growth of drift droplets as a function of atmospheric conditions and ambient conditions. Plume depletion effects	Adjustments for non-point source geometry collection efficiency of ground for droplets

cooling towers represent design performance characteristics of the facility. Numerical envelopes for each of these factors are presented under "Condenser Cooling Systems."

Assuming cooling towers are continuous point sources, salt drift can be simulated by any number of simple dispersion models. A comparison among various prediction methods for an identical set of source and meteorological conditions is shown in Figure 1. The models generally agree that the maximum salt deposition occurs between 1 and 10 km in the downwind direction. However, they differ considerably as to the absolute magnitude of the deposition rate.

3.4 WEATHER MODIFICATION

Whereas combustion products and salts can affect ambient air quality, the water vapor and waste heat from the facility may be responsible for undesirable modifications to the weather in the vicinity of the site. These modifications may take the form of fogging and icing, increased precipitation, increased cloudiness and continual atmospheric instability, and in certain instances they may persist for 10 to 20 miles. The degree to which any of these can be classified as undesirable depends on the uses to which the affected land is put.

3.4.1 Water Vapor

All condenser cooling systems, except closed-cycle dry cooling towers, utilize evaporation as one of their major heat transfer mechanisms. As a consequence, large amounts of water vapor are released to the atmosphere by such systems; there the excess vapor cools and may condense to minute water droplets that become visible as a cloud.

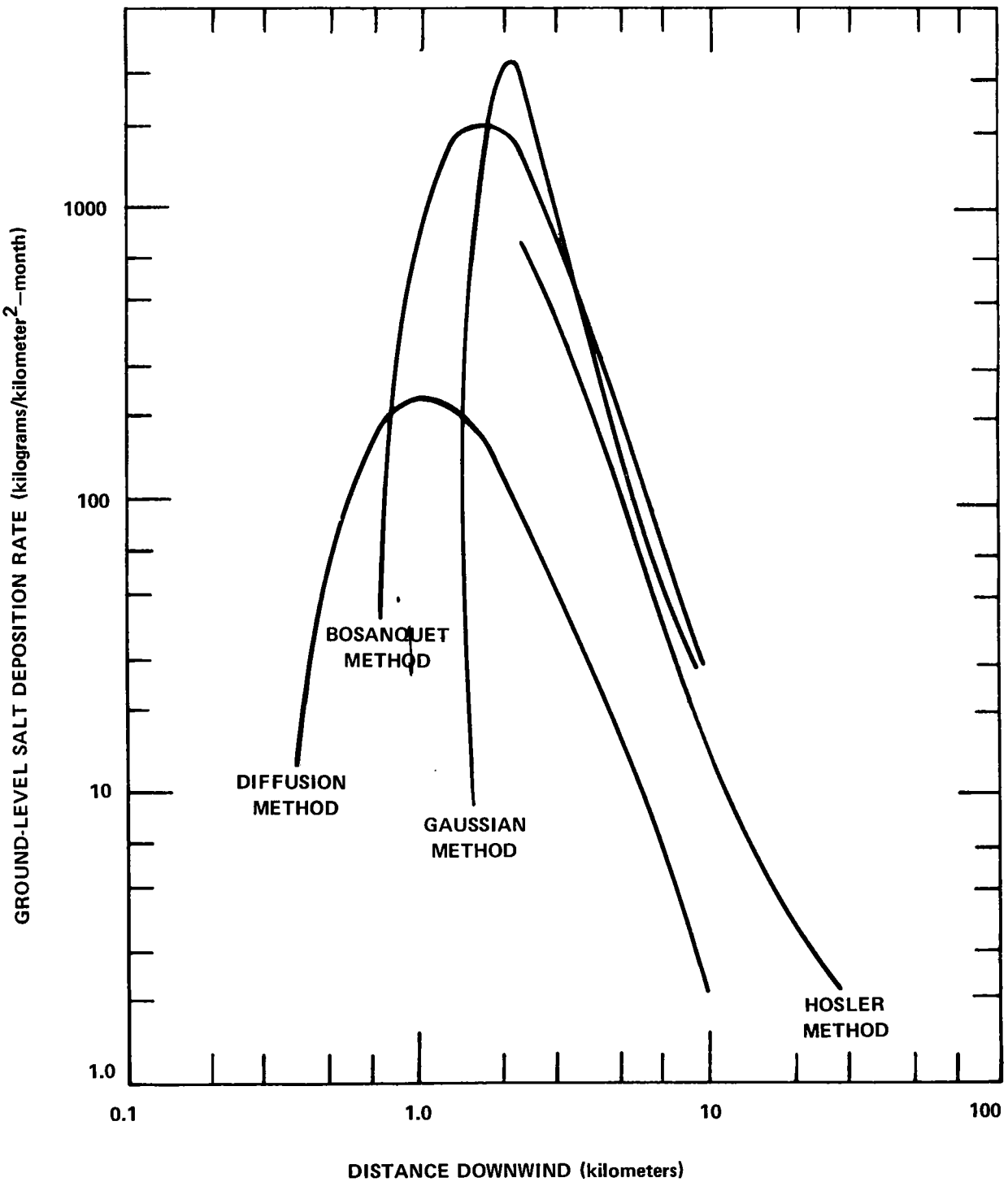

Figure 1. Ground-Level Salt Deposition Rate From a Natural-Draft Tower As a Function of the Distance Downwind. A Comparison Between Various Prediction Methods (Taken from Roffman,et al [3])

Cooling towers at nuclear power stations produce a condensation vapor cloud which can persist over considerable distances. A chance for tangible environmental damage exists should the tower plume mingle and react with a nearby industrial plume containing a reactive substance such as sulfur dioxide.

Any cloud that touches the ground surface is fog, and, if the surface is sufficiently cold, the water droplets may aggregate on the surface as ice. Induced fogging and icing are the two most frequently cited environmental effects of evaporative cooling devices.

Plant-generated fog often results whenever atmospheric conditions (i.e., air temperature, humidity, stability) favor the formation of natural fog. In general, fog is produced by the interaction of the warm, saturated water vapor of plant effluent with cooler, unsaturated ambient air. The appropriate conditions for generating fog are illustrated in Figure 2, which is a plot of absolute humidity versus air temperature. As an example, the line AB gives the approximate trace of all mixtures of plant effluent (A) with ambient air (B). The line segment AE falls within the zone of supersaturation, and any air mixtures along that segment will form fog. The remainder of the line (BE) lies in the zone of undersaturation, and any fog formed along the AE segment will tend to evaporate. As applied to impact evaluation, the problem becomes one of selecting where to place points A and B in Figure 2 along with determining the location of E relative to some point at which impact is evaluated, such as the site boundary.

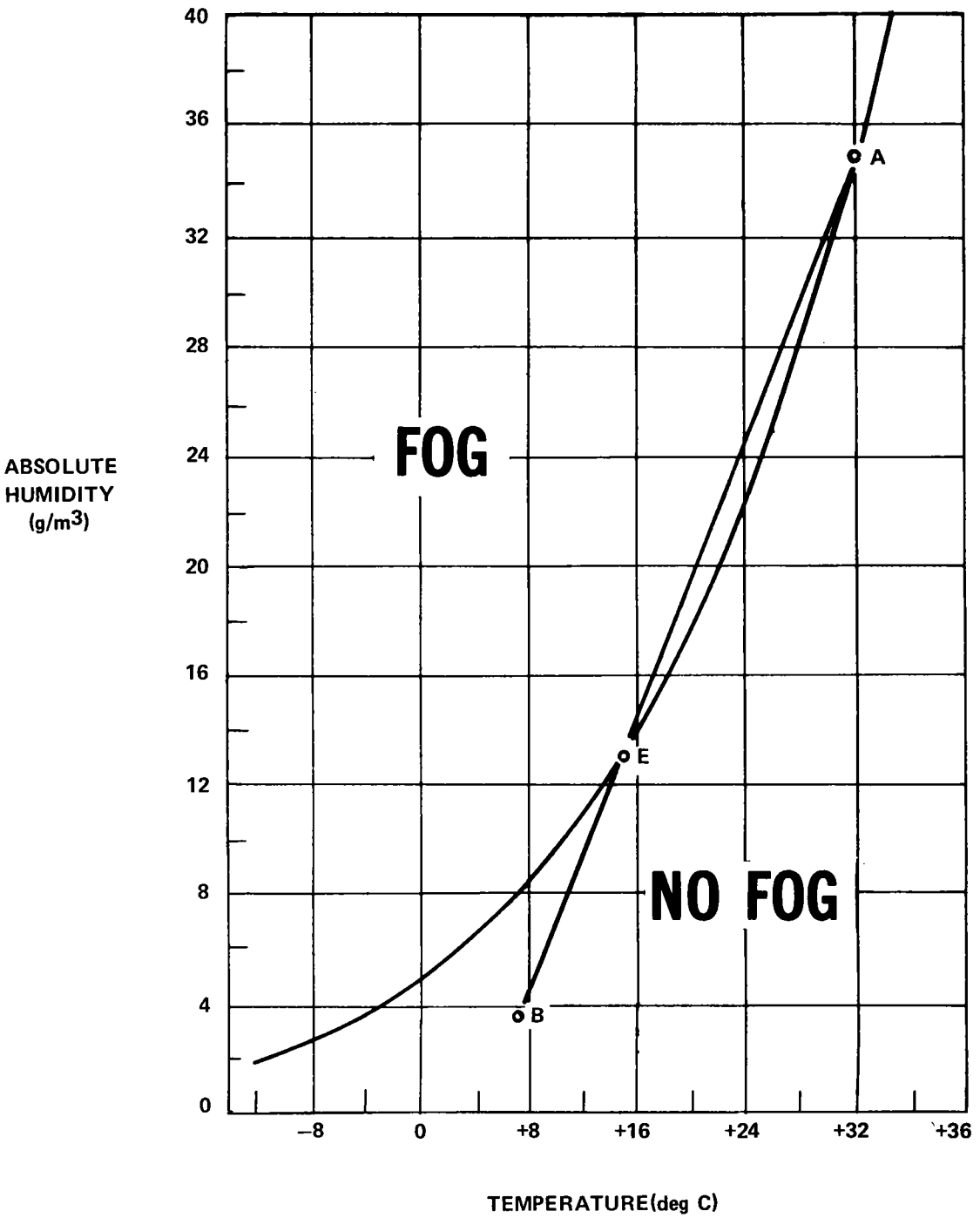

Figure 2. Saturation Absolute Humidity Versus Temperature (Taken from Reference 4)

Whereas point A is largely plant dependent and can be estimated to lie close to the saturation curve over a fairly small range of temperature, the remaining points are totally site specific and subject to local variations.

Aynsley and Carson [2] suggest that, to a first approximation, fog-forming potential can be estimated from the amount of dilution with ambient air required to prevent the water vapor plume from exceeding 100 percent relative humidity. The development of fog can then be determined by comparing the calculated dilution with probable dilutions based on atmospheric dispersion for various stability classes. Those stability classes that give insufficient dilution will permit the formation of fog.

An analysis of facility-generated fog requires an estimate of the water-vapor plume temperature (i.e., exit air wet bulb temperature). This design performance characteristic is presented under "Condenser Cooling Systems." More sophisticated approaches require estimates of plume rise and volumetric discharge rate; numerical envelopes of parameters used for evaluating these factors are similarly presented under "Condenser Cooling Systems."

Among other things, fogging potential varies according to the type of evaporative cooling device. For the most part, once-through cooling systems dilute their effluents to the receiving waterbody to the extent that the probability of a dense surface fog is virtually

nonexistent. Cooling ponds, on the other hand, operate at temperatures well above ambient, enabling the vapor pressure at the water surface to exceed the saturation vapor pressure at some reference height. The greater the vapor pressure difference, the more dense the resultant fog. Unless atmospheric conditions favor the formation of natural fog, cooling pond fog seldom penetrates ashore more than a few hundred feet.

Since by their nature they release large quantities of saturated water vapor, evaporative cooling tower systems are considered the primary source of plant-induced fogging and icing. Most experts have agreed that fog and ice are minor problems with natural-draft towers, but the effects may occur frequently enough with mechanical-draft towers to be objectionable [2]. The principal reason for this appears to be the contrasting release elevations and resultant plume rise associated with each tower system. A natural-draft vapor plume is likely to remain aloft and disperse without reaching the ground; a mechanical-draft plume is more likely to remain close to ground level. Meager observational data at hand tend to support these interpretations.

In addition to fogging and icing, increased precipitation, other than that directly caused by drift, may occur in connection with cooling tower operation. However, continual observation of cooling tower plumes over a period of years has failed to substantiate that the effect is appreciable [2].

3.4.2 Airborne Heat

The significance of airborne heat as an environmental impact involves the "heat island" effect wherein large amounts of heat are

added to the atmosphere from sources with relatively small surface areas. Some researchers have suggested that thermal discharges of this type may function as triggering mechanisms for atmospheric disturbances such as thunderstorms and tornadoes [2,5].

The effective area over which a given amount of waste heat is dissipated is probably the controlling factor for initiating weather modification due to the "heat island." In this regard cooling towers are high temperature, point sources of heat whereas large natural waterbodies are low temperature, diffuse sources of heat. The amounts of waste heat released by the facility and the parameters needed to estimate their effective areas of release are presented as design performance characteristics under "Condenser Cooling Systems."

In the case of large thermal sources such as cities, weather modification due to the "heat island" is a real and measurable effect. To what extent power plants alter meso-scale weather patterns by contributing to or creating their own "heat islands" is as yet uncertain. In all probability the effect of a single, moderate-sized station would be negligible; however, the consequences of a large number of stations distributed over an area comparable to a large city are not so readily predictable.

3.5 AVAILABILITY OF WATER RESOURCES

This category of effect has been divided into two subcategories, water supply or use and water consumption. The water supply requirements of the facility place a renewal burden on the waterbody from

which the supply is drawn. This constitutes a depletion of resources if the waterbody is incapable of replenishing the supply in quality and amount. Water consumption is an estimate of minimum renewal burden in that it is a measure of water lost to the atmosphere as water vapor or otherwise removed by facility operations.

3.5.1 Water Supply

Typically the water supply of nuclear power stations serves the dual purpose of satisfying main condenser cooling and service water needs. For once-through condenser cooling systems the maximum withdrawal requirements can be calculated from the equation,

$$W = \frac{H}{3600\ \rho C \Delta T}$$

where W = volumetric withdrawal rate (ft^3/sec)

H = heat rejection rate (Btu/hr)

ρ = density of water ($\sim$62.4 lb/ft^3)

C = specific heat of water ($\sim$1 Btu/lb-°F)

ΔT = temperature rise caused by rejected heat (°F)

The heat rejection rate and the temperature rise are design performance characteristics, and their numerical values are presented under "Condenser Cooling Systems". They are usually derived by optimizing the heat balance of the plant.

The withdrawal rate for closed-cycle systems is taken to be the equilibrium condition

$$W = B + E + D$$

where B = volumetric blowdown rate (ft^3/sec)

E = evaporation rate (ft^3/sec)

D = drift rate (ft^3/sec)

In closed-cycle condenser cooling systems, blowdown serves as a dissolved solids control mechanism. To regulate the buildup of solids in the circulating cooling water, solids must be discharged from the system at the same rate they are brought into the system via makeup water. That is, at steady state:

$$WC_w = BC_b + DC_b$$

where C_w, C_b = concentration of dissolved solids in the makeup and blowdown, respectively.

In order to simplify matters, the concentrations of dissolved solids in blowdown and drift are assumed identical. This is not quite correct since blowdown usually occurs after the coolant passes through the cooling device, and the solids are slightly more concentrated. However, since the absolute drift rate is rather small to begin with (see "Condenser Cooling Systems"), the error introduced is negligible.

Combining the two previous equations and solving for withdrawal rate yields:

$$W = \frac{C_b}{C_b - C_w} E = \frac{C_b/C_w}{C_b/C_w - 1} E$$

The ratio, C_b/C_w, is the concentration factor and represents the increase in dissolved solids content of the circulating cooling water above natural dissolved solids in the makeup. For all intents and purposes, this concentration factor is identical to the one used in the earlier discussion of drift. Numerical estimates of the facility

concentration factor may be found under "Condenser Cooling Systems." The evaporation rate, E, is a separately determined effect of the facility and is taken up in the next section. Given the dependence of the last equation on evaporation rate, the facility's cooling system water supply requirements are presented separately under "Balance of Plant Systems."

The service water system is the final heat sink for all plant heat loads except that carried by the main condenser. Such heat loads originate from the cooling of pumps, turbines, motors, containment air, and spent fuel and removal of core residual heat. The heat load totals about 1 to 3 percent of core thermal power, or as much as 200 MWt for the hypothetical facility. The amount of cooling water required to remove the waste heat can be appreciable.

The service water system also includes a number of low volume process streams for radwaste treatment, sanitary waste treatment, and other miscellaneous uses. Since a higher degree of quality is required for the water used in process streams, the supply is usually drawn from a source (e.g., onsite wells, municipal water system) different from that of the water used strictly for cooling. Because of this distinction it is desirable to separate the service water system into two flow streams: the process stream and the cooling stream. The facility's service water supply requirements for the process stream and the cooling stream are presented under "Balance of Plant Systems."

Where a closed-cycle condenser cooling system is used, the impact potential of the service water system may be as great as that of the condenser cooling system. Two basic designs are (1) discharge of all service water directly to the receiving waterbody and (2) discharge of the cooling stream to the circulating condenser cooling water of a closed-cycle system. Actual piping layouts show numerous variations on these two basic alternatives. The variations result from consideration of safety requirements (i.e., ultimate heat sink) as well as economy of design for a specific site. In order to maximize water usage, the facility's service water system is nonrecirculating and independent of the condenser cooling system.

3.5.2 Water Consumption

The majority of water consumed by nuclear power stations is lost through evaporation from the condenser cooling system. In most cases, the service water system contributes a minor amount through the use of evaporation pans or cooling towers in the various process streams.

Evaporative losses from several cooling systems have been estimated by Hauser and Oleson [6]. Using a heat budget analysis, they found evaporation to be sensitive to five independent variables: (1) wet bulb temperature, (2) relative humidity, (3) cloud cover, (4) wind speed, and (5) cooling range. By holding four variables fixed, the effect of the fifth variable on the water consumption of various cooling systems can be calculated. As an example, the authors selected average daytime values for the month of August at their site:

Wet bulb temperature: 64.4°F

Relative humidity: 60%

Cloud cover: 70%

Wind speed: 8 mph

Cooling range: 20°F

Note that, except for cooling range, which is design sensitive, each variable is site specific. Results of the sample calculation are shown in Figure 3. The dependent variable is the "water rate," or the water consumed by evaporation for each net kilowatt-hour (kWh) of electricity produced by the plant. Cooling pond evaporation includes both natural and induced evaporation for two designs: 1 acre per MWe and 2 acres per MWe.

The Hauser and Oleson model should be applied with care since, in the strictest sense, it is valid only for average summer weather conditions at one geographical location (Philadelphia, Pa.). However, the model does demonstrate the considerable dependence of consumptive water loss on site conditions. Since water consumption in turn affects station water requirements and water vapor discharge, the importance of this dependence deserves emphasis.

The principal design performance characteristics regulating consumptive water loss are the type of cooling system, cooling range, and approach [6]. Three types of cooling systems have been assumed for this study; cooling range and approach area addressed under "Condenser

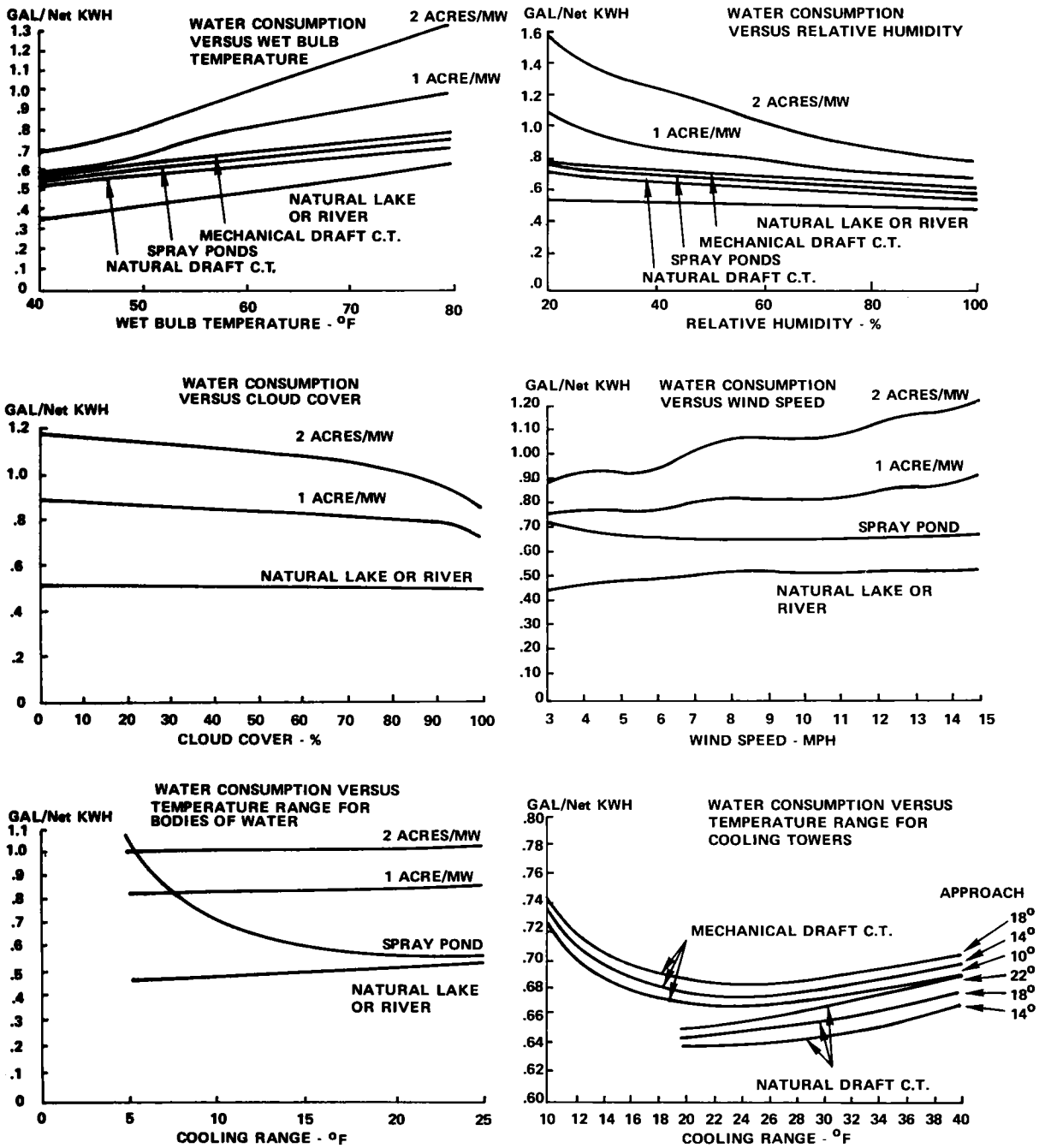

FIGURE 3. WATER CONSUMPTION VERSUS INDEPENDENT SITE PARAMETERS. (TAKEN FROM HAUSER AND OLESON [6])

Cooling Systems." For comparative purposes and as a check on computed water supply requirements, the probable evaporation rate for each of the three cooling systems is also given under "Condenser Cooling Systems."

Total water consumption is equal to the sum of (1) the amount evaporated from the condenser cooling system (including the waterbody to which thermal effluent is discharged), (2) evaporation from certain components of the service water system, (3) drift losses from the condenser cooling system, and (4) miscellaneous losses through leaks, drains, and so forth. As a rule, consumption due to (3) and (4) is a small fraction of that caused by (1) and (2) and can be ignored.

3.6 WATER QUALITY

The principal nonradioactive contaminants contained in nuclear power station liquid discharges include treatment chemicals and their reaction products and rejected heat from the various cooling systems. Depending on the amounts of such effluents and the nature of the receiving waterbody, detrimental effects can result, not the least of which would be damage to the ecological habitat and an overall lowering of water quality.

3.6.1 Waterborne Chemicals

There are three classes of chemical additives utilized in a nuclear power station: (1) biocides, (2) corrosion and scale inhibitors, and (3) cleaning and neutralizing compounds. A comprehensive listing of chemical species within each of these classes has been presented by Becker and Thatcher [7].

Biocides such as chlorine are added to condenser cooling water as a means of controlling biological growth. Boilers, heat exchangers, and other components susceptible to deterioration and scale buildup require the addition of corrosion and scale inhibitors (e.g., phosphates) to their circulating water. Cleaning and neutralizing compounds (e.g., sulfuric acid) serve the dual purpose of removing unwanted deposits from the inner walls of plant components and pipes and regulating the acidity of the circulating water.

With the occasional exception of biocides, treatment chemicals are usually applied on a periodic, as needed basis, and their residues comprise only a fraction of the total chemical effluent of the station. To a great extent the chemical discharge stream is composed of the reaction products of treatment chemicals and a concentrated fraction of dissolved solids from the makeup water.

Major pollutants in the waste-water streams of nuclear power stations have been identified by the EPA in preparation for recommending effluent limitation guidelines [5]. Those identified include:

1. Chlorine (free available). The maintenance level of unreacted chlorine in the condenser cooling water to control biological growth;
2. Chlorine (total residual). The sum of free available chlorine and combined residual chlorine (e.g., chloramines) in the condenser cooling water;

3. Chromium. The result of the application of chromate salts as corrosion and scale inhibitors in the condenser cooling water;

4. Copper. A corrosion product released in boiler and steam generator (PWR) blowdown after cleaning operations and in condenser cooling water;

5. Iron. A corrosion product released after cleaning operations;

6. Zinc. A product of the use of zinc-bearing compounds as corrosion and scale inhibitors in the condenser cooling water;

7. Phosphorous. A product of the use of phosphates as scale inhibitors in boilers, steam generators (PWR), and recirculating cooling water systems;

8. Sulfate. A result of the application of sulfuric acid as a cleaning and neutralizing compound (also appears in regenerant wastes of ion exchange processes);

9. Oil and Grease. A product of equipment cleaning and housekeeping operations;

10. Total Dissolved Solids. The concentrated fraction of soluble salts contained in the blowdown of recirculating water systems;

11. Total Suspended Solids. The particulate residue in effluent streams after the completion of all water treatment processes;

12. Biochemical Oxygen Demand (BOD_5). The five-day oxygen deficit of the sanitary waste water.

Essentially all of the above pollutants would be present in the facility's liquid effluent stream, and, as such, their concentrations in that stream constitute design performance characteristics. Since liquid chemical effluents enter the environment through the facility's discharge structure, they are evaluated under "Balance of Plant Systems."

3.6.2 Waterborne Heat

Waste heat is a component of the effluent stream of every nuclear power station. A primary source of rejected heat is the condenser cooling system, regardless of whether it operates open or closed cycle, although other plant systems that contribute to the effluent stream via the service water do add a significant amount. The heat rejection rate by the facility to the receiving waterbody can be approximated as the difference between the total waste heat produced ($\sim$1.8 x 10^{10} Btu/hr) and that portion rejected to the atmosphere (see "Condenser Cooling Systems"). The rate will depend primarily on the type of condenser cooling system.

The effects of excessive heat loading on the biota and ecology of a receiving waterbody are well documented [8-10]. In turn the physical dimensions to which these effects extend are usually measured by the surface area and volume of the thermal discharge plume. For this reason, many State standards on heated water discharges are written in terms of a maximum "area of influence" for a certain heat increment of the plume.

Thermal discharges are simulated by means of either a mathematical model or a physical model. Of the two, mathematical models are more frequently employed. Policastro and Tokar [11] and Benedict et al [12] have presented comprehensive reviews of commonly used mathematical models for thermal discharges.

The plant discharge characteristics needed to model heated effluent dispersion in natural waterbodies are identified in Regulatory Guide 4.4 [13]. Essentially, these characteristics are design performance characteristics of the facility:

1. Discharge Type. The physical design of the outfall structure;
2. Discharge Location. The outfall location relative to the receiving waterbody;
3. Discharge Effective Area. The total cross-sectional area through which the heated effluent passes at the point of entry to the receiving waterbody;
4. Discharge Flow Rate. The volumetric rate of flow of the heated discharge;
5. Discharge Velocity. The discharge velocity at the outfall;
6. Excess Temperature. The difference between the effluent temperature and the ambient water temperature at the outfall.

The facility possesses a submerged diffuser-type outfall; the remaining characteristics are evaluated under "Balance of Plant Systems." They should be adequate to estimate the extent of any thermal discharge when combined with the properties of the receiving waterbody.

3.7 DAMAGE TO AQUATIC SPECIES

A number of facility effluents have already been mentioned as potentially harmful to biota. This section goes beyond facility effluents to consider those aspects of internal facility operation that can produce detrimental impacts on a community of organisms, namely, mechanical stress via the pumping of the water supply and thermal stress in transit through the condenser cooling system.

3.7.1 Intake Hydraulics

The pumping of intake water by a nuclear power station may entrain organisms that lack sufficient mobility to withstand the pumping force. These organisms may impinge on intake screens intended to prevent the entry of debris with the water supply. As a consequence, not only are the organisms damaged or destroyed, but operating efficiency of the plant may be affected.

Design performance characteristics pertinent to evaluating the effects of entrainment and impingement at the intake structure include intake type, intake location, approach velocity, screen size, and screen velocity. Except for the type and location of the intake structure, numerical envelopes are assigned to these characteristics under "Balance of Plant Systems."

Trent [14] and Dresner et al. [15] have devised mathematical models that simulate streamlines about an intake based on potential flow theory.

The effects of impingement can be decreased by intake structures that withdraw water at a low velocity. Recently guidelines for the siting, design, and operation of the cooling systems of steam electric power plants have been proposed by the American National Standards Institute [16, 17]. The guidelines contain criteria to control damage to aquatic populations resulting from the effects of entrainment, entrapment, and impingement.

3.7.2 Cooling Water Circulation

Those organisms small enough to escape impingement on the intake screens are subjected to the shock of passing through the condenser cooling system. The degree to which they are affected depends on the transit time through the cooling system, the temperature rise across the condenser, the pressure differentials and mechanical agitation resulting from the flow, and the concentrations of toxic chemical additives. The first two design performance characteristics of the facility are evaluated under "Condenser Cooling Systems." Since the design features responsible for mechanical buffeting are not well understood, no performance characteristics dealing with this effect have as yet been identified. As for chemical stress, the concentration of the most common biocide, chlorine, is presented along with other chemical effluents under "Balance of Plant Systems."

Due to their inherent design properties, closed-cycle systems, especially cooling towers, are essentially 100 percent lethal to organisms entrained with the makeup water. However, the impact on populations is moderated by the smaller water supply needs of closed-cycle systems. The shock of cooling water circulation is an important ecological effect only for high-volume once-through cooling systems. In that regard, an ANSI Standard [16] has been proposed which provides the technical bases for assessing damage to aquatic organisms resulting from their entrainment with cooling water.

3.8 LAND MODIFICATION

The siting of a nuclear power station on a tract of land effectively withdraws that land from other constructive uses. Indirectly, the station may also have an impact on the utilization of surrounding land areas by encouraging certain land uses such as industrial development at the expense of others.

Besides altering land utilization, the land requirements of offsite transmission lines and access rights-of-way can adversely affect ecological processes in the area. The environmental effects of transmission lines have been addressed by Kitchings et al. [18] and others [19, 20].

In addition, actions connected with plant construction can produce important changes in the physical character of the terrain. This is especially the case if a cooling pond must be constructed.

3.8.1 Land Requirement

The total land commitment to site a nuclear power station can be divided into two land requirement categories: onsite and offsite. Onsite land needs include the total surface area of the site; a subset of this would be the station area or the land required to house all major plant components. Offsite land needs are generally limited to transmission line area and access route areas for railways and roadways. These design performance characteristics are addressed under "Combined Plant Systems."

Naturally, many site-dependent factors enter into what constitutes the land requirement of the facility. For example, the total site area can be sensitive to local conditions (e.g., topography, land use, zoning, cost) and radiation dose constraints (e.g., exclusion area), but consideration of these factors exceeds the scope of this effort. Numerical envelopes of those performance characteristics dealing with the land needs of the facility are merely nominal estimates of historical siting practice and should not be regarded as limiting in the site selection process.

3.8.2 Site Preparation

Construction of a nuclear power station requires clearing, grading, and excavation of the land. Environmental effects resulting from these activities can include erosion, sedimentation, ground water contamination, defoliation, and modification of habitat. The extent to which these effects are exhibited varies on a site-by-site basis, but they are a function of the total area involved and the amount of material moved.

As a means of assessing impact, the disrupted land surface of the facility is limited to those onsite lands and waterways modified by construction activities. Offsite modifications to accommodate transmission lines and access rights-of-way are conservatively assumed to incorporate the full land areas devoted to these purposes. Similarly, the volume of excavation spoil removed or relocated to prepare the site is limited to the onsite generation of spoil, including the products of dredging.

Numerical estimates of the above characteristics of site preparation are presented under "Combined Plant Systems." As in the case of land requirements, the effects of site preparation are largely dependent on site-related factors such as physiography.

3.9 QUALITY OF LIFE

In addition to those effects normally associated with nuclear power station effluents, there exists a wide-ranging class of effects whose primary impact may best be described as altering the quality of life in the station surroundings. Quality of life in this instance refers to that broad spectrum of factors which determines the sociological desirability of a particular environment. As an example, the availability of electric power would be such a factor. Some factors are less tangible than others. For example, aesthetic considerations are difficult to describe quantitatively. On the whole, quality of life is a subjective value judgement whose estimation depends on the needs or biases of the entity making the judgement.

This report is concerned with those properties of a nuclear power station that may produce undesirable changes in the quality of life. Such properties include the level of noise emitted by the station, the viewability of the station from its surroundings, and the station personnel who must be absorbed by the community.

3.9.1 Noise

Undesirable noise levels can occur during both the construction and operation of a nuclear power station. However, because of the transient nature of construction noise and the concurrent temporary effect, no attempt is made to analyze that sound source. During operation, various components (e.g., cooling towers, turbines, transformers) contribute to the overall sound level; mechanical-draft cooling towers are particular sources of pervasive noise.

The noise emitted by a nuclear power station should be judged relative to background noise already present at the site. If the resultant noise complies with an established noise criterion at a critical listening post such as a school building, the sound increment is unlikely to interfere with activities at the post.

Cooling tower noise and background noise are compared at various octave band frequencies in Figure 4. The curves are based on noise measurements made 600 feet west of the mechanical-draft cooling towers at Vermont Yankee Nuclear Power Station. Noise from the towers at Vermont Yankee

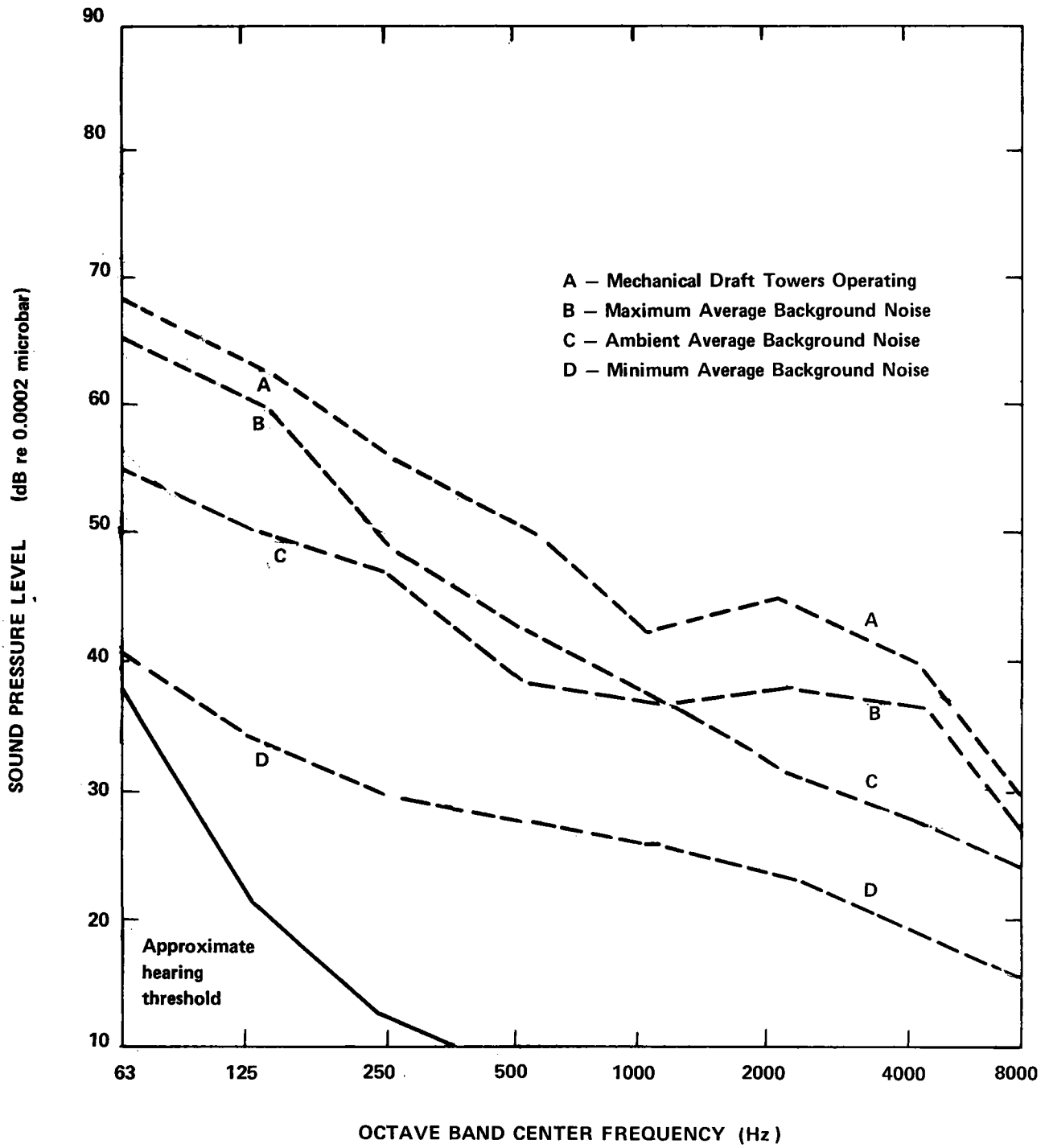

Figure 4. Comparison of Mechanical Draft Cooling-Tower Noise (Curve A), and Background Noise (Curves B,C,D) Near Vermont Yankee Nuclear Power Station (Taken from Aynsley and Carson [2])

slightly exceeds the maximum average background noise, but there has been no noticeable effect on the conduct of classes at a nearby school [21].

The design performance characteristics for noise are the sound pressure levels generated at the source by various noise-making facility components, especially cooling towers. These characteristics are discussed under "Combined Plant Systems."

In order to properly evaluate the intensity and distribution of noise produced by a nuclear power plant, a sound-level model is needed that accounts for noise generation at the source and attenuation in the environment (e.g., atmospheric absorption, hemispherical radiation, surface roughness). Ellis [22] among others has developed a predictive technique for estimating sound-level contours around cooling towers.

3.9.2. Viewability

Viewability is a function of multiple factors of both site and plant origin, including height and width of structures, the visual relationship between the facility and the setting, the scenic worth of the setting, location of prominent viewpoints, type of surrounding topography and vegetative ground cover, and seasonal variations. Each factor must be weighed separately, and, since a number of subjective considerations are included, the resultant aesthetic impact must also be subjective.

Battelle Northwest Laboratories [23] has attempted to quantify the aesthetic impact of a nuclear power facility on a viewscape. Relationships between viewscape quality and its basic components (i.e., intactness,

vividness, and unity) were derived. A questionnaire was developed whereby viewscape quality could be measured from the opinions of a diverse group of observers.

That characteristic of the facility which is probably the overall determining variable for measuring viewability is the height of the tallest facility structure. An envelope of nominal height for the tallest structure is presented under "Combined Plant Systems."

The sight of plumes from cooling towers can be aesthetically undesirable to certain individuals. The persistence (effective length) of cooling tower vapor plumes can be estimated using the same design performance characteristics used to analyze induced fog (see Section 3.4.1, "Water Vapor").

3.9.3 Labor Force

The construction and operation of a nuclear power station can tax those public services offered by the community or political entity in which the station is located. In particular, the temporary or permanent needs of workers and their families may be in excess of what the community can provide in terms of housing, schooling, medical care, and so forth.

The number of workers engaged at the facility provides a first estimate of the probable impact on community services, although it should be noted that only 25 to 30 percent of the construction labor force are likely to become new residents in communities near the site. Temporary impact is deducible from the average number of contruction personnel involved in

onsite construction activities at any one time during the peak construction period. The number of operating personnel employed at the facility suggests the extent of the permanent burden on community services. Numerical estimates of these design performance characteristics are presented under "Combined Plant Systems."

In order to carry out a more thorough analysis, assumptions have to be made regarding family size, income levels, commuting distances, and so forth. None of these are considered design performance characteristics of the facility; they are more representative of site conditions and lie beyond the scope of this report.

SECTION 4.0

DESIGN PERFORMANCE CHARACTERISTICS

This section includes the numerical envelopes for each of the performance characteristics identified during the discussion of major environmental effects of facility operations in Section 3.0. The presentation is in three parts: (1) the analytical approach used for making the selection of envelopes, (2) the numerical envelopes themselves, and (3) the technical bases from which the envelopes are derived.

4.1 ANALYTICAL APPROACH

The analytical approach adopted in this initial effort is based on the assumption that the design objectives of existing and proposed nuclear power stations can be used to define the design performance characteristics of the hypothetical facility.

4.1.1 Nuclear Power Station Survey

In order to implement the analytical approach, a survey of design objectives among a group of 40 stations was conducted. Those stations are identified in Table 3. The average electrical generating capacity is 1030 MWe per reactor, and the average station size is 1850 MWe. These compare with a capacity of 1250 MWe per reactor and a station size of 2500 MWe for the hypothetical facility. The differences are due to the broad spectrum of station sizes chosen for the survey; the hypothetical facility lies at the high end of the spectrum.

TABLE 3

NUCLEAR POWER STATIONS USED IN SURVEY
(Based on data from Ref. [24])

	STATION NAME	REACTOR[a]	STATUS[b]	TOTAL CAPACITY MWt	MWe	COOLING[c]
1	Allens Creek	2-B	AP	7158	2300	ACL
2	Bailly 1	1-B	CP	1931	660	NDCT
3	Bellefonte	2-P	AP	6826	2426	NDCT
4	Braidwood	2-P	AP	6850	2240	ACL
5	Byron	2-P	AP	6850	2240	NDCT
6	Clinton	2-B	AP	5788	1910	ACL
7	Comanche Peak	2-P	AP	6822	2300	ACL
8	Cook, D. C.	2-P	CP	6500	2120	OT
9	Diablo Canyon	2-P	CP	6749	2190	OT
10	Douglas Point	2-B	AP	7158	2356	NDCT
11	Dresden 2&3	2-B	AP	5054	1618	ACL[e]
12	Farley	2-P	CP	5304	1658	MDCT
13	Fermi 2	1-B	CP	3293	1093	NDCT
14	FitzPatrick	1-B	CP	2436	821	OT
15	Forked River	1-P	CP	3390	1070	NDCT
16	Grand Gulf	2-B	AP	7666	2500	NDCT
17	Greenwood 2&3	2-P	AP	7200	2400	ACL[e]
18	Hanford 2	1-B	CP	3323	1103	MDCT
19	Harris, Shearon	4-P	AP	11100	3660	NDCT
20	LaSalle	2-B	CP	6586	2156	ACL
21	Limerick	2-B	CP	6586	2130	NDCT
22	Maine Yankee	1-P	OL	2440	790	OT

TABLE 3 (Continued)
NUCLEAR POWER STATIONS USED IN SURVEY
(Based on data from Ref. [24])

	STATION NAME	REACTOR[a]	STATUS[b]	TOTAL CAPACITY Mwt	MWe	COOLING[c]
23	McGuire	2-P	CP	6822	2360	OT
24	Oconee 1,2&3	3-P	OL	7704	2658	OT
25	Palisades	1-P	OL	2200	700	MDCT
26	Peach Bottom 2&3	2-B	OL	6586	2130	VC
27	Perry	2-B	AP	7158	2410	OT
28	Quad Cities	2-B	OL	5022	1600	VC[e]
29	Rancho Seco	1-P	OL	2772	913	NDCT
30	River Bend	2-B	AP	5788	1868	MDCT
31	Robinson 2	1-P	OL	2200	700	ACL
32	Salem	2-P	CP	6773	2205	OT
33	San Onofre 2&3	2-P	CP	6780	2280	OT
34	Seabrook	2-P	AP	6822	2400	OT
35	Sequoyah	2-P	CP	6846	2280	VC
36	Shoreham	1-B	CP	2436	819	OT
37	Surry 1&2	2-P	OL	4882	1576	OT
38	Susquehanna	2-B	CP	6586	2100	NDCT
39	Trojan	1-P	CP	3423	1130	NDCT
40	Zion	2-P	OL	6500[d]	2170	OT

[a] Number of reactors and NSSS type (B=BWR; P=PWR)

[b] Licensing status as of September 30, 1974 (OL=Operating License; CP=Construction Permit; AP=Application Pending for Construction Permit)

[c] Cooling system type (OT=Once-Through; ACL=Artificial Cooling Lake, including ponds and impoundments; NDCT = Natural-Draft Cooling Tower; MDCT = Mechanical-Draft Cooling Tower; VC = Variable Cycle)

[d] Zion Station is licensed at 85% of design capacity (5520 MWt)

[e] Design includes spray canal

A summary breakdown of the surveyed stations according to their licensing status is presented in Table 4a. Licensing status is a rough indicator of station age (and of the age of its design), those stations with operating licenses being the oldest. The breakdown shows significant increases in thermal efficiency, average station size, and average reactor capacity from stations with operating licenses to those with construction permits pending. These trends are similar to those of all nuclear power stations subject to licensing action, the breakdown for which is given in Table 4b. A comparison of Tables 4a and 4b reveals that the survey contains 36% of all stations, 40% of all reactors, and 42% of the total electrical generating capacity of all light-water-cooled power reactors.

The survey sample was chosen to reflect future growth tendencies (see Appendix A), as well as to represent a fair cross section of the modern nuclear power industry. Hence the survey is somewhat biased toward large multi-unit stations.

Insofar as condenser cooling systems are concerned, the survey stations are rather evenly divided between open- and closed-cycle systems as shown below.

Cooling Type	Number of Stations
Once-Through	13
Natural-Draft Cooling Tower	12
Mechanical-Draft Cooling Tower	4
Artificial Cooling Lake	8
Variable Cycle	3

TABLE 4a
STATISTICAL SUMMARY OF NUCLEAR POWER STATIONS FOR WHICH DESIGN PERFORMANCE CHARACTERISTICS WERE SURVEYED

Status[a]	Number of Stations	Number of Reactors BWR	PWR	Total Net Capacity MWt	MWe	Eff[b]	MWe/Station	MWe/Reactor
OL	10	6	11	45360	14855	32.7	1486	874
CP	17	11	16	85764	28175	32.9	1657	1044
AP	13	12	16	93186	31010	33.3	2385	1108
Totals	40	29	43	224310	74040	33.0	1851	1028

TABLE 4b
STATISTICAL SUMMARY OF ALL NUCLEAR POWER STATIONS (EXCLUSIVE OF HTGRs) SUBJECT TO LICENSING ACTION AS OF SEPTEMBER 30, 1974
(Based on data from Ref. [24])

Status[a]	Number of Stations	Number of Reactors BWR	PWR	Total Net Capacity MWt	MWe	Eff[b]	MWe/Station	MWe/Reactor
OL	36	21	26	98322	31994	32.5	889	681
CP	38	19	39	173830	56839	32.7	1496	980
AP	37	24	52	263616	89289	33.9	2413	1175
Totals	111	64	117	535768	178122	33.2	1605	984

[a]Licensing status as of September 30, 1974 (OL=Operating License; CP=Construction Permit; AP=Application Pending for Construction Permit.

[b]Percent thermal efficiency.

It should be noted that, in today's nuclear power industry, both mechanical-draft cooling towers and variable-cycle cooling systems are relatively uncommon cooling options. The majority of recent station designs have tended to utilize either natural-draft cooling towers or cooling ponds, although once-through systems are still the most numerous type for stations currently in operation. The survey was structured to duplicate the trend toward closed-cycle cooling.

4.1.2 Statistical Envelope

The results of the survey on a station-by-station basis are reported in Appendix B. The data generated by the survey of 40 nuclear power stations were augmented by the results of a more wide-ranging survey of a limited group of parameters conducted by Thorsen [25]. These additional data on 61 stations are presented in Appendix C; all but 11 of the 40 base stations are included. Both surveys relied on Final (or Draft) Environmental Statements written by the AEC as their primary source of design information.

It must be expected that, in surveys of the type on which this report is based, some erroneous data are bound to be included. Where such data were identified, they were eliminated from the analysis. However, the "weeding out" of questionable data was applied sparingly and not without some justification, in order that no valid data were rejected. It is hoped that eliminating errors avoided the introduction of artificial trends or biases.

Whenever feasible, the survey data were used to construct envelopes for the facility's design performance characteristics. Initially, the data were examined for any dependence on station size (i.e., total electrical generating capacity). For those parameters in which a regular relationship was indicated, a linear regression analysis was applied to yield the least squares fit to the data. A confidence interval of one standard deviation about the estimated line was used to define the upper and lower bounds of the envelopes of the characteristics in question.

The statistical criterion used to determine whether the data indicated a sufficiently strong dependence on station size was the following: the dependence of a design performance characteristic on station size is considered significant only if the correlation coefficient of the paired data is greater than 0.7 or less than -0.7. The criterion is based on the inherent property of the correlation coefficient, r, that, for a given set of paired data, $100r^2$ percent of the variation of the dependent variable (i.e., design performance characteristic) can be attributed to differences in the independent variable (i.e., station size) [26]. In other words, the linear variation of a design performance characteristic was regarded as truly a function of station size only if at least 50 percent of the variation could be attributed to station size.

However, it must be emphasized that (1) r measures only the strength of linear relationships and (2) in no way does the value of r affirm or refute a cause-effect relationship. Furthermore, a high value of r computed for a given data set may be due purely to chance.

Linear regression was preferred to nonlinear regression because the data were not considered sufficiently accurate or plentiful to warrant nonlinear analysis. Any nonlinear dependencies that may exist require a more careful examination of the data than has been attempted here.

Station size was the only independent variable used in the regression analysis. The data were grouped according to reactor type or cooling system type. However, sophisticated techniques such as multivariate analysis to determine what positive correlations exist among the data were not deemed essential to the purposes of this study, at least at this stage of the effort, and they were not utilized.

If the data for a particular characteristic were judged to be independent of station size, the design envelope was defined by one standard deviation about the mean of the data. This approach permitted the majority of data to be within the envelope while, at the same time, excluding more divergent values that may reflect unique design requirements.

In those instances in which the data were too limited or scattered to permit statistical techniques to be applied with confidence, alternative methods of estimating the design envelope were developed. These methods are addressed separately in the section dealing with the technical bases used for assigning envelopes.

4.2 DESIGN ENVELOPES FOR THE FACILITY

Numerical envelopes for the design performance characteristics of the hypothetical facility are summarized in the following set of tables: (1) characteristics associated with "Nuclear Island Systems" are dealt with in Table 5; (2) those belonging to "Balance of Plant Systems" are given in Table 6; (3) variations in "Condenser Cooling Systems" are given in Table 7; and (4) characteristics relevant to "Combined Plant Systems" are evaluated in Table 8.

The envelopes, usually consisting of a mean value with upper and lower bounds, are identified relative to the facility component that interfaces with the environment. The units of measure for each envelope are identified. In addition, a page number reference to a discussion of the technical basis of each envelope is listed.

Every envelope should have positive limits. However, certain characteristics have envelopes whose lower bounds are negative (e.g., Approach Velocity, Table 6). The inconsistencies result from using the standard deviation to define the range of the envelopes. If the data are

TABLE 5

NUCLEAR ISLAND SYSTEMS

FACILITY INTERFACE COMPONENT	DESIGN PERFORMANCE CHARACTERISTIC	DESIGN ENVELOPE	UNITS	BASIS
Effluent Radwaste Treatment System	Radioactive Gas Release	see BASIS	Ci/yr	4-20
	Radioactive Liquid Release	see BASIS	Ci/yr	4-22
Sources of Direct Radiation	Direct Radiation	see BASIS	mrem/yr	4-24
Solid Radwaste Treatment System	Disposal Burden Radioactivity	BWR: 5600±4900 PWR: 14000±7400	Ci/yr	4-26
	Disposal Burden Volume	BWR: 2000±940 PWR: 1400±880	drums/ yr	4-28
Diesel Generator	Fuel Consumption	400	gal/yr	4-30
	Total Usage	400	hr/yr	4-30
	Release Elevation	0	ft	4-30
Auxiliary Boiler	Fuel Consumption	1400	gal/hr	4-32
	Total Usage	1000	hr/yr	4-32
	Release Elevation	100	ft	4-32

TABLE 6

BALANCE OF PLANT SYSTEMS

FACILITY INTERFACE COMPONENT	DESIGN PERFORMANCE CHARACTERISTIC	DESIGN ENVELOPE	UNITS	BASIS
Intake Structure	Cooling Water Supply		cu ft/ sec	4-35
	Once-through	4000±1000		
	Cooling Tower	89±54		
	Cooling Pond	1200±1700*		
	Service Water Supply		cu ft/ sec	4-38
	Cooling Stream	170±40		
	Process Stream	0.88±1.10*		
	Approach Velocity		ft/sec	4-41
	Once-Through	1.7±2.0*		
	Cooling Tower	0.75±0.9*		
	Cooling Pond	0.75±0.9*		
	Screen Velocity	1.3±0.9	ft/sec	4-43
	Screen Mesh Size	0.375	in	4-44
Discharge Structure	Effective Area of Discharge		sq ft	4-45
	Once-Through	200±190		
	Cooling Tower	6.3±5.9		
	Cooling Pond	6.3±5.9		

* Lower bound of design envelope is zero.

TABLE 6

BALANCE OF PLANT SYSTEMS
(CONTINUED)

FACILITY INTERFACE COMPONENT	DESIGN PERFORMANCE CHARACTERISTIC	DESIGN ENVELOPE	UNITS	BASIS
Discharge Structure (continued)	Discharge Velocity		ft/sec	4-47
	Once-Through	14±3		
	Cooling Tower	8.4±2.6		
	Cooling Pond	8.4±2.6		
	Discharge Flow Rate		cu ft/ sec	4-49
	Once-Through	4200±1100		
	Cooling Tower	210±110		
	Cooling Pond	1800±1900*		
	Excess Temperature	21±11	°F	4-53
	Chemical Effluents		ppm	4-55
	Chlorine, Total	4±11*		
	Chlorine, Free	≤0.5		
	Chromium	NDA**		
	Copper	0.19±0.38*		
	Iron	≤1.0		
	Zinc	NDA		
	Phosphorous	NDA		
	Sulfate	580±2100*		
	Oil and Grease	≤20		
	Total Dissolved Solids	1300±2600*		
	Total Suspended Solids	≤100		
	BOD, 5-day	120±370*		

* Lower bound of design envelope is zero.
** No detectable amount as specified by EPA in 40 CFR 423.

TABLE 7

CONDENSER COOLING SYSTEMS

FACILITY INTERFACE COMPONENT	DESIGN PERFORMANCE CHARACTERISTIC	DESIGN ENVELOPE	UNITS	BASIS
Once-Through Cooling System	Heat Rejection Rate	18.1	10^9Btu/hr	4-62
	Temperature Rise	24±8	°F	4-65
	Transit Time	11±3	min	4-67
	Circulating Cooling Water	4000±1000	cu ft/sec	4-69
	Evaporation Rate	47±4	cu ft/sec	4-72
Natural-Draft Cooling Tower System	Heat Rejection	0.9	10^9Btu/hr	4-62
	Number of Towers	2	---	4-78
	Tower Height	500	ft	4-78
	Exit Diameter	250	ft	4-78
	Base Diameter	500	ft	4-78
	Exit Velocity	17±6	ft/sec	4-81
	Cooling Range	29±6	°F	4-83
	Approach	20±4	°F	4-85
	Exit Air Wet Bulb Temperature	115	°F	4-87
	Drift Rate	0.02±0.03*	percent	4-88
	Droplet Size	140±60	microns	4-89
	Concentration Factor	4.0±2.6	---	4-92
	Circulating Cooling Water	2600±500	cu ft/sec	4-69
	Evaporation Rate	71±4	cu ft/sec	4-72

*** Lower bound of design envelope is zero.**

TABLE 7

CONDENSER COOLING SYSTEMS
(CONTINUED)

FACILITY INTERFACE COMPONENT	DESIGN PERFORMANCE CHARACTERISTIC	DESIGN ENVELOPE	UNITS	BASIS
Mechanical-Draft Cooling Tower System	Heat Rejection Rate	0.9	10^9Btu/hr	4-62
	Number of Towers	6	---	4-79
	Number of Cells	14	per tower	4-79
	Tower Height	60	ft	4-79
	Tower Length	500	ft	4-79
	Exit Diameter	30	ft	4-79
	Exit Velocity	30	ft/sec	4-81
	Cooling Range	21±8	°F	4-83
	Approach	14±4	°F	4-85
	Exit Air Wet Bulb Temperature	115	°F	4-87
	Drift Rate	0.10±0.10	percent	4-88
	Droplet Size	140±60	microns	4-89
	Concentration Factor	4.0±2.6	---	4-92
	Circulating Cooling Water	2600±500	cu ft/sec	4-69
	Evaporation Rate	77±15	cu ft/sec	4-72
Cooling Pond System	Heat Rejection Rate	0.9	10^9Btu/hr	4-62
	Temperature Rise	22±5	°F	4-65
	Concentration Factor	1.8±0.7	---	4-92
	Circulating Cooling Water	3100±1000	cu ft/sec	4-69
	Evaporation Rate	51±12	cu ft/sec	4-72

TABLE 8

COMBINED PLANT SYSTEMS

FACILITY INTERFACE COMPONENT	DESIGN PERFORMANCE CHARACTERISTIC	DESIGN ENVELOPE	UNITS	BASIS
Total Facility	Station Land Requirement	130±100	acres	4-94
	Site Land Requirement		acres	4-96
	Once-Through	1100±900		
	Cooling Tower	1100±900		
	Cooling Pond	11000±2600		
	Transmission Route Land Requirement	1800±2200*	acres	4-99
	Access Route Land Requirement	59±72*	acres	4-101
	Disrupted Land Surface		acres	4-103
	Once-Through	350±610*		
	Cooling Tower	350±610*		
	Cooling Pond	4800±2600		
	Excavation Spoil	2.7±2.8*	10^6 cu yd	4-105
	Noise Power Level	84±4	dBA	4-106
	Structure Height		ft	4-109
	Once-Through	230±60		
	Cooling Tower	500		
	Cooling Pond	230±60		
	Construction Personnel	1270±205	persons	4-111
	Operating Personnel	105±43	persons	4-115

* Lower bound of design envelope is zero.

widely scattered about the mean and distributed in a skewed manner, the computed standard deviation will exceed the mean. The skewness may be real, or it may be caused by an unrepresentative sample size or erroneous data. For the purposes of this report, no envelope has a lower bound less than zero, and any negative portion of an envelope should be ignored.

4.2.1 Utilization of the Envelopes

The envelopes presented in Tables 5 through 8 are intended as aids in making conservative environmental impact assessments for proposed designated sites. Since the numerical values are applicable only to the hypothetical facility defined herein, some adjustment may be required to accomodate stations that differ substantially from the facility's design. Power-dependent characteristics are identified in the following section. Where necessary, their envelopes can be adjusted to the proposed power level by means of the least squares line. Other design variances (e.g., special cooling options, features of intake or discharge structures) are not addressed here, and any performance value that falls outside the established envelope as a result of them would require technical substantiation.

The envelopes can be used in a number of ways. The preferred approach would be to estimate environmental impact on the basis of both the average values from the envelopes and the extremes that yield the highest estimate of impact. This approach would show the degree to which environmental impact at a particular site is sensitive to probable

design values. Several characteristics have envelopes that are not necessarily consistent with one another. For example, those envelopes dealing with the facility's water economy fail to balance exactly. This is a consequence of the statistical method of evaluation; however, the envelopes do provide substantial overlap in characteristics that are interdependent.

As a means of assuring compatibility among envelopes, one could fix the value of one or more characteristics. Then, if the value of a performance characteristic is preselected or fixed as a design objective of a station to be built on a designated site, only that value would be used in making the impact analysis. If a performance characteristic has a preselected value, an analysis would be provided showing the relationship between that characteristic and the remaining characteristics with which it interacts. The purpose of this analysis is to determine whether the envelopes can be used for the remaining characteristics.

4.3 TECHNICAL BASES FOR THE ENVELOPES

In order to provide a consistent format with which to present the technical bases for the numerical envelopes, a Performance Characteristic Summary (PCS) has been developed. The top-center heading of the PCS is used to identify those facility components from which design performance characteristics have been derived (Tables 5-8); the remaining PCS entries are defined as follows:

- Characteristic: The design performance characteristic, or that variable by which environmental impact is measured or evaluated.
- Definition: The definition of the characteristic.
- Units: That unit of measure in which the envelope for the characteristic is given.
- Design Envelope: The characteristic's numerical value or range of values as applied to the hypothetical facility.
- Basis: The foundation from which the Design Envelope is deduced; additional relevant information such as limiting assumptions and references to supporting data are included.

Certain characteristics such as those involving cooling tower dimensions are grouped together under a single PCS. However, a PCS is usually supplied for each characteristic.

If a characteristic varies with station size, the data used to evaluate the envelope are plotted on graphs accompanying the PCS. Also plotted are the least squares lines and the curves representing a confidence interval of one standard deviation about the line. The 40 survey stations are distinguishable on the graphs by their numerical order in Table 3.

4.3.1 Nuclear Island Systems

Technical bases are provided for the following design performance characteristics:

- Radioactive Gas Release
- Radioactive Liquid Release
- Direct Radiation
- Disposal Burden Radioactivity
- Disposal Burden Volume
- Diesel Generator Fuel Consumption
- Diesel Generator Total Usage
- Diesel Generator Combustion Product Release Elevation
- Auxiliary Boiler Fuel Consumption
- Auxiliary Boiler Total Usage
- Auxiliary Boiler Combustion Product Release Elevation

Effluent Radwaste Treatment System

CHARACTERISTIC: Radioactive Gas Release

DEFINITION: The annual average rate at which radioactive gases are released to the atmosphere

UNITS: curies per year

DESIGN ENVELOPE: see BASIS

BASIS: The American Nuclear Society[1] is currently developing standardized source term specifications for BWR- and PWR-type light-water reactors. As an interim measure, until such specifications are issued, the source term information given in WASH-1258[2] for those cases with advanced radwaste treatment systems may be used as the design envelope. Alternatively, the Concluding Statement on ALAP[3] defines baseline control measures for the treatment of gaseous and liquid effluents from light-water-cooled reactors, and draft Regulatory Guides 1.BB and 1.CC[4] present acceptable methods for calculating source terms based on a realistic assessment of reactor and radwaste treatment system performance.

BASIS (Continued)

[1]"Radioactive Materials in Principal Fluid Streams of Light-Water-Cooled Nuclear Power Plants," American National Standards Source Term Specification, N237, prepared by ANS 18.1 Working Group, Draft, May 20, 1974.

[2]"Final Environmental Statement Concerning Proposed Rule-making Action: Numerical Guides for Design Objectives and Limiting Conditions for Operation to Meet the Criterion 'As Low As Practicable' for Radioactive Material in Light-Water-Cooled Nuclear Power Reactor Effluents," WASH-1258, July 1973.

[3]"Concluding Statement of Position of the Regulatory Staff Public Rulemaking Hearing on: Numerical Guides for Design Objectives and Limiting Conditions for Operation to Meet the Criterion 'As Low As Practicable' for Radioactive Material in Light-Water-Cooled Nuclear Power Reactors," Docket No. RM-50-2, February 20, 1974.

[4]"Attachment to Concluding Statement of Position of the Regulatory Staff, Public Rulemaking Hearing on: Numerical Guides for Design Objectives and Limiting Conditions for Operation to Meet the Criterion 'As Low As Practicable' for Radioactive Material in Light-Water-Cooled Nuclear Power Reactors," Docket No. RM-50-2, February 20, 1974.

Effluent Radwaste Treatment System

CHARACTERISTIC: Radioactive Liquid Release

DEFINITION: The annual average rate at which radioactive liquids are released to the receiving waterbody

UNITS: curies per year

DESIGN ENVELOPE: see BASIS

BASIS: The American Nuclear Society[1] is currently developing standardized source term specifications for BWR- and PWR-type light-water reactors. As an interim measure, until such specifications are issued, the source term information given in WASH-1258[2] for those cases with advanced radwaste treatment systems may be used as the design envelope. Alternatively, the Concluding Statement on ALAP[3] defines baseline control measures for the treatment of gaseous and liquid effluents from light-water-cooled reactors, and draft Regulatory Guides 1.BB and 1.CC[4] present acceptable methods for calculating source terms based on a realistic assessment of reactor and radwaste treatment system performance.

BASIS (Continued)

[1]"Radioactive Materials in Principal Fluid Streams of Light-Water-Cooled Nuclear Power Plants," American National Standards Source Term Specification, N237, prepared by ANS 18.1 Working Group, Draft, May 20, 1974.

[2]"Final Environmental Statement Concerning Proposed Rule-making Action: Numerical Guides for Design Objectives and Limiting Conditions for Operation to Meet the Criterion 'As Low As Practicable' for Radioactive Material in Light-Water-Cooled Nuclear Power Reactor Effluents," WASH-1258, July 1973.

[3]"Concluding Statement of Position of the Regulatory Staff Public Rulemaking Hearing on: Numerical Guides for Design Objectives and Limiting Conditions for Operation to Meet the Criterion 'As Low As Practicable' for Radioactive Material in Light-Water-Cooled Nuclear Power Reactors," Docket No. RM-50-2, February 20, 1974.

[4]"Attachment to Concluding Statement of Position of the Regulatory Staff, Public Rulemaking Hearing on: Numerical Guides for Design Objectives and Limiting Conditions for Operation to Meet the Criterion 'As Low As Practicable' for Radioactive Material in Light-Water-Cooled Nuclear Power Reactors," Docket No. RM-50-2, February 20, 1974.

Sources of Direct Radiation

CHARACTERISTIC: Direct Radiation

DEFINITION: The maximum direct radiation external to the facility from all sources

UNITS: millirems per year

DESIGN ENVELOPE: see BASIS

BASIS: Exposure rates at the sources of direct radiation are not normally given in environmental statements. However, the maximum exposure rate at the site boundary due to all sources of direct radiation is given, and this parameter has been included in Appendix B.

The results of a survey of site boundary exposure rates (mrem/yr) due to direct radiation are presented in the following table:

	BWR	PWR
Sample size	12	13
Maximum	228	3.5
Minimum	0.17	.0
Average	30	0.31
Std deviation	67	0.96

BASIS (Continued)

The radiation from BWRs is greater than that from PWRs because of 'turbine shine' created by the decay of N-16 in primary loop steam lines. The envelopes produced by the averages and standard deviations of both reactor types are well within the dose limit of 500 mrem/yr at the site boundary prescribed by the AEC (10 CFR 20.105(a)). As an interim measure pending the collection of data on exposure rates from various sources, the envelopes of total exposure by direct radiation at the site boundary may be used.

Solid Radwaste Treatment System

CHARACTERISTIC: Disposal Burden Radioactivity

DEFINITION: The average amount of radioactive material removed annually from the site as solid radwaste

UNITS: curies per year

DESIGN ENVELOPE:

BWR	5600 ± 4900
PWR	14000 ± 7400

BASIS: A study of solid radioactive waste practices at operating nuclear power plants by Kibbey and Godbee[1] reveals that large PWRs (>1000 MWt) contain slightly more than twice as much activity in their solid radwastes per MWh(t) of operation as do large BWRs. These findings are corroborated by a survey of design estimates of annual radioactivity produced at light-water-cooled nuclear power stations (Appendix B). The survey data were separated according to reactor type (16 BWR, 15 PWR), and the resultant averages and standard deviations were used to construct the design envelope. Two

[1] A.H.Kibbey and H.W.Godbee, "Critical Review of Solid Radioactive Waste Practices at Nuclear Power Plants," Oak Ridge National Laboratory, ORNL-4924, March 1974.

BASIS (continued)

PWR stations (McGuire and Oconee) were dropped from the calculation because of exceptionally high estimated activities in spent resins from their liquid radwaste treatment systems. Apparently no allowance for decay during onsite storage of radioactive liquids was made in these two instances. The survey data for BWRs do not correlate with station size; a fair correlation ($r = 0.68$) is indicated for PWRs, but the data fail to meet the statistical criterion. Hence, no allowance for variable generating capacity is made.

Solid Radwaste Treatment System

CHARACTERISTIC: Disposal Burden Volume

DEFINITION: The average volume of solid radwaste removed annually from the site

UNITS: drums per year

DESIGN ENVELOPE:

BWR	2000	± 940
PWR	1400	± 880

BASIS: All solid radwastes are assumed to be packaged in 55-gallon drums, the typical waste container at most nuclear power stations.

According to Kibbey and Godbee[1], the volume of solid radwaste shipped per MWh(t) from large BWRs (>1000 MWt) is a factor of 3 greater than for large PWRs. This finding differs from the results of a survey of design values given for 17 BWRs and 22 PWRs (Appendix B). The survey data show BWRs should produce 1.4 times as much solid radwaste

[1] A. H. Kibbey and H. W. Godbee, "A Critical Review of Solid Radioactive Waste Practices at Nuclear Power Plants," Oak Ridge National Laboratory, ORNL-4924, March 1974.

BASIS (Continued)

by volume as PWRs. Radwaste volume is sensitive to many variables, and the resultant uncertainties introduced by these variables probably accounts for the difference between design estimates and operating experience.

The correlation of radwaste volume with station size is poor for BWRs ($r = 0.32$) and fair for PWRs ($r = 0.68$). Since the statistical criterion is not met, the design envelope is taken as the average and standard deviation of the survey data.

Diesel Generator

CHARACTERISTIC: Combustion Product Release

DEFINITION: The rate (and elevation) at which diesel generator combustion products are released to the atmosphere

UNITS: pounds per year

DESIGN ENVELOPE: see BASIS

BASIS: Three design performance characteristics regulate the impact of combustion products released from the facility's diesel generators:

a. fuel consumption: the total rate at which diesel fuel is burned;
b. usage: The total hours per year all generators operate;
c. release elevation: the height above grade that combustion products are released.

Because nuclear power stations contribute only minor amounts of combustion products to the atmosphere, the above characteristics are seldom reported in environmental statements. However, some data are available for a few stations; these are summarized in the following table:

BASIS (continued)

Station	Number of Generators	Total Fuel Consumption (gal/hr)	Total Usage (hr/yr)
Grand Gulf 1 & 2	8	-	384
Harris 1, 2, 3, & 4	6	284	312
Hope Creek 1 & 2	8	-	400
Rancho Seco	2	270	-
Salem 1 & 2	6	-	312

Diesel generators vary in size and serve a variety of station needs. For example, Grand Gulf has two diesels for emergency electrical power, one high-pressure core spray diesel, and one fire pump diesel per reactor. Under normal operating conditions, usage is limited to periodic maintenance testing at a rate of about 4 hours per month per diesel. Several stations stagger their testing schedule so that no more than two diesels are running at any one time. The method of venting and the release elevation of diesel generator combustion products are not reported.

Given this lack of data, design envelopes are difficult to define; an alternative is to specify conservative values for the facility:

a. total fuel consumption: 400 gallons per hour
b. total usage: 400 hours per year
c. release elevation: ground level

Characteristics a and b and a table of emission factors published by the EPA[1] may be used to calculate the annual quantities of all pollutants emitted by the facility's diesel engines. Characteristic c serves as a factor in estimating the distribution of those pollutants.

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[1]"Compilation of Air Pollutant Emission Factors," U. S. Environmental Protection Agency, Office of Air Programs, AP-42, February 1972.

Auxiliary Boiler

CHARACTERISTIC: Combustion Product Release

DEFINITION: The rate (and elevation) at which auxiliary boiler combustion products are released to the atmosphere

UNITS: pounds per year

DESIGN ENVELOPE: see BASIS

BASIS: Three design performance characteristics regulate the impact of combustion product released from the auxiliary boiler:

a. fuel consumption: the total rate at which No. 2 fuel oil is burned;
b. usage: the total hours per year the boiler operates;
c. release elevation: the height above grade that combustion products are released.

Because nuclear power stations contribute only minor amounts of combustion products to the atmosphere, the above characteristics are seldom reported in environmental statements. However, some data are available for a few stations; these are summarized in the following table:

Station	Total Fuel Consumption (gal/hr)	Total Usage (hr/yr)
Diable Canyon 1 & 2	180	336
Hope Creek 1 & 2	-	870
Rancho Seco	2000	1680
Salem 1 & 2	-	870
Watts Bar 1 & 2	550	6600 (?)

Auxiliary boilers are used to meet all plant steam requirements when the reactor is shut down. Most stations have more than one auxiliary boiler, and their sizes vary according to the specific application for which they are designed. Two stations, Hope Creek and Watts Bar, exhaust the combustion products from their auxilary boilers through stacks 100 and 127 feet above grade, respectively.

Given the lack of data, design envelopes are difficult to define; an alternative is to specify conservative values for the facility:

a. total fuel consumption: 1400 gallons per hour
b. total usage: 1000 hours per year
c. release elevation: 100 feet above grade

Characteristic a is based on fuel consumption by the large boiler at Rancho Seco, and characteristic b is based on an assumed usage of 6 weeks per year. The annual quantities of all pollutants emitted by the facility's auxiliary boilers are calculable from the table of emission factors[1]. The release elevation, characteristic c, is a factor in estimating the distribution of those pollutants.

---

[1]"Compilation of Air Pollutant Emission Factors," U. S. Environmental Protection Agency, Office of Air Programs, AP-42, February 1972.

4.3.2 Balance of Plant Systems

Technical bases are provided for the following design performance characteristics:

- Condenser Cooling Water Supply
- Service Water Supply
- Approach Velocity
- Screen Velocity
- Screen Mesh Size
- Effective Area of Discharge
- Discharge Velocity
- Discharge Flow Rate
- Excess Temperature
- Chemical Effluents

Intake Structure

CHARACTERISTIC: Cooling System Water Supply

DEFINITION: The maximum rate of removal of water from a natural source for main condenser cooling purposes

UNITS: cubic feet per second

	COOLING SYSTEM		
	Once-Through	Cooling Tower	Cooling Pond
DESIGN ENVELOPE:	4000 ± 1000	89 ± 54	1200 ± 1700

BASIS: The characteristic includes water drawn as makeup for closed-cycle cooling systems. The survey data given in Appendix B on cooling system water supply (cfs) are summarized in the following table:

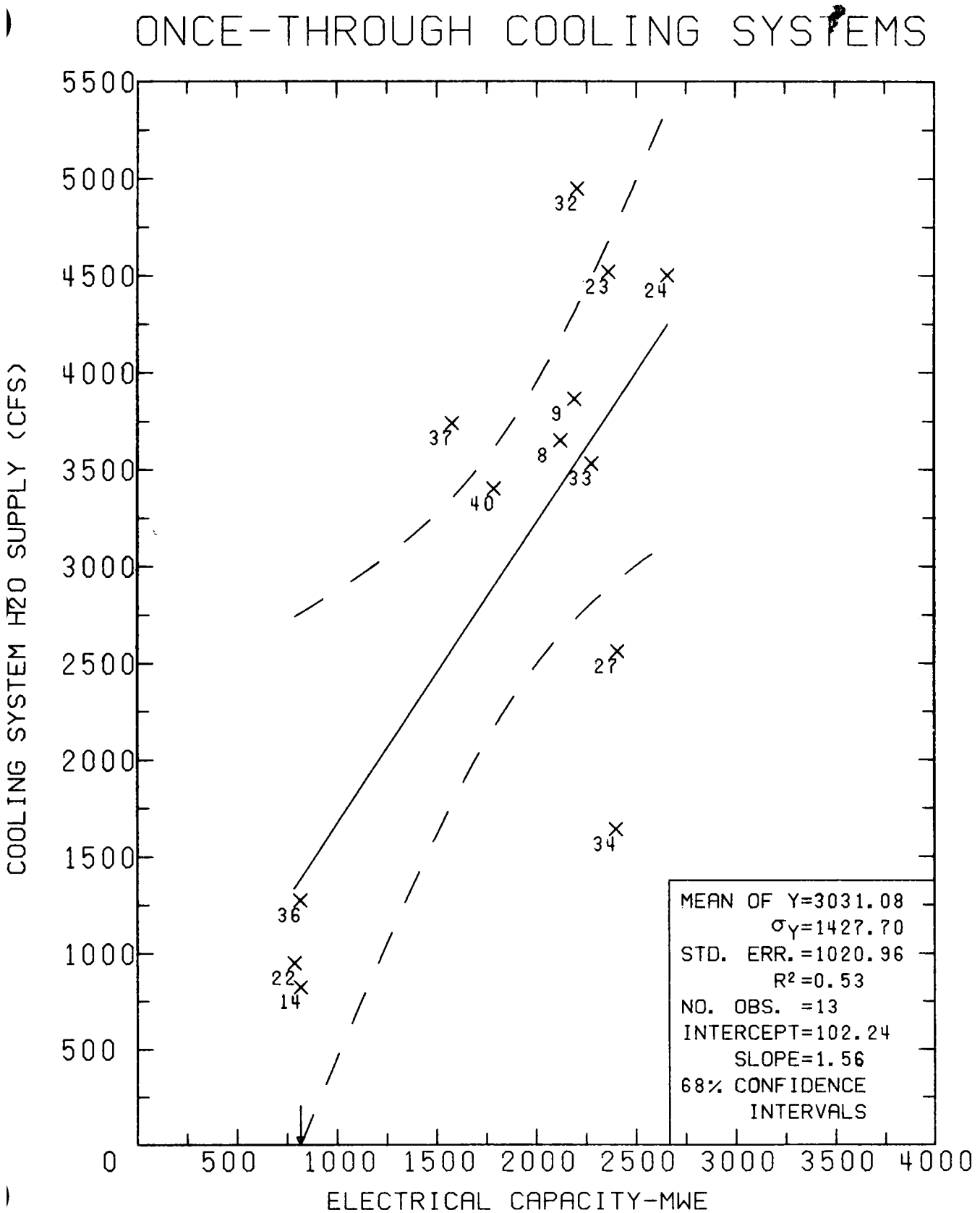
	Once-through	Cooling Tower	Cooling Pond
Sample size	13	16	8
Maximum	4950	237	4902
Minimum	825	20	83.3
Average	3030	88.7	1180
Std deviation	1430	53.8	1720

The data for stations with once-through cooling systems correlate well with station size as shown in the accompanying figure. On the other hand, the correlation is only fair

BASIS (continued)

for cooling tower stations (r = 0.54) and poor for stations with cooling ponds (r = 0.2). The lack of a good correlation for stations with closed-cycle cooling systems is attributable to the great variety of water supply design options that are available with closed-cycle cooling. For example, some stations utilize part of the service water as makeup, while others withdraw makeup and service water as separate streams. The water requirements of cooling pond stations are highly variable, depending on whether the pond was created by impounding a natural water course or flooding a lowland.

The facility's design envelopes for the closed-cycle cooling options are determined by the averages and standard deviations in the above table. Since open-cycle cooling is sensitive to station size, the least squares line is used to define the envelope.


ONCE-THROUGH COOLING SYSTEMS
COOLING SYSTEM H2O SUPPLY (CFS)
ELECTRICAL CAPACITY-MWE
5500
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
500
1000
1500
2000
2500
3000
3500
4000
32
23
24
9
37
8
33
40
27
34
36
22
14
MEAN OF Y=3031.08
σY=1427.70
STD. ERR.=1020.96
R²=0.53
NO. OBS. =13
INTERCEPT=102.24
SLOPE=1.56
68% CONFIDENCE
INTERVALS

Intake Structure

CHARACTERISTIC: Service Water Supply

DEFINITION: The maximum rate of removal of water from a natural source to meet all facility requirements except main condenser cooling

UNITS: cubic feet per second

DESIGN ENVELOPE:

Cooling Stream	170 ± 40
Process Stream	0.88 ± 1.10

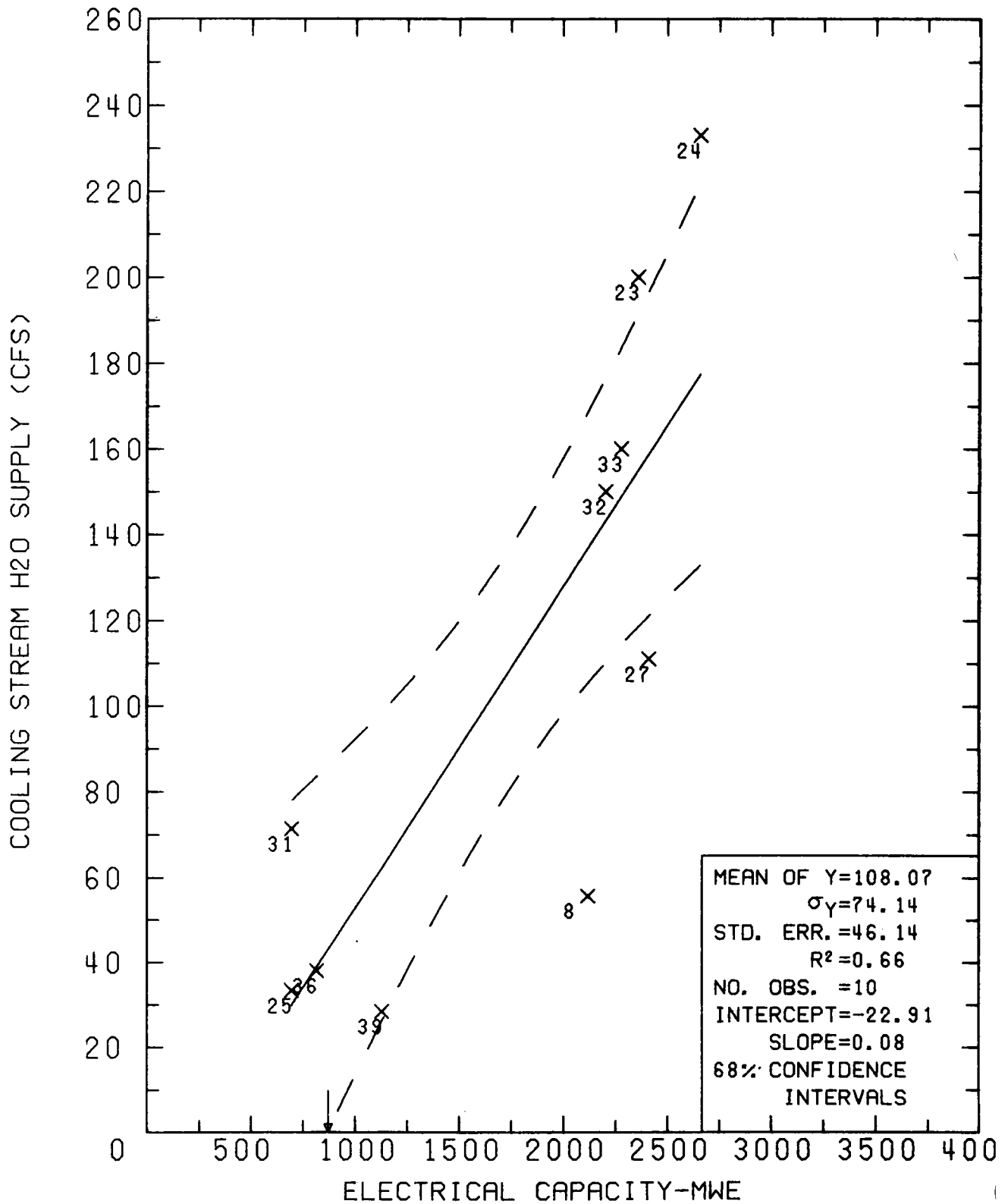
BASIS: Through a misunderstanding of the meaning of this characteristic, either the cooling stream or the process stream is reported under the parameter Service Water Withdrawal in Appendix B. Since 2 to 3 orders of magnitude typically separate the water requirements of the two streams, the data for each are easily distinguishable. These data are summarized as follows:

	Cooling Stream	Process Stream
Sample size	10	16
Maximum	233	4.44
Minimum	28.4	0.02
Average	108	0.88
Std deviation	74	1.10

BASIS (Continued)

The cooling stream data correlate well with station size as the attached figure indicates. The process stream fails to correlate. Design envelopes for the cooling stream and process stream are based on the least squares fit and the average of the data set respectively.

SERVICE WATER SYSTEMS



Intake Structure

CHARACTERISTIC: Approach Velocity

DEFINITION: The maximum pump-induced current speed at the intake structure

UNITS: feet per second

	COOLING SYSTEM		
	Once-Through	Cooling Tower	Cooling Pond
DESIGN ENVELOPE:	1.7 ± 2.0	0.75 ± 0.9	0.75 ± 0.9

BASIS: The approach velocity is heavily dependent on site-specific conditions (e.g., water depth, ambient current) as well as plant design factors. This fact accounts for the wide range of approach velocities reported in Appendix B:

Sample size	34
Maximum	7.3
Minimum	0.02
Average	1.1
Std deviation	1.5

Despite the apparent scatter of the data, they are separable according to whether the station has an open-cycle condenser cooling system or one that operates closed cycle. This results

BASIS (Continued)

from the different water requirements of the two systems: open-cycle systems need more water than closed-cycle systems (see Cooling System Water Supply). For identical intake structures, the pumping rate of an open-cycle system will induce a higher approach velocity than that caused by a closed-cycle system. The data substantiate this conclusion fairly well, although environmental influences should not be discounted.

Intake Structure

CHARACTERISTIC: Screen Velocity

DEFINITION: The maximum through-screen current speed at the intake structure

UNITS: feet per second

DESIGN ENVELOPE: 1.3 ± 0.9

BASIS: As in the case of approach velocity, the screen velocity data should be separable according to whether the station has an open-cycle or closed-cycle condenser cooling system. The average screen velocity of 11 open-cycle systems (1.7 fps) does differ from the average of 21 closed-cycle systems (1.0 fps); however, their respective standard deviations (0.4 and 1.0) give both systems practically identical envelopes. As a result, the statistics of the combined data are used for the design envelope.

Intake Structure

CHARACTERISTIC: Screen Mesh Size

DEFINITION: The intake screen mesh size

UNITS: inches

DESIGN ENVELOPE: 0.375

BASIS: Survey data on intake screen mesh sizes at 28 nuclear power stations reveal a range varying from 1/8 inch to 1 inch. However, 23 stations use 3/8-inch screen at their intake structure. This size is apparently standard and has been adopted for the design envelope without upper or lower bounds.

Discharge Structure

CHARACTERISTIC: Effective Area of Discharge

DEFINITION: The total cross section through which the liquid effluent flows at the discharge point

UNITS: square feet

	COOLING SYSTEM		
	Once-Through	Cooling Tower	Cooling Pond
DESIGN ENVELOPE:	200 ± 190	6.3 ± 5.9	6.3 ± 5.9

BASIS: As a predetermined property of the facility, the discharge structure is assumed to be an offshore submerged diffuser (Section 2.5). The selection is substantiated by the following summary of discharge locations for the 40 survey stations:

Location	Number of Stations
Canal	6
Outlet or bay	3
Shoreline	9
Offshore, submerged	22

Of the 22 offshore submerged discharge structures, 17 are diffusers.

BASIS (Continued)

The total area of discharge from diffusers depends largely on the volumetric flow rate, that is, whether open- or closed-cycle condenser cooling is used. Of the 17 stations in the survey with offshore submerged diffusers, 7 have open-cycle cooling, 8 have closed-cycle cooling and 2 have variable-cycle cooling. There is a significant difference in the statistical properties of the data after they are grouped by cooling system type. The resultant average and standard deviation of each type are used for the facility's design envelope.

Discharge Structure

CHARACTERISTIC: Discharge Velocity

DEFINITION: The maximum velocity of the liquid effluent stream at the point of discharge

UNITS: feet per second

	COOLING SYSTEM		
	Once-Through	Cooling Tower	Cooling Pond
DESIGN ENVELOPE:	14 ± 3	8.4 ± 2.6	8.4 ± 2.6

BASIS: The characteristic is a function of the volumetric flow rate of the effluent and the design of the discharge structure (i.e., type, location, effective area of discharge). Volumetric flow rate is largely dependent on whether the facility operates with open-cycle or closed-cycle condenser cooling. By definition, the facility has an offshore submerged diffuser; the area of discharge of that diffuser is a separate design characteristic.

The 17 survey stations with offshore submerged diffusers (Appendix B) display the following statistical properties for discharge velocity:

BASIS (Continued)

	Offshore Diffuser	Shoreline Canal	Shoreline Pipe
Sample size	17	5	8
Maximum	20.0	7.9	14.3
Minimum	0.2	3.4	0.3
Average	10.5	5.0	4.1
Std deviation	4.7	2.0	4.8

Other discharge types are included for comparative purposes.

After deleting Quad Cities (0.2 fps) and Sequoyah (10 fps) from the data set because they employ variable-cycle cooling, the remaining data can be partitioned into two subsets: 7 open-cycle stations and 8 closed-cycle stations. The statistical properties of these subsets are sufficiently different to warrant specifying separate design envelopes.

Discharge Structure

CHARACTERISTIC: Discharge Flow Rate

DEFINITION: The total volumetric discharge rate of all liquid effluent

UNITS: cubic feet per second

	COOLING SYSTEM		
	Once-Through	Cooling Tower	Cooling Pond
DESIGN ENVELOPE:	4200 ± 1100	210 ± 110	1800 ± 1900

BASIS: The characteristic represents the sum of the discharge rates from the condenser cooling system and the service water system. Often the layout of the service water system is the determining factor for total discharge rate, especially with a closed-cycle cooling system. Some stations with cooling towers use the service water cooling stream as makeup; others discharge their service water directly or recirculate it through auxiliary cooling towers or a holding basin. For an estimate of maximum environmental impact, the facility's service water system is nonrecirculating and its effluent combines with the cooling system effluent for immediate discharge.

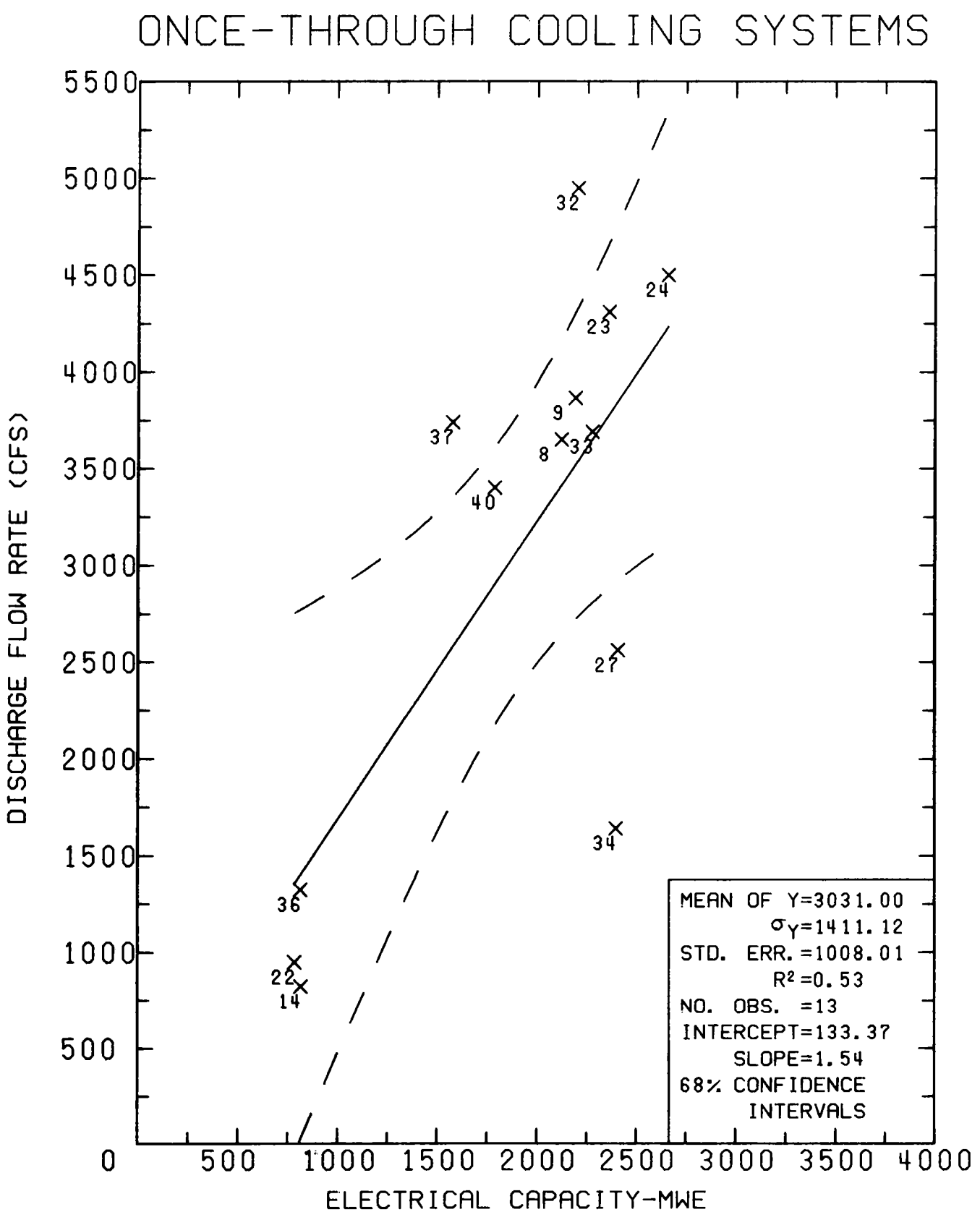
BASIS (Continued)

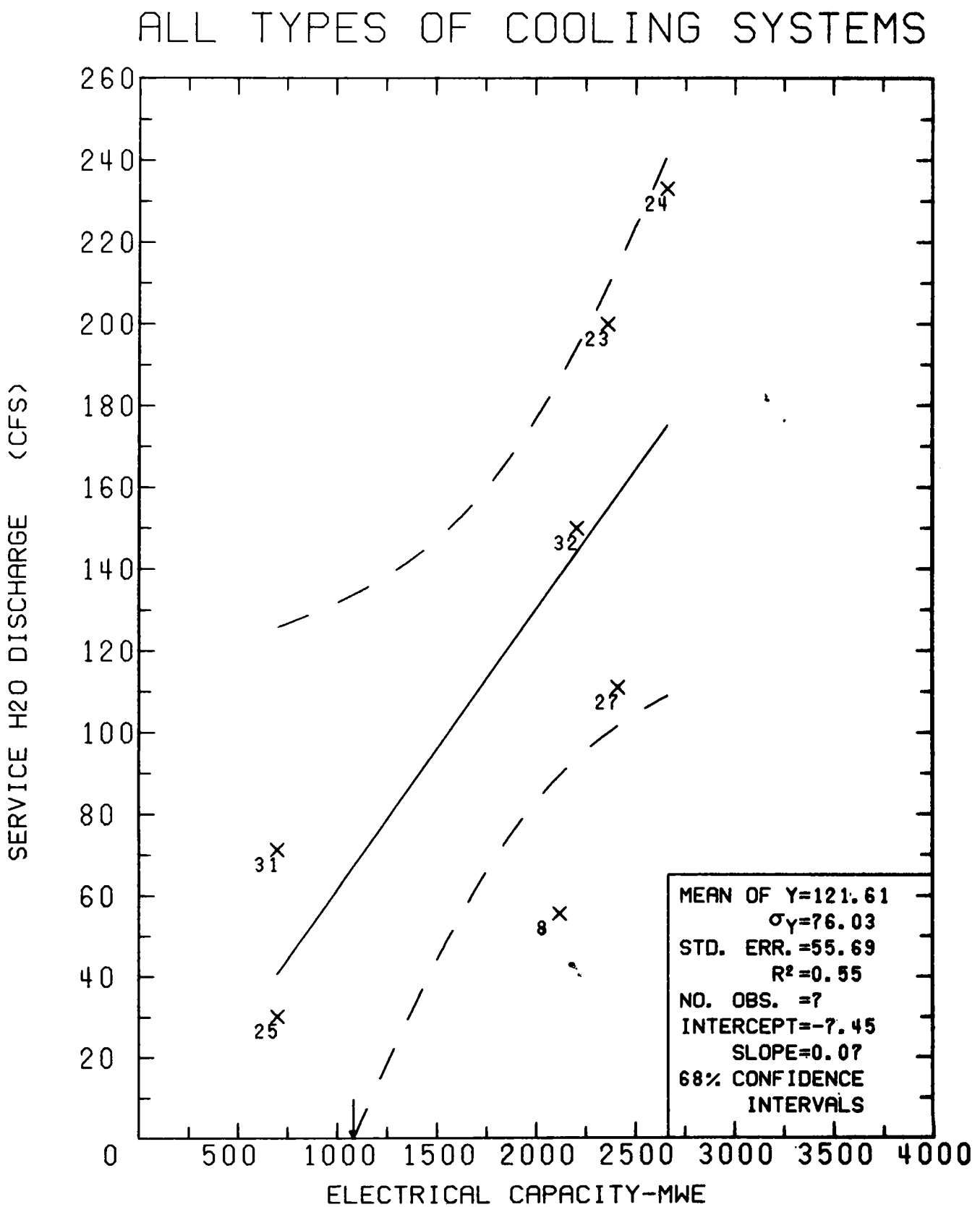
Station survey data are presented for both cooling system discharge rate and service water discharge rate. Partitioning the data on cooling system discharge rate according to cooling system type yields the following statistics:

	Once-through	Cooling Towers	Cooling Pond
Sample size	13	16	8
Maximum	4950	178	4902
Minimum	824	1.93	28.9
Average	3030	45.8	1620
Std deviation	1410	50.3	1890

The large standard deviations for stations with closed-cycle cooling systems reflect the variability of design associated with this cooling option; as a result, the data do not correlate with station size. On the other hand, the data for once-through systems do correlate with station size, as shown in the accompanying figure.

The cooling stream is the only significant contributor to the effluent volume of the service water system. Cooling stream discharge rates are identified for 7 stations in Appendix B. These correlate with station size (attached figure), and the resultant envelope at 2500 MWe (160 $\pm$ 60 cfs) when combined with the means and standard deviations of the cooling system discharge rates yields the design envelope for the facility. (Note that since flow rate data from stations with various types of discharge structures are used, the design envelope does not coincide with computed discharge rates based on discharge velocity and effective area.)


ONCE-THROUGH COOLING SYSTEMS
DISCHARGE FLOW RATE (CFS)
ELECTRICAL CAPACITY-MWE
5500
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
500
1000
1500
2000
2500
3000
3500
4000
32
24
23
9
37
8
33
40
27
34
36
22
14
MEAN OF Y=3031.00
σY=1411.12
STD. ERR.=1008.01
R²=0.53
NO. OBS. =13
INTERCEPT=133.37
SLOPE=1.54
68% CONFIDENCE
INTERVALS


ALL TYPES OF COOLING SYSTEMS
SERVICE H2O DISCHARGE (CFS)
260
240
220
200
180
160
140
120
100
80
60
40
20
0
500
1000
1500
2000
2500
3000
3500
4000
ELECTRICAL CAPACITY-MWE
24
23
32
27
31
8
25
MEAN OF Y=121.61
σY=76.03
STD. ERR.=55.69
R²=0.55
NO. OBS. =7
INTERCEPT=-7.45
SLOPE=0.07
68% CONFIDENCE
INTERVALS

Discharge Structure

CHARACTERISTIC: Excess Temperature

DEFINITION: The maximum difference between the effluent temperature at the point of discharge and the ambient water temperature

UNITS: degrees Fahrenheit

DESIGN ENVELOPE: 21 $\pm$ 11

BASIS: By definition, the characteristic is site dependent; that is, excess temperature is sensitive to geographical locale, type of receiving waterbody, size and depth of waterbody, and location of discharge structure. These factors tend to obscure any variation based solely on plant attributes. Data on excess temperature are available for 37 of the 40 survey stations:

Maximum	44.7
Minimum	-0.4
Average	21.1
Std deviation	10.7

Partitioning the data by cooling system type fails to produce a significant shift from the grand average; neither does

BASIS (Continued)

separating out those stations with offshore submerged discharge structures. The correlation with station size is poor ($r = 0.43$).

This analysis cannot account for all site-dependent variables of the characteristic; however, they are implicit in the data. As a result, the data are sufficiently representative to be used to determine the design envelope.

Discharge Structure

CHARACTERISTIC: Chemical Effluents

DEFINITION: The maximum concentrations of chemical effluents released to the receiving waterbody

UNITS: parts per million

DESIGN ENVELOPE:

Total residual chlorine	4 ± 11
Free available chlorine	≤ 0.5
Chromium	NDA*
Copper	0.19 ± 0.38
Iron	≤ 1.0
Zinc	NDA*
Phosphorous	NDA*
Sulfate	580 ± 2100
Oil and grease	≤ 20
Total dissolved solids	1300 ± 2600
Total suspended solids	≤ 100
BOD, 5-day	120 ± 370

*No detectable amount, as defined in "Steam Electric Power Generating Point Source Category, Effluent Guidelines and Standards," 40 CFR Part 423, Federal Register, October 8, 1974.

BASIS: Survey data from Appendix B on each chemical constituent are summarized below. Where applicable, the design effluent concentrations are compared with 40 CFR Part 423, "Steam Electric Power Generating Point Source Category, Effluent Guidelines and Standards," for new sources as published by the Environmental Protection Agency. The EPA effluent limitations provide maximum concentrations for the design envelopes of many chemicals discharged by nuclear power stations. In such cases, the limitations themselves are adequate to define the design envelope, if they are more conservative than the values derived from the survey.

Chlorine. Total residual and free available chlorine concentrations are reported for 35 and 21 survey stations, respectively. The average and standard deviation of the data for each species are (1) total residual chlorine, 4 ± 11 ppm and (2) free available chlorine, 0.6 ± 2.3 ppm. The statistics on total residual chlorine exclude the anomalously high value from Allens Creek (150 ppm); the statistics on free available chlorine include a high value from Palisades (10.7 ppm) and 5 stations that report zero concentration. There are no effluent limitations for total residual chlorine and the survey data are used to define the envelope. The maximum limitation for free available chlorine is 0.5 ppm; this value is used as the envelope's upper bound.

Chromium. The metal appears primarily in cooling tower blowdown. Estimates of chromium in the chemical effluents of 9 survey stations are given in Appendix B. The resultant statistical envelope is 0.32 ± 0.56 ppm. This range compares with an effluent limitation that specifies no detectable amount (NDA) of chromium in cooling tower blowdown. The effluent limitation is adopted as the design envelope.

BASIS (Continued)

Copper. Estimates of copper concentrations are given for 12 survey stations; the statistical envelope is 0.19 $\pm$ 0.38 ppm. The concentration of copper in nuclear power station effluents is well within the effluent limitation of 1.0 ppm.

Iron. Design concentrations of iron are reported for 12 survey stations; the statistical envelope is 0.66 $\pm$ 0.84. The upper boundary of the statistics exceeds the effluent limitation of 1.0 ppm; the limitation is adopted as the design envelope.

Zinc. Zinc generally appears as a constituent of cooling tower blowdown. Appendix B gives the concentrations of zinc in the chemical effluents of 10 stations, 6 of which employ cooling towers. Grouping the data by cooling system type produces no significant improvement over the statistics of the data set of 10:

Maximum	1.0
Minimum	0.01
Average	0.03
Std deviation	0.04

Effluent limitations specify NDA of zinc in cooling tower blowdown. The limitation is adopted as the design envelope irrespective of cooling system.

Phosphorous. Phosphorous is reported in the chemical effluents of 29 survey stations. The data are summarized as follows:

Maximum	30
Minimum	5.8×10^{-7}
Average	1.55
Std deviation	5.65

BASIS (Continued)

Effluent limitations specify that NDA of phosphorous should be present in cooling tower blowdown. This limit is chosen for the facility's design envelope irrespective of cooling system.

Sulfate. There are no EPA limitations on the amount of sulfate in the chemical effluent. Survey data from 34 stations give the following statistics:

Maximum	1.23×10^{4}
Minimum	7.40×10^{-7}
Average	5.77×10^{2}
Standard deviation	2.07×10^{3}

The maximum (Harris) and minimum (Hanford 2) values are anomalous relative to the remainder of the data. The data do not correlate with either station size or cooling system type; the average and standard deviation of the complete data set are taken as the design envelope.

Oil and Grease. The loss of lubricants to the chemical effluent stream is estimated for only 5 of the 40 survey stations. The maximum value is 15 ppm. This compares with a maximum effluent limitation of 20 ppm on oil and grease in low-volume wastes. Since only a few stations are represented in the data set, the effluent limitation is chosen as the design envelope.

Total Dissolved Solids (TDS). This constituent is dependent in large part on the original dissolved solids content of the water used by the facility. The high value given for San Onofre (150,000 ppm), a station that uses sea water for cooling,

BASIS (Continued)

reflects this dependence. As a general rule, the dissolved solids content of the effluent from a closed-cycle station should be several times greater than that from an open-cycle station, assuming both use the same water supply. With the exception of San Onofre and Sequoyah, which has variable-cycle cooling, survey data on TDS contained in the effluents from 25 stations are summarized in the following table:

	Open-cycle	Closed-cycle
Sample size	5	20
Maximum	2374	12000
Minimum	6	5.2
Average	618	1300
Std deviation	988	2580

The statistics suggest an average factor of two increase in the TDS content from closed-cycle stations over that from open-cycle stations. Site-caused variations in the data have not been addressed (except for San Onofre), and they ultimately determine the magnitude of TDS. The average and standard deviation of the survey data for closed-cycle stations are used to specify the design envelope. However, the envelope is only applicable to sites where fresh water is used for cooling.

Total Suspended Solids (TSS). The effluent limitation on total suspended solids is 100 ppm in low volume plant wastes. Of the 6 survey stations for which TSS data are given, only one (San Onofre) exceeds the limit. Since TSS values are given for only a few stations, the effluent limitation is chosen as the design envelope.

BASIS (Continued)

BOD5. The five-day biochemical oxygen demand in sanitary wastes is estimated for 12 survey stations. The data are summarized as follows:

Maximum	1280
Minimum	0
Average	116
Standard deviation	367

Municipal standards generally determine how much sanitary waste is acceptable. In lieu of those standards, the average and standard deviation of the data are used for the design envelope.

4.3.3 Condenser Cooling Systems

Technical bases are provided for the following design performance characteristics:

- Heat Rejection to Receiving Waterbody
- Temperature Rise
- Transit Time
- Circulating Cooling Water Flow
- Evaporation Rate
- Cooling Tower Dimensions
- Water Vapor Exit Velocity
- Cooling Range
- Approach
- Exit Air Wet Bulb Temperature
- Drift Rate
- Drift Droplet Size
- Concentration Factor

Condenser Cooling System

CHARACTERISTIC: Heat Rejection Rate

DEFINITION: The maximum heat rejection rate to an offsite receiving waterbody

UNITS: 10^9 Btu/hr*

	COOLING SYSTEM		
	Once-Through	Cooling Tower	Cooling Pond
DESIGN ENVELOPE:	18.1	0.9	0.9

BASIS: The waste heat produced by the facility can be calculated from the equation

$$H = cPf$$

where

H = heat rejection rate (Btu/hr)

P = total thermal power (MWt)

f = heat rejection factor

c = conversion constant

For the case of the facility, P = 7600 MWt and f = 0.67; the rejection rate is 17.4 x 10^9 Btu/hr. If a once-through cooling option is used, essentially all of this heat is released to the receiving waterbody. If a closed-cycle cooling system is used, the majority of waste heat will dissipate directly

*British thermal units per hour

BASIS (Continued)

to the atmosphere, and only the fraction contained in blowdown will reach the receiving waterbody. Appendix B contains data on the maximum heat released to the atmoshpere and receiving waterbody by the closed-cycle cooling systems of 19 nuclear power stations. (The survey values for Palisades are anomalously high, and those for Allens Creek and Robinson do not comply with the definition that cooling ponds are not receiving waterbodies). The resultant data set has the following statistical properties:

Maximum	0.44
Minimum	0.007
Average	0.21
Std deviation	0.17

The data correlate poorly with station size (r = 0.26). This is not surprising considering the variety of design options available for closed-cycle cooling systems.

In addition to the heat load carried by the condenser cooling system, the service water system carries appreciable waste heat. This is estimated to be as much as 200 MWt for the hypothetical facility. Depending on the layout of the service waste system, either all, some, or none of this heat is transferred to the receiving waterbody. All service water heat is assumed to be discharged with the liquid effluent. This yields a heat rejection rate of 0.68×10^9 Btu/hr, a value greater than that of closed-cycle cooling systems.

BASIS (Continued)

The design envelope for the open-cycle facility is the sum of the computed values for the cooling system and service water system; for the closed-cycle facility, the average from the data and the computed value for the service water system are used.

As an estimate of heat rejected directly to the atmoshpere by the facility, the design envelope can be subtracted from the total waste heat produced (18.1×10^9 Btu/hr). If the facility has a cooling pond, an allowance should also be made for the exchange of stored solar energy.

Condenser Cooling System

CHARACTERISTIC: Temperature Rise

DEFINITION: The maximum temperature increase in condenser cooling water while passing through the cooling system

UNITS: degrees Fahrenheit

	COOLING SYSTEM		
	Once-Through	Cooling Tower	Cooling Pond
DESIGN ENVELOPE:	24 ± 8	see BASIS	22 ± 5

BASIS: Appendix B provides data on this characteristic for all 40 survey stations. The statistics of the data set are:

Maximum	39.0
Minimum	13.4
Average	25.1
Std deviation	6.7

The facility's temperature rise will depend on various design properties such as heat load, cooling water flow rate, and cooling system type. Regrouping the survey data according to cooling system type yields the following statistics:

BASIS (Continued)

	Once-Through	Cooling Tower	Cooling Pond
Sample size	14	16	8
Maximum	39.0	38.0	30.0
Minimum	13.6	18.0	13.4
Average	23.5	28.1	21.9
Std deviation	8.0	6.0	4.8

Temperature rise is equivalent to the cooling range of cooling tower systems (see Cooling Range). The average and standard deviation of once-through and cooling pond systems are used to define the design envelope.

Condenser Cooling System

CHARACTERISTIC: Transit Time

DEFINITION: The average travel time through the condenser cooling system from the intake manifold to the discharge port

UNITS: minutes

	COOLING SYSTEM		
	Once-Through	Cooling Tower	Cooling Pond
DESIGN ENVELOPE:	11 ± 3	N/A	N/A

BASIS: The characteristic is reported for 23 of the 40 survey stations (Appendix B). In terms of environmental impact, transit time is important only for once-through cooling systems. Statistics covering 10 stations designed with once-through cooling are as follows:

Maximum	27
Minimum	1.3
Average	8.6
Std deviation	8.0

BASIS (Continued)

(The value of 0.25 min for Seabrook is considered anomalous.) The variation by an order of magnitude in the extremes is attributable to differences in the type and location of the discharge structure. Since the facility possesses an offshore submerged diffuser, only those stations with comparable discharge structures are used to estimate the design envelope:

Station	Transit Time
Cook	10
Fitzpatrick	15
San Onofre 2 & 3	8
Shoreham	12.7

The data are well grouped and more representative of the facility's transit time.

Condenser Cooling System

CHARACTERISTIC: Cooling Water Flow

DEFINITION: The average flow rate of cooling water circulating through the main condenser

UNITS: cubic feet per second

	COOLING SYSTEM		
	Once-Through	Cooling Tower	Cooling Pond
DESIGN ENVELOPE:	4000 ± 1000	2600 ± 500	3100 ± 1000

BASIS: The characteristic is reported for 28 of the 40 survey stations; the statistics on that data are:

Maximum	8620
Minimum	823
Average	2410
Std deviation	1590

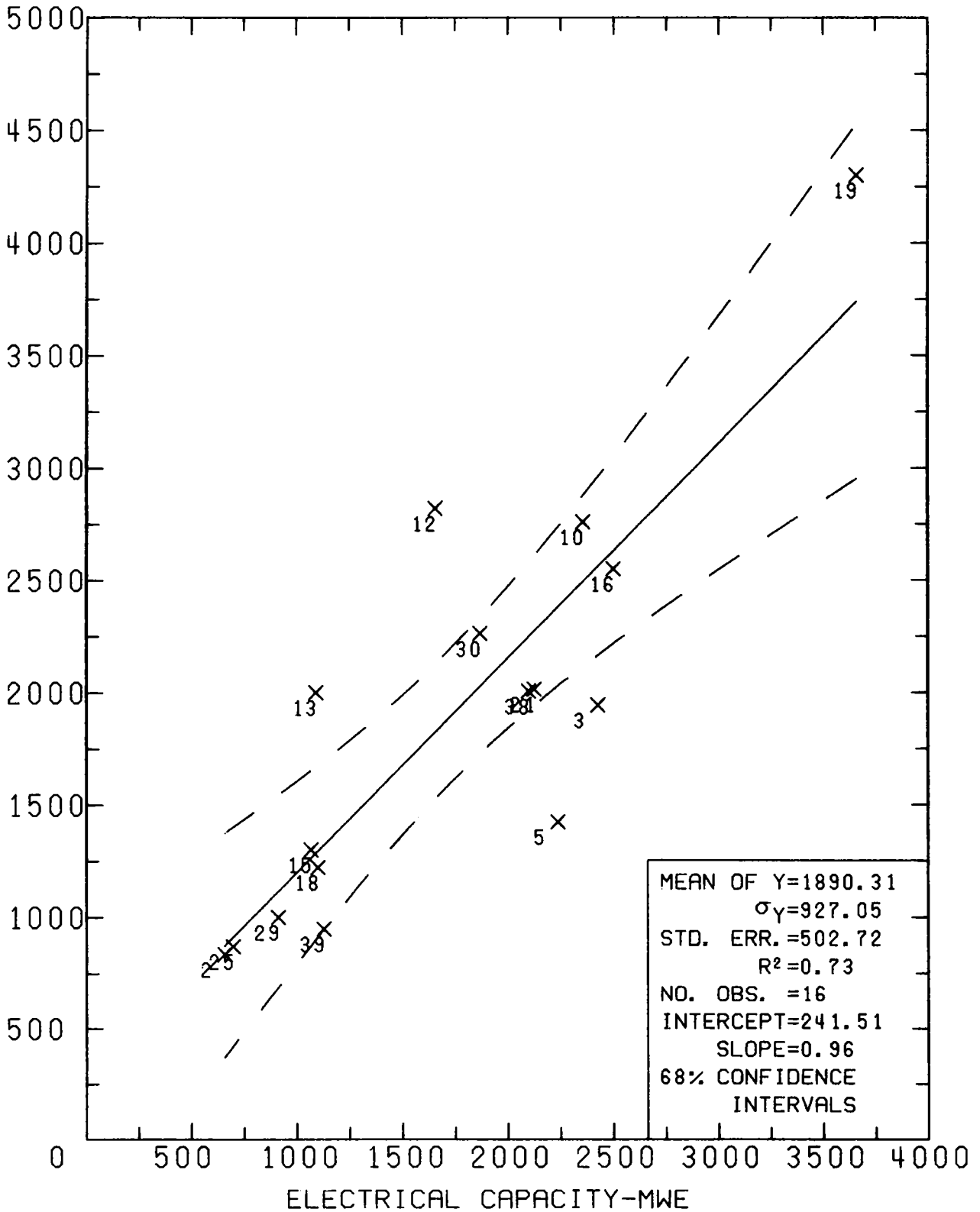
The circulating cooling water, water supply, and discharge are all roughly equivalent for open-cycle systems. Hence the once-through facility has a design envelope identical to that of cooling water supply. The survey data, grouped according to closed-cycle cooling type are summarized as follows:

BASIS (Continued)

	Cooling Tower	Cooling Pond
Sample size	16	7
Maximum	4300	4902
Minimum	835	2100
Average	1890	3080
Std deviation	927	988

The data differ sufficiently to warrant separate design envelopes. In addition, the cooling tower data correlate well with station size (see attached figure); the correlation with the cooling pond data is only fair ($r = 0.52$). The least squares line is used for the cooling tower envelope, while the average and standard deviation determine the cooling pond envelope.

COOLING TOWER SYSTEMS



Condenser Cooling System

CHARACTERISTIC: Evaporation Rate

DEFINITION: The maximum rate at which water is lost by evaporation from the condenser cooling system

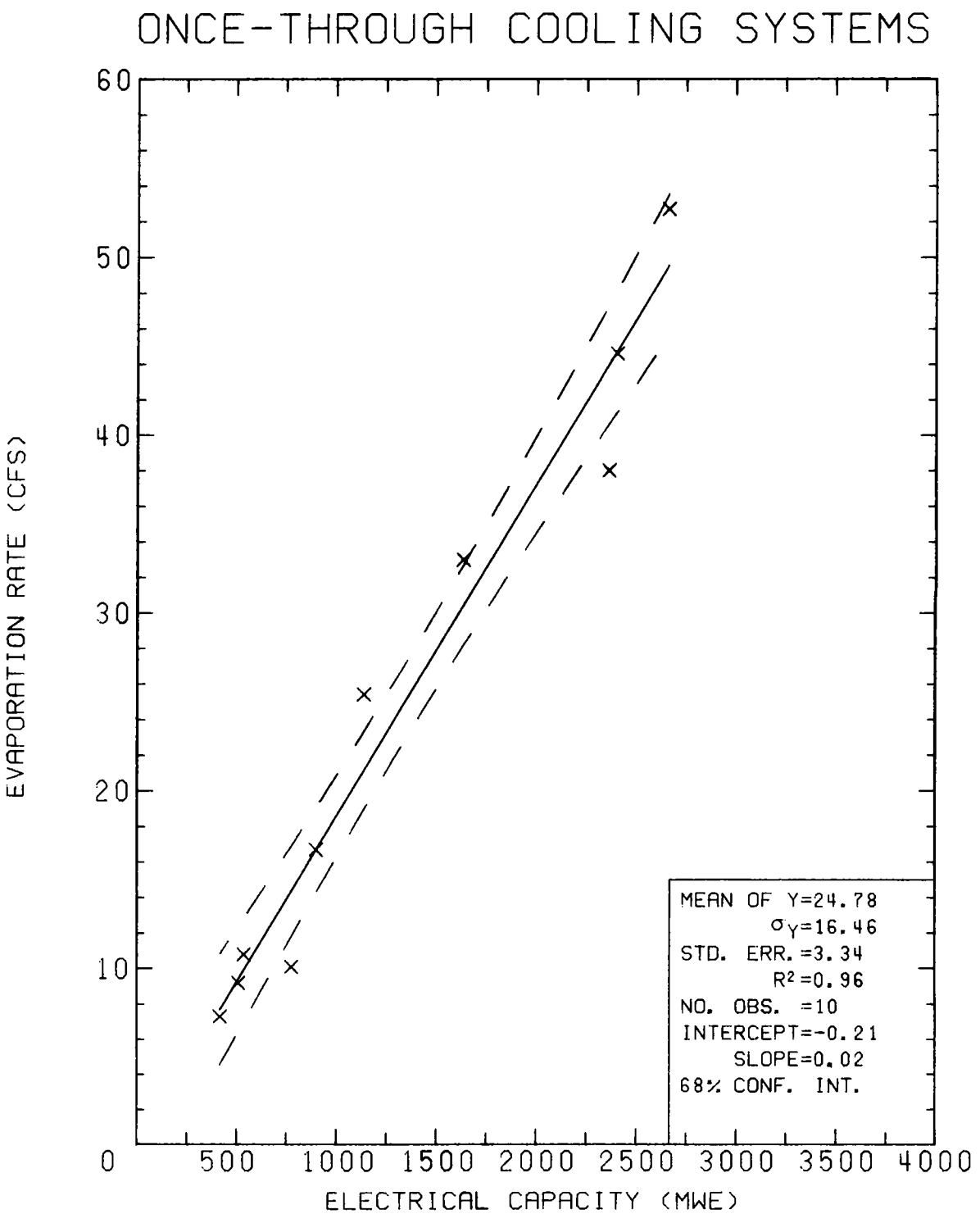
UNITS: cubic feet per second

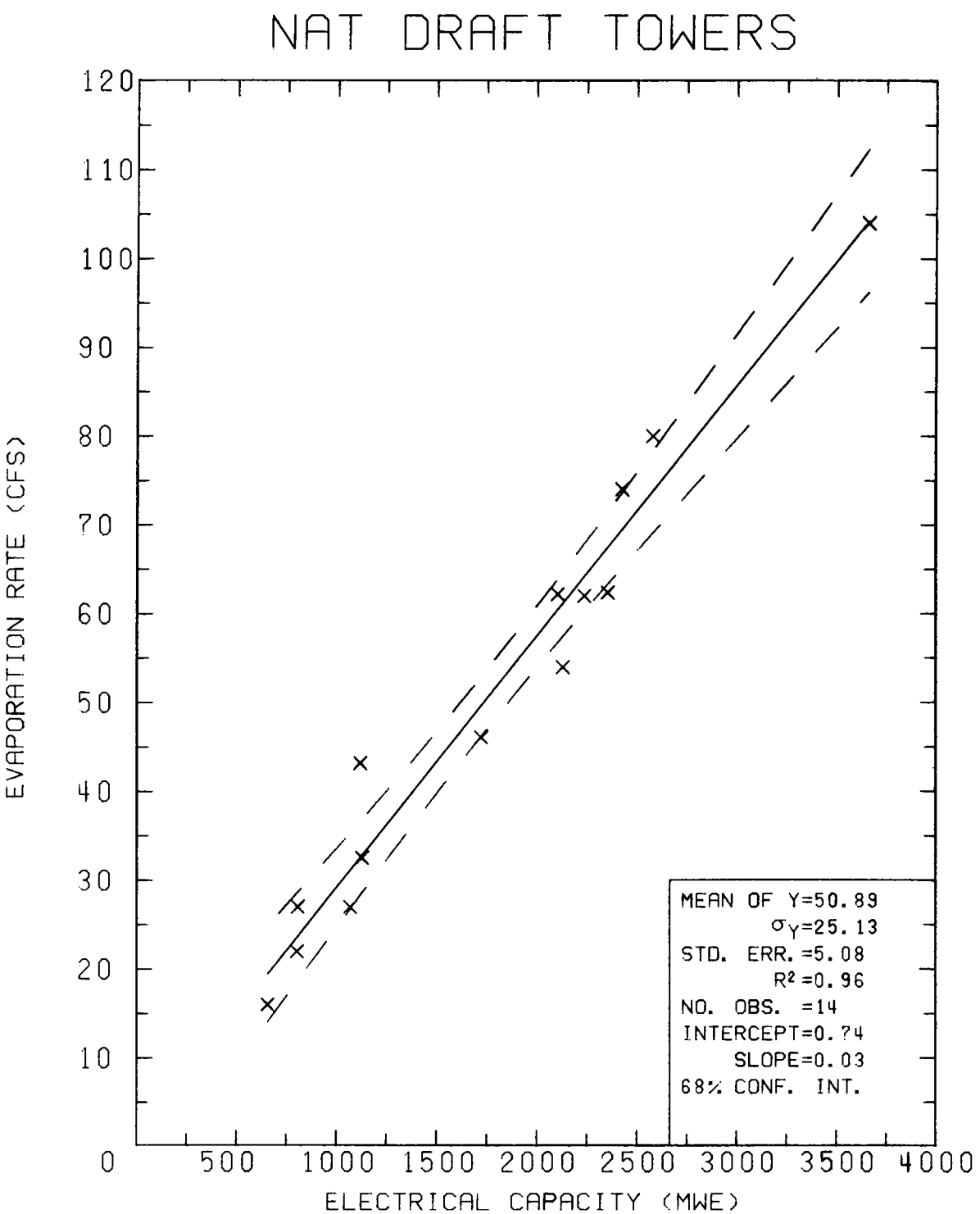
	COOLING SYSTEM		
	Once-Through	Cooling Tower	Cooling Pond
DESIGN ENVELOPE:	47 ± 4	Nat 71 ± 4 Mech 77 ± 15	51 ± 12

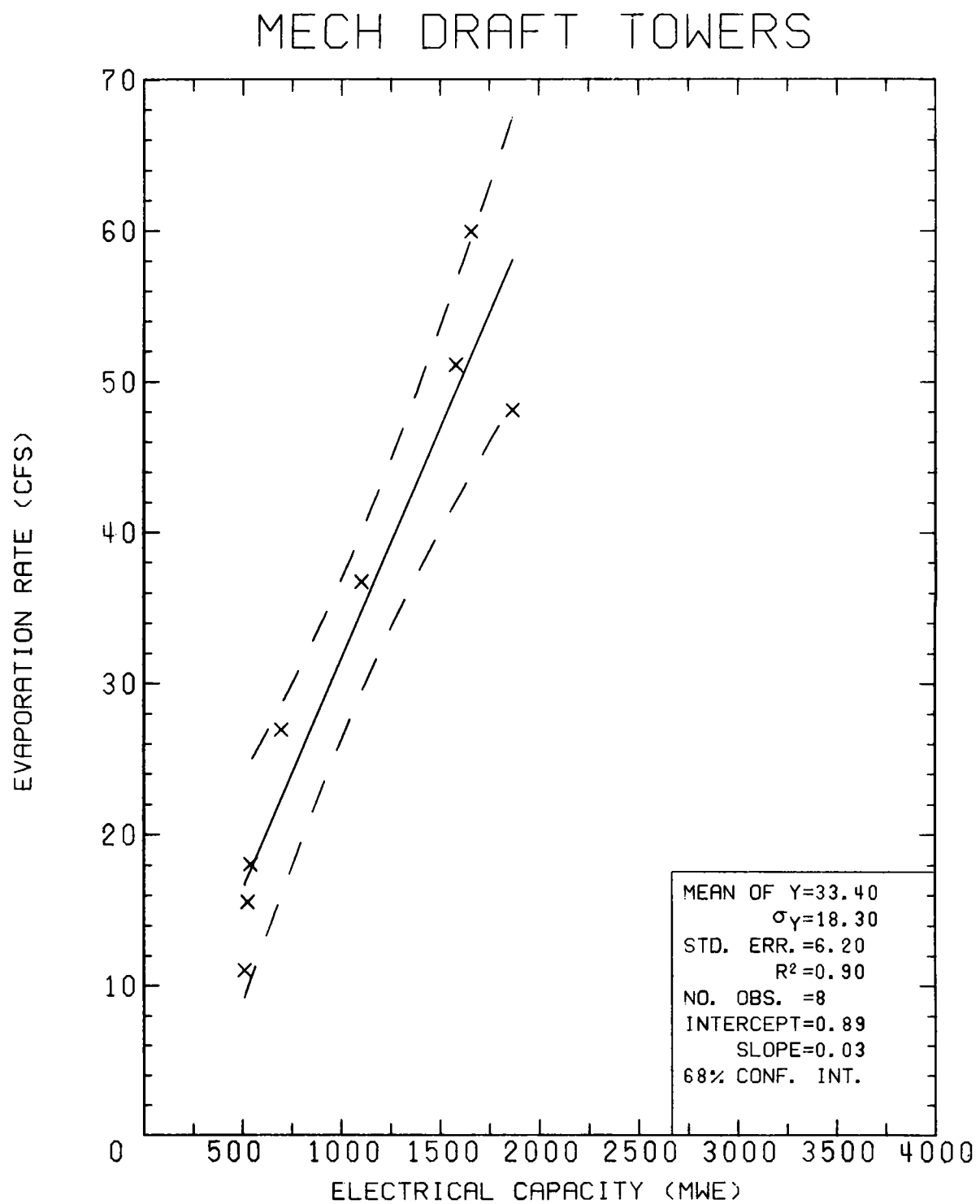
BASIS: Appendix C presents data on the evaporation rates of 10 stations with once-through cooling systems, 14 stations with natural-draft towers, 8 stations with mechanical-draft towers, and 5 stations with cooling ponds. The data representing cooling pond stations are augmented by the values given in Appendix B for Braidwood, Clinton and Comanche Peak. (Note that Greenwood's survey value (1.93 cfs) is anomalously low and the value for Allens Creek represents total evaporation.) The resultant data sets correlate well as indicated by the attached figures. The evaporation rate for the once-through systems represents the additional evaporation in the receiving waterbody

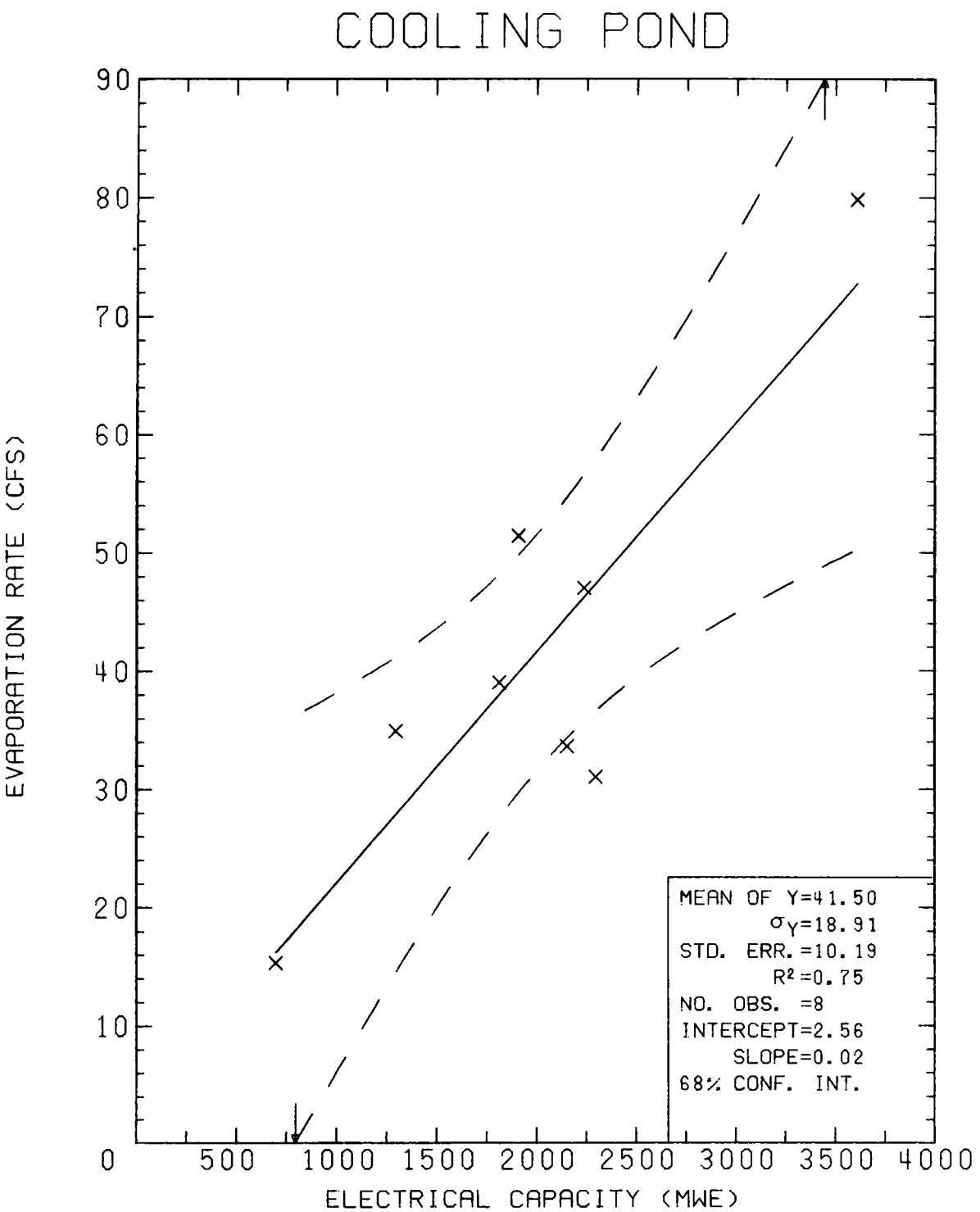
BASIS (Continued)

resulting from the heated water discharge. The evaporation rate for the cooling pond system represents only the evaporation induced by the facility; natural evaporation from the pond is not included. An environmental impact analysis of cooling pond water consumption should take into account total water lost.


ONCE-THROUGH COOLING SYSTEMS
EVAPORATION RATE (CFS)
ELECTRICAL CAPACITY (MWE)
0
10
20
30
40
50
60
500
1000
1500
2000
2500
3000
3500
4000
MEAN OF Y=24.78
σY=16.46
STD. ERR.=3.34
R²=0.96
NO. OBS. =10
INTERCEPT=-0.21
SLOPE=0.02
68% CONF. INT.


NAT DRAFT TOWERS
EVAPORATION RATE (CFS)
ELECTRICAL CAPACITY (MWE)
0
10
20
30
40
50
60
70
80
90
100
110
120
500
1000
1500
2000
2500
3000
3500
4000
MEAN OF Y=50.89
σY=25.13
STD. ERR.=5.08
R²=0.96
NO. OBS. =14
INTERCEPT=0.74
SLOPE=0.03
68% CONF. INT.


MECH DRAFT TOWERS
EVAPORATION RATE (CFS)
ELECTRICAL CAPACITY (MWE)
0
10
20
30
40
50
60
70
500
1000
1500
2000
2500
3000
3500
4000
MEAN OF Y=33.40
σY=18.30
STD. ERR.=6.20
R²=0.90
NO. OBS. =8
INTERCEPT=0.89
SLOPE=0.03
68% CONF. INT.


COOLING POND
EVAPORATION RATE (CFS)
ELECTRICAL CAPACITY (MWE)
0
10
20
30
40
50
60
70
80
90
500
1000
1500
2000
2500
3000
3500
4000
MEAN OF Y=41.50
σY=18.91
STD. ERR.=10.19
R²=0.75
NO. OBS. =8
INTERCEPT=2.56
SLOPE=0.02
68% CONF. INT.

Natural-Draft Cooling Tower

CHARACTERISTIC: Cooling Tower Dimensions

DEFINITION: The quantity and physical dimensions of natural draft cooling towers serving the facility

UNITS: feet

DESIGN ENVELOPE:

Number of towers	2
Height	500
Base Diameter	500
Exit Diameter	250

BASIS: A survey of 13 stations designed with hyperbolic natural-draft cooling towers (Appendix B) shows that the ratio of the number of towers to the number of reactors is unity. Thus the facility has two towers. The physical dimensions of these towers are approximated by relationships derived from the survey data: (1) the ratio of tower height to base diameter is about one and (2) the ratio of tower height to exit (top) diameter is about two. The resultant design envelopes are defined by the means of the survey data rounded to conform to the above relationships. The computed means and standard deviations of the data are: height, 480 $\pm$ 35; base diameter, 470 $\pm$ 40; and exit diameter, 250 $\pm$ 70. The design envelopes are well within the range of the data.

Mechanical-Draft Cooling Tower

CHARACTERISTIC: Cooling Tower Dimensions

DEFINITION: The quantity and physical dimensions of mechanical draft cooling towers serving the facility

UNITS: feet

DESIGN ENVELOPE:

Number of towers	6
Cells per tower	14
Height	60
Length	500
Exit Diameter	30

BASIS: Survey data on the dimensions of mechanical-draft cooling towers employed at nuclear power stations are presented in the following table:

Station	Number of Towers	Number of Cells	Height	Length	Exit Diameter
Farley	6	14	60	500	196
Hanford 2	2	20	60	---	---
Palisades	2	--	50	---	---
Peach Bottom	3	12	53	500	25
River Bend	6	10	59	360	31

BASIS (Continued)

As a general rule there are 2 to 3 towers for each reactor (Peach Bottom is variable cycle), but the number of cells per tower varies. Since there is a negative correlation with station size, the variation is probably due to different manufacturer's design specifications. Maximum average values are chosen as the design envelopes for both of these characteristics.

With minor exceptions, the height of the towers is uniform, and a single value is assumed for the envelope. The data on tower length and exit diameter are incomplete; for the time being their maxima are used as the envelopes. Exit diameter is approximately equivalent to fan diameter in induced-draft mechanical towers, the type used in almost all power plant applications. Fan diameters up to 60 feet are available; the exit diameter given for Farley is a factor of 3 greater than this and is assumed erroneous.

Condenser Cooling System

CHARACTERISTIC: Exit Velocity

DEFINITION: The speed at which the vapor plume exits from the cooling tower

UNITS: feet per second

DESIGN ENVELOPE:

Natural-draft cooling tower	17 ± 6
Mechanical-draft cooling tower	30

BASIS: The characteristic is reported for only 8 of the 18 survey stations equipped with cooling towers. The data are as follows:

Type	Station	Exit Velocity
Natural draft	Bailly	10
	Douglas Point	18.5
	Forked River	13
	Limerick	20
	Rancho Seco	23
Mechanical Draft	Hanford 2	30
	Peach Bottom	8
	River Bend	30

BASIS (Continued)

Mechanical-draft towers are fan assisted to compensate for lack of a chimney effect. As a result, their exit velocities should be greater than those of natural-draft towers. The survey value for Peach Bottom represents a calculated estimate and is probably incorrect. Deleting Peach Bottom from the data yields the expected variation with tower type. The data are independent of station size, and the means and standard deviations are used to define the design envelope.

Condenser Cooling System

CHARACTERISTIC: Cooling Range

DEFINITION: The temperature difference between the condenser cooling water entering and leaving the heat removal device

UNITS: degrees Fahrenheit

DESIGN ENVELOPE:

Natural-draft cooling tower	29 ± 6
Mechanical-draft cooling tower	21 ± 8

BASIS: Since water consumption for once-through systems and cooling ponds is almost independent of cooling range (Figure 3), the characteristic is assumed applicable only to cooling tower systems. If a cooling range envelope is desired for the facility's once-through system or cooling pond, the values of the temperature rise through the condenser (see Temperature Rise) may be used as a first approximation.

BASIS (Continued)

Appendix B gives cooling range values for 17 stations equipped with cooling towers. The data are summarized as follows:

Maximum	37
Minimum	11
Average	27
Std deviation	7.5

When the data are partitioned by cooling tower type (12 natural draft and 5 mechanical draft) the resultant statistics show a significant departure from the grand average. According to the statistics, the cooling range of natural draft towers is somewhat higher than that of mechanical draft towers. Since the correlation with station size is poor, the calculated means and standard deviations for each tower type are used to define the envelope.

Condenser Cooling System

CHARACTERISTIC: Approach

DEFINITION: The temperature difference between the cooling water leaving a cooling tower and the wet bulb temperature of the surrounding air

UNITS: degrees Fahrenheit

DESIGN ENVELOPE:

Natural-draft cooling tower	20 ± 4
Mechanical-draft cooling tower	14 ± 4

BASIS: Approach temperature is seldom given as a design parameter in environmental statements, although it is calculable provided the cold-side tower temperature and design wet bulb temperature are supplied. Those few survey stations for which approach temperatures are given are identified in the following table:

Type	Station	Approach
Natural draft	Douglas Point	24
	Grand Gulf	16
	Trojan	21
Mechanical draft	Farley	11
	Hanford 2	16
	River Bend	15

BASIS (Continued)

Normally the sample size would be too small to partition the data by tower type; however, Hauser and Oleson [6] indicate that natural-draft towers and mechanical-draft towers have significantly different design approaches (Figure 3). Hence, the means and standard deviations of each type are used to define the envelope.

Station size is apparently not an important factor in determining the approach. Since, by definition, the wet bulb temperature establishes approach, site meteorology is a more significant consideration.

Condenser Cooling System

CHARACTERISTIC: Exit Air Wet Bulb Temperature

DEFINITION: The temperature of saturated air exhausted from the cooling tower

UNITS: degrees Fahrenheit

DESIGN ENVELOPE: 115

BASIS: The characteristic is reported for only 3 stations: Douglas Point, 115 °F; Limerick, 112°F; and River Bend, 106°F. Given the scarcity of data, a lengthy analysis is unjustified at this time. Tentatively, the maximum reported temperature is used for the design envelope.

Condenser Cooling System

CHARACTERISTIC: Drift Rate

DEFINITION: The maximum fraction of circulating cooling water discharged to the atmosphere as droplets

UNITS: percent

DESIGN ENVELOPE:		
	Natural-draft cooling tower	0.02 ± 0.03
	Mechanical-draft cooling tower	0.10 ± 0.10

BASIS: The size of the drift rate depends amost exclusively on cooling tower design, especially with regard to the drift eliminators. At present cooling tower manufacturers state design objective drift rates as low as 0.002 percent for both natural draft and mechanical-draft towers. This value contrasts with the design drift rates of 18 tower-equipped stations reported in Appendix B. The average of the data is 0.042 percent, an order of magnitude greater than best available technology. As a conservative measure, high drift rates are usually adopted for design purposes. Accordingly, the means and standard deviations of the drift rates given in the survey are taken as the facility's design envelope.

Condenser Cooling System

CHARACTERISTIC: Droplet Size

DEFINITION: The diameter range of droplets which comprise the largest mass fraction of cooling tower drift

UNITS: microns

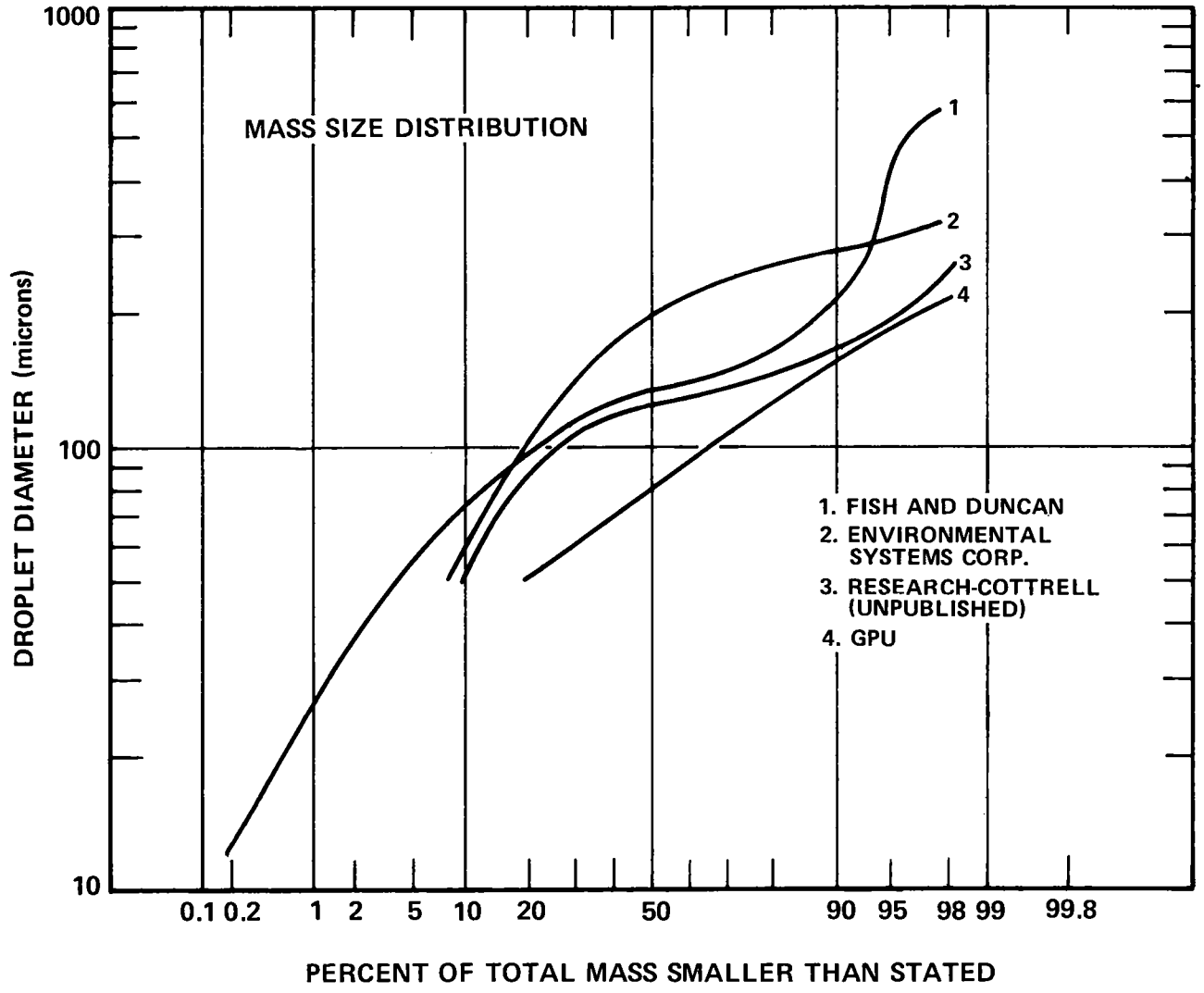
DESIGN ENVELOPE: 140 ± 60

BASIS: The only available information on droplet size distribution in cooling tower drift comes from a few field studies at operating towers. Roffman et al.[3] have identified these studies and summarized their results. Accordingly, the mass distribution of drift as a function of droplet size is shown in the accompanying figure. Only the GPU results follow a log-normal distribution, but their findings represent an extrapolation from measured data at larger droplet sizes. According to Roffman et al., the median diameters of the distributions vary from 80 to 195 microns with a total mean value of 140 microns.

BASIS (Continued)

The mass size distribution contrasts with the droplet population distribution which shows that about 70 percent of the droplets in drift have diameters less than 50 microns. For purposes of environmental impact, mass size distribution is the more critical measurement, and, given the lack of more definitive data, the range of median diameters was chosen as the design envelope. This envelope includes about 75% of the total drift mass as represented by the measured data.

Because of the lack of data, no distinction is drawn between droplets generated by natural-draft towers and those generated by mechanical-draft towers. Ranges of droplet sizes presented by Aynsley and Carson[2] do suggest a tendency toward larger sizes from mechanical-draft towers, but the data are inconclusive.



Cumulative Mass Distribution of Drift Droplets For Various Diameters As Observed Above The Drift Eliminators (Taken From Roffman, et al, 1973)

Condenser Cooling System

CHARACTERISTIC: Concentration Factor

DEFINITION: The ratio of total dissolved solids in the cooling system effluent to dissolved solids in the makeup water

UNITS: dimensionless

	COOLING SYSTEM		
	Once-Through	Cooling Tower	Cooling Pond
DESIGN ENVELOPE:	N/A	4.0 ± 2.6	1.8 ± 0.7

BASIS: The data in Appendix B on this characteristic are separable according to cooling system type. By consequence of their design, once-through systems have concentration factors approaching unity and need not be analyzed. Since the data are relatively insensitive to station size, the averages and standard deviations of 13 cooling tower stations and 7 cooling pond stations are used to define the facility's design envelope.

4.3.4 Combined Plant Systems

Technical bases are provided for the following design performance characteristics:

- Station Land Requirement
- Site Land Requirement
- Transmission Route Land Requirement
- Access Route Land Requirement
- Disrupted Land Surface
- Excavation Spoil
- Noise Power Level
- Structure Height
- Construction Personnel
- Operating Personnel

Total Facility

CHARACTERISTIC: Station Land Requirement

DEFINITION: The average surface area required to contain major facility components exclusive of cooling ponds, access routes, and transmission rights-of-way

UNITS: acres

DESIGN ENVELOPE: 130 ± 100

BASIS: The design envelope is based on an analysis of data on 61 nuclear power stations presented in Appendix C. A statistical breakdown of these data by cooling system type is as follows:

	Once-Through	Cooling Tower	Cooling Pond
Sample size	33	21	5
Maximum	453	483	200
Minimum	20	30	100
Average	108	156	150
Std deviation	91	126	50

BASIS (Continued)

Although the computed averages suggest that stations using cooling towers require larger areas than those having once-through cooling, the data scatter is too great to support the difference with an acceptable degree of confidence. The correlation with station size is only poor to fair for the various cooling system options. At this stage in the analysis, the statistics of the entire data set are considered adequate for the facility's design envelope.

Total Facility

CHARACTERISTIC: Site Land Requirement

DEFINITION: The average land surface, other than that assigned to offsite transmission rights-of-way and access routes, required to site the facility

UNITS: acres

	COOLING SYSTEM		
	Once-Through	Cooling Tower	Cooling Pond
DESIGN ENVELOPE:	1100 ± 900	1100 ± 900	11000 ± 2600

BASIS: The characteristic is assumed to be more sensitive to site specific conditions than it is to plant design objectives. The site area data provided in Appendices B and C confirm this assumption with the single exception of stations that utilize cooling ponds. In this case the size of the pond influences the total site area. The following table presents the total site area, nominal cooling pond area, and acres of pond per megawatt generating capacity for a group of stations:

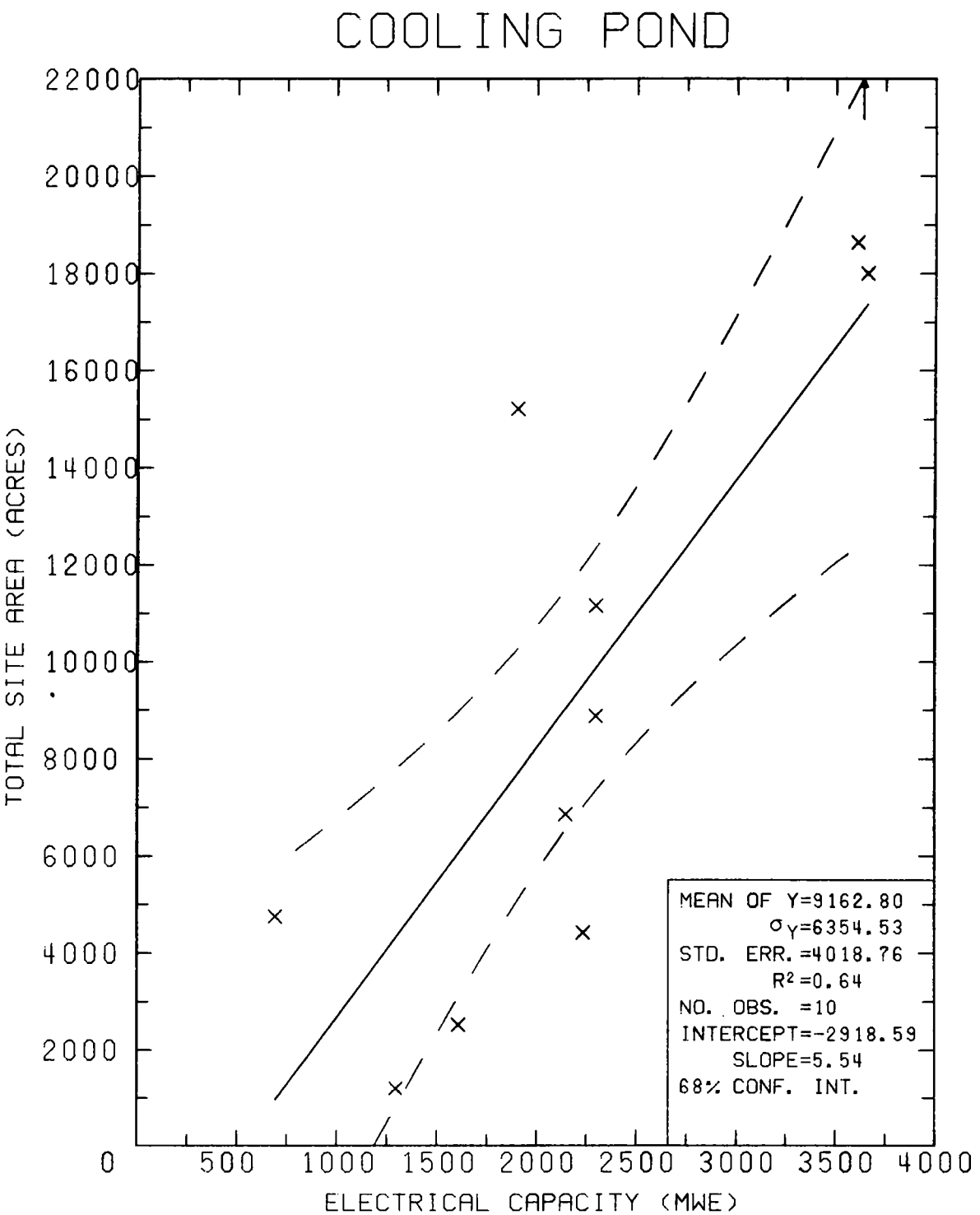
BASIS (Continued)

Station	Site Area (Acres)	Cooling Pond Area (Acres)	Pond Utilization (Acres/MWe)
Allens Creek	11,152	7,600	3.30
Braidwood	4,420	2,640	1.18
Clinton	15,210	4,895	2.56
Comanche Peak	8,876	3,228	1.40
Dresden 2 & 3	2,517	1,275	0.79
Harris	18,000	10,400	2.84
LaSalle	6,860	2,190	1.02
Midland	1,200	880	0.68
North Anna	18,643	13,000	3.60
Robinson 2	4,750	2,250	3.21
Average	9,160	4,840	2.1
Std deviation	6,350	4,150	1.1

The original design objectives of the Shearon Harris cooling pond have been included in this table even though the station is presently designed for natural-draft cooling towers.

According to the table, the average pond utilization is about 2 acres per megawatt. With respect to the facility, the average utilization infers a nominal cooling pond size of 5,000 acres.

With the exception of stations with cooling ponds, the data on site area fail to correlate with station size. Therefore, the computed average and standard deviation of 54 stations not equipped with cooling pond systems are used to determine the facility's design envelope for once-through and cooling-tower systems. The least squares fit to station size (see attached figure) gives the envelope for the cooling pond option.


COOLING POND
TOTAL SITE AREA (ACRES)
ELECTRICAL CAPACITY (MWE)
22000
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
500
1000
1500
2000
2500
3000
3500
4000
MEAN OF Y=9162.80
σY=6354.53
STD. ERR.=4018.76
R²=0.64
NO. OBS. =10
INTERCEPT=-2918.59
SLOPE=5.54
68% CONF. INT.

Total Facility

CHARACTERISTIC: Transmission Route Land Requirement

DEFINITION: The average land surface required for transmission rights-of-way from the site boundary to an existing transmission grid

UNITS: acres

DESIGN ENVELOPE: 1800 $\pm$ 2200

BASIS: The characteristic is analogous to Site Land Requirement in that its value is largely a function of site-specific conditions. Appendix C contains data on transmission corridor land needs for 58 nuclear power stations. Despite the site dependence of these data, they correlate well with station size ($r = 0.56$). The correlation exceeds the 99 percent level of significance for the sample size.

The dependence on station size reflects historic siting practice in the nuclear power industry. The earliest stations were typically small (Appendix A) and situated near their load centers, often at a site adjacent to a

BASIS (Continued)

pre-existing fossil fuel plant. Few additional transmission lines were needed. As nuclear power stations became larger and the number of suitable close-in sites decreased, more stations were sited in remote areas, distant from their load centers. Because of their large generating capacity, these stations were able to serve more than one load center. Consequently, longer and more numerous transmission corridors were required to serve the larger stations. Since it is uncertain whether this trend in nuclear power station siting will persist for any length of time, the facility's design envelope is estimated from the average and standard deviation of the entire data set rather than as a function of station size.

Total Facility

CHARACTERISTIC: Access Route Land Requirement

DEFINITION: The average land surface required to accommodate access rights-of-way from the site boundary to an existing transportation system

UNITS: acres

DESIGN ENVELOPE: 59 ± 72

BASIS: Both a road spur and a rail spur are included under this characteristic. The amounts of land needed to accommodate access routes are site specific variables. Data covering access roadways and access railways are presented in Appendix B. Of the 40 stations surveyed, only 8 require land for a road spur, while just 13 are designed with a rail spur. By contrast, 22 stations require neither an access road nor a rail spur. These data indicate a tendency to site nuclear power stations adjacent to existing transportation routes.

Statistical summaries of those stations for which some offsite access routing was necessary are given in the following table:

BASIS (Continued)

	Access Roadway (acres)	Access Railway (acres)
Maximum	51	169
Minimum	2.6	1.1
Average	18	41
Std deviation	17	55

The combined averages and standard deviations define the facility's design envelope.

Total Facility

CHARACTERISTIC: Disrupted Land Surface

DEFINITION: The total land surface area disturbed during site preparation and facility construction

UNITS: acres

	COOLING SYSTEM		
	Once-Through	Cooling Tower	Cooling Pond
DESIGN ENVELOPE:	350 ± 610	350 ± 610	4800 ± 2600

BASIS: The characteristic is dependent on site-specific conditions such as topography and vegetation coverage as well as facility design. The fact is illustrated by the extremes of disrupted surface area given for 37 nuclear power stations in Appendix B: maximum--9000 acres; minimum--30 acres. However, the data are separable by cooling system type. According to the statistics, stations having cooling ponds disturb an order of magnitude more land on the average than stations having other cooling options. The computed averages and standard deviations of 6 cooling pond stations and 31 stations with other cooling systems define the facility's design envelope.

BASIS (Continued)

The data correlate poorly with station size as might be expected if site conditions are the principal controlling factors. It should be pointed out that, of the 31 stations with cooling systems other than ponds, only two have disrupted surface areas greater than 600 acres. As a result, the design envelope may be overly conservative for most sites without cooling ponds.

Total Facility

CHARACTERISTIC: Excavation Spoil

DEFINITION: The quality of spoil (including dredge material) removed or relocated to prepare the site

UNITS: 10^6 cubic yards

DESIGN ENVELOPE: 2.7 ± 2.8

BASIS: As in the case of Disrupted Land Surface, the characteristic varies with the nature of the site. Survey data on the amounts of material excavated and dredged at nuclear power plant sites are available for only 11 stations. (The dredged spoil estimate for Byron is exceptionally high (1.6×10^9) and has been deleted.) These data are summarized as follows:

	Excavated Spoil	Dredged Spoil
Maximum	8.1	0.50
Minimum	0.5	0.006
Average	2.5	0.17
Std deviation	2.6	0.15

The various cooling system options are too poorly represented to justify partitioning the data, and the correlation with station size is poor ($r = 0.26$). Consequently, the combined statistics of the two variables are taken as the facility's design envelope.

Total Facility

CHARACTERISTIC: Noise Power Level

DEFINITION: The maximum sound level produced by any component during normal operation

UNITS: decibels

	COOLING SYSTEM		
	Once-Through	Cooling Tower	Cooling Pond
DESIGN ENVELOPE:	N/A	84 ± 4	N/A

BASIS: Noise is expected to be a potential problem only at a facility equipped with cooling towers. Transformers and other noise making components are assumed to contribute a negligible sound increment at the site boundary. The paucity of information about noise in Environmental Statements (Appendix B) indicates a lack of sound level measurements at cooling towers from which to base estimates of impact. In the few cases in which estimates of sound level are made, the noise is greater than 50 dBA at the site boundary, a value that may exceed acceptable offsite noise criteria.

Capano and Bradley[1] measured the sound radiating from five mechanical-draft towers and nine natural-draft towers and

BASIS (Continued)

compared the results against two well-known noise prediction models. They found that the Dyer and Miller technique[2] gave good agreement with measured sound levels at mechanical-draft towers, but the model by Ellis [22] overpredicted the sound levels from natural-draft towers by as much as 10 dBA. Sound level envelopes measured by Capano and Bradley as a function of distance from the source are shown in the attached figure. Because of the contribution by fans, mechanical-draft towers are approximately 1 to 2 dBA noisier. The sound level envelopes enable comparisons with predicted noise levels to be made. The facility's design envelope is defined by the extremes measured at the base of the towers; at present no distinction is drawn between natural-draft and mechanical-draft towers.

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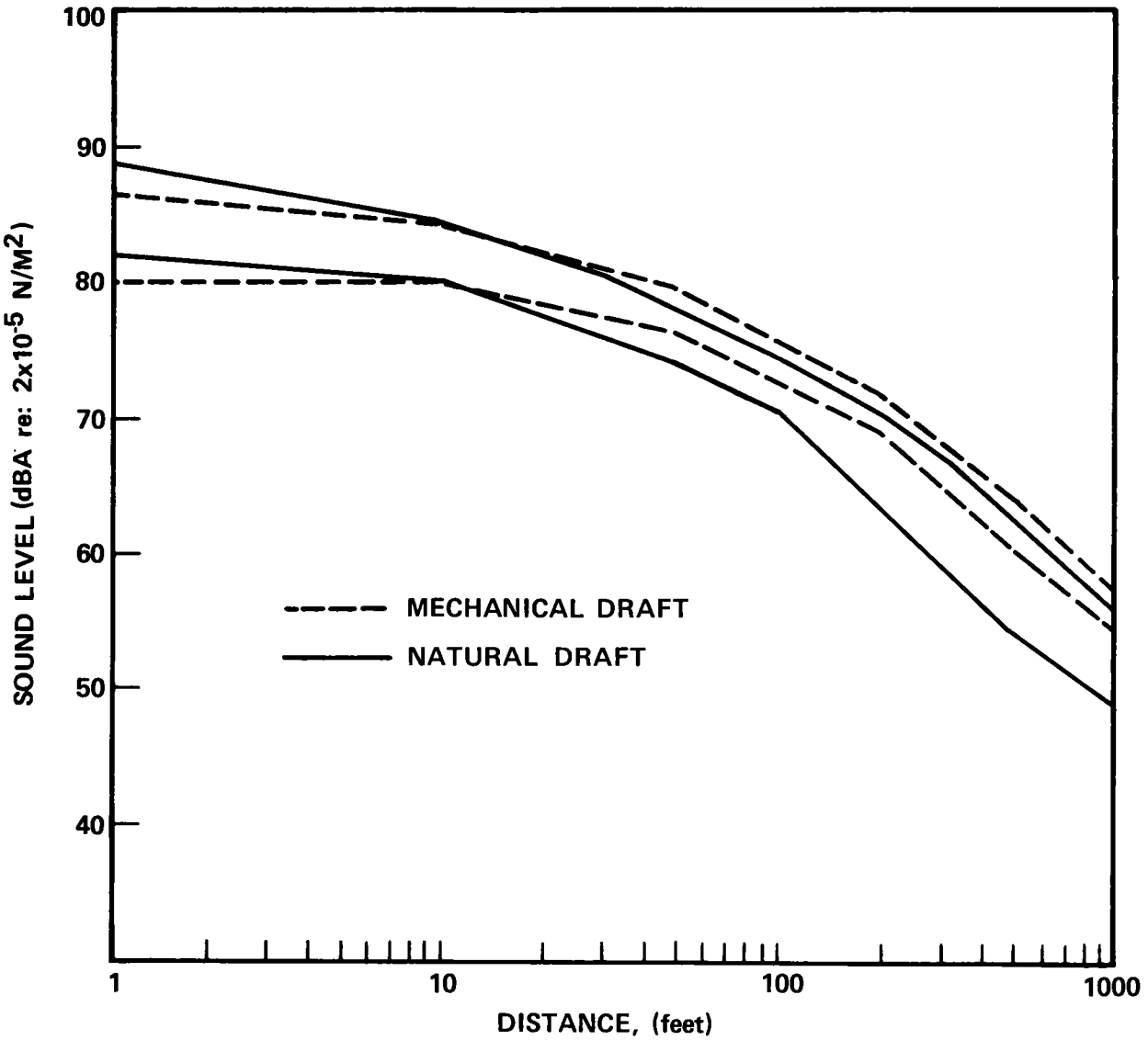
[1] G. A. Capano and W. E. Bradley, "Radiation of Noise from Large Natural Draft and Mechanical Draft Cooling Towers," Heat Transfer Division of ASME, 74-WA/HT-55, 1974.

[2] I. Dyer and L. N. Miller, "Cooling Tower Noise," Noise Control, p. 180-183, May 1959.



Natural and Mechanical Draft Cooling Towers Sound Level Envelope
(Taken from Capano and Bradley, 1974)

Total Facility

CHARACTERISTIC: Structure Height

DEFINITION: The height above grade of the tallest onsite facility structure

UNITS: units

	COOLING SYSTEM		
	Once-Through	Cooling Tower	Cooling Pond
DESIGN ENVELOPE:	230 ± 60	Nat 500 Mech 230 ± 60	230 ± 60

BASIS: In many cases, the tallest structure at nuclear power stations is the meteorological tower. Given the narrow profile of this structure, its effect on viewability is likely to be minimal. Therefore, the characteristic is assumed to include only massive structures. In this regard, natural-draft cooling towers are the tallest facility structure, usually followed by the containment building (including stack).

Survey data on the tallest structure at 34 nuclear power stations are available (Appendix B). The data are summarized as follows:

BASIS (Continued)

Natural-draft cooling tower	Yes	No
Sample size	13	21
Maximum	516	385
Minimum	400	115
Average	478	232
Std deviation	35	64

A nominal height of 500 feet was previously selected for natural-draft towers (see Cooling Tower Dimensions); for consistency, the same value is applied to this characteristic. The design envelope for other cooling system options is defined by the average and standard deviation of the data.

Total Facility

CHARACTERISTIC: Construction Personnel

DEFINITION: The average number of workers engaged in construction activities during a six-year peak construction period

UNITS: persons

DESIGN ENVELOPE: 1270 ± 205

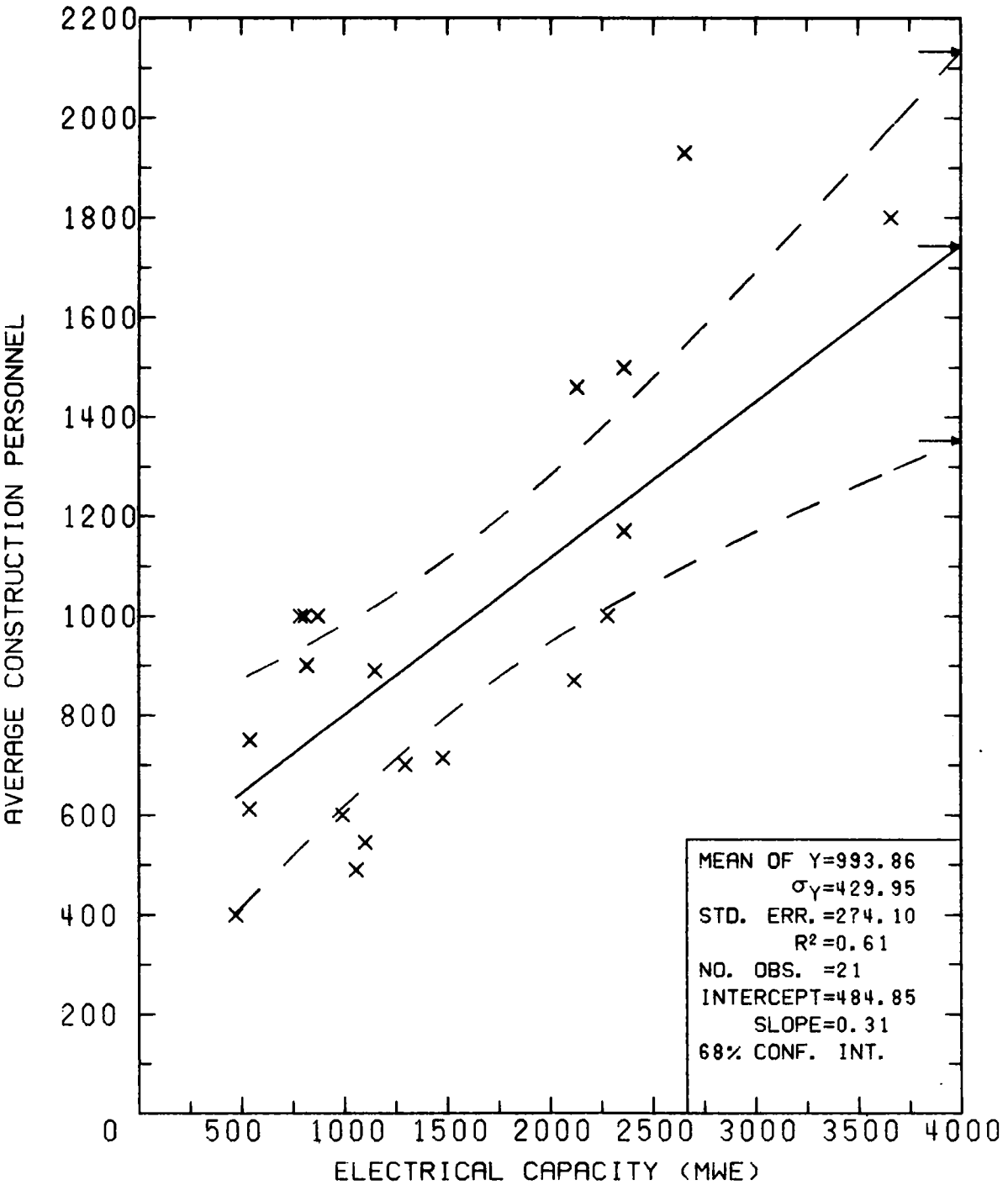
BASIS: Appendix C provides data on the annual average manpower requirements as well as the peak manpower needs during the construction of a station. The data are summarized in the following table:

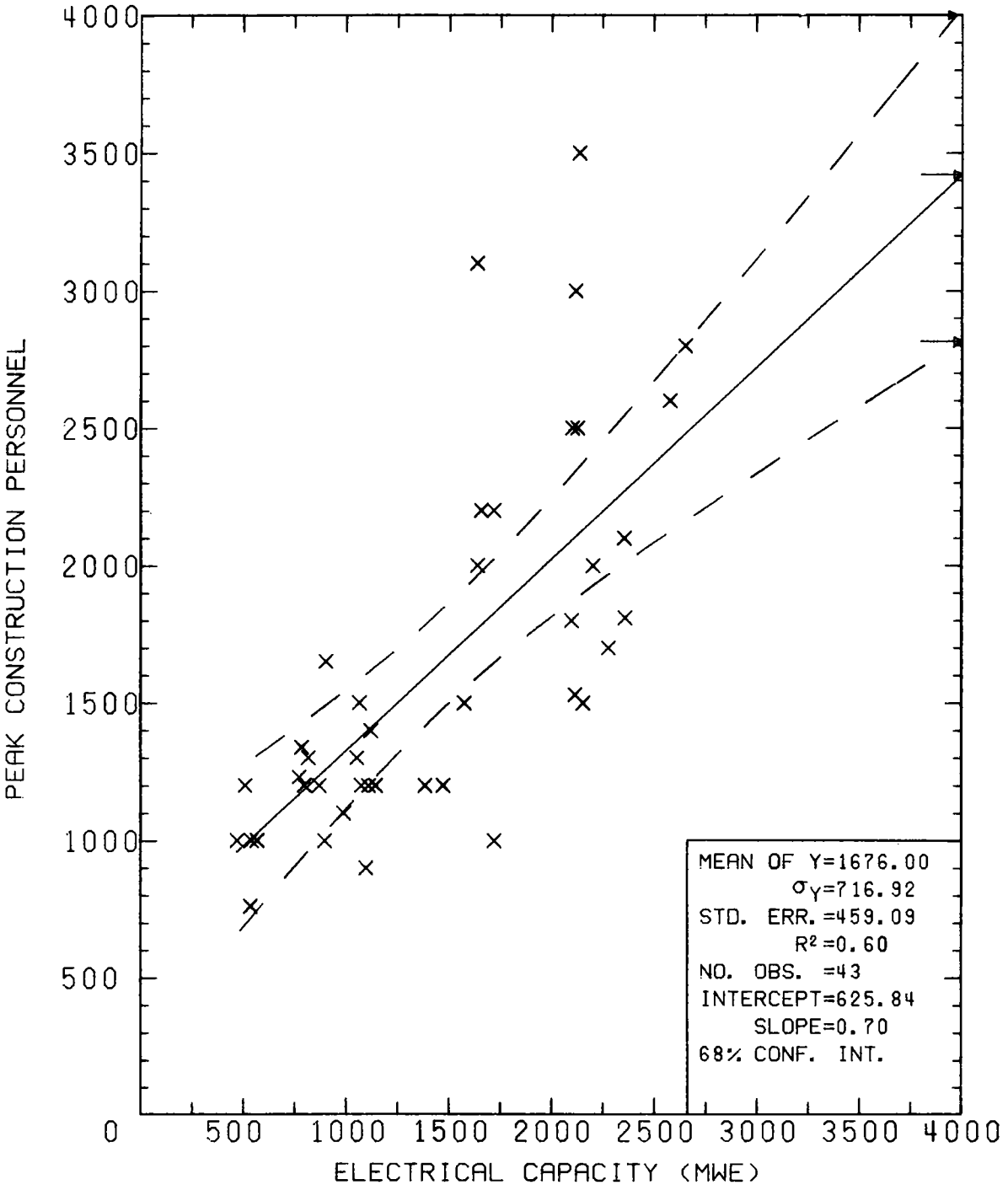
	Peak Manpower	Average Manpower
Sample size	43	21
Maximum	3500	1900
Minimum	760	400
Average	1680	990
Std deviation	720	430

Both types of manpower needs are sensitive to station size; the linear fits of the data are shown in the attached figures. A breakdown of the data by cooling system type does not result in an appreciable improvement in the correlation; therefore, the number of construction personnel is assumed independent of cooling type. Since the average manpower employed during the

BASIS (Continued)

construction period provides a better estimate of sustained impact, the least squares fit of this variable is used to define the envelope.


AVERAGE CONSTRUCTION PERSONNEL
2200
2000
1800
1600
1400
1200
1000
800
600
400
200
0
500
1000
1500
2000
2500
3000
3500
4000
ELECTRICAL CAPACITY (MWE)
MEAN OF Y=993.86
σY=429.95
STD. ERR.=274.10
R²=0.61
NO. OBS. =21
INTERCEPT=484.85
SLOPE=0.31
68% CONF. INT.


PEAK CONSTRUCTION PERSONNEL
4000
3500
3000
2500
2000
1500
1000
500
0
500
1000
1500
2000
2500
3000
3500
4000
ELECTRICAL CAPACITY (MWE)
MEAN OF Y=1676.00
σY=716.92
STD. ERR.=459.09
R²=0.60
NO. OBS. =43
INTERCEPT=625.84
SLOPE=0.70
68% CONF. INT.

Total Facility

CHARACTERISTIC: Operating Personnel

DEFINITION: The maximum number of workers permanently stationed at the facility

UNITS: persons

DESIGN ENVELOPE: 105 ± 43

BASIS: Appendix C provides data on the number of operating personnel at 50 nuclear power stations. The range of personnel varies from 45 to 230; the average and standard deviation are used to define the design envelope. The data correlate farily well with station size ($r = 0.64$), but the statistical criterion is not met. Partitioning data by cooling system type does not improve the correlation.

SECTION 5.0

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APPENDIX A

FUTURE TRENDS IN NUCLEAR POWER STATION SIZE

The anticipated large growth in nuclear power generating capacity presumes a concurrent increase in the number of facilities needed to accommodate that growth. The actual number of stations that will be required is indeterminate because of the varying sizes of nuclear power reactors and the tendency to place more than one reactor on a given site.

Future trends in the deployment of nuclear generating capacity can be estimated from an examination of data compiled from the AEC licensing record.[1] Of particular interest is the frequency distribution of operating facilities as a function of the total electrical generating capacity per station.

Histograms illustrating facility distribution with generating capacity for several time periods are given as an attachment to this appendix; however, for discussion purposes the idealized, sinusoidal curves of Figure A-1 will be used. These curves more clearly demonstrate past and future growth trends of the nuclear power industry in the United States.

Prior to 1970 nearly all reactor stations possessed single units with modest power ratings. During this period, small (<500 MWe), less efficient reactors were numerically dominant, although by 1969 a number of moderate-sized (500-900 MWe) units had begun to operate.

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[1] "Facilities License Application Record," USAEC Directorate of Licensing, September 30, 1974.

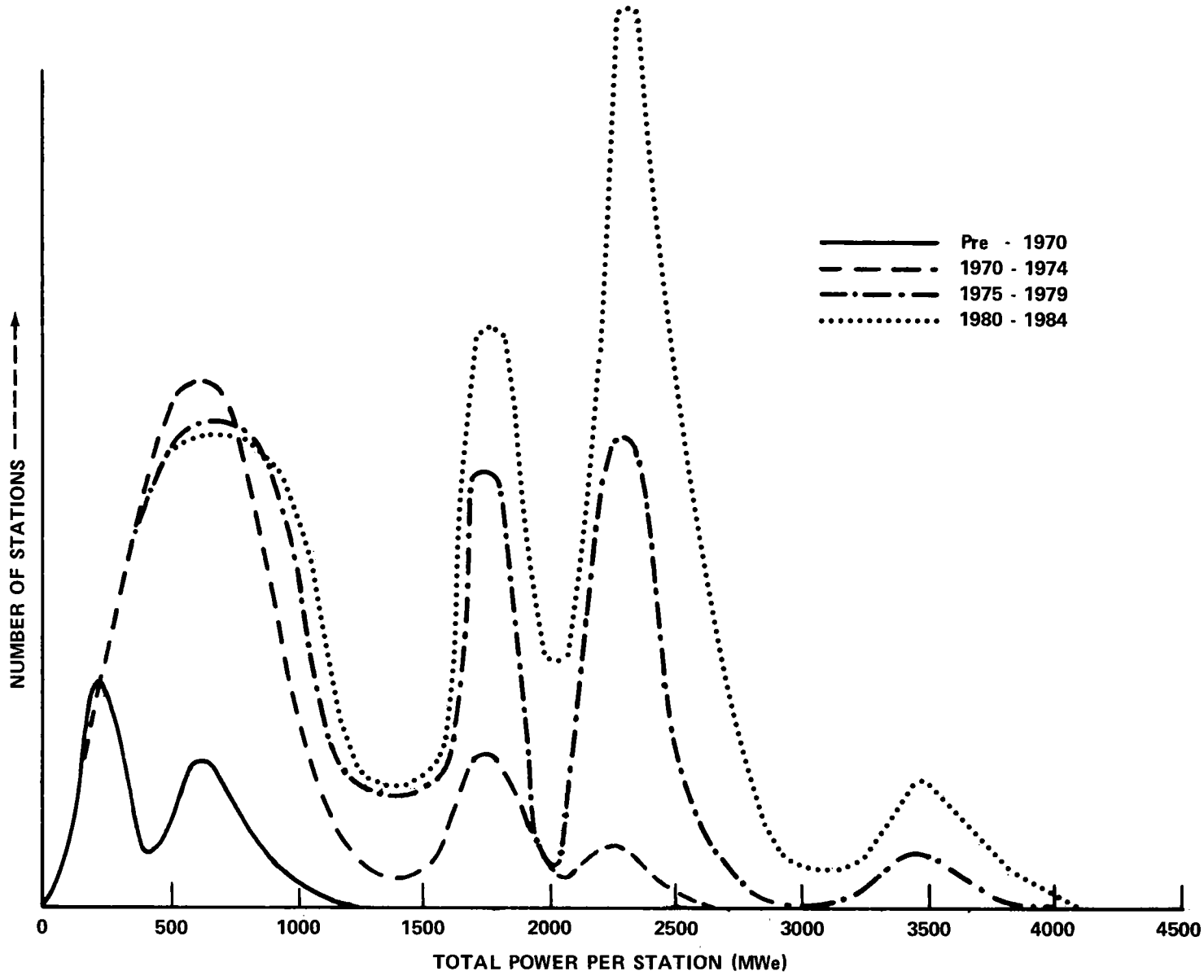


FIGURE A-1. DISTRIBUTION OF ELECTRICAL GENERATING CAPACITY AT NUCLEAR POWER STATIONS.

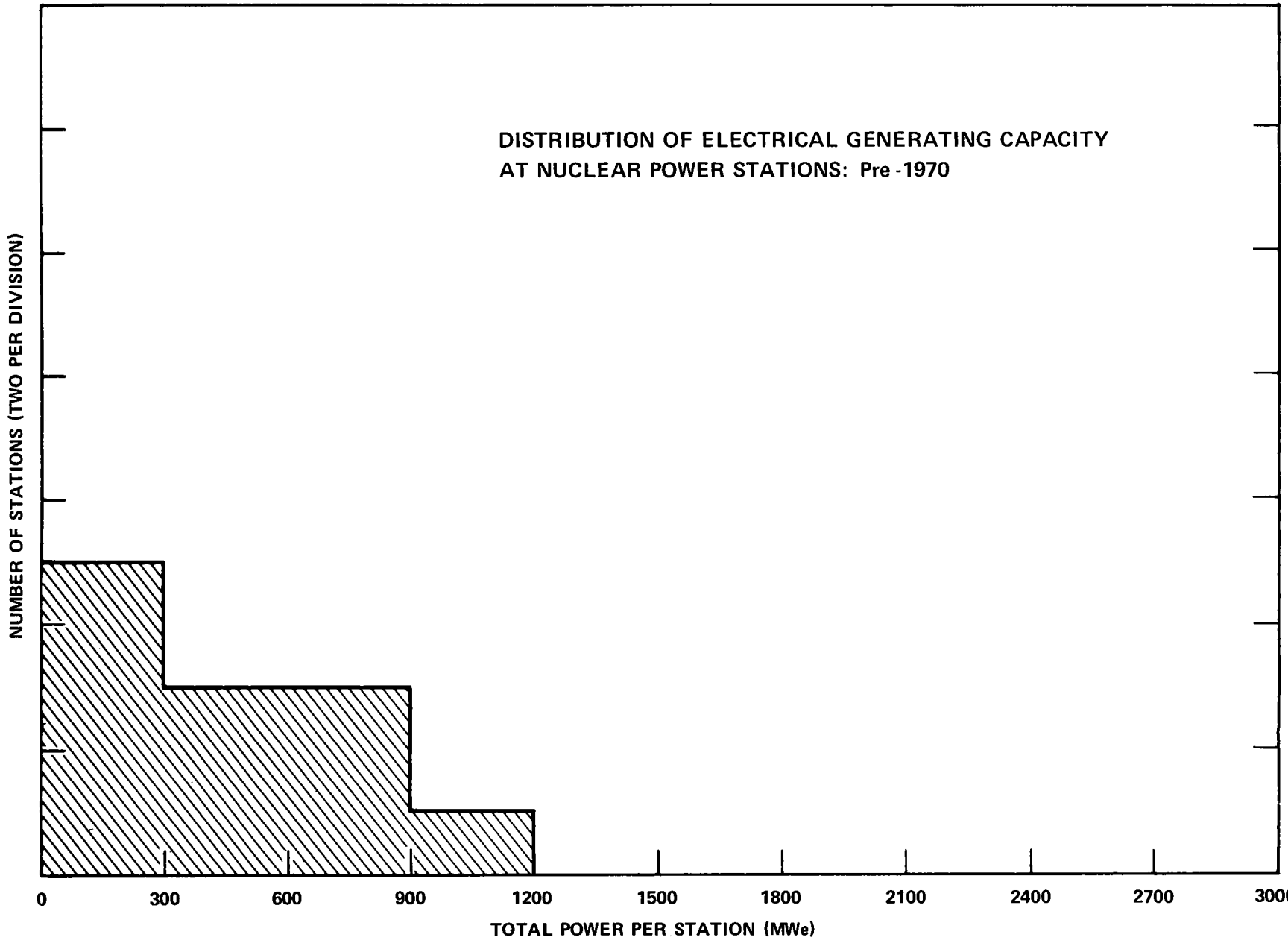
A dramatic expansion in the nuclear power industry took place during the period 1970-1974. The majority of reactor stations were still single-unit facilities, but by then moderate-sized units had become numerically superior. The first of the large (>900 MWe) units became operational during this interval. However, of greater significance was the appearance of multi-unit facilities generally consisting of two moderate-sized reactor units (1600-1800 MWe total).

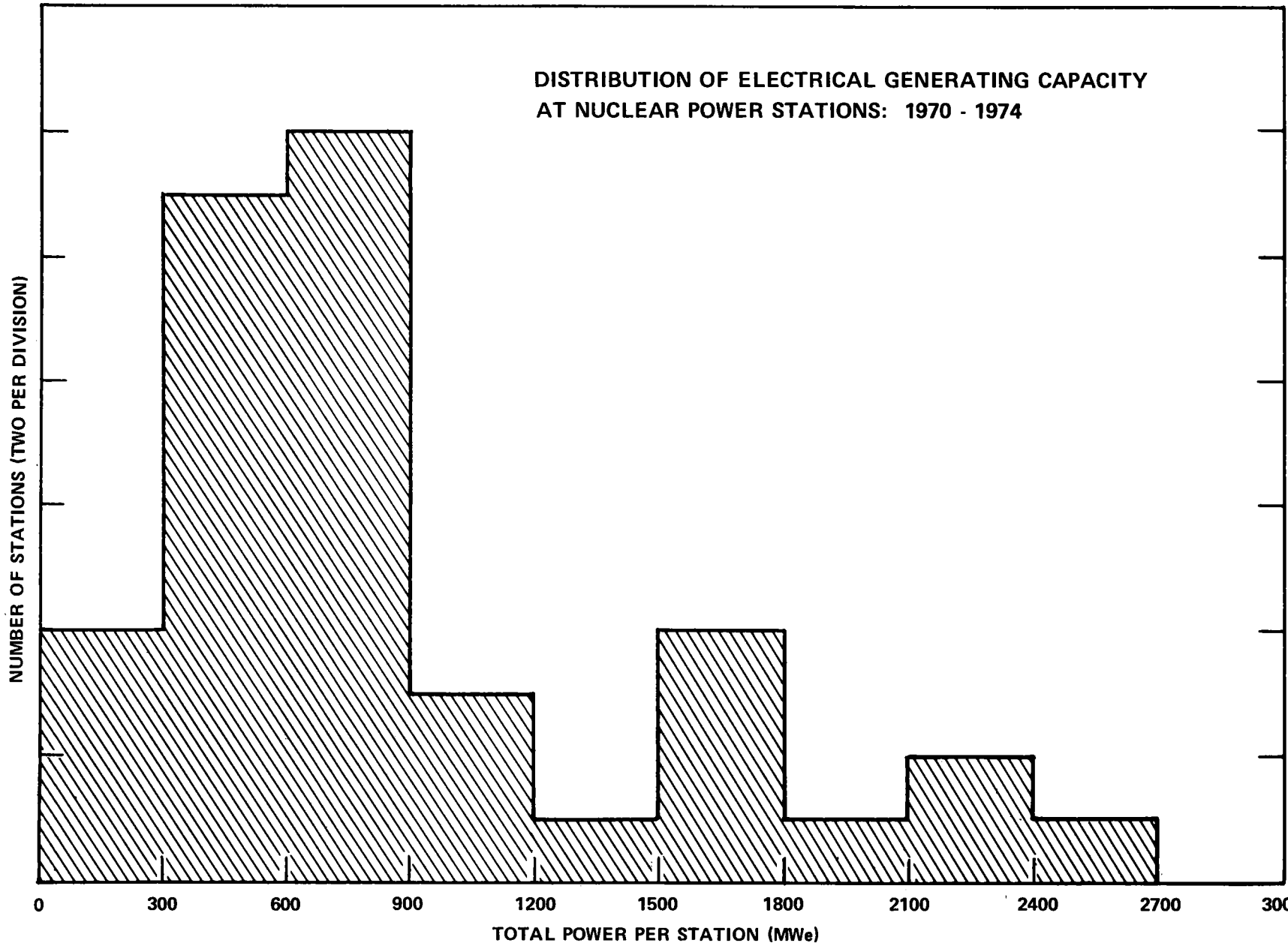
Beyond 1974 the licensing record enables reasonable predictions to be made based on construction permits granted and applications for construction permits currently being processed. During the next five years (1975-1979) single-unit reactor stations will achieve their greatest numbers (Figure A-1). Since the AEC has set a thermal power ceiling of 3800 MWt on applications for individual reactors, single-unit facilities are unlikely to exceed that limit. Assuming a 33 percent thermal efficiency for light-water-cooled reactors, the limit proves to be about 1250 MWe. As Figure A-1 shows, future reactors are expected to rapidly approach this generating capacity.

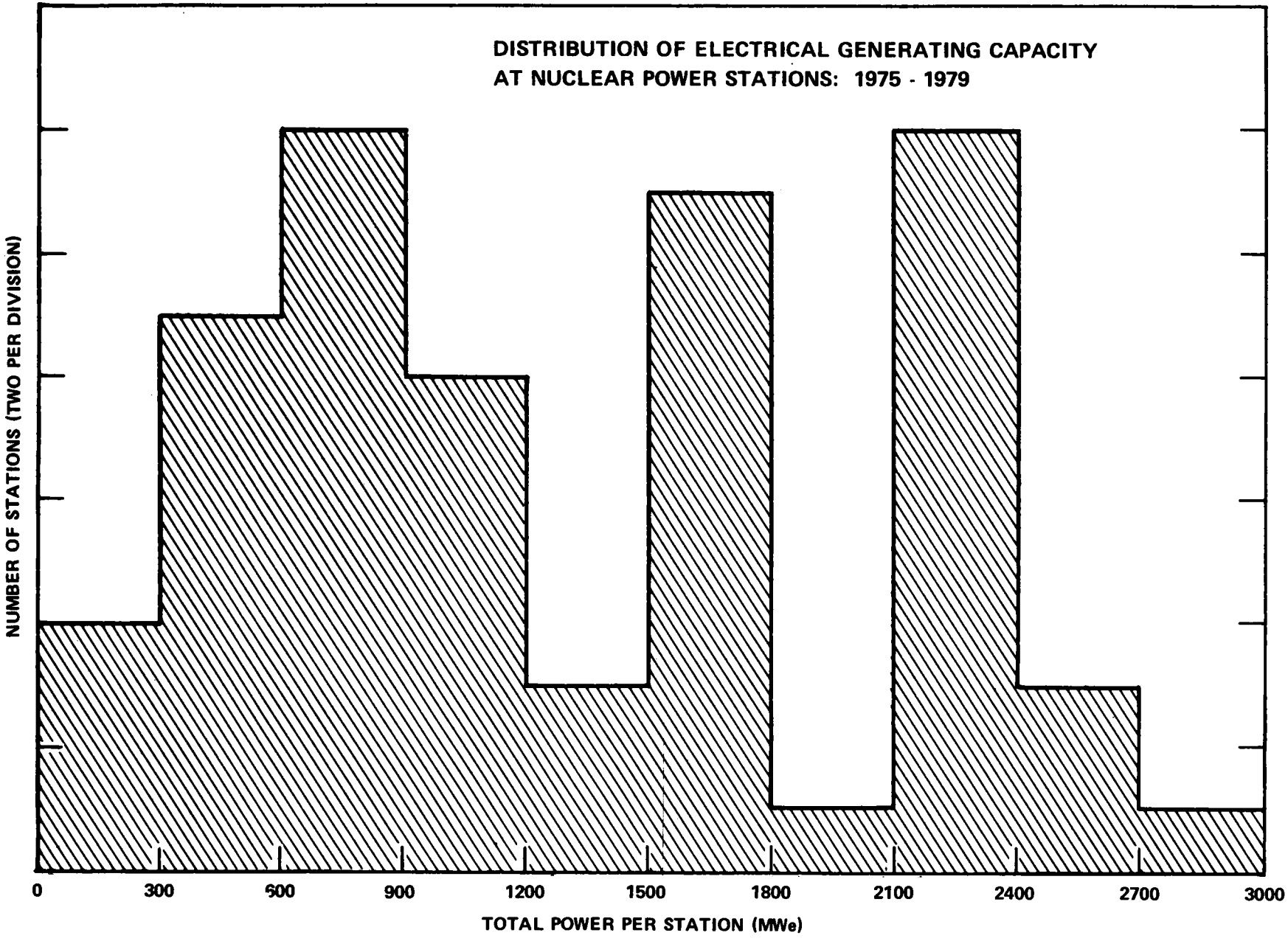
Growth in the nuclear power industry for the remainder of this century will be manifested by increasing numbers of multi-unit facilities. Although there will remain many single-unit facilities and two-unit, moderate-sized stations, the predominant nuclear power facility of the future will consist of two large reactors with a total power rating of 2100-2500 MWe. In all likelihood even this configuration will eventually

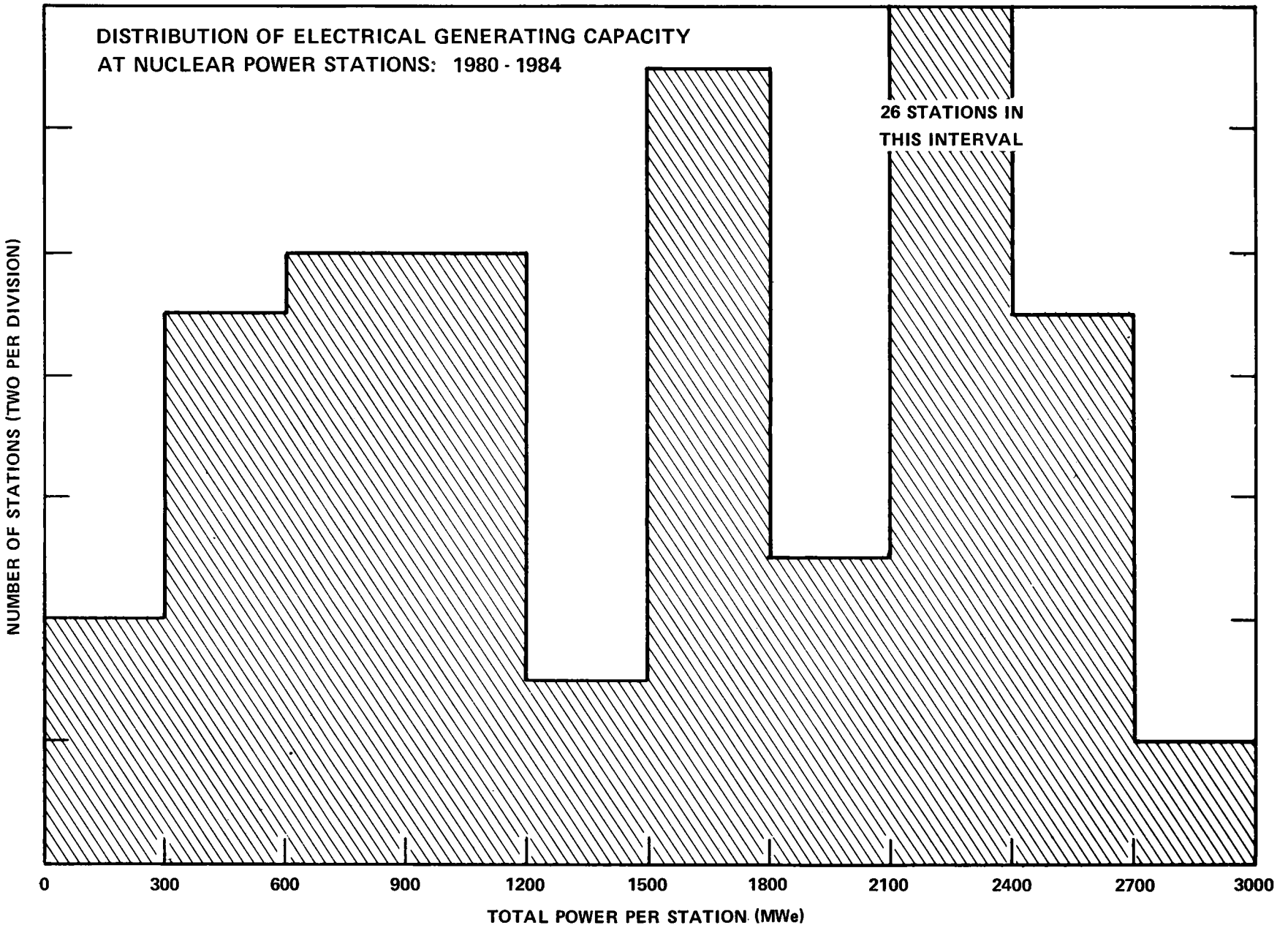
be displaced by 3- and 4-unit groupings having power outputs in the 3000-4000 MWe range. This tendency has already become apparent (Figure A-1), and several stations approaching 5000 MWe have been proposed. Large power centers with total generating capacities in excess of 10,000 MWe have been forecast as the ultimate means of satisfying future electrical energy needs.

In summary, growth of the nuclear power industry has been characterized by two parallel trends: increased unit capacity and multiple-unit siting. Given the Commission recommended ceiling on unit size, future growth in the nuclear power industry will be concentrated in multi-unit facilities. Two-unit stations will predominate for at least another decade, but their numbers may be surpassed by 3- and 4-unit facilities near the end of the century.


DISTRIBUTION OF ELECTRICAL GENERATING CAPACITY
AT NUCLEAR POWER STATIONS: Pre-1970
NUMBER OF STATIONS (TWO PER DIVISION)
0
300
600
900
1200
1500
1800
2100
2400
2700
3000
TOTAL POWER PER STATION (MWe)


DISTRIBUTION OF ELECTRICAL GENERATING CAPACITY
AT NUCLEAR POWER STATIONS: 1970 - 1974
NUMBER OF STATIONS (TWO PER DIVISION)
0
300
600
900
1200
1500
1800
2100
2400
2700
3000
TOTAL POWER PER STATION (MWe)


DISTRIBUTION OF ELECTRICAL GENERATING CAPACITY
AT NUCLEAR POWER STATIONS: 1975 - 1979
NUMBER OF STATIONS (TWO PER DIVISION)
0
300
600
900
1200
1500
1800
2100
2400
2700
3000
TOTAL POWER PER STATION (MWe)


DISTRIBUTION OF ELECTRICAL GENERATING CAPACITY
AT NUCLEAR POWER STATIONS: 1980 - 1984
26 STATIONS IN
THIS INTERVAL
NUMBER OF STATIONS (TWO PER DIVISION)
0
300
600
900
1200
1500
1800
2100
2400
2700
3000
TOTAL POWER PER STATION (MWe)

APPENDIX B

SURVEY OF DESIGN OBJECTIVES OF FORTY NUCLEAR POWER STATIONS

This appendix contains data on certain design objectives and site properties of forty nuclear power stations. The data were gathered during a survey of Environmental Statements (Draft and Final) by Northwestern University under the supervision of Argonne National Laboratory. The data for each station are reported separately in a tabular format organized approximately as follows:

1. General station data
2. General site data
3. Intake, discharge, and condenser cooling system data (including cooling tower properties)
4. Radioactive waste treatment and release rate data
5. Treatment chemicals and chemical effluent data

The main text provides definitions for the majority of parameters appearing in this appendix (see "Technical Bases for the Envelopes"). In nearly every instance the data represent maximum design objectives. Note that an entry labeled "Data Not Available" means only that the parameter is not evaluated in the Environmental Statement. The forty stations which comprise the survey appear in alphabetical order.

1. Allens Creek
2. Bailly
3. Bellefonte
4. Braidwood
5. Byron
6. Clinton
7. Comanche Peak
8. Cook, D. C.
9. Diablo Canyon
10. Douglas Point
11. Dresden 2&3
12. Farley
13. Fermi 2
14. FitzPatrick
15. Forked River
16. Grand Gulf
17. Greenwood 2&3
18. Hanford 2
19. Harris, S.
20. LaSalle
21. Limerick
22. Maine Yankee
23. McGuire
24. Oconee
25. Palisades
26. Peach Bottom 2&3
27. Perry
28. Quad Cities
29. Rancho Seco
30. River Bend
31. Robinson 2
32. Salem
33. San Onofre 2&3
34. Seabrook
35. Sequoyah
36. Shoreham
37. Surry 1&2
38. Susquehanna
39. Trojan
40. Zion

ID: ALLENS CREEK 1&2, HOUSTON L&PO CO., COUNTY OF AUSTIN, STATE OF TX

MAJOR RIVER BASIN	WESTERN GULF	DISRUPTED ONSITE LAND, ACRES	9000
LATITUDE, DEG MIN SEC	029 40 44	DISPL.EXCAVATION SPOIL,MIL CU YRD	0.52
LONGITUDE, DEG MIN SEC	096 06 16	DREDGE SPOIL, MIL CU YRD	DATA NOT AVAILABLE
DOCKET NUMBER	50466	AVG. CONSTRUCTION PERSONNEL	1758
LICENSING ACTION	CP APPLICATION PENDING	OPERATING PERSONNEL	121
DATE OF LICENSING ACTION	12 07 73	NOBLE GAS AIR RELEASE, CURIES/YR	720000
NSSS TYPE	BWR	I-131 AIR RELEASE, CURIES/YR	0.56
NO.NUCLEAR UNITS INFO. APPL	2	LIQ. EFFLUENT(NON-H3), CURIES/YR	0.2
TOTAL THERMAL CAPACITY, MWT	7158	TRITIUM LIQUID RELEASE, CURIES/YR	40
TOTAL ELECTRICAL CAPACITY,MWE	2300	CS-137 LIQ. EFFLUENT, CURIES/YR	0.002
ADDITIONAL UNITS ONSITE	NONE	DIRECT RADIATION AT SITE BOUNDARY,MR/YR	0.3
TALLEST STRUCTURE, FEET	328	MAX. GAS STORAGE, CURIES	6526
COOLING SYSTEM TYPE	COOLING POND/CANAL	MAX. LIQUID STORAGE, CURIES	DATA NOT AVAILABLE
PLANT LIFETIME, YEARS	30	RADIOACTIVE SOLID WASTE, CURIES/YR	3210
SOURCE WATERBODY	RIVER, NONTIDAL	RADIOACTIVE SOLID WASTE VOL.,DRUMS/YR	3612
RECEIVING WATERBODY	RIVER, NONTIDAL	MAX. HEAT TO ATMOS.,BBTU/HR	0.0
LAND ACREAGE OF STATION FACILITIES	8640	MAX. HEAT TO REC. WATER, BBTU/HR	16.58
TOTAL LAND ACREAGE OF SITE	11152	TREATMENT CHEMICALS, LBS/YR	
OFFSITE ACREAGE, TRANSMISSION LINES	2200	BIOCIDES	
OFFSITE ACREAGE, ACCESS ROADWAY	0.0	CHLORINE	770000
OFFSITE ACREAGE, ACCESS RAILWAY	0.0		
MIN. DISTANCE TO SITE BOUNDARY, FT	4400		
MIN. DIST. LARG. DIFFUSION FACTOR,FT	11021		
INTAKE LOCATION	SHORELINE/RIVERBANK		
COOLING SYSTEM WITHDRAWAL,CU FT/SEC	157	CORROSION AND SCALE INHIBITORS	
SERVICE WATER WITHDRAWAL, CU FT/SEC	1.1		
APPROACH VELOCITY, FEET PER SECOND	0.48		
SCREEN VELOCITY, FEET PER SECOND	0.53		
INTAKE SCREEN MESH, INCHES	DATA NOT AVAILABLE		
COOLING SYSTEM EVAPORATION,CU FT/SEC	97.4		
SERVICE WATER EVAPORATION,CU FT/SEC	0.009	CLEANING AND NEUTRALIZING COMPOUNDS	
DRIFT, PERCENT	0.0	SODIUM HYDROXIDE	950000
DISCHARGE LOCATION	SHORELINE	SULFURIC ACID	1200000
DISCHARGE TYPE	CANAL		
COOLING SYSTEM DISCHARGE, CU FT/SEC	3780		
SERVICE WATER DISCHARGE, CU FT/SEC	0.18		
DISCHARGE VELOCITY, FEET PER SECOND	3.12	CHEMICAL EFFLUENTS, PPM	
DISCHARGE EFFECTIVE AREA, SQ FT	DATA NOT AVAILABLE	TOTAL RESIDUAL CHLORINE	150
COND. COOLING WATER FLOW,CU FT/SEC	3780	FREE AVAILABLE CHLORINE	DATA NOT AVAILABLE
RETURN COND. TDS RATIO	1.6	TOTAL CHROMIUM	DATA NOT AVAILABLE
NO. CONDENSER COOLING TOWERS	NOT APPLICABLE	TOTAL COPPER	DATA NOT AVAILABLE
COOLING TOWER HEIGHT, FT	NOT APPLICABLE	TOTAL IRON	DATA NOT AVAILABLE
COOLING TOWER EXIT DIAM.,FT	NOT APPLICABLE	TOTAL NICKEL	DATA NOT AVAILABLE
COOLING RANGE, DEG. F	NOT APPLICABLE	TOTAL ZINC	DATA NOT AVAILABLE
COOLING TOWER EXIT VELOCITY, FT/SEC	NOT APPLICABLE	TOTAL PHOSPHORUS (AS P)	6
COOLING TOWER DROPLET SIZE, MICRONS	NOT APPLICABLE	SULFATE	140
CONDENSER TEMP.RISE, DEG. F	19.5	OIL AND GREASE	DATA NOT AVAILABLE
COOLING SYSTEM TRANSIT TIME, MIN.	7.6	DISSOLVED OXYGEN	DATA NOT AVAILABLE
EFFLUENT TEMP. ABOVE AMBIENT,DEG F	19.5	TOTAL DISSOLVED SOLIDS	1300
NOISE AT BOUNDARY, DECIBELS	43	TOTAL SUSPENDED SOLIDS	DATA NOT AVAILABLE
		BOD5 DAY	7.6

NOTES:

ID: BAILLY NUCL.GS, N.INDIANA PUB. SERVICE, COUNTY OF PORTER, STATE OF ID

MAJOR RIVER BASIN	WESTERN GREAT LAKES
LATITUDE, DEG MIN SEC	041 38 00
LONGITUDE, DEG MIN SEC	087 07 45
DOCKET NUMBER	50367
LICENSING ACTION	UNDER CONSTRUCTION
DATE OF LICENSING ACTION	05 02 74
NSSS TYPE	BWR
NO.NUCLEAR UNITS INFO. APPL	1
TOTAL THERMAL CAPACITY, MWT	1931
TOTAL ELECTRICAL CAPACITY,MWE	660
ADDITIONAL UNITS ONSITE	YES, FOSSIL
TALLEST STRUCTURE, FEET	450
COOLING SYSTEM TYPE	NATURAL DRAFT, WET COOLING TOWER
PLANT LIFETIME, YEARS	30
SOURCE WATERBODY	LAKE
RECEIVING WATERBODY	LAKE
LAND ACREAGE OF STATION FACILITIES	350
TOTAL LAND ACREAGE OF SITE	350
OFFSITE ACREAGE, TRANSMISSION LINES	31
OFFSITE ACREAGE, ACCESS ROADWAY	0.0
OFFSITE ACREAGE, ACCESS RAILWAY	0.0
MIN. DISTANCE TO SITE BOUNDARY, FT	620
MIN. DIST. LARG. DIFFUSION FACTOR,FT	620
INTAKE LOCATION	OFFSHORE, SUBMERGE
COOLING SYSTEM WITHDRAWAL,CU FT/SEC	20
SERVICE WATER WITHDRAWAL, CU FT/SEC	0.67
APPROACH VELOCITY, FEET PER SECOND	1
SCREEN VELOCITY, FEET PER SECOND	4.7
INTAKE SCREEN MESH, INCHES	1
COOLING SYSTEM EVAPORATION,CU FT/SEC	16
SERVICE WATER EVAPORATION,CU FT/SEC	0.44
DRIFT, PERCENT	0.03
DISCHARGE LOCATION	OFFSHORE, SUBMERGED
DISCHARGE TYPE	EFFLUENT PIPE
COOLING SYSTEM DISCHARGE, CU FT/SEC	4.2
SERVICE WATER DISCHARGE, CU FT/SEC	0.13
DISCHARGE VELOCITY, FEET PER SECOND	1.8
DISCHARGE EFFECTIVE AREA, SQ FT	43.1
COND. COOLING WATER FLOW,CU FT/SEC	835
RETURN COND. TDS RATIO	1.02
NO. CONDENSER COOLING TOWERS	1
COOLING TOWER HEIGHT, FT	450
COOLING TOWER EXIT DIAM.,FT	205
COOLING RANGE, DEG. F	15
COOLING TOWER EXIT VELOCITY, FT/SEC	10
COOLING TOWER DROPLET SIZE, MICRONS	100
CONDENSER TEMP.RISE, DEG. F	18
COOLING SYSTEM TRANSIT TIME, MIN.	8
EFFLUENT TEMP. ABOVE AMBIENT,DEG F	15
NOISE AT BOUNDARY, DECIBELS	0.0

NOTES:

DISRUPTED ONSITE LAND, ACRES	70
DISPL.EXCAVATION SPOIL,MIL CU YRD	0.0
DREDGE SPOIL, MIL CU YRD	0.0
AVG. CONSTRUCTION PERSONNEL	750
OPERATING PERSONNEL	93
NOBLE GAS AIR RELEASE, CURIES/YR	34000
I-131 AIR RELEASE, CURIES/YR	0.5
LIQ. EFFLUENT(NON-H3), CURIES/YR	5
TRITIUM LIQUID RELEASE, CURIES/YR	20
CS-137 LIQ. EFFLUENT, CURIES/YR	0.19
DIRECT RADIATION AT SITE BOUNDARY,MR/YR	25
MAX. GAS STORAGE, CURIES	0.0
MAX. LIQUID STORAGE, CURIES	0.0
RADIOACTIVE SOLID WASTE, CURIES/YR	15000
RADIOACTIVE SOLID WASTE VOL.,DRUMS/YR	3000
MAX. HEAT TO ATMOS.,BBTU/HR	3.5
MAX. HEAT TO REC. WATER, BBTU/HR	0.1
TREATMENT CHEMICALS, LBS/YR	
BIOCIDES	
CHLORINE	1150
CORROSION AND SCALE INHIBITORS	
CLEANING AND NEUTRALIZING COMPOUNDS	
SODIUM SULFATE	220000
CALCIUM SULFATE	180000
FERRIC SULFATE	180000
CHEMICAL EFFLUENTS, PPM	
TOTAL RESIDUAL CHLORINE	DATA NOT AVAILABLE
FREE AVAILABLE CHLORINE	DATA NOT AVAILABLE
TOTAL CHROMIUM	0.1
TOTAL COPPER	0.001
TOTAL IRON	DATA NOT AVAILABLE
TOTAL NICKEL	DATA NOT AVAILABLE
TOTAL ZINC	DATA NOT AVAILABLE
TOTAL PHOSPHORUS (AS P)	DATA NOT AVAILABLE
SULFATE	17.5
OIL AND GREASE	DATA NOT AVAILABLE
DISSOLVED OXYGEN	DATA NOT AVAILABLE
TOTAL DISSOLVED SOLIDS	153
TOTAL SUSPENDED SOLIDS	DATA NOT AVAILABLE
BOD5 DAY	DATA NOT AVAILABLE

ID: BYRON STN 1&2, COMMONWEALTH ED, COUNTY OF OGLE, STATE OF IL

MAJOR RIVER BASIN	UPPER MISSISSIPPI
LATITUDE, DEG MIN SEC	042 07 48
LONGITUDE, DEG MIN SEC	089 15 18
DOCKET NUMBER	50454
LICENSING ACTION	CP APPLICATION PENDING
DATE OF LICENSING ACTION	09 20 73
NSSS TYPE	PWR
NO.NUCLEAR UNITS INFO. APPL	2
TOTAL THERMAL CAPACITY, MWT	6850
TOTAL ELECTRICAL CAPACITY,MWE	2240
ADDITIONAL UNITS ONSITE	NO
TALLEST STRUCTURE, FEET	500
COOLING SYSTEM TYPE	NATURAL DRAFT, WET COOLING TOWER
PLANT LIFETIME, YEARS	30
SOURCE WATERBODY	RIVER, NONTIDAL
RECEIVING WATERBODY	RIVER, NONTIDAL
LAND ACREAGE OF STATION FACILITIES	125
TOTAL LAND ACREAGE OF SITE	1360
OFFSITE ACREAGE, TRANSMISSION LINES	1100
OFFSITE ACREAGE, ACCESS ROADWAY	0.0
OFFSITE ACREAGE, ACCESS RAILWAY	90
MIN. DISTANCE TO SITE BOUNDARY, FT	1500
MIN. DIST. LARG. DIFFUSION FACTOR,FT	1505
INTAKE LOCATION	SHORELINE/RIVERBANK
COOLING SYSTEM WITHDRAWAL,CU FT/SEC	121
SERVICE WATER WITHDRAWAL, CU FT/SEC	0.04
APPROACH VELOCITY, FEET PER SECOND	0.5
SCREEN VELOCITY, FEET PER SECOND	DATA NOT AVAILABLE
INTAKE SCREEN MESH, INCHES	DATA NOT AVAILABLE
COOLING SYSTEM EVAPORATION,CU FT/SEC	60
SERVICE WATER EVAPORATION,CU FT/SEC	DATA NOT AVAILABLE
DRIFT, PERCENT	0.002
DISCHARGE LOCATION	SHORELINE
DISCHARGE TYPE	CANAL
COOLING SYSTEM DISCHARGE, CU FT/SEC	28.90
SERVICE WATER DISCHARGE, CU FT/SEC	DATA NOT AVAILABLE
DISCHARGE VELOCITY, FEET PER SECOND	2
DISCHARGE EFFECTIVE AREA, SQ FT	14.45
COND. COOLING WATER FLOW,CU FT/SEC	1422
RETURN COND. TDS RATIO	DATA NOT AVAILABLE
NO. CONDENSER COOLING TOWERS	2
COOLING TOWER HEIGHT, FT	500
COOLING TOWER EXIT DIAM.,FT	225
COOLING RANGE, DEG. F	24
COOLING TOWER EXIT VELOCITY, FT/SEC	DATA NOT AVAILABLE
COOLING TOWER DROPLET SIZE, MICRONS	DATA NOT AVAILABLE
CONDENSER TEMP.RISE, DEG. F	24
COOLING SYSTEM TRANSIT TIME, MIN.	0.24
EFFLUENT TEMP. ABOVE AMBIENT,DEG F	44.70
NOISE AT BOUNDARY, DECIBELS	DATA NOT AVAILABLE

DISRUPTED ONSITE LAND, ACRES	300
DISPL.EXCAVATION SPOIL,MIL CU YRD	DATA NOT AVAILABLE
DREDGE SPOIL, MIL CU YRD	1600
AVG. CONSTRUCTION PERSONNEL	1500
OPERATING PERSONNEL	200
NOBLE GAS AIR RELEASE, CURIES/YR	7026
I-131 AIR RELEASE, CURIES/YR	0.1
LIQ. EFFLUENT(NON-H3), CURIES/YR	0.2
TRITIUM LIQUID RELEASE, CURIES/YR	700
CS-137 LIQ. EFFLUENT, CURIES/YR	0.00918
DIRECT RADIATION AT SITE BOUNDARY,MR/YR	0.1
MAX. GAS STORAGE, CURIES	2124
MAX. LIQUID STORAGE, CURIES	DATA NOT AVAILABLE
RADIOACTIVE SOLID WASTE, CURIES/YR	19000
RADIOACTIVE SOLID WASTE VOL.,DRUMS/YR	2100
MAX. HEAT TO ATMOS.,BBTU/HR	15.2
MAX. HEAT TO REC. WATER, BBTU/HR	0.163
TREATMENT CHEMICALS, LBS/YR	
BIOCIDES	
SODIUM HYPOCHLORITE	AMOUNT NOT AVAILABLE
CORROSION AND SCALE INHIBITORS	
SULFURIC ACID	AMOUNT NOT AVAILABLE
PHOSPHATES AND POLYPHOSPHATES	360
CLEANING AND NEUTRALIZING COMPOUNDS	
SODIUM HYDROXIDE	1300000
SULFURIC ACID	1500000
HYDRAZINE	24000
MORPHOLINE	4000
CHEMICAL EFFLUENTS, PPM	
TOTAL RESIDUAL CHLORINE	DATA NOT AVAILABLE
FREE AVAILABLE CHLORINE	0.1
TOTAL CHROMIUM	1.3
TOTAL COPPER	1
TOTAL IRON	2
TOTAL NICKEL	1
TOTAL ZINC	1
TOTAL PHOSPHORUS (AS P)	0.0016
SULFATE	440
OIL AND GREASE	15
DISSOLVED OXYGEN	DATA NOT AVAILABLE
TOTAL DISSOLVED SOLIDS	850
TOTAL SUSPENDED SOLIDS	15
BOD5 DAY	30

NOTES:

ID: CLINTON STN 1&2, ILLINOIS POWER, COUNTY OF DEWITT, STATE OF IL

MAJOR RIVER BASIN	UPPER MISSISSIPPI	DISRUPTED ONSITE LAND, ACRES	5420
LATITUDE, DEG MIN SEC	040 10 20	DISPL.EXCAVATION SPOIL,MIL CU YRD	8.1
LONGITUDE, DEG MIN SEC	088 50 03	DREDGE SPOIL, MIL CU YRD	DATA NOT AVAILABLE
DOCKET NUMBER	50461	AVG. CONSTRUCTION PERSONNEL	766
LICENSING ACTION	CP APPLICATION PENDING	OPERATING PERSONNEL	116
DATE OF LICENSING ACTION	10 30 73	NOBLE GAS AIR RELEASE, CURIES/YR	9038
NSSS TYPE	BWR	I-131 AIR RELEASE, CURIES/YR	0.138
NO.NUCLEAR UNITS INFO. APPL	2	LIQ. EFFLUENT(NON-H3), CURIES/YR	6
TOTAL THERMAL CAPACITY, MWT	5788	TRITIUM LIQUID RELEASE, CURIES/YR	40
TOTAL ELECTRICAL CAPACITY,MWE	1910	CS-137 LIQ. EFFLUENT, CURIES/YR	0.0082
ADDITIONAL UNITS ONSITE	NO	DIRECT RADIATION AT SITE BOUNDARY,MR/YR	0.17
TALLEST STRUCTURE, FEET	200	MAX. GAS STORAGE, CURIES	10680
COOLING SYSTEM TYPE	COOLING POND/CANAL	MAX. LIQUID STORAGE, CURIES	DATA NOT AVAILABLE
PLANT LIFETIME, YEARS	30	RADIOACTIVE SOLID WASTE, CURIES/YR	2933
SOURCE WATERBODY	RESERVOIR	RADIOACTIVE SOLID WASTE VOL.,DRUMS/YR	2990
RECEIVING WATERBODY	RESERVOIR	MAX. HEAT TO ATMOS.,BBTU/HR	12.8
LAND ACREAGE OF STATION FACILITIES	5225	MAX. HEAT TO REC. WATER, BBTU/HR	DATA NOT AVAILABLE
TOTAL LAND ACREAGE OF SITE	15210	TREATMENT CHEMICALS, LBS/YR	
OFFSITE ACREAGE, TRANSMISSION LINES	708	BIOCIDES	
OFFSITE ACREAGE, ACCESS ROADWAY	0.0	CHLORINE	930000
OFFSITE ACREAGE, ACCESS RAILWAY	0.0	SODIUM HYPOCHLORITE	AMOUNT NOT AVAILABLE
MIN. DISTANCE TO SITE BOUNDARY, FT	4100		
MIN. DIST. LARG. DIFFUSION FACTOR,FT	5199		
INTAKE LOCATION	OFFSHORE, SURFACE		
COOLING SYSTEM WITHDRAWAL,CU FT/SEC	2523	CORROSION AND SCALE INHIBITORS	
SERVICE WATER WITHDRAWAL, CU FT/SEC	1.1		
APPROACH VELOCITY, FEET PER SECOND	1		
SCREEN VELOCITY, FEET PER SECOND	DATA NOT AVAILABLE		
INTAKE SCREEN MESH, INCHES	0.375		
COOLING SYSTEM EVAPORATION,CU FT/SEC	51.4		
SERVICE WATER EVAPORATION,CU FT/SEC	DATA NOT AVAILABLE	CLEANING AND NEUTRALIZING COMPOUNDS	
DRIFT, PERCENT	0.0	SULFURIC ACID	AMOUNT NOT AVAILABLE
DISCHARGE LOCATION	SHORELINE	SODIUM HYDROXIDE	AMOUNT NOT AVAILABLE
DISCHARGE TYPE	CANAL		
COOLING SYSTEM DISCHARGE, CU FT/SEC	2523		
SERVICE WATER DISCHARGE, CU FT/SEC	1.1		
DISCHARGE VELOCITY, FEET PER SECOND	1.3	CHEMICAL EFFLUENTS, PPM	
DISCHARGE EFFECTIVE AREA, SQ FT	1960	TOTAL RESIDUAL CHLORINE	0.1
COND. COOLING WATER FLOW,CU FT/SEC	2523	FREE AVAILABLE CHLORINE	DATA NOT AVAILABLE
RETURN COND. TDS RATIO	1.25	TOTAL CHROMIUM	DATA NOT AVAILABLE
NO. CONDENSER COOLING TOWERS	0.0	TOTAL COPPER	DATA NOT AVAILABLE
COOLING TOWER HEIGHT, FT	NOT APPLICABLE	TOTAL IRON	DATA NOT AVAILABLE
COOLING TOWER EXIT DIAM.,FT	NOT APPLICABLE	TOTAL NICKEL	DATA NOT AVAILABLE
COOLING RANGE, DEG. F	NOT APPLICABLE	TOTAL ZINC	DATA NOT AVAILABLE
COOLING TOWER EXIT VELOCITY, FT/SEC	NOT APPLICABLE	TOTAL PHOSPHORUS (AS P)	0.18
COOLING TOWER DROPLET SIZE, MICRONS	NOT APPLICABLE	SULFATE	73
CONDENSER TEMP.RISE, DEG. F	24	OIL AND GREASE	DATA NOT AVAILABLE
COOLING SYSTEM TRANSIT TIME, MIN.	210	DISSOLVED OXYGEN	DATA NOT AVAILABLE
EFFLUENT TEMP. ABOVE AMBIENT,DEG F	24	TOTAL DISSOLVED SOLIDS	750
NOISE AT BOUNDARY, DECIBELS	DATA NOT AVAILABLE	TOTAL SUSPENDED SOLIDS	DATA NOT AVAILABLE
		BOD5 DAY	DATA NOT AVAILABLE

NOTES:

ID: COMANCHE PEAK, TEXAS UTILITIES, COUNTY OF SOMERVELL, STATE OF TX

MAJOR RIVER BASIN	WESTERN GULF	DISRUPTED ONSITE LAND, ACRES	3921
LATITUDE, DEG MIN SEC	032 17 49	DISPL.EXCAVATION SPOIL,MIL CU YRD	1.23
LONGITUDE, DEG MIN SEC	097 47 06	DREDGE SPOIL, MIL CU YRD	0.0
DOCKET NUMBER	50445	AVG. CONSTRUCTION PERSONNEL	1000
LICENSING ACTION	CP APPLICATION PENDING	OPERATING PERSONNEL	80
DATE OF LICENSING ACTION	07 20 73	NOBLE GAS AIR RELEASE, CURIES/YR	1980
NSSS TYPE	PWR	I-131 AIR RELEASE, CURIES/YR	0.088
NO.NUCLEAR UNITS INFO. APPL	2	LIQ. EFFLUENT(NON-H3), CURIES/YR	0.6
TOTAL THERMAL CAPACITY, MWT	6822	TRITIUM LIQUID RELEASE, CURIES/YR	700
TOTAL ELECTRICAL CAPACITY,MWE	2300	CS-137 LIQ. EFFLUENT, CURIES/YR	0.0194
ADDITIONAL UNITS ONSITE	NO	DIRECT RADIATION AT SITE BOUNDARY,MR/YR	0.01
TALLEST STRUCTURE, FEET	268	MAX. GAS STORAGE, CURIES	DATA NOT AVAILABLE
COOLING SYSTEM TYPE	COOLING POND/CANAL	MAX. LIQUID STORAGE, CURIES	DATA NOT AVAILABLE
PLANT LIFETIME, YEARS	40	RADIOACTIVE SOLID WASTE, CURIES/YR	18900
SOURCE WATERBODY	RESERVOIR	RADIOACTIVE SOLID WASTE VOL.,DRUMS/YR	2100
RECEIVING WATERBODY	RESERVOIR	MAX. HEAT TO ATMOS.,BBTU/HR	0.1
LAND ACREAGE OF STATION FACILITIES	3578	MAX. HEAT TO REC. WATER, BBTU/HR	15.6
TOTAL LAND ACREAGE OF SITE	8876	TREATMENT CHEMICALS, LBS/YR	
OFFSITE ACREAGE, TRANSMISSION LINES	400	BIOCIDES	
OFFSITE ACREAGE, ACCESS ROADWAY	10	CHLORINE	602250
OFFSITE ACREAGE, ACCESS RAILWAY	169		
MIN. DISTANCE TO SITE BOUNDARY, FT	4790		
MIN. DIST. LARG. DIFFUSION FACTOR,FT	4790		
INTAKE LOCATION	SHORELINE/RIVERBANK		
COOLING SYSTEM WITHDRAWAL,CU FT/SEC	4902	CORROSION AND SCALE INHIBITORS	
SERVICE WATER WITHDRAWAL, CU FT/SEC	0.82	HYDRAZINE	3650
APPROACH VELOCITY, FEET PER SECOND	0.85	CYCLOHEXYLAMINE	88
SCREEN VELOCITY, FEET PER SECOND	1.69	SODIUM PHOSPHATE, ORTHO, ANHYDROUS	1650
INTAKE SCREEN MESH, INCHES	DATA NOT AVAILABLE		
COOLING SYSTEM EVAPORATION,CU FT/SEC	31		
SERVICE WATER EVAPORATION,CU FT/SEC	0.07	CLEANING AND NEUTRALIZING COMPOUNDS	
DRIFT, PERCENT	NOT APPLICABLE	BORIC ACID	36500
DISCHARGE LOCATION	OUTLET OR BAY	SULFURIC ACID	204400
DISCHARGE TYPE	DIFFUSER PIPE	SODIUM HYDROXIDE	193450
COOLING SYSTEM DISCHARGE, CU FT/SEC	4902	LITHIUM HYDROXIDE	22
SERVICE WATER DISCHARGE, CU FT/SEC	NOT APPLICABLE		
DISCHARGE VELOCITY, FEET PER SECOND	1.2	CHEMICAL EFFLUENTS, PPM	
DISCHARGE EFFECTIVE AREA, SQ FT	19053	TOTAL RESIDUAL CHLORINE	0.1
COND. COOLING WATER FLOW,CU FT/SEC	4902	FREE AVAILABLE CHLORINE	DATA NOT AVAILABLE
RETURN COND. TDS RATIO	1.81	TOTAL CHROMIUM	DATA NOT AVAILABLE
NO. CONDENSER COOLING TOWERS	NOT APPLICABLE	TOTAL COPPER	0.001
COOLING TOWER HEIGHT, FT	NOT APPLICABLE	TOTAL IRON	0.04
COOLING TOWER EXIT DIAM.,FT	NOT APPLICABLE	TOTAL NICKEL	DATA NOT AVAILABLE
COOLING RANGE, DEG. F	NOT APPLICABLE	TOTAL ZINC	0.05
COOLING TOWER EXIT VELOCITY, FT/SEC	NOT APPLICABLE	TOTAL PHOSPHORUS (AS P)	0.05
COOLING TOWER DROPLET SIZE, MICRONS	NOT APPLICABLE	SULFATE	587
CONDENSER TEMP.RISE, DEG. F	13.37	OIL AND GREASE	DATA NOT AVAILABLE
COOLING SYSTEM TRANSIT TIME, MIN.	3.2	DISSOLVED OXYGEN	DATA NOT AVAILABLE
EFFLUENT TEMP. ABOVE AMBIENT,DEG F	14.7	TOTAL DISSOLVED SOLIDS	2374
NOISE AT BOUNDARY, DECIBELS	DATA NOT APPLICABLE	TOTAL SUSPENDED SOLIDS	DATA NOT AVAILABLE
		BOD5 DAY	DATA NOT AVAILABLE

NOTES:

ID: COOK, D. C., IND & MICH ELEC, COUNTY OF BERRIEN, STATE OF MI

MAJOR RIVER BASIN	WESTERN GREAT LAKES	DISRUPTED ONSITE LAND, ACRES	180
LATITUDE, DEG MIN SEC	041 58 27	DISPL.EXCAVATION SPOIL,MIL CU YRD	DATA NOT AVAILABLE
LONGITUDE, DEG MIN SEC	086 34 00	DREDGE SPOIL, MIL CU YRD	DATA NOT AVAILABLE
DOCKET NUMBER	50315	AVG. CONSTRUCTION PERSONNEL	4500
LICENSING ACTION	UNDER CONSTRUCTION	OPERATING PERSONNEL	130
DATE OF LICENSING ACTION	03 25 69	NOBLE GAS AIR RELEASE, CURIES/YR	6800
NSSS TYPE	PWR	I-131 AIR RELEASE, CURIES/YR	0.4
NO.NUCLEAR UNITS INFO. APPL	2	LIQ. EFFLUENT(NON-H3), CURIES/YR	10.6
TOTAL THERMAL CAPACITY, MWT	6500	TRITIUM LIQUID RELEASE, CURIES/YR	700
TOTAL ELECTRICAL CAPACITY,MWE	2120	CS-137 LIQ. EFFLUENT, CURIES/YR	0.56
ADDITIONAL UNITS ONSITE	NO	DIRECT RADIATION AT SITE BOUNDARY,MR/YR	3.5
TALLEST STRUCTURE, FEET	162	MAX. GAS STORAGE, CURIES	17438
COOLING SYSTEM TYPE	ONCE-THROUGH	MAX. LIQUID STORAGE, CURIES	DATA NOT AVAILABLE
PLANT LIFETIME, YEARS	30	RADIOACTIVE SOLID WASTE, CURIES/YR	9705
SOURCE WATERBODY	LAKE	RADIOACTIVE SOLID WASTE VOL.,DRUMS/YR	1326
RECEIVING WATERBODY	LAKE	MAX. HEAT TO ATMOS.,BBTU/HR	NOT APPLICABLE
LAND ACREAGE OF STATION FACILITIES	50	MAX. HEAT TO REC. WATER, BBTU/HR	15
TOTAL LAND ACREAGE OF SITE	650	TREATMENT CHEMICALS, LBS/YR	
OFFSITE ACREAGE, TRANSMISSION LINES	3300	BIOCIDES	
OFFSITE ACREAGE, ACCESS ROADWAY	0.0	CHLORINE	760000
OFFSITE ACREAGE, ACCESS RAILWAY	0.0		
MIN. DISTANCE TO SITE BOUNDARY, FT	600		
MIN. DIST. LARG. DIFFUSION FACTOR,FT	2006		
INTAKE LOCATION	OFFSHORE, SUBMERGED		
COOLING SYSTEM WITHDRAWAL,CU FT/SEC	3650	CORROSION AND SCALE INHIBITORS	
SERVICE WATER WITHDRAWAL, CU FT/SEC	55.7	PHOSPHATES AND POLYPHOSPHATES	480
APPROACH VELOCITY, FEET PER SECOND	1	MORPHOLINE	1750
SCREEN VELOCITY, FEET PER SECOND	1.27	HYDRAZINE	1.75
INTAKE SCREEN MESH, INCHES	0.375	LITHIUM HYDROXIDE	3.4
COOLING SYSTEM EVAPORATION,CU FT/SEC	DATA NOT AVAILABLE		
SERVICE WATER EVAPORATION,CU FT/SEC	DATA NOT AVAILABLE	CLEANING AND NEUTRALIZING COMPOUNDS	
DRIFT, PERCENT	NOT APPLICABLE	CITRIC ACID	807000
DISCHARGE LOCATION	OFFSHORE, SUBMERGED	SODIUM HYDROXIDE	658000
DISCHARGE TYPE	DIFFUSER PIPE	BORIC ACID	5660
COOLING SYSTEM DISCHARGE, CU FT/SEC	3650		
SERVICE WATER DISCHARGE, CU FT/SEC	55.7		
DISCHARGE VELOCITY, FEET PER SECOND	13	CHEMICAL EFFLUENTS, PPM	
DISCHARGE EFFECTIVE AREA, SQ FT	285	TOTAL RESIDUAL CHLORINE	0.5
COND. COOLING WATER FLOW,CU FT/SEC	NOT APPLICABLE	FREE AVAILABLE CHLORINE	DATA NOT AVAILABLE
RETURN COND. TDS RATIO	NOT APPLICABLE	TOTAL CHROMIUM	DATA NOT AVAILABLE
NO. CONDENSER COOLING TOWERS	0.0	TOTAL COPPER	DATA NOT AVAILABLE
COOLING TOWER HEIGHT, FT	NOT APPLICABLE	TOTAL IRON	DATA NOT AVAILABLE
COOLING TOWER EXIT DIAM.,FT	NOT APPLICABLE	TOTAL NICKEL	DATA NOT AVAILABLE
COOLING RANGE, DEG. F	NOT APPLICABLE	TOTAL ZINC	DATA NOT AVAILABLE
COOLING TOWER EXIT VELOCITY, FT/SEC	NOT APPLICABLE	TOTAL PHOSPHORUS (AS P)	0.00002
COOLING TOWER DROPLET SIZE, MICRONS	NOT APPLICABLE	SULFATE	DATA NOT AVAILABLE
CONDENSER TEMP RISE, DEG. F	21.8	OIL AND GREASE	DATA NOT AVAILABLE
COOLING SYSTEM TRANSIT TIME, MIN.	10	DISSOLVED OXYGEN	DATA NOT AVAILABLE
EFFLUENT TEMP. ABOVE AMBIENT,DEG F	20	TOTAL DISSOLVED SOLIDS	DATA NOT AVAILABLE
NOISE AT BOUNDARY, DECIBELS	DATA NOT AVAILABLE	TOTAL SUSPENDED SOLIDS	DATA NOT AVAILABLE
		BOD5 DAY	DATA NOT AVAILABLE

ID: DIABLO CANYON-12, PACIFIC GAS & ELEC., COUNTY OF SAN LUIS OBISPO, STATE OF CA

MAJOR RIVER BASIN	CALIFORNIA	DISRUPTED ONSITE LAND, ACRES	142
LATITUDE, DEG MIN SEC	035 12 40	DISPL.EXCAVATION SPOIL,MIL CU YRD	DATA NOT AVAILABLE
LONGITUDE, DEG MIN SEC	120 51 08	DREDGE SPOIL, MIL CU YRD	DATA NOT AVAILABLE
DOCKET NUMBER	50275	AVG. CONSTRUCTION PERSONNEL	800
LICENSING ACTION	UNDER CONSTRUCTION	OPERATING PERSONNEL	70
DATE OF LICENSING ACTION	04 23 68	NOBLE GAS AIR RELEASE, CURIES/YR	7400
NSSS TYPE	PWR	I-131 AIR RELEASE, CURIES/YR	0.56
NO.NUCLEAR UNITS INFO. APPL	2	LIQ. EFFLUENT(NON-H3), CURIES/YR	10.6
TOTAL THERMAL CAPACITY, MWT	6749	TRITIUM LIQUID RELEASE, CURIES/YR	700
TOTAL ELECTRICAL CAPACITY,MWE	2190	CS-137 LIQ. EFFLUENT, CURIES/YR	0.26
ADDITIONAL UNITS ONSITE	NO	DIRECT RADIATION AT SITE BOUNDARY,MR/YR	DATA NOT AVAILABLE
TALLEST STRUCTURE, FEET	200	MAX. GAS STORAGE, CURIES	4616
COOLING SYSTEM TYPE	ONCE-THROUGH	MAX. LIQUID STORAGE, CURIES	DATA NOT AVAILABLE
PLANT LIFETIME, YEARS	40	RADIOACTIVE SOLID WASTE, CURIES/YR	10010
SOURCE WATERBODY	OCEAN, NEARSHORE LITTORAL	RADIOACTIVE SOLID WASTE VOL.,DRUMS/YR	1500
RECEIVING WATERBODY	OCEAN, NEARSHORE LITTORAL	MAX. HEAT TO ATMOS.,BBTU/HR	NOT APPLICABLE
LAND ACREAGE OF STATION FACILITIES	51	MAX. HEAT TO REC. WATER, BBTU/HR	16.4
TOTAL LAND ACREAGE OF SITE	750	TREATMENT CHEMICALS, LBS/YR	
OFFSITE ACREAGE, TRANSMISSION LINES	6000	BIOCIDES	
OFFSITE ACREAGE, ACCESS ROADWAY	29	CHLORINE	80000
OFFSITE ACREAGE, ACCESS RAILWAY	0.0		
MIN. DISTANCE TO SITE BOUNDARY, FT	2640		
MIN. DIST. LARG. DIFFUSION FACTOR,FT	2640		
INTAKE LOCATION	SHORELINE/RIVERBANK		
COOLING SYSTEM WITHDRAWAL,CU FT/SEC	3864	CORROSION AND SCALE INHIBITORS	
SERVICE WATER WITHDRAWAL, CU FT/SEC	4.44	SODIUM PHOSPHATE, ORTHO, ANHYDROUS	1300
APPROACH VELOCITY, FEET PER SECOND	0.8	HYDRAZINE	29000
SCREEN VELOCITY, FEET PER SECOND	2	LITHIUM HYDROXIDE	120
INTAKE SCREEN MESH, INCHES	0.375	SULFURIC ACID	320000
COOLING SYSTEM EVAPORATION,CU FT/SEC	NOT APPLICABLE		
SERVICE WATER EVAPORATION,CU FT/SEC	DATA NOT AVAILABLE	CLEANING AND NEUTRALIZING COMPOUNDS	
DRIFT, PERCENT	NOT APPLICABLE	AMMONIA	1700
DISCHARGE LOCATION	SHORELINE	SULFURIC ACID	2600
DISCHARGE TYPE	CASCADE	SODIUM HYDROXIDE	2100
COOLING SYSTEM DISCHARGE, CU FT/SEC	3864	BORIC ACID	7200
SERVICE WATER DISCHARGE, CU FT/SEC	4.44	DETERGENTS, MISC	160
DISCHARGE VELOCITY, FEET PER SECOND	14.3	CHEMICAL EFFLUENTS, PPM	
DISCHARGE EFFECTIVE AREA, SQ FT	270	TOTAL RESIDUAL CHLORINE	0.37
COND. COOLING WATER FLOW,CU FT/SEC	0.0	FREE AVAILABLE CHLORINE	0.1
RETURN COND. TDS RATIO	1	TOTAL CHROMIUM	0.00006
NO. CONDENSER COOLING TOWERS	0.0	TOTAL COPPER	0.006
COOLING TOWER HEIGHT, FT	NOT APPLICABLE	TOTAL IRON	DATA NOT AVAILABLE
COOLING TOWER EXIT DIAM.,FT	NOT APPLICABLE	TOTAL NICKEL	0.0009
COOLING RANGE, DEG. F	NOT APPLICABLE	TOTAL ZINC	DATA NOT AVAILABLE
COOLING TOWER EXIT VELOCITY, FT/SEC	NOT APPLICABLE	TOTAL PHOSPHORUS (AS P)	0.00065
COOLING TOWER DROPLET SIZE, MICRONS	NOT APPLICABLE	SULFATE	0.045
CONDENSER TEMP.RISE, DEG. F	18	OIL AND GREASE	DATA NOT AVAILABLE
COOLING SYSTEM TRANSIT TIME, MIN.	1.3	DISSOLVED OXYGEN	DATA NOT AVAILABLE
EFFLUENT TEMP. ABOVE AMBIENT,DEG F	19	TOTAL DISSOLVED SOLIDS	6
NOISE AT BOUNDARY, DECIBELS	DATA NOT AVAILABLE	TOTAL SUSPENDED SOLIDS	DATA NOT AVAILABLE
		BOD5 DAY	DATA NOT AVAILABLE

NOTES:

ID: DOUGLAS PNT 1&2, POTOMAC ELECTRIC, COUNTY OF CHARLES, STATE OF MD

MAJOR RIVER BASIN	NORTH ATLANTIC	DISRUPTED ONSITE LAND, ACRES	230
LATITUDE, DEG MIN SEC	038 26 44	DISPL.EXCAVATION SPOIL,MIL CU YRD	DATA NOT AVAILABLE
LONGITUDE, DEG MIN SEC	077 15 24	DREDGE SPOIL, MIL CU YRD	0.3
DOCKET NUMBER	50448	AVG. CONSTRUCTION PERSONNEL	2000
LICENSING ACTION	CP APPLICATION PENDING	OPERATING PERSONNEL	120
DATE OF LICENSING ACTION	08 09 73	NOBLE GAS AIR RELEASE, CURIES/YR	11400
NSSS TYPE	BWR	I-131 AIR RELEASE, CURIES/YR	0.054
NO.NUCLEAR UNITS INFO. APPL	2	LIQ. EFFLUENT(NON-H3), CURIES/YR	1.4
TOTAL THERMAL CAPACITY, MWT	7158	TRITIUM LIQUID RELEASE, CURIES/YR	40
TOTAL ELECTRICAL CAPACITY,MWE	2356	CS-137 LIQ. EFFLUENT, CURIES/YR	0.008
ADDITIONAL UNITS ONSITE	NO	DIRECT RADIATION AT SITE BOUNDARY,MR/YR	1.3
TALLEST STRUCTURE, FEET	450	MAX. GAS STORAGE, CURIES	12978
COOLING SYSTEM TYPE	NATURAL DRAFT, WET COOLING TOWER	MAX. LIQUID STORAGE, CURIES	DATA NOT AVAILABLE
PLANT LIFETIME, YEARS	40	RADIOACTIVE SOLID WASTE, CURIES/YR	3196
SOURCE WATERBODY	RIVER, TIDAL	RADIOACTIVE SOLID WASTE VOL.,DRUMS/YR	2806
RECEIVING WATERBODY	RIVER, TIDAL	MAX. HEAT TO ATMOS.,BBTU/HR	16.2
LAND ACREAGE OF STATION FACILITIES	50	MAX. HEAT TO REC. WATER, BBTU/HR	0.44
TOTAL LAND ACREAGE OF SITE	1440	TREATMENT CHEMICALS, LBS/YR	
OFFSITE ACREAGE, TRANSMISSION LINES	675	BIOCIDES	
OFFSITE ACREAGE, ACCESS ROADWAY	0.0	CHLORINE	1600000
OFFSITE ACREAGE, ACCESS RAILWAY	0.0		
MIN. DISTANCE TO SITE BOUNDARY, FT	2200		
MIN. DIST. LARG. DIFFUSION FACTOR,FT	2429		
INTAKE LOCATION	SHORELINE/RIVERBANK		
COOLING SYSTEM WITHDRAWAL,CU FT/SEC	237.6	CORROSION AND SCALE INHIBITORS	
SERVICE WATER WITHDRAWAL, CU FT/SEC	1.54	SULFURIC ACID	10000000
APPROACH VELOCITY, FEET PER SECOND	0.3		
SCREEN VELOCITY, FEET PER SECOND	0.65		
INTAKE SCREEN MESH, INCHES	0.375		
COOLING SYSTEM EVAPORATION,CU FT/SEC	60		
SERVICE WATER EVAPORATION,CU FT/SEC	DATA NOT AVAILABLE	CLEANING AND NEUTRALIZING COMPOUNDS	
DRIFT, PERCENT	.10.5	SULFURIC ACID	2800000
DISCHARGE LOCATION	OFFSHORE, SUBMERGED	SODIUM HYDROXIDE	4500000
DISCHARGE TYPE	DIFFUSER PIPE		
COOLING SYSTEM DISCHARGE, CU FT/SEC	178.2		
SERVICE WATER DISCHARGE, CU FT/SEC	1.1		
DISCHARGE VELOCITY, FEET PER SECOND	11.5	CHEMICAL EFFLUENTS, PPM	
DISCHARGE EFFECTIVE AREA, SQ FT	20.3	TOTAL RESIDUAL CHLORINE	4
COND. COOLING WATER FLOW,CU FT/SEC	2758	FREE AVAILABLE CHLORINE	0.1
RETURN COND. TDS RATIO	5	TOTAL CHROMIUM	DATA NOT AVAILABLE
NO. CONDENSER COOLING TOWERS	2	TOTAL COPPER	0.025
COOLING TOWER HEIGHT, FT	450	TOTAL IRON	DATA NOT AVAILABLE
COOLING TOWER EXIT DIAM.,FT	190	TOTAL NICKEL	0.008
COOLING RANGE, DEG. F	25.9	TOTAL ZINC	DATA NOT AVAILABLE
COOLING TOWER EXIT VELOCITY, FT/SEC	18.5	TOTAL PHOSPHORUS (AS P)	0.88
COOLING TOWER DROPLET SIZE, MICRONS	100	SULFATE	1100
CONDENSER TEMP.RISE, DEG. F	25.9	OIL AND GREASE	DATA NOT AVAILABLE
COOLING SYSTEM TRANSIT TIME, MIN.	6	DISSOLVED OXYGEN	DATA NOT AVAILABLE
EFFLUENT TEMP. ABOVE AMBIENT,DEG F	11	TOTAL DISSOLVED SOLIDS	12000
NOISE AT BOUNDARY, DECIBELS	DATA NOT AVAILABLE	TOTAL SUSPENDED SOLIDS	DATA NOT AVAILABLE
		BOD5 DAY	1.6

NOTES:

ID: DRESDEN 2&3, COMMONWEALTH ED., COUNTY OF GRUNDY, STATE OF IL

MAJOR RIVER BASIN	UPPER MISSISSIPPI	DISRUPTED ONSITE LAND, ACRES	DATA NOT AVAILABLE
LATITUDE, DEG MIN SEC	041 23 23	DISPL.EXCAVATION SPOIL,MIL CU YRD	DATA NOT AVAILABLE
LONGITUDE, DEG MIN SEC	088 16 17	DREDGE SPOIL, MIL CU YRD	DATA NOT AVAILABLE
DOCKET NUMBER	50237	AVG. CONSTRUCTION PERSONNEL	DATA NOT AVAILABLE
LICENSING ACTION	OPERATING	OPERATING PERSONNEL	150
DATE OF LICENSING ACTION	12 22 69	NOBLE GAS AIR RELEASE, CURIES/YR	96000
NSSS TYPE	BWR	I-131 AIR RELEASE, CURIES/YR	0.68
NO.NUCLEAR UNITS INFO. APPL	2	LIQ. EFFLUENT(NON-H3), CURIES/YR	10
TOTAL THERMAL CAPACITY, MWT	5054	TRITIUM LIQUID RELEASE, CURIES/YR	13.2
TOTAL ELECTRICAL CAPACITY,MWE	1618	CS-137 LIQ. EFFLUENT, CURIES/YR	1.42
ADDITIONAL UNITS ONSITE	YES, NUCLEAR	DIRECT RADIATION AT SITE BOUNDARY,MR/YR	1
TALLEST STRUCTURE, FEET	310	MAX. GAS STORAGE, CURIES	6486
COOLING SYSTEM TYPE	COOLING POND/CANAL	MAX. LIQUID STORAGE, CURIES	DATA NOT AVAILABLE
PLANT LIFETIME, YEARS	30	RADIOACTIVE SOLID WASTE, CURIES/YR	4800
SOURCE WATERBODY	RIVER, NONTIDAL	RADIOACTIVE SOLID WASTE VOL.,DRUMS/YR	2000
RECEIVING WATERBODY	RIVER, NONTIDAL	MAX. HEAT TO ATMOS.,BBTU/HR	10.83
LAND ACREAGE OF STATION FACILITIES	1585	MAX. HEAT TO REC. WATER, BBTU/HR	0.37
TOTAL LAND ACREAGE OF SITE	2517	TREATMENT CHEMICALS, LBS/YR	
OFFSITE ACREAGE, TRANSMISSION LINES	93	BIOCIDES	
OFFSITE ACREAGE, ACCESS ROADWAY	0.0	SODIUM HYPOCHLORITE	3200000
OFFSITE ACREAGE, ACCESS RAILWAY	0.0		
MIN. DISTANCE TO SITE BOUNDARY, FT	2000		
MIN. DIST. LARG. DIFFUSION FACTOR,FT	2328		
INTAKE LOCATION	CANAL		
COOLING SYSTEM WITHDRAWAL,CU FT/SEC	523.5	CORROSION AND SCALE INHIBITORS	
SERVICE WATER WITHDRAWAL, CU FT/SEC	DATA NOT AVAILABLE	SODIUM PHOSPHATE, ORTHO, ANHYDROUS	AMOUNT NOT AVAILABLE
APPROACH VELOCITY, FEET PER SECOND	0.6	SODIUM SULFITE	AMOUNT NOT AVAILABLE
SCREEN VELOCITY, FEET PER SECOND	1.85	MORPHOLINE	AMOUNT NOT AVAILABLE
INTAKE SCREEN MESH, INCHES	0.375		
COOLING SYSTEM EVAPORATION,CU FT/SEC	35.6		
SERVICE WATER EVAPORATION,CU FT/SEC	0.008	CLEANING AND NEUTRALIZING COMPOUNDS	
DRIFT, PERCENT	103	SODIUM HYDROXIDE	AMOUNT NOT AVAILABLE
DISCHARGE LOCATION	CANAL	SULFURIC ACID	AMOUNT NOT AVAILABLE
DISCHARGE TYPE	SPRAY CANAL		
COOLING SYSTEM DISCHARGE, CU FT/SEC	537		
SERVICE WATER DISCHARGE, CU FT/SEC	DATA NOT AVAILABLE		
DISCHARGE VELOCITY, FEET PER SECOND	3.4	CHEMICAL EFFLUENTS, PPM	
DISCHARGE EFFECTIVE AREA, SQ FT	158	TOTAL RESIDUAL CHLORINE	3.3
COND. COOLING WATER FLOW,CU FT/SEC	2100	FREE AVAILABLE CHLORINE	0.0
RETURN COND. TDS RATIO	1.06	TOTAL CHROMIUM	DATA NOT AVAILABLE
NO. CONDENSER COOLING TOWERS	0.0	TOTAL COPPER	DATA NOT AVAILABLE
COOLING TOWER HEIGHT, FT	NOT APPLICABLE	TOTAL IRON	DATA NOT AVAILABLE
COOLING TOWER EXIT DIAM.,FT	NOT APPLICABLE	TOTAL NICKEL	DATA NOT AVAILABLE
COOLING RANGE, DEG. F	NOT APPLICABLE	TOTAL ZINC	DATA NOT AVAILABLE
COOLING TOWER EXIT VELOCITY, FT/SEC	NOT APPLICABLE	TOTAL PHOSPHORUS (AS P)	0.11
COOLING TOWER DROPLET SIZE, MICRONS	NOT APPLICABLE	SULFATE	0.29
CONDENSER TEMP.RISE, DEG. F	23	OIL AND GREASE	DATA NOT AVAILABLE
COOLING SYSTEM TRANSIT TIME, MIN.	DATA NOT AVAILABLE	DISSOLVED OXYGEN	6
EFFLUENT TEMP. ABOVE AMBIENT,DEG F	21	TOTAL DISSOLVED SOLIDS	380
NOISE AT BOUNDARY, DECIBELS	DATA NOT AVAILABLE	TOTAL SUSPENDED SOLIDS	DATA NOT AVAILABLE
		BOD5 DAY	DATA NOT AVAILABLE

NOTES:

ID: FARLEY NP 1&2, ALABAMA POWER CO, COUNTY OF HOUSTON, STATE OF AL

MAJOR RIVER BASIN	SOUTHEAST
LATITUDE, DEG MIN SEC	031 10 54
LONGITUDE, DEG MIN SEC	085 14 12
DOCKET NUMBER	50348
LICENSING ACTION	UNDER CONSTRUCTION
DATE OF LICENSING ACTION	08 16 72
NSSS TYPE	PWR
NO.NUCLEAR UNITS INFO. APPL	2
TOTAL THERMAL CAPACITY, MWT	5304
TOTAL ELECTRICAL CAPACITY,MWE	1658
ADDITIONAL UNITS ONSITE	NO
TALLEST STRUCTURE, FEET	115
COOLING SYSTEM TYPE	MECHANICAL DRAFT, WET COOLING TOWER
PLANT LIFETIME, YEARS	40
SOURCE WATERBODY	RIVER, NONTIDAL
RECEIVING WATERBODY	RIVER, NONTIDAL
LAND ACREAGE OF STATION FACILITIES	483
TOTAL LAND ACREAGE OF SITE	1850
OFFSITE ACREAGE, TRANSMISSION LINES	5300
OFFSITE ACREAGE, ACCESS ROADWAY	0.0
OFFSITE ACREAGE, ACCESS RAILWAY	76
MIN. DISTANCE TO SITE BOUNDARY, FT	4100
MIN. DIST. LARG. DIFFUSION FACTOR,FT	4100
INTAKE LOCATION	CANAL
COOLING SYSTEM WITHDRAWAL,CU FT/SEC	80
SERVICE WATER WITHDRAWAL, CU FT/SEC	0.02
APPROACH VELOCITY, FEET PER SECOND	0.44
SCREEN VELOCITY, FEET PER SECOND	1
INTAKE SCREEN MESH, INCHES	0.375
COOLING SYSTEM EVAPORATION,CU FT/SEC	60
SERVICE WATER EVAPORATION,CU FT/SEC	0.0
DRIFT, PERCENT	0.01
DISCHARGE LOCATION	SHORELINE
DISCHARGE TYPE	SPRAY CANAL
COOLING SYSTEM DISCHARGE, CU FT/SEC	20
SERVICE WATER DISCHARGE, CU FT/SEC	0.02
DISCHARGE VELOCITY, FEET PER SECOND	0.3
DISCHARGE EFFECTIVE AREA, SQ FT	7.1
COND. COOLING WATER FLOW,CU FT/SEC	2820
RETURN COND. TDS RATIO	3.5
NO. CONDENSER COOLING TOWERS	6
COOLING TOWER HEIGHT, FT	60
COOLING TOWER EXIT DIAM.,FT	196
COOLING RANGE, DEG. F	11
COOLING TOWER EXIT VELOCITY, FT/SEC	DATA NOT AVAILABLE
COOLING TOWER DROPLET SIZE, MICRONS	DATA NOT AVAILABLE
CONDENSER TEMP.RISE, DEG. F	20
COOLING SYSTEM TRANSIT TIME, MIN.	DATA NOT AVAILABLE
EFFLUENT TEMP. ABOVE AMBIENT,DEG F	0.7
NOISE AT BOUNDARY, DECIBELS	57

DISRUPTED ONSITE LAND, ACRES	559
DISPL.EXCAVATION SPOIL,MIL CU YRD	DATA NOT AVAILABLE
DREDGE SPOIL, MIL CU YRD	0.0
AVG. CONSTRUCTION PERSONNEL	1400
OPERATING PERSONNEL	125
NOBLE GAS AIR RELEASE, CURIES/YR	10000
I-131 AIR RELEASE, CURIES/YR	1.5
LIQ. EFFLUENT(NON-H3), CURIES/YR	20
TRITIUM LIQUID RELEASE, CURIES/YR	2000
CS-137 LIQ. EFFLUENT, CURIES/YR	0.238
DIRECT RADIATION AT SITE BOUNDARY,MR/YR	0.24
MAX. GAS STORAGE, CURIES	DATA NOT AVAILABLE
MAX. LIQUID STORAGE, CURIES	DATA NOT AVAILABLE
RADIOACTIVE SOLID WASTE, CURIES/YR	16450
RADIOACTIVE SOLID WASTE VOL.,DRUMS/YR	2030
MAX. HEAT TO ATMOS.,BBTU/HR	13.1
MAX. HEAT TO REC. WATER, BBTU/HR	0.007
TREATMENT CHEMICALS, LBS/YR	
BIOCIDES	
CHLORINE	10000
CORROSION AND SCALE INHIBITORS	
SODIUM PHOSPHATE, ORTHO, ANHYDROUS	72000
CLEANING AND NEUTRALIZING COMPOUNDS	
LITHIUM HYDROXIDE	2850
BORIC ACID	22350
AMMONIUM HYDROXIDE	5000
SULFURIC ACID	600000
SODIUM HYDROXIDE	488000
CHEMICAL EFFLUENTS, PPM	
TOTAL RESIDUAL CHLORINE	0.2
FREE AVAILABLE CHLORINE	0.001
TOTAL CHROMIUM	DATA NOT AVAILABLE
TOTAL COPPER	DATA NOT AVAILABLE
TOTAL IRON	0.4
TOTAL NICKEL	DATA NOT AVAILABLE
TOTAL ZINC	DATA NOT AVAILABLE
TOTAL PHOSPHORUS (AS P)	0.16
SULFATE	49
OIL AND GREASE	DATA NOT AVAILABLE
DISSOLVED OXYGEN	DATA NOT AVAILABLE
TOTAL DISSOLVED SOLIDS	124
TOTAL SUSPENDED SOLIDS	DATA NOT AVAILABLE
BOD5 DAY	DATA NOT AVAILABLE

NOTES:

ID: FERMI-2, DETROIT EDISON, COUNTY OF MONROE

MAJOR RIVER BASIN	LAKE ERIE
LATITUDE, DEG MIN SEC	041 58 41
LONGITUDE, DEG MIN SEC	083 15 34
DOCKET NUMBER	50341
LICENSING ACTION	UNDER CONSTRUCTION
DATE OF LICENSING ACTION	09 26 72
NSSS TYPE	BWR
NO.NUCLEAR UNITS INFO. APPL	1
TOTAL THERMAL CAPACITY, MWT	3293
TOTAL ELECTRICAL CAPACITY,MWE	1093
ADDITIONAL UNITS ONSITE	YES, NUCLEAR
TALLEST STRUCTURE, FEET	400
COOLING SYSTEM TYPE	NATURAL DRAFT, WET COOLING TOWER
PLANT LIFETIME, YEARS	35
SOURCE WATERBODY	LAKE
RECEIVING WATERBODY	LAKE
LAND ACREAGE OF STATION FACILITIES	100
TOTAL LAND ACREAGE OF SITE	1088
OFFSITE ACREAGE, TRANSMISSION LINES	180
OFFSITE ACREAGE, ACCESS ROADWAY	0.0
OFFSITE ACREAGE, ACCESS RAILWAY	0.0
MIN. DISTANCE TO SITE BOUNDARY, FT	1500
MIN. DIST. LARG. DIFFUSION FACTOR,FT	1500
INTAKE LOCATION	CANAL
COOLING SYSTEM WITHDRAWAL,CU FT/SEC	70
SERVICE WATER WITHDRAWAL, CU FT/SEC	1.78
APPROACH VELOCITY, FEET PER SECOND	0.13
SCREEN VELOCITY, FEET PER SECOND	1
INTAKE SCREEN MESH, INCHES	DATA NOT AVAILABLE
COOLING SYSTEM EVAPORATION,CU FT/SEC	43.44
SERVICE WATER EVAPORATION,CU FT/SEC	DATA NOT AVAILABLE
DRIFT, PERCENT	0.1
DISCHARGE LOCATION	OFFSHORE SUBMERGED
DISCHARGE TYPE	EFFLUENT PIPE
COOLING SYSTEM DISCHARGE, CU FT/SEC	26.7
SERVICE WATER DISCHARGE, CU FT/SEC	DATA NOT AVAILABLE
DISCHARGE VELOCITY, FEET PER SECOND	DATA NOT AVAILABLE
DISCHARGE EFFECTIVE AREA, SQ FT	DATA NOT AVAILABLE
COND. COOLING WATER FLOW,CU FT/SEC	2000
RETURN COND. TDS RATIO	3
NO. CONDENSER COOLING TOWERS	2
COOLING TOWER HEIGHT, FT	400
COOLING TOWER EXIT DIAM.,FT	200
COOLING RANGE, DEG. F	DATA NOT AVAILABLE
COOLING TOWER EXIT VELOCITY, FT/SEC	DATA NOT AVAILABLE
COOLING TOWER DROPLET SIZE, MICRONS	DATA NOT AVAILABLE
CONDENSER TEMP.RISE, DEG. F	18
COOLING SYSTEM TRANSIT TIME, MIN.	DATA NOT AVAILABLE
EFFLUENT TEMP. ABOVE AMBIENT,DEG F	23
NOISE AT BOUNDARY, DECIBELS	DATA NOT AVAILABLE

DISRUPTED ONSITE LAND, ACRES	150
DISPL.EXCAVATION SPOIL,MIL CU YRD	DATA NOT AVAILABLE
DREDGE SPOIL, MIL CU YRD	0.065
AVG. CONSTRUCTION PERSONNEL	1150
OPERATING PERSONNEL	100
NOBLE GAS AIR RELEASE, CURIES/YR	50000
I-131 AIR RELEASE, CURIES/YR	0.5
LIQ. EFFLUENT(NON-H3), CURIES/YR	5
TRITIUM LIQUID RELEASE, CURIES/YR	20
CS-137 LIQ. EFFLUENT, CURIES/YR	0.19
DIRECT RADIATION AT SITE BOUNDARY,MR/YR	DATA NOT AVAILABLE
MAX. GAS STORAGE, CURIES	DATA NOT AVAILABLE
MAX. LIQUID STORAGE, CURIES	DATA NOT AVAILABLE
RADIOACTIVE SOLID WASTE, CURIES/YR	600
RADIOACTIVE SOLID WASTE VOL.,DRUMS/YR	540
MAX. HEAT TO ATMOS.,BBTU/HR	8.1
MAX. HEAT TO REC. WATER, BBTU/HR	0.078
TREATMENT CHEMICALS, LBS/YR	
BIOCIDES	
CHLORINE	1300000
CORROSION AND SCALE INHIBITORS	
SULFURIC ACID	AMOUNT NOT AVAILABLE
CLEANING AND NEUTRALIZING COMPOUNDS	
SULFURIC ACID	3100000
SODIUM HYDROXIDE	AMOUNT NOT AVAILABLE
CHEMICAL EFFLUENTS, PPM	
TOTAL RESIDUAL CHLORINE	0.1
FREE AVAILABLE CHLORINE	DATA NOT AVAILABLE
TOTAL CHROMIUM	DATA NOT AVAILABLE
TOTAL COPPER	DATA NOT AVAILABLE
TOTAL IRON	DATA NOT AVAILABLE
TOTAL NICKEL	DATA NOT AVAILABLE
TOTAL ZINC	DATA NOT AVAILABLE
TOTAL PHOSPHORUS (AS P)	DATA NOT AVAILABLE
SULFATE	4
OIL AND GREASE	DATA NOT AVAILABLE
DISSOLVED OXYGEN	DATA NOT AVAILABLE
TOTAL DISSOLVED SOLIDS	500
TOTAL SUSPENDED SOLIDS	25
BOD5 DAY	25

NOTES:

ID: FITZPATRICK, POWER AUTH. NYS, COUNTY OF OSWEGO, STATE OF NY

MAJOR RIVER BASIN	NORTHEAST	DISRUPTED ONSITE LAND, ACRES	100
LATITUDE, DEG MIN SEC	043 31 17	DISPL.EXCAVATION SPOIL,MIL CU YRD	DATA NOT AVAILABLE
LONGITUDE, DEG MIN SEC	076 23 53	DREDGE SPOIL, MIL CU YRD	DATA NOT AVAILABLE
DOCKET NUMBER	50333	AVG. CONSTRUCTION PERSONNEL	DATA NOT AVAILABLE
LICENSING ACTION	UNDER CONSTRUCTION	OPERATING PERSONNEL	65
DATE OF LICENSING ACTION	05 20 70	NOBLE GAS AIR RELEASE, CURIES/YR	203410
NSSS TYPE	BWR	I-131 AIR RELEASE, CURIES/YR	0.9
NO.NUCLEAR UNITS INFO. APPL	1	LIQ. EFFLUENT(NON-H3), CURIES/YR	4.4
TOTAL THERMAL CAPACITY, MWT	2436	TRITIUM LIQUID RELEASE, CURIES/YR	20
TOTAL ELECTRICAL CAPACITY,MWE	821	CS-137 LIQ. EFFLUENT, CURIES/YR	0.16
ADDITIONAL UNITS ONSITE	NO	DIRECT RADIATION AT SITE BOUNDARY,MR/YR	2.7
TALLEST STRUCTURE, FEET	385	MAX. GAS STORAGE, CURIES	2310
COOLING SYSTEM TYPE	ONCE-THROUGH	MAX. LIQUID STORAGE, CURIES	DATA NOT AVAILABLE
PLANT LIFETIME, YEARS	40	RADIOACTIVE SOLID WASTE, CURIES/YR	4000
SOURCE WATERBODY	LAKE	RADIOACTIVE SOLID WASTE VOL.,DRUMS/YR	1500
RECEIVING WATERBODY	LAKE	MAX. HEAT TO ATMOS.,BBTU/HR	0.0
LAND ACREAGE OF STATION FACILITIES	22	MAX. HEAT TO REC. WATER, BBTU/HR	5.7
TOTAL LAND ACREAGE OF SITE	702	TREATMENT CHEMICALS, LBS/YR	
OFFSITE ACREAGE, TRANSMISSION LINES	1000	BIOCIDES	
OFFSITE ACREAGE, ACCESS ROADWAY	0.0		
OFFSITE ACREAGE, ACCESS RAILWAY	0.0	SODIUM HYPOCHLORITE	13000
MIN. DISTANCE TO SITE BOUNDARY, FT	800		
MIN. DIST. LARG. DIFFUSION FACTOR,FT	3168		
INTAKE LOCATION	OFFSHORE, SUBMERGED		
COOLING SYSTEM WITHDRAWAL,CU FT/SEC	825	CORROSION AND SCALE INHIBITORS	
SERVICE WATER WITHDRAWAL, CU FT/SEC	DATA NOT AVAILABLE	SODIUM SULFITE	2.4
APPROACH VELOCITY, FEET PER SECOND	4.6	SODIUM PHOSPHATE, ORTHO, ANHYDROUS	7.2
SCREEN VELOCITY, FEET PER SECOND	1.2		
INTAKE SCREEN MESH, INCHES	0.375		
COOLING SYSTEM EVAPORATION,CU FT/SEC	DATA NOT AVAILABLE		
SERVICE WATER EVAPORATION,CU FT/SEC	DATA NOT AVAILABLE	CLEANING AND NEUTRALIZING COMPOUNDS	
DRIFT, PERCENT	NOT APPLICABLE	SULFURIC ACID	100000
DISCHARGE LOCATION	OFFSHORE, SUBMERGED	SODIUM HYDROXIDE	85000
DISCHARGE TYPE	DIFFUSER PIPE	LIME	52000
COOLING SYSTEM DISCHARGE, CU FT/SEC	824	FERRIC SULFATE	6400
SERVICE WATER DISCHARGE, CU FT/SEC	DATA NOT AVAILABLE		
DISCHARGE VELOCITY, FEET PER SECOND	14	CHEMICAL EFFLUENTS, PPM	
DISCHARGE EFFECTIVE AREA, SQ FT	59	TOTAL RESIDUAL CHLORINE	30.08
COND. COOLING WATER FLOW,CU FT/SEC	823	FREE AVAILABLE CHLORINE	1
RETURN COND. TDS RATIO	1.1	TOTAL CHROMIUM	DATA NOT AVAILABLE
NO. CONDENSER COOLING TOWERS	NOT APPLICABLE	TOTAL COPPER	DATA NOT AVAILABLE
COOLING TOWER HEIGHT, FT	NOT APPLICABLE	TOTAL IRON	0.01
COOLING TOWER EXIT DIAM.,FT	NOT APPLICABLE	TOTAL NICKEL	DATA NOT AVAILABLE
COOLING RANGE, DEG. F	NOT APPLICABLE	TOTAL ZINC	DATA NOT AVAILABLE
COOLING TOWER EXIT VELOCITY, FT/SEC	NOT APPLICABLE	TOTAL PHOSPHORUS (AS P)	0.0621
COOLING TOWER DROPLET SIZE, MICRONS	NOT APPLICABLE	SULFATE	30.64
CONDENSER TEMP.RISE, DEG. F	32.4	OIL AND GREASE	DATA NOT AVAILABLE
COOLING SYSTEM TRANSIT TIME, MIN.	15	DISSOLVED OXYGEN	DATA NOT AVAILABLE
EFFLUENT TEMP. ABOVE AMBIENT,DEG F	31.5	TOTAL DISSOLVED SOLIDS	233.3
NOISE AT BOUNDARY, DECIBELS	DATA NOT AVAILABLE	TOTAL SUSPENDED SOLIDS	DATA NOT AVAILABLE
		BOD5 DAY	DATA NOT AVAILABLE

NOTES:

ID: FORKED RIVER #1, JERSEY CEN. POW., COUNTY OF OCEAN, STATE OF NJ

MAJOR RIVER BASIN	NORTH ATLANTIC
LATITUDE, DEG MIN SEC	039 48 50
LONGITUDE, DEG MIN SEC	074 12 41
DOCKET NUMBER	50363
LICENSING ACTION	UNDER CONSTRUCTION
DATE OF LICENSING ACTION	07 10 73
NSSS TYPE	PWR
NO.NUCLEAR UNITS INFO. APPL	1
TOTAL THERMAL CAPACITY, MWT	3390
TOTAL ELECTRICAL CAPACITY,MWE	1070
ADDITIONAL UNITS ONSITE	YES, NUCLEAR
TALLEST STRUCTURE, FEET	490
COOLING SYSTEM TYPE	NATURAL DRAFT, WET COOLING TOWER
PLANT LIFETIME, YEARS	30
SOURCE WATERBODY	BARNEGAT BAY
RECEIVING WATERBODY	BARNEGAT BAY
LAND ACREAGE OF STATION FACILITIES	80
TOTAL LAND ACREAGE OF SITE	1416
OFFSITE ACREAGE, TRANSMISSION LINES	3248
OFFSITE ACREAGE, ACCESS ROADWAY	0.0
OFFSITE ACREAGE, ACCESS RAILWAY	0.0
MIN. DISTANCE TO SITE BOUNDARY, FT	2112
MIN. DIST. LARG. DIFFUSION FACTOR,FT	2112
INTAKE LOCATION	CANAL
COOLING SYSTEM WITHDRAWAL,CU FT/SEC	116
SERVICE WATER WITHDRAWAL, CU FT/SEC	DATA NOT AVAILABLE
APPROACH VELOCITY, FEET PER SECOND	0.7
SCREEN VELOCITY, FEET PER SECOND	0.7
INTAKE SCREEN MESH, INCHES	0.375
COOLING SYSTEM EVAPORATION,CU FT/SEC	26.7
SERVICE WATER EVAPORATION,CU FT/SEC	DATA NOT AVAILABLE
DRIFT, PERCENT	0.004
DISCHARGE LOCATION	CANAL
DISCHARGE TYPE	CANAL
COOLING SYSTEM DISCHARGE, CU FT/SEC	89
SERVICE WATER DISCHARGE, CU FT/SEC	0.0
DISCHARGE VELOCITY, FEET PER SECOND	DATA NOT AVAILABLE
DISCHARGE EFFECTIVE AREA, SQ FT	DATA NOT AVAILABLE
COND. COOLING WATER FLOW,CU FT/SEC	1300
RETURN COND. TDS RATIO	1.5
NO. CONDENSER COOLING TOWERS	1
COOLING TOWER HEIGHT, FT	490
COOLING TOWER EXIT DIAM.,FT	275
COOLING RANGE, DEG. F	28
COOLING TOWER EXIT VELOCITY, FT/SEC	13
COOLING TOWER DROPLET SIZE, MICRONS	100
CONDENSER TEMP.RISE, DEG. F	28
COOLING SYSTEM TRANSIT TIME, MIN.	DATA NOT AVAILABLE
EFFLUENT TEMP. ABOVE AMBIENT,DEG F	3
NOISE AT BOUNDARY, DECIBELS	DATA NOT AVAILABLE

DISRUPTED ONSITE LAND, ACRES	210
DISPL.EXCAVATION SPOIL,MIL CU YRD	0.7
DREDGE SPOIL, MIL CU YRD	0.04
AVG. CONSTRUCTION PERSONNEL	1500
OPERATING PERSONNEL	DATA NOT AVAILABLE
NOBLE GAS AIR RELEASE, CURIES/YR	4790
I-131 AIR RELEASE, CURIES/YR	0.46
LIQ. EFFLUENT(NON-H3), CURIES/YR	2
TRITIUM LIQUID RELEASE, CURIES/YR	1000
CS-137 LIQ. EFFLUENT, CURIES/YR	0.28
DIRECT RADIATION AT SITE BOUNDARY,MR/YR	0.000000002
MAX. GAS STORAGE, CURIES	1900
MAX. LIQUID STORAGE, CURIES	DATA NOT AVAILABLE
RADIOACTIVE SOLID WASTE, CURIES/YR	5255
RADIOACTIVE SOLID WASTE VOL.,DRUMS/YR	850
MAX. HEAT TO ATMOS.,BBTU/HR	7.2
MAX. HEAT TO REC. WATER, BBTU/HR	0.3
TREATMENT CHEMICALS, LBS/YR	
BIOCIDES	
CHLORINE	AMOUNT NOT AVAILABLE
CORROSION AND SCALE INHIBITORS	
SULFURIC ACID	AMOUNT NOT AVAILABLE
CLEANING AND NEUTRALIZING COMPOUNDS	
SODIUM HYDROXIDE	220000
SULFURIC ACID	260000
BORIC ACID	4400
CHEMICAL EFFLUENTS, PPM	
TOTAL RESIDUAL CHLORINE	0.38
FREE AVAILABLE CHLORINE	DATA NOT AVAILABLE
TOTAL CHROMIUM	DATA NOT AVAILABLE
TOTAL COPPER	DATA NOT AVAILABLE
TOTAL IRON	DATA NOT AVAILABLE
TOTAL NICKEL	DATA NOT AVAILABLE
TOTAL ZINC	DATA NOT AVAILABLE
TOTAL PHOSPHORUS (AS P)	DATA NOT AVAILABLE
SULFATE	34
OIL AND GREASE	DATA NOT AVAILABLE
DISSOLVED OXYGEN	5
TOTAL DISSOLVED SOLIDS	DATA NOT AVAILABLE
TOTAL SUSPENDED SOLIDS	DATA NOT AVAILABLE
BOD5 DAY	DATA NOT AVAILABLE

NOTES:

ID: GRAND GULF 1&2, MISS POWER & LIG, COUNTY OF CLAIBORNE, ST OF MS

MAJOR RIVER BASIN	SOUTHWEST-LOWER MISS.	DISRUPTED ONSITE LAND, ACRES	345
LATITUDE, DEG MIN SEC	032 00 27	DISPL.EXCAVATION SPOIL,MIL CU YRD	5
LONGITUDE, DEG MIN SEC	091 02 53	DREDGE SPOIL, MIL CU YRD	DATA NOT AVAILABLE
DOCKET NUMBER	50416	AVG. CONSTRUCTION PERSONNEL	1430
LICENSING ACTION	CP APPLICATION PENDING	OPERATING PERSONNEL	85
DATE OF LICENSING ACTION	11 17 72	NOBLE GAS AIR RELEASE, CURIES/YR	11800
NSSS TYPE	BWR	I-131 AIR RELEASE, CURIES/YR	0.074
NO.NUCLEAR UNITS INFO. APPL	2	LIQ. EFFLUENT(NON-H3), CURIES/YR	10
TOTAL THERMAL CAPACITY, MWT	7666	TRITIUM LIQUID RELEASE, CURIES/YR	40
TOTAL ELECTRICAL CAPACITY,MWE	2500	CS-137 LIQ. EFFLUENT, CURIES/YR	1.16
ADDITIONAL UNITS ONSITE	NO	DIRECT RADIATION AT SITE BOUNDARY,MR/YR	3.5
TALLEST STRUCTURE, FEET	492	MAX. GAS STORAGE, CURIES	13022
COOLING SYSTEM TYPE	NATURAL DRAFT, WET COOLING TOWER	MAX. LIQUID STORAGE, CURIES	DATA NOT AVAILABLE
PLANT LIFETIME, YEARS	40	RADIOACTIVE SOLID WASTE, CURIES/YR	5400
SOURCE WATERBODY	RIVER, NONTIDAL	RADIOACTIVE SOLID WASTE VOL.,DRUMS/YR	2721
RECEIVING WATERBODY	RIVER, NONTIDAL	MAX. HEAT TO ATMOS.,BBTU/HR	17.8
LAND ACREAGE OF STATION FACILITIES	345	MAX. HEAT TO REC. WATER, BBTU/HR	0.51
TOTAL LAND ACREAGE OF SITE	2300	TREATMENT CHEMICALS, LBS/YR	
OFFSITE ACREAGE, TRANSMISSION LINES	2300	BIOCIDES	
OFFSITE ACREAGE, ACCESS ROADWAY	0.0	CHLORINE	25000
OFFSITE ACREAGE, ACCESS RAILWAY	DATA NOT AVAILABLE		
MIN. DISTANCE TO SITE BOUNDARY, FT	2560		
MIN. DIST. LARG. DIFFUSION FACTOR,FT	2640		
INTAKE LOCATION	OFFSHORE, SUBMERGED		
COOLING SYSTEM WITHDRAWAL,CU FT/SEC	128.1	CORROSION AND SCALE INHIBITORS	
SERVICE WATER WITHDRAWAL, CU FT/SEC	1.1		
APPROACH VELOCITY, FEET PER SECOND	3		
SCREEN VELOCITY, FEET PER SECOND	0.2		
INTAKE SCREEN MESH, INCHES	0.375		
COOLING SYSTEM EVAPORATION,CU FT/SEC	76.9		
SERVICE WATER EVAPORATION,CU FT/SEC	DATA NOT AVAILABLE	CLEANING AND NEUTRALIZING COMPOUNDS	
DRIFT, PERCENT	0.02	SULFURIC ACID	400000
DISCHARGE LOCATION	OFFSHORE, SUBMERGED	SODIUM HYDROXIDE	260000
DISCHARGE TYPE	DIFFUSER PIPE		
COOLING SYSTEM DISCHARGE, CU FT/SEC	66.6		
SERVICE WATER DISCHARGE, CU FT/SEC	DATA NOT AVAILABLE		
DISCHARGE VELOCITY, FEET PER SECOND	10	CHEMICAL EFFLUENTS, PPM	
DISCHARGE EFFECTIVE AREA, SQ FT	6	TOTAL RESIDUAL CHLORINE	0.1
COND. COOLING WATER FLOW,CU FT/SEC	2549	FREE AVAILABLE CHLORINE	0.0005
RETURN COND. TDS RATIO	3	TOTAL CHROMIUM	DATA NOT AVAILABLE
NO. CONDENSER COOLING TOWERS	2	TOTAL COPPER	DATA NOT AVAILABLE
COOLING TOWER HEIGHT, FT	492	TOTAL IRON	DATA NOT AVAILABLE
COOLING TOWER EXIT DIAM.,FT	DATA NOT AVAILABLE	TOTAL NICKEL	DATA NOT AVAILABLE
COOLING RANGE, DEG. F	31.7	TOTAL ZINC	DATA NOT AVAILABLE
COOLING TOWER EXIT VELOCITY, FT/SEC	DATA NOT AVAILABLE	TOTAL PHOSPHORUS (AS P)	DATA NOT AVAILABLE
COOLING TOWER DROPLET SIZE, MICRONS	DATA NOT AVAILABLE	SULFATE	3
CONDENSER TEMP.RISE, DEG. F	32	OIL AND GREASE	DATA NOT AVAILABLE
COOLING SYSTEM TRANSIT TIME, MIN.	NOT APPLICABLE	DISSOLVED OXYGEN	DATA NOT AVAILABLE
EFFLUENT TEMP. ABOVE AMBIENT,DEG F	20	TOTAL DISSOLVED SOLIDS	5.2
NOISE AT BOUNDARY, DECIBELS	DATA NOT AVAILABLE	TOTAL SUSPENDED SOLIDS	2.7
		BOD5 DAY	0.01

NOTES:

ID: GREENWOOD 2,3, DETROIT EDISON, COUNTY OF ST. CLAIR, STATE OF MI

MAJOR RIVER BASIN	WESTERN GREAT LAKES	DISRUPTED ONSITE LAND, ACRES	1200
LATITUDE, DEG MIN SEC	043 05 30	DISPL.EXCAVATION SPOIL,MIL CU YRD	6
LONGITUDE, DEG MIN SEC	082 41 40	DREDGE SPOIL, MIL CU YRD	0.0
DOCKET NUMBER	50452	AVG. CONSTRUCTION PERSONNEL	1200
LICENSING ACTION	CP APPLICATION PENDING	OPERATING PERSONNEL	135
DATE OF LICENSING ACTION	09 17 73	NOBLE GAS AIR RELEASE, CURIES/YR	7954
NSSS TYPE	PWR	I-131 AIR RELEASE, CURIES/YR	0.038
NO.NUCLEAR UNITS INFO. APPL	2	LIQ. EFFLUENT(NON-H3), CURIES/YR	0.2
TOTAL THERMAL CAPACITY, MWT	7200	TRITIUM LIQUID RELEASE, CURIES/YR	700
TOTAL ELECTRICAL CAPACITY,MWE	2400	CS-137 LIQ. EFFLUENT, CURIES/YR	0.0036
ADDITIONAL UNITS ONSITE	YES, FOSSIL	DIRECT RADIATION AT SITE BOUNDARY,MR/YR	0.01
TALLEST STRUCTURE, FEET	215	MAX. GAS STORAGE, CURIES	22690
COOLING SYSTEM TYPE	SPRAY POND/CANAL	MAX. LIQUID STORAGE, CURIES	DATA NOT AVAILABLE
PLANT LIFETIME, YEARS	30	RADIOACTIVE SOLID WASTE, CURIES/YR	12010
SOURCE WATERBODY	LAKE	RADIOACTIVE SOLID WASTE VOL.,DRUMS/YR	2096
RECEIVING WATERBODY	RIVER, NONTIDAL	MAX. HEAT TO ATMOS.,BBTU/HR	8.25
LAND ACREAGE OF STATION FACILITIES	445	MAX. HEAT TO REC. WATER, BBTU/HR	0.095
TOTAL LAND ACREAGE OF SITE	3620	TREATMENT CHEMICALS, LBS/YR	
OFFSITE ACREAGE, TRANSMISSION LINES	3647	BIOCIDES	
OFFSITE ACREAGE, ACCESS ROADWAY	0.0	CHLORINE	AMOUNT NOT AVAILABLE
OFFSITE ACREAGE, ACCESS RAILWAY	0.0		
MIN. DISTANCE TO SITE BOUNDARY, FT	4250		
MIN. DIST. LARG. DIFFUSION FACTOR,FT	4858		
INTAKE LOCATION	OFFSHORE, SUBMERGED		
COOLING SYSTEM WITHDRAWAL,CU FT/SEC	83.3	CORROSION AND SCALE INHIBITORS	
SERVICE WATER WITHDRAWAL, CU FT/SEC	0.1	SULFURIC ACID	AMOUNT NOT AVAILABLE
APPROACH VELOCITY, FEET PER SECOND	0.25	SODIUM SULFITE	1200
SCREEN VELOCITY, FEET PER SECOND	0.50		
INTAKE SCREEN MESH, INCHES	DATA NOT AVAILABLE		
COOLING SYSTEM EVAPORATION,CU FT/SEC	1.93		
SERVICE WATER EVAPORATION,CU FT/SEC	DATA NOT AVAILABLE	CLEANING AND NEUTRALIZING COMPOUNDS	
DRIFT, PERCENT	0.029	SULFURIC ACID	170000
DISCHARGE LOCATION	OFFSHORE, SUBMERGED		130000
DISCHARGE TYPE	DIFFUSER PIPE		
COOLING SYSTEM DISCHARGE, CU FT/SEC	28.9		
SERVICE WATER DISCHARGE, CU FT/SEC	0.1		
DISCHARGE VELOCITY, FEET PER SECOND	4.8	CHEMICAL EFFLUENTS, PPM	
DISCHARGE EFFECTIVE AREA, SQ FT	6	TOTAL RESIDUAL CHLORINE	16
COND. COOLING WATER FLOW,CU FT/SEC	2317	FREE AVAILABLE CHLORINE	DATA NOT AVAILABLE
RETURN COND. TDS RATIO	3	TOTAL CHROMIUM	DATA NOT AVAILABLE
NO. CONDENSER COOLING TOWERS	0.0	TOTAL COPPER	0.08
COOLING TOWER HEIGHT, FT	NOT APPLICABLE	TOTAL IRON	0.16
COOLING TOWER EXIT DIAM.,FT	NOT APPLICABLE	TOTAL NICKEL	DATA NOT AVAILABLE
COOLING RANGE, DEG. F	NOT APPLICABLE	TOTAL ZINC	0.07
COOLING TOWER EXIT VELOCITY, FT/SEC	NOT APPLICABLE	TOTAL PHOSPHORUS (AS P)	0.008
COOLING TOWER DROPLET SIZE, MICRONS	NOT APPLICABLE	SULFATE	150
CONDENSER TEMP.RISE, DEG. F	30	OIL AND GREASE	0.0
COOLING SYSTEM TRANSIT TIME, MIN.	DATA NOT AVAILABLE	DISSOLVED OXYGEN	DATA NOT AVAILABLE
EFFLUENT TEMP. ABOVE AMBIENT,DEG F	-0.41	TOTAL DISSOLVED SOLIDS	370
NOISE AT BOUNDARY, DECIBELS	DATA NOT AVAILABLE	TOTAL SUSPENDED SOLIDS	DATA NOT AVAILABLE
		BOD5 DAY	0.0083

NOTES:

ID: HANFORD NO. 2, WASHINGTON PPSS, COUNTY OF BENTON, STATE OF WA

MAJOR RIVER BASIN	PACIFIC NORTHWEST	DISRUPTED ONSITE LAND, ACRES	30
LATITUDE, DEG MIN SEC	046 17 00	DISPL.EXCAVATION SPOIL,MIL CU YRD	DATA NOT AVAILABLE
LONGITUDE, DEG MIN SEC	119 17 30	DREDGE SPOIL, MIL CU YRD	DATA NOT AVAILABLE
DOCKET NUMBER	50397	AVG. CONSTRUCTION PERSONNEL	545
LICENSING ACTION	UNDER CONSTRUCTION	OPERATING PERSONNEL	65
DATE OF LICENSING ACTION	03 19 73	NOBLE GAS AIR RELEASE, CURIES/YR	32085
NSSS TYPE	BWR	I-131 AIR RELEASE, CURIES/YR	0.13
NO.NUCLEAR UNITS INFO. APPL	1	LIQ. EFFLUENT(NON-H3), CURIES/YR	0.25
TOTAL THERMAL CAPACITY, MWT	3323	TRITIUM LIQUID RELEASE, CURIES/YR	10
TOTAL ELECTRICAL CAPACITY,MWE	1103	CS-137 LIQ. EFFLUENT, CURIES/YR	0.019
ADDITIONAL UNITS ONSITE	NO	DIRECT RADIATION AT SITE BOUNDARY,MR/YR	DATA NOT AVAILABLE
TALLEST STRUCTURE, FEET	220	MAX. GAS STORAGE, CURIES	5487
COOLING SYSTEM TYPE	MECHANICAL DRAFT, WET COOLING TOWER	MAX. LIQUID STORAGE, CURIES	DATA NOT AVAILABLE
PLANT LIFETIME, YEARS	35	RADIOACTIVE SOLID WASTE, CURIES/YR	2615
SOURCE WATERBODY	RIVER, NONTIDAL	RADIOACTIVE SOLID WASTE VOL.,DRUMS/YR	1500
RECEIVING WATERBODY	RIVER, NONTIDAL	MAX. HEAT TO ATMOS.,BBTU/HR	7.88
LAND ACREAGE OF STATION FACILITIES	10	MAX. HEAT TO REC. WATER, BBTU/HR	0.081
TOTAL LAND ACREAGE OF SITE	1089	TREATMENT CHEMICALS, LBS/YR	
OFFSITE ACREAGE, TRANSMISSION LINES	480	BIOCIDES	
OFFSITE ACREAGE, ACCESS ROADWAY	2.6	CHLORINE	694000
OFFSITE ACREAGE, ACCESS RAILWAY	0.0		
MIN. DISTANCE TO SITE BOUNDARY, FT	1173		
MIN. DIST. LARG. DIFFUSION FACTOR,FT	1950		
INTAKE LOCATION	SHORELINE/RIVERBANK		
COOLING SYSTEM WITHDRAWAL,CU FT/SEC	51.2	CORROSION AND SCALE INHIBITORS	
SERVICE WATER WITHDRAWAL, CU FT/SEC	DATA NOT AVAILABLE	SULFURIC ACID	730000
APPROACH VELOCITY, FEET PER SECOND	0.02		
SCREEN VELOCITY, FEET PER SECOND	0.02		
INTAKE SCREEN MESH, INCHES	NOT APPLICABLE		
COOLING SYSTEM EVAPORATION,CU FT/SEC	36.1		
SERVICE WATER EVAPORATION,CU FT/SEC	DATA NOT AVAILABLE	CLEANING AND NEUTRALIZING COMPOUNDS	
DRIFT, PERCENT	0.05	SODIUM HYDROXIDE	2160
DISCHARGE LOCATION	OFFSHORE SUBMERGED	SULFURIC ACID	2650
DISCHARGE TYPE	EFFLUENT PIPE		
COOLING SYSTEM DISCHARGE, CU FT/SEC	14.42		
SERVICE WATER DISCHARGE, CU FT/SEC	DATA NOT AVAILABLE		
DISCHARGE VELOCITY, FEET PER SECOND	7	CHEMICAL EFFLUENTS, PPM	
DISCHARGE EFFECTIVE AREA, SQ FT	1.77	TOTAL RESIDUAL CHLORINE	DATA NOT AVAILABLE
COND. COOLING WATER FLOW,CU FT/SEC.	1221	FREE AVAILABLE CHLORINE	0.1
RETURN COND. TDS RATIO	1.1	TOTAL CHROMIUM	DATA NOT AVAILABLE
NO. CONDENSER COOLING TOWERS	2	TOTAL COPPER	DATA NOT AVAILABLE
COOLING TOWER HEIGHT, FT	60	TOTAL IRON	DATA NOT AVAILABLE
COOLING TOWER EXIT DIAM.,FT	DATA NOT AVAILABLE	TOTAL NICKEL	DATA NOT AVAILABLE
COOLING RANGE, DEG. F	29	TOTAL ZINC	DATA NOT AVAILABLE
COOLING TOWER EXIT VELOCITY, FT/SEC	30	TOTAL PHOSPHORUS (AS P)	DATA NOT AVAILABLE
COOLING TOWER DROPLET SIZE, MICRONS	DATA NOT AVAILABLE	SULFATE	0.00000074
CONDENSER TEMP.RISE, DEG. F	28.7	OIL AND GREASE	DATA NOT AVAILABLE
COOLING SYSTEM TRANSIT TIME, MIN.	DATA NOT AVAILABLE	DISSOLVED OXYGEN	DATA NOT AVAILABLE
EFFLUENT TEMP. ABOVE AMBIENT,DEG F	25	TOTAL DISSOLVED SOLIDS	1000
NOISE AT BOUNDARY, DECIBELS	DATA NOT AVAILABLE	TOTAL SUSPENDED SOLIDS	DATA NOT AVAILABLE
		BOD5 DAY	DATA NOT AVAILABLE

NOTES:

ID: HARRIS-SHN, 1-4, CAROLINA POWER, COUNTY OF WAKE AND CHATHAM, STATE OF NC

MAJOR RIVER BASIN	SOUTHEAST
LATITUDE, DEG MIN SEC	035 35 00
LONGITUDE, DEG MIN SEC	078 52 00
DOCKET NUMBER	50400
LICENSING ACTION	CP APPLICATION PENDING
DATE OF LICENSING ACTION	09 07 71
NSSS TYPE	PWR
NO.NUCLEAR UNITS INFO. APPL	4
TOTAL THERMAL CAPACITY, MWT	11100
TOTAL ELECTRICAL CAPACITY,MWE	3660
ADDITIONAL UNITS ONSITE	NO
TALLEST STRUCTURE, FEET	480
COOLING SYSTEM TYPE	NATURAL DRAFT, WET COOLING TOWER
PLANT LIFETIME, YEARS	40
SOURCE WATERBODY	RESERVOIR
RECEIVING WATERBODY	RESERVOIR
LAND ACREAGE OF STATION FACILITIES	4595
TOTAL LAND ACREAGE OF SITE	10744
OFFSITE ACREAGE, TRANSMISSION LINES	3672
OFFSITE ACREAGE, ACCESS ROADWAY	3
OFFSITE ACREAGE, ACCESS RAILWAY	5.4
MIN. DISTANCE TO SITE BOUNDARY, FT	2900
MIN. DIST. LARG. DIFFUSION FACTOR,FT	7000
INTAKE LOCATION	SHORELINE/RIVERBANK
COOLING SYSTEM WITHDRAWAL,CU FT/SEC	85
SERVICE WATER WITHDRAWAL, CU FT/SEC	DATA NOT AVAILABLE
APPROACH VELOCITY, FEET PER SECOND	DATA NOT AVAILABLE
SCREEN VELOCITY, FEET PER SECOND	0.5
INTAKE SCREEN MESH, INCHES	0.375
COOLING SYSTEM EVAPORATION,CU FT/SEC	68
SERVICE WATER EVAPORATION,CU FT/SEC	DATA NOT AVAILABLE
DRIFT, PERCENT	0.05
DISCHARGE LOCATION	OFFSHORE, SUBMERGED
DISCHARGE TYPE	DIFFUSER PIPE
COOLING SYSTEM DISCHARGE, CU FT/SEC	15
SERVICE WATER DISCHARGE, CU FT/SEC	DATA NOT AVAILABLE
DISCHARGE VELOCITY, FEET PER SECOND	6
DISCHARGE EFFECTIVE AREA, SQ FT	2.5
COND. COOLING WATER FLOW,CU FT/SEC	4300
RETURN COND. TDS RATIO	8.5
NO. CONDENSER COOLING TOWERS	4
COOLING TOWER HEIGHT, FT	480
COOLING TOWER EXIT DIAM.,FT	260
COOLING RANGE, DEG. F	28
COOLING TOWER EXIT VELOCITY, FT/SEC	DATA NOT AVAILABLE
COOLING TOWER DROPLET SIZE, MICRONS	DATA NOT AVAILABLE
CONDENSER TEMP.RISE, DEG. F	28
COOLING SYSTEM TRANSIT TIME, MIN.	NOT APPLICABLE
EFFLUENT TEMP. ABOVE AMBIENT,DEG F	36
NOISE AT BOUNDARY, DECIBELS	DATA NOT AVAILABLE

DISRUPTED ONSITE LAND, ACRES	3495
DISPL.EXCAVATION SPOIL,MIL CU YRD	DATA NOT AVAILABLE
DREDGE SPOIL, MIL CU YRD	DATA NOT AVAILABLE
AVG. CONSTRUCTION PERSONNEL	3500
OPERATING PERSONNEL	180
NOBLE GAS AIR RELEASE, CURIES/YR	13824
I-131 AIR RELEASE, CURIES/YR	0.172
LIQ. EFFLUENT(NON-H3), CURIES/YR	0.4
TRITIUM LIQUID RELEASE, CURIES/YR	1400
CS-137 LIQ. EFFLUENT, CURIES/YR	0.0176
DIRECT RADIATION AT SITE BOUNDARY,MR/YR	0.0
MAX. GAS STORAGE, CURIES	12432
MAX. LIQUID STORAGE, CURIES	DATA NOT AVAILABLE
RADIOACTIVE SOLID WASTE, CURIES/YR	32000
RADIOACTIVE SOLID WASTE VOL.,DRUMS/YR	3400
MAX. HEAT TO ATMOS.,BBTU/HR	27
MAX. HEAT TO REC. WATER, BBTU/HR	0.012
TREATMENT CHEMICALS, LBS/YR	
BIOCIDES	
CHLORINE	1400000
CORROSION AND SCALE INHIBITORS	
PHOSPHATES AND POLYPHOSPHATES	200
MORPHOLINE	200
CLEANING AND NEUTRALIZING COMPOUNDS	
BORIC ACID	0.73
HYDRAZINE	0.4
AMMONIA	10
SULFURIC ACID	8800000
CHEMICAL EFFLUENTS, PPM	
TOTAL RESIDUAL CHLORINE	0.2
FREE AVAILABLE CHLORINE	DATA NOT AVAILABLE
TOTAL CHROMIUM	DATA NOT AVAILABLE
TOTAL COPPER	DATA NOT AVAILABLE
TOTAL IRON	DATA NOT AVAILABLE
TOTAL NICKEL	DATA NOT AVAILABLE
TOTAL ZINC	DATA NOT AVAILABLE
TOTAL PHOSPHORUS (AS P)	30
SULFATE	12300
OIL AND GREASE	10
DISSOLVED OXYGEN	DATA NOT AVAILABLE
TOTAL DISSOLVED SOLIDS	360
TOTAL SUSPENDED SOLIDS	DATA NOT AVAILABLE
BOD5 DAY	DATA NOT AVAILABLE

NOTES:

ID: LASALLE STN 1,2, COMMONWEALTH ED., COUNTY OF LASALLE, STATE OF IL

MAJOR RIVER BASIN	UPPER MISSISSIPPI	DISRUPTED ONSITE LAND, ACRES	5560
LATITUDE, DEG MIN SEC	041 14 48	DISPL.EXCAVATION SPOIL,MIL CU YRD	DATA NOT AVAILABLE
LONGITUDE, DEG MIN SEC	088 43 58	DREDGE SPOIL, MIL CU YRD	DATA NOT AVAILABLE
DOCKET NUMBER	50373	AVG. CONSTRUCTION PERSONNEL	1500
LICENSING ACTION	UNDER CONSTRUCTION	OPERATING PERSONNEL	180
DATE OF LICENSING ACTION	09 10 73	NOBLE GAS AIR RELEASE, CURIES/YR	64000
NSSS TYPE	BWR	I-131 AIR RELEASE, CURIES/YR	1.16
NO.NUCLEAR UNITS INFO. APPL	2	LIQ. EFFLUENT(NON-H3), CURIES/YR	6
TOTAL THERMAL CAPACITY, MWT	6584	TRITIUM LIQUID RELEASE, CURIES/YR	40
TOTAL ELECTRICAL CAPACITY,MWE	2156	CS-137 LIQ. EFFLUENT, CURIES/YR	0.064
ADDITIONAL UNITS ONSITE	NO	DIRECT RADIATION AT SITE BOUNDARY,MR/YR	DATA NOT AVAILABLE
TALLEST STRUCTURE, FEET	DATA NOT AVAILABLE	MAX. GAS STORAGE, CURIES	10542
COOLING SYSTEM TYPE	COOLING POND/CANAL	MAX. LIQUID STORAGE, CURIES	DATA NOT AVAILABLE
PLANT LIFETIME, YEARS	40	RADIOACTIVE SOLID WASTE, CURIES/YR	5400
SOURCE WATERBODY	RIVER, NONTIDAL	RADIOACTIVE SOLID WASTE VOL.,DRUMS/YR	3000
RECEIVING WATERBODY	RIVER, NONTIDAL	MAX. HEAT TO ATMOS.,BBTU/HR	15
LAND ACREAGE OF STATION FACILITIES	4510	MAX. HEAT TO REC. WATER, BBTU/HR	0.436
TOTAL LAND ACREAGE OF SITE	6860	TREATMENT CHEMICALS, LBS/YR	
OFFSITE ACREAGE, TRANSMISSION LINES	2280	BIOCIDES	
OFFSITE ACREAGE, ACCESS ROADWAY	0.0	SODIUM HYPOCHLORITE	110000
OFFSITE ACREAGE, ACCESS RAILWAY	120		
MIN. DISTANCE TO SITE BOUNDARY, FT	1450		
MIN. DIST. LARG. DIFFUSION FACTOR,FT	1450		
INTAKE LOCATION	SHORELINE/RIVERBANK		
COOLING SYSTEM WITHDRAWAL,CU FT/SEC	88.8	CORROSION AND SCALE INHIBITORS	
SERVICE WATER WITHDRAWAL, CU FT/SEC	0.26		
APPROACH VELOCITY, FEET PER SECOND	DATA NOT AVAILABLE		
SCREEN VELOCITY, FEET PER SECOND	DATA NOT AVAILABLE		
INTAKE SCREEN MESH, INCHES	DATA NOT AVAILABLE		
COOLING SYSTEM EVAPORATION,CU FT/SEC	36.6		
SERVICE WATER EVAPORATION,CU FT/SEC	DATA NOT AVAILABLE	CLEANING AND NEUTRALIZING COMPOUNDS	
DRIFT, PERCENT	NOT APPLICABLE	SODIUM HYDROXIDE	320000
DISCHARGE LOCATION	SHORELINE	SULFURIC ACID	520000
DISCHARGE TYPE	EFFLUENT PIPE	DETERGENTS, MISC.	2000
COOLING SYSTEM DISCHARGE, CU FT/SEC	66.6	SODIUM PHOSPHATE, ORTHO, ANHYDROUS	1000
SERVICE WATER DISCHARGE, CU FT/SEC	DATA NOT AVAILABLE		
DISCHARGE VELOCITY, FEET PER SECOND	DATA NOT AVAILABLE	CHEMICAL EFFLUENTS, PPM	
DISCHARGE EFFECTIVE AREA, SQ FT	DATA NOT AVAILABLE	TOTAL RESIDUAL CHLORINE	0.002
COND. COOLING WATER FLOW,CU FT/SEC	2674	FREE AVAILABLE CHLORINE	0.0
RETURN COND. TDS RATIO	1.28	TOTAL CHROMIUM	DATA NOT AVAILABLE
NO. CONDENSER COOLING TOWERS	0.0	TOTAL COPPER	DATA NOT AVAILABLE
COOLING TOWER HEIGHT, FT	NOT APPLICABLE	TOTAL IRON	DATA NOT AVAILABLE
COOLING TOWER EXIT DIAM.,FT	NOT APPLICABLE	TOTAL NICKEL	DATA NOT AVAILABLE
COOLING RANGE, DEG. F	NOT APPLICABLE	TOTAL ZINC	DATA NOT AVAILABLE
COOLING TOWER EXIT VELOCITY, FT/SEC	NOT APPLICABLE	TOTAL PHOSPHORUS (AS P)	0.3
COOLING TOWER DROPLET SIZE, MICRONS	NOT APPLICABLE	SULFATE	DATA NOT AVAILABLE
CONDENSER TEMP.RISE, DEG. F	24	OIL AND GREASE	DATA NOT AVAILABLE
COOLING SYSTEM TRANSIT TIME, MIN.	DATA NOT AVAILABLE	DISSOLVED OXYGEN	DATA NOT AVAILABLE
EFFLUENT TEMP. ABOVE AMBIENT,DEG F	29	TOTAL DISSOLVED SOLIDS	570
NOISE AT BOUNDARY, DECIBELS	DATA NOT AVAILABLE	TOTAL SUSPENDED SOLIDS	DATA NOT AVAILABLE
		BOD5 DAY	

NOTES:

ID: LIMERICK STN 1,2, PHILADELPHIA EL., COUNTY OF MONTGOMERY, STATE OF PA

MAJOR RIVER BASIN	NORTH ATLANTIC
LATITUDE, DEG MIN SEC	040 13 27
LONGITUDE, DEG MIN SEC	075 35 15
DOCKET NUMBER	50352
LICENSING ACTION	UNDER CONSTRUCTION
DATE OF LICENSING ACTION	06 19 74
NSSS TYPE	BWR
NO.NUCLEAR UNITS INFO. APPL	2
TOTAL THERMAL CAPACITY, MWT	6586
TOTAL ELECTRICAL CAPACITY,MWE	2130
ADDITIONAL UNITS ONSITE	NO
TALLEST STRUCTURE, FEET	509
COOLING SYSTEM TYPE	NATURAL DRAFT, WET COOLING TOWER
PLANT LIFETIME, YEARS	30
SOURCE WATERBODY	RIVER, TIDAL
RECEIVING WATERBODY	RIVER, TIDAL
LAND ACREAGE OF STATION FACILITIES	85
TOTAL LAND ACREAGE OF SITE	587
OFFSITE ACREAGE, TRANSMISSION LINES	7
OFFSITE ACREAGE, ACCESS ROADWAY	0.0
OFFSITE ACREAGE, ACCESS RAILWAY	0.0
MIN. DISTANCE TO SITE BOUNDARY, FT	2100
MIN. DIST. LARG. DIFFUSION FACTOR,FT	2100
INTAKE LOCATION	SHORELINE/RIVERBANK
COOLING SYSTEM WITHDRAWAL,CU FT/SEC	74
SERVICE WATER WITHDRAWAL, CU FT/SEC	0.0
APPROACH VELOCITY, FEET PER SECOND	0.75
SCREEN VELOCITY, FEET PER SECOND	0.75
INTAKE SCREEN MESH, INCHES	0.25
COOLING SYSTEM EVAPORATION,CU FT/SEC	54
SERVICE WATER EVAPORATION,CU FT/SEC	DATA NOT AVAILABLE
DRIFT, PERCENT	0.003
DISCHARGE LOCATION	OFFSHORE, SUBMERGED
DISCHARGE TYPE	DIFFUSER PIPE
COOLING SYSTEM DISCHARGE, CU FT/SEC	20
SERVICE WATER DISCHARGE, CU FT/SEC	0.0
DISCHARGE VELOCITY, FEET PER SECOND	9.2
DISCHARGE EFFECTIVE AREA, SQ FT	2.2
COND. COOLING WATER FLOW,CU FT/SEC.	2014
RETURN COND. TDS RATIO	3.67
NO. CONDENSER COOLING TOWERS	2
COOLING TOWER HEIGHT, FT	507
COOLING TOWER EXIT DIAM.,FT	219
COOLING RANGE, DEG. F	33.4
COOLING TOWER EXIT VELOCITY, FT/SEC	20
COOLING TOWER DROPLET SIZE, MICRONS	DATA NOT AVAILABLE
CONDENSER TEMP.RISE, DEG. F	34.8
COOLING SYSTEM TRANSIT TIME, MIN.	NOT APPLICABLE
EFFLUENT TEMP. ABOVE AMBIENT,DEG F	24.7
NOISE AT BOUNDARY, DECIBELS	50

DISRUPTED ONSITE LAND, ACRES	264
DISPL.EXCAVATION SPOIL,MIL CU YRD	DATA NOT AVAILABLE
DREDGE SPOIL, MIL CU YRD	DATA NOT AVAILABLE
AVG. CONSTRUCTION PERSONNEL	1712
OPERATING PERSONNEL	150
NOBLE GAS AIR RELEASE, CURIES/YR	7656
I-131 AIR RELEASE, CURIES/YR	0.0156
LIQ. EFFLUENT(NON-H3), CURIES/YR	2
TRITIUM LIQUID RELEASE, CURIES/YR	40
CS-137 LIQ. EFFLUENT, CURIES/YR	0.21
DIRECT RADIATION AT SITE BOUNDARY,MR/YR	87.6
MAX. GAS STORAGE, CURIES	DATA NOT AVAILABLE
MAX. LIQUID STORAGE, CURIES	DATA NOT AVAILABLE
RADIOACTIVE SOLID WASTE, CURIES/YR	3200
RADIOACTIVE SOLID WASTE VOL.,DRUMS/YR	1496
MAX. HEAT TO ATMOS.,BBTU/HR	15.8
MAX. HEAT TO REC. WATER, BBTU/HR	0.11
TREATMENT CHEMICALS, LBS/YR	
BIOCIDES	
CHLORINE	7900
CORROSION AND SCALE INHIBITORS	
SULFURIC ACID	9500000
CLEANING AND NEUTRALIZING COMPOUNDS	
SULFURIC ACID	66000
SODIUM HYDROXIDE	400000
MAGNIFLOC 990N (PROP CLARIFIER)	1300
CHEMICAL EFFLUENTS, PPM	
TOTAL RESIDUAL CHLORINE	DATA NOT AVAILABLE
FREE AVAILABLE CHLORINE	DATA NOT AVAILABLE
TOTAL CHROMIUM	DATA NOT AVAILABLE
TOTAL COPPER	DATA NOT AVAILABLE
TOTAL IRON	DATA NOT AVAILABLE
TOTAL NICKEL	DATA NOT AVAILABLE
TOTAL ZINC	DATA NOT AVAILABLE
TOTAL PHOSPHORUS (AS P)	DATA NOT AVAILABLE
SULFATE	5.9
OIL AND GREASE	DATA NOT AVAILABLE
DISSOLVED OXYGEN	DATA NOT AVAILABLE
TOTAL DISSOLVED SOLIDS	1100
TOTAL SUSPENDED SOLIDS	DATA NOT AVAILABLE
BOD5 DAY	DATA NOT AVAILABLE

NOTES:

ID: MAINE YANKEE, MAINE YANKEE CO, COUNTY OF LINCOLN, STATE OF ME

MAJOR RIVER BASIN	NORTHEAST	DISRUPTED ONSITE LAND, ACRES	100
LATITUDE, DEG MIN SEC	043 57 01	DISPL.EXCAVATION SPOIL,MIL CU YRD	DATA NOT AVAILABLE
LONGITUDE, DEG MIN SEC	069 41 47	DREDGE SPOIL, MIL CU YRD	0.1
DOCKET NUMBER	50309	AVG. CONSTRUCTION PERSONNEL	1000
LICENSING ACTION	OPERATING	OPERATING PERSONNEL	DATA NOT AVAILABLE
DATE OF LICENSING ACTION	09 15 72	NOBLE GAS AIR RELEASE, CURIES/YR	2746
NSSS TYPE	PWR	I-131 AIR RELEASE, CURIES/YR	0.62
NO.NUCLEAR UNITS INFO. APPL	1	LIQ. EFFLUENT(NON-H3), CURIES/YR	10
TOTAL THERMAL CAPACITY, MWT	2440	TRITIUM LIQUID RELEASE, CURIES/YR	1000
TOTAL ELECTRICAL CAPACITY,MWE	790	CS-137 LIQ. EFFLUENT, CURIES/YR	0.31
ADDITIONAL UNITS ONSITE	NO	DIRECT RADIATION AT SITE BOUNDARY,MR/YR	DATA NOT AVAILABLE
TALLEST STRUCTURE, FEET	DATA NOT AVAILABLE	MAX. GAS STORAGE, CURIES	2153
COOLING SYSTEM TYPE	ONCE-THROUGH	MAX. LIQUID STORAGE, CURIES	DATA NOT AVAILABLE
PLANT LIFETIME, YEARS	40	RADIOACTIVE SOLID WASTE, CURIES/YR	DATA NOT AVAILABLE
SOURCE WATERBODY	ESTUARY, STRATIFIED	RADIOACTIVE SOLID WASTE VOL.,DRUMS/YR	200
RECEIVING WATERBODY	ESTUARY, STRATIFIED	MAX. HEAT TO ATMOS.,BBTU/HR	0.0
LAND ACREAGE OF STATION FACILITIES	30	MAX. HEAT TO REC. WATER, BBTU/HR	5.46
TOTAL LAND ACREAGE OF SITE	740	TREATMENT CHEMICALS, LBS/YR	
OFFSITE ACREAGE, TRANSMISSION LINES	220	BIOCIDES	
OFFSITE ACREAGE, ACCESS ROADWAY	0.0	CHLORINE	7.6
OFFSITE ACREAGE, ACCESS RAILWAY	5		
MIN. DISTANCE TO SITE BOUNDARY, FT	2000		
MIN. DIST. LARG. DIFFUSION FACTOR,FT	2000		
INTAKE LOCATION	SHORELINE/RIVERBANK		
COOLING SYSTEM WITHDRAWAL,CU FT/SEC	950	CORROSION AND SCALE INHIBITORS	
SERVICE WATER WITHDRAWAL, CU FT/SEC	DATA NOT AVAILABLE	SODIUM PHOSPHATE, ORTHO, ANHYDROUS	548
APPROACH VELOCITY, FEET PER SECOND	1.25	FERROUS SULFATE	219000
SCREEN VELOCITY, FEET PER SECOND	1.25	MORPHOLINE	21.9
INTAKE SCREEN MESH, INCHES	0.375	HYDRAZINE	11
COOLING SYSTEM EVAPORATION,CU FT/SEC	DATA NOT AVAILABLE	BORIC ACID	814
SERVICE WATER EVAPORATION,CU FT/SEC	DATA NOT AVAILABLE	CLEANING AND NEUTRALIZING COMPOUNDS	
DRIFT, PERCENT	0.0	ALUMINUM SULFATE	15300
DISCHARGE LOCATION	OUTLET OR BAY	SODIUM HYDROXIDE	13100
DISCHARGE TYPE	PIT TO WEIR INTO COVE	SULFURIC ACID	5290
COOLING SYSTEM DISCHARGE, CU FT/SEC	950	SODIUM HYPOCHLORITE	2560
SERVICE WATER DISCHARGE, CU FT/SEC	DATA NOT AVAILABLE	MAGNIFLOC 990N (PROP. CLARIFIER)	256
DISCHARGE VELOCITY, FEET PER SECOND	DATA NOT AVAILABLE	CHEMICAL EFFLUENTS, PPM	
DISCHARGE EFFECTIVE AREA, SQ FT	DATA NOT AVAILABLE	TOTAL RESIDUAL CHLORINE	0.000005
COND. COOLING WATER FLOW,CU FT/SEC	NOT APPLICABLE	FREE AVAILABLE CHLORINE	DATA NOT AVAILABLE
RETURN COND. TDS RATIO	DATA NOT AVAILABLE	TOTAL CHROMIUM	DATA NOT AVAILABLE
NO. CONDENSER COOLING TOWERS	0.0	TOTAL COPPER	DATA NOT AVAILABLE
COOLING TOWER HEIGHT, FT	NOT APPLICABLE	TOTAL IRON	0.25
COOLING TOWER EXIT DIAM.,FT	NOT APPLICABLE	TOTAL NICKEL	DATA NOT AVAILABLE
COOLING RANGE, DEG. F	NOT APPLICABLE	TOTAL ZINC	DATA NOT AVAILABLE
COOLING TOWER EXIT VELOCITY, FT/SEC	NOT APPLICABLE	TOTAL PHOSPHORUS (AS P)	0.000055
COOLING TOWER DROPLET SIZE, MICRONS	NOT APPLICABLE	SULFATE	0.29
CONDENSER TEMP.RISE, DEG. F	25.6	OIL AND GREASE	DATA NOT AVAILABLE
COOLING SYSTEM TRANSIT TIME, MIN.	2.5	DISSOLVED OXYGEN	DATA NOT AVAILABLE
EFFLUENT TEMP. ABOVE AMBIENT,DEG F	DATA NOT AVAILABLE	TOTAL DISSOLVED SOLIDS	DATA NOT AVAILABLE
NOISE AT BOUNDARY, DECIBELS	DATA NOT AVAILABLE	TOTAL SUSPENDED SOLIDS	DATA NOT AVAILABLE
		BOD5 DAY	DATA NOT AVAILABLE

NOTES:

ID: MCGUIRE STN 1&2, DUKE POWER CO., COUNTY OF MECKLENBURG, STATE OF NC

MAJOR RIVER BASIN	SOUTHEAST
LATITUDE, DEG MIN SEC	035 25 59
LONGITUDE, DEG MIN SEC	080 56 55
DOCKET NUMBER	50369
LICENSING ACTION	UNDER CONSTRUCTION
DATE OF LICENSING ACTION	02 28 73
NSSS TYPE	PWR
NO.NUCLEAR UNITS INFO. APPL	2
TOTAL THERMAL CAPACITY, MWT	6822
TOTAL ELECTRICAL CAPACITY,MWE	2360
ADDITIONAL UNITS ONSITE	NO
TALLEST STRUCTURE, FEET	300
COOLING SYSTEM TYPE	ONCE-THROUGH
PLANT LIFETIME, YEARS	40
SOURCE WATERBODY	RESERVOIR
RECEIVING WATERBODY	RESERVOIR
LAND ACREAGE OF STATION FACILITIES	90
TOTAL LAND ACREAGE OF SITE	180
OFFSITE ACREAGE, TRANSMISSION LINES	40
OFFSITE ACREAGE, ACCESS ROADWAY	0.0
OFFSITE ACREAGE, ACCESS RAILWAY	2.4
MIN. DISTANCE TO SITE BOUNDARY, FT	415
MIN. DIST. LARG. DIFFUSION FACTOR,FT	415
INTAKE LOCATION	SHORELINE/RIVERBANK
COOLING SYSTEM WITHDRAWAL,CU FT/SEC	4520
SERVICE WATER WITHDRAWAL, CU FT/SEC	200
APPROACH VELOCITY, FEET PER SECOND	0.84
SCREEN VELOCITY, FEET PER SECOND	1.4
INTAKE SCREEN MESH, INCHES	DATA NOT AVAILABLE
COOLING SYSTEM EVAPORATION,CU FT/SEC	38
SERVICE WATER EVAPORATION,CU FT/SEC	DATA NOT AVAILABLE
DRIFT, PERCENT	0.0
DISCHARGE LOCATION	CANAL
DISCHARGE TYPE	DIFFUSER PIPE
COOLING SYSTEM DISCHARGE, CU FT/SEC	4310
SERVICE WATER DISCHARGE, CU FT/SEC	200
DISCHARGE VELOCITY, FEET PER SECOND	7.91
DISCHARGE EFFECTIVE AREA, SQ FT	570
COND. COOLING WATER FLOW,CU FT/SEC.	8620
RETURN COND. TDS RATIO	NOT APPLICABLE
NO. CONDENSER COOLING TOWERS	0.0
COOLING TOWER HEIGHT, FT	NOT APPLICABLE
COOLING TOWER EXIT DIAM.,FT	NOT APPLICABLE
COOLING RANGE, DEG. F	NOT APPLICABLE
COOLING TOWER EXIT VELOCITY, FT/SEC	NOT APPLICABLE
COOLING TOWER DROPLET SIZE, MICRONS	NOT APPLICABLE
CONDENSER TEMP.RISE, DEG. F	32
COOLING SYSTEM TRANSIT TIME, MIN.	4.5
EFFLUENT TEMP. ABOVE AMBIENT,DEG F	35
NOISE AT BOUNDARY, DECIBELS	DATA NOT AVAILABLE

DISRUPTED ONSITE LAND, ACRES	340
DISPL.EXCAVATION SPOIL,MIL CU YRD	0.95
DREDGE SPOIL, MIL CU YRD	0.165
AVG. CONSTRUCTION PERSONNEL	1360
OPERATING PERSONNEL	66
NOBLE GAS AIR RELEASE, CURIES/YR	10000
I-131 AIR RELEASE, CURIES/YR	0.2
LIQ. EFFLUENT(NON-H3), CURIES/YR	10
TRITIUM LIQUID RELEASE, CURIES/YR	2000
CS-137 LIQ. EFFLUENT, CURIES/YR	0.12
DIRECT RADIATION AT SITE BOUNDARY,MR/YR	0.0
MAX. GAS STORAGE, CURIES	DATA NOT AVAILABLE
MAX. LIQUID STORAGE, CURIES	DATA NOT AVAILABLE
RADIOACTIVE SOLID WASTE, CURIES/YR	800000
RADIOACTIVE SOLID WASTE VOL.,DRUMS/YR	215
MAX. HEAT TO ATMOS.,BBTU/HR	0.0
MAX. HEAT TO REC. WATER, BBTU/HR	15.36
TREATMENT CHEMICALS, LBS/YR	
BIOCIDES	
CHLORINE	70
CORROSION AND SCALE INHIBITORS	
AMMONIUM HYDROXIDE	13000
SODIUM NITRITE	AMOUNT NOT AVAILABLE
DETERGENTS, MISC.	9900
CLEANING AND NEUTRALIZING COMPOUNDS	
SODIUM HYDROXIDE	140000
SULFURIC ACID	89000
BORIC ACID	36000
LITHIUM HYDROXIDE	22
HYDRAZINE	400
CHEMICAL EFFLUENTS, PPM	
TOTAL RESIDUAL CHLORINE	DATA NOT AVAILABLE
FREE AVAILABLE CHLORINE	DATA NOT AVAILABLE
TOTAL CHROMIUM	DATA NOT AVAILABLE
TOTAL COPPER	DATA NOT AVAILABLE
TOTAL IRON	DATA NOT AVAILABLE
TOTAL NICKEL	DATA NOT AVAILABLE
TOTAL ZINC	DATA NOT AVAILABLE
TOTAL PHOSPHORUS (AS P)	DATA NOT AVAILABLE
SULFATE	DATA NOT AVAILABLE
OIL AND GREASE	DATA NOT AVAILABLE
DISSOLVED OXYGEN	4
TOTAL DISSOLVED SOLIDS	DATA NOT AVAILABLE
TOTAL SUSPENDED SOLIDS	DATA NOT AVAILABLE
BOD5 DAY	DATA NOT AVAILABLE

NOTES:

ID: OCONEE STN 1,2,3, DUKE POWER CO., COUNTY OF OCONEE, STATE OF SC

MAJOR RIVER BASIN	SOUTHEAST	DISRUPTED ONSITE LAND, ACRES	510
LATITUDE, DEG MIN SEC	034 45 00	DISPL.EXCAVATION SPOIL,MIL CU YRD	DATA NOT AVAILABLE
LONGITUDE, DEG MIN SEC	083 02 45	DREDGE SPOIL, MIL CU YRD	DATA NOT AVAILABLE
DOCKET NUMBER	50269	AVG. CONSTRUCTION PERSONNEL	1620
LICENSING ACTION	OPERATING	OPERATING PERSONNEL	DATA NOT AVAILABLE
DATE OF LICENSING ACTION	02 06 73	NOBLE GAS AIR RELEASE, CURIES/YR	15575
NSSS TYPE	PWR	I-131 AIR RELEASE, CURIES/YR	0.8
NO.NUCLEAR UNITS INFO. APPL	3	LIQ. EFFLUENT(NON-H3), CURIES/YR	3
TOTAL THERMAL CAPACITY, MWT	7704	TRITIUM LIQUID RELEASE, CURIES/YR	3000
TOTAL ELECTRICAL CAPACITY,MWE	2658	CS-137 LIQ. EFFLUENT, CURIES/YR	0.044
ADDITIONAL UNITS ONSITE	YES, HYDROELECTRIC	DIRECT RADIATION AT SITE BOUNDARY,MR/YR	DATA NOT AVAILABLE
TALLEST STRUCTURE, FEET	200	MAX. GAS STORAGE, CURIES	8744
COOLING SYSTEM TYPE	ONCE-THROUGH	MAX. LIQUID STORAGE, CURIES	DATA NOT AVAILABLE
PLANT LIFETIME, YEARS	40	RADIOACTIVE SOLID WASTE, CURIES/YR	200000
SOURCE WATERBODY	RESERVOIR	RADIOACTIVE SOLID WASTE VOL.,DRUMS/YR	640
RECEIVING WATERBODY	RESERVOIR	MAX. HEAT TO ATMOS.,BBTU/HR	1
LAND ACREAGE OF STATION FACILITIES	33	MAX. HEAT TO REC. WATER, BBTU/HR	16.2
TOTAL LAND ACREAGE OF SITE	2010	TREATMENT CHEMICALS, LBS/YR	
OFFSITE ACREAGE, TRANSMISSION LINES	7800	BIOCIDES	
OFFSITE ACREAGE, ACCESS ROADWAY	0.0	CHLORINE	16
OFFSITE ACREAGE, ACCESS RAILWAY	17		
MIN. DISTANCE TO SITE BOUNDARY, FT	5280		
MIN. DIST. LARG. DIFFUSION FACTOR,FT	5280		
INTAKE LOCATION	CANAL		
COOLING SYSTEM WITHDRAWAL,CU FT/SEC	4500	CORROSION AND SCALE INHIBITORS	
SERVICE WATER WITHDRAWAL, CU FT/SEC	233	HYDRAZINE	5780
APPROACH VELOCITY, FEET PER SECOND	3.5		
SCREEN VELOCITY, FEET PER SECOND	1		
INTAKE SCREEN MESH, INCHES	0.375		
COOLING SYSTEM EVAPORATION,CU FT/SEC	55		
SERVICE WATER EVAPORATION,CU FT/SEC	DATA NOT AVAILABLE	CLEANING AND NEUTRALIZING COMPOUNDS	
DRIFT, PERCENT	0.0	SODIUM HYDROXIDE	443000
DISCHARGE LOCATION	CANAL	SULFURIC ACID	150000
DISCHARGE TYPE	EFFLUENT PIPE	LITHIUM HYDROXIDE	180
COOLING SYSTEM DISCHARGE, CU FT/SEC	4500	BORIC ACID	53
SERVICE WATER DISCHARGE, CU FT/SEC	233	DETERGENTS, MISC.	15000
DISCHARGE VELOCITY, FEET PER SECOND	4	CHEMICAL EFFLUENTS, PPM	
DISCHARGE EFFECTIVE AREA, SQ FT	1200	TOTAL RESIDUAL CHLORINE	0.00026
COND. COOLING WATER FLOW,CU FT/SEC.	NOT APPLICABLE	FREE AVAILABLE CHLORINE	DATA NOT AVAILABLE
RETURN COND. TDS RATIO	NOT APPLICABLE	TOTAL CHROMIUM	DATA NOT AVAILABLE
NO. CONDENSER COOLING TOWERS	0.0	TOTAL COPPER	DATA NOT AVAILABLE
COOLING TOWER HEIGHT, FT	NOT APPLICABLE	TOTAL IRON	DATA NOT AVAILABLE
COOLING TOWER EXIT DIAM.,FT	NOT APPLICABLE	TOTAL NICKEL	DATA NOT AVAILABLE
COOLING RANGE, DEG. F	NOT APPLICABLE	TOTAL ZINC	DATA NOT AVAILABLE
COOLING TOWER EXIT VELOCITY, FT/SEC	NOT APPLICABLE	TOTAL PHOSPHORUS (AS P)	DATA NOT AVAILABLE
COOLING TOWER DROPLET SIZE, MICRONS	NOT APPLICABLE	SULFATE	0.067
CONDENSER TEMP.RISE, DEG. F	17.6	OIL AND GREASE	DATA NOT AVAILABLE
COOLING SYSTEM TRANSIT TIME, MIN.	3.47	DISSOLVED OXYGEN	0.7
EFFLUENT TEMP. ABOVE AMBIENT,DEG F	30	TOTAL DISSOLVED SOLIDS	DATA NOT AVAILABLE
NOISE AT BOUNDARY, DECIBELS	DATA NOT AVAILABLE	TOTAL SUSPENDED SOLIDS	DATA NOT AVAILABLE
		BOD5 DAY	0.0

ID: PALISADES PLANT, CONSUMERS POWER, COUNTY OF VAN BUREN, STATE OF MI

MAJOR RIVER BASIN	WESTERN GREAT LAKES
LATITUDE, DEG MIN SEC	042 19 24
LONGITUDE, DEG MIN SEC	086 18 51
DOCKET NUMBER	50255
LICENSING ACTION	OPERATING
DATE OF LICENSING ACTION	03 24 71
NSSS TYPE	PWR
NO.NUCLEAR UNITS INFO. APPL	1
TOTAL THERMAL CAPACITY, MWT	2200
TOTAL ELECTRICAL CAPACITY,MWE	700
ADDITIONAL UNITS ONSITE	NO
TALLEST STRUCTURE, FEET	213
COOLING SYSTEM TYPE	MECHANICAL DRAFT, WET COOLING TOWER
PLANT LIFETIME, YEARS	40
SOURCE WATERBODY	LAKE
RECEIVING WATERBODY	LAKE
LAND ACREAGE OF STATION FACILITIES	32
TOTAL LAND ACREAGE OF SITE	487
OFFSITE ACREAGE, TRANSMISSION LINES	2255
OFFSITE ACREAGE, ACCESS ROADWAY	0.0
OFFSITE ACREAGE, ACCESS RAILWAY	13
MIN. DISTANCE TO SITE BOUNDARY, FT	300
MIN. DIST. LARG. DIFFUSION FACTOR,FT	2400
INTAKE LOCATION	OFFSHORE, SUBMERGED
COOLING SYSTEM WITHDRAWAL,CU FT/SEC	30.4
SERVICE WATER WITHDRAWAL, CU FT/SEC	33.3
APPROACH VELOCITY, FEET PER SECOND	0.0
SCREEN VELOCITY, FEET PER SECOND	0.6
INTAKE SCREEN MESH, INCHES	0.375
COOLING SYSTEM EVAPORATION,CU FT/SEC	27
SERVICE WATER EVAPORATION,CU FT/SEC	DATA NOT AVAILABLE
DRIFT, PERCENT	0.21
DISCHARGE LOCATION	SHORELINE
DISCHARGE TYPE	CANAL
COOLING SYSTEM DISCHARGE, CU FT/SEC	133.2
SERVICE WATER DISCHARGE, CU FT/SEC	30.3
DISCHARGE VELOCITY, FEET PER SECOND	0.3
DISCHARGE EFFECTIVE AREA, SQ FT	444
COND. COOLING WATER FLOW,CU FT/SEC	870
RETURN COND. TDS RATIO	3.5
NO. CONDENSER COOLING TOWERS	2
COOLING TOWER HEIGHT, FT	50
COOLING TOWER EXIT DIAM.,FT	NOT APPLICABLE
COOLING RANGE, DEG. F	26
COOLING TOWER EXIT VELOCITY, FT/SEC	DATA NOT AVAILABLE
COOLING TOWER DROPLET SIZE, MICRONS	DATA NOT AVAILABLE
CONDENSER TEMP.RISE, DEG. F	28
COOLING SYSTEM TRANSIT TIME, MIN.	0.42
EFFLUENT TEMP. ABOVE AMBIENT,DEG F	5
NOISE AT BOUNDARY, DECIBELS	DATA NOT AVAILABLE

DISRUPTED ONSITE LAND, ACRES	37.3
DISPL.EXCAVATION SPOIL,MIL CU YRD	DATA NOT AVAILABLE
DREDGE SPOIL, MIL CU YRD	DATA NOT AVAILABLE
AVG. CONSTRUCTION PERSONNEL	DATA NOT AVAILABLE
OPERATING PERSONNEL	33
NOBLE GAS AIR RELEASE, CURIES/YR	4179
I-131 AIR RELEASE, CURIES/YR	0.79
LIQ. EFFLUENT(NON-H3), CURIES/YR	115.5
TRITIUM LIQUID RELEASE, CURIES/YR	1000
CS-137 LIQ. EFFLUENT, CURIES/YR	2.97
DIRECT RADIATION AT SITE BOUNDARY,MR/YR	DATA NOT AVAILABLE
MAX. GAS STORAGE, CURIES	1068
MAX. LIQUID STORAGE, CURIES	DATA NOT AVAILABLE
RADIOACTIVE SOLID WASTE, CURIES/YR	DATA NOT AVAILABLE
RADIOACTIVE SOLID WASTE VOL.,DRUMS/YR	1360
MAX. HEAT TO ATMOS.,BBTU/HR	55.8
MAX. HEAT TO REC. WATER, BBTU/HR	4.9
TREATMENT CHEMICALS, LBS/YR	
BIOCIDES	
SODIUM HYPOCHLORITE	AMOUNT NOT AVAILABLE
CORROSION AND SCALE INHIBITORS	
PHOSPHATES AND POLYPHOSPHATES	AMOUNT NOT AVAILABLE
ZINC PHOSPHATE	AMOUNT NOT AVAILABLE
CLEANING AND NEUTRALIZING COMPOUNDS	
LITHIUM	AMOUNT NOT AVAILABLE
AMMONIA	AMOUNT NOT AVAILABLE
SODIUM HYDROXIDE	AMOUNT NOT AVAILABLE
BORIC ACID	AMOUNT NOT AVAILABLE
HYDRAZINE	AMOUNT NOT AVAILABLE
CHEMICAL EFFLUENTS, PPM	
TOTAL RESIDUAL CHLORINE	0.022
FREE AVAILABLE CHLORINE	10.7
TOTAL CHROMIUM	DATA NOT AVAILABLE
TOTAL COPPER	DATA NOT AVAILABLE
TOTAL IRON	0.1
TOTAL NICKEL	DATA NOT AVAILABLE
TOTAL ZINC	0.036
TOTAL PHOSPHORUS (AS P)	0.09
SULFATE	48.9
OIL AND GREASE	DATA NOT AVAILABLE
DISSOLVED OXYGEN	DATA NOT AVAILABLE
TOTAL DISSOLVED SOLIDS	DATA NOT AVAILABLE
TOTAL SUSPENDED SOLIDS	DATA NOT AVAILABLE
BOD5 DAY	1280

NOTES:

ID: PEACH BOTTOM 2,3, PHILADELPHIA EL., COUNTY OF YORK, STATE OF PA

MAJOR RIVER BASIN	NORTH ATLANTIC
LATITUDE, DEG MIN SEC	039 45 33
LONGITUDE, DEG MIN SEC	076 16 08
DOCKET NUMBER	50277
LICENSING ACTION	OPERATING
DATE OF LICENSING ACTION	08 08 73
NSSS TYPE	BWR
NO.NUCLEAR UNITS INFO. APPL	2
TOTAL THERMAL CAPACITY, MWT	6586
TOTAL ELECTRICAL CAPACITY,MWE	2130
ADDITIONAL UNITS ONSITE	YES, NUCLEAR
TALLEST STRUCTURE, FEET	500
COOLING SYSTEM TYPE	ONCE-THROUGH, COOLING TOWER HELPER
PLANT LIFETIME, YEARS	30
SOURCE WATERBODY	RESERVOIR
RECEIVING WATERBODY	RESERVOIR
LAND ACREAGE OF STATION FACILITIES	80
TOTAL LAND ACREAGE OF SITE	620
OFFSITE ACREAGE, TRANSMISSION LINES	1030
OFFSITE ACREAGE, ACCESS ROADWAY	0.0
OFFSITE ACREAGE, ACCESS RAILWAY	DATA NOT AVAILABLE
MIN. DISTANCE TO SITE BOUNDARY, FT	300
MIN. DIST. LARG. DIFFUSION FACTOR,FT	300
INTAKE LOCATION	SHORELINE/RIVERBANK
COOLING SYSTEM WITHDRAWAL,CU FT/SEC	3350
SERVICE WATER WITHDRAWAL, CU FT/SEC	DATA NOT AVAILABLE
APPROACH VELOCITY, FEET PER SECOND	0.0
SCREEN VELOCITY, FEET PER SECOND	0.75
INTAKE SCREEN MESH, INCHES	0.375
COOLING SYSTEM EVAPORATION,CU FT/SEC	50
SERVICE WATER EVAPORATION,CU FT/SEC	DATA NOT AVAILABLE
DRIFT, PERCENT	0.2
DISCHARGE LOCATION	SHORELINE
DISCHARGE TYPE	SUBSURFACE DISCHARGE PORT
COOLING SYSTEM DISCHARGE, CU FT/SEC	3350
SERVICE WATER DISCHARGE, CU FT/SEC	DATA NOT AVAILABLE
DISCHARGE VELOCITY, FEET PER SECOND	8
DISCHARGE EFFECTIVE AREA, SQ FT	419
COND. COOLING WATER FLOW,CU FT/SEC	NOT APPLICABLE
RETURN COND. TDS RATIO	DATA NOT AVAILABLE
NO. CONDENSER COOLING TOWERS	3
COOLING TOWER HEIGHT, FT	53
COOLING TOWER EXIT DIAM.,FT	25
COOLING RANGE, DEG. F	13.8
COOLING TOWER EXIT VELOCITY, FT/SEC	8
COOLING TOWER DROPLET SIZE, MICRONS	DATA NOT AVAILABLE
CONDENSER TEMP.RISE, DEG. F	20.8
COOLING SYSTEM TRANSIT TIME, MIN.	0.23
EFFLUENT TEMP. ABOVE AMBIENT,DEG F	4.2
NOISE AT BOUNDARY, DECIBELS	75

DISRUPTED ONSITE LAND, ACRES	40
DISPL.EXCAVATION SPOIL,MIL CU YRD	DATA NOT AVAILABLE
DREDGE SPOIL, MIL CU YRD	DATA NOT AVAILABLE
AVG. CONSTRUCTION PERSONNEL	3500
OPERATING PERSONNEL	150
NOBLE GAS AIR RELEASE, CURIES/YR	600000
I-131 AIR RELEASE, CURIES/YR	6.6
LIQ. EFFLUENT(NON-H3), CURIES/YR	10
TRITIUM LIQUID RELEASE, CURIES/YR	40
CS-137 LIQ. EFFLUENT, CURIES/YR	0.38
DIRECT RADIATION AT SITE BOUNDARY,MR/YR	2.4
MAX. GAS STORAGE, CURIES	5400
MAX. LIQUID STORAGE, CURIES	DATA NOT AVAILABLE
RADIOACTIVE SOLID WASTE, CURIES/YR	DATA NOT AVAILABLE
RADIOACTIVE SOLID WASTE VOL.,DRUMS/YR	2300
MAX. HEAT TO ATMOS.,BBTU/HR	2.9
MAX. HEAT TO REC. WATER, BBTU/HR	15.2
TREATMENT CHEMICALS, LBS/YR	
BIOCIDES	
CHLORINE	1400000
CORROSION AND SCALE INHIBITORS	
SODIUM PHOSPHATE, ORTHO, ANHYDROUS	17
SODIUM SULFITE	17
CLEANING AND NEUTRALIZING COMPOUNDS	
SODIUM HYDROXIDE	210000
SULFURIC ACID	220000
CHEMICAL EFFLUENTS, PPM	
TOTAL RESIDUAL CHLORINE	1
FREE AVAILABLE CHLORINE	0.5
TOTAL CHROMIUM	DATA NOT AVAILABLE
TOTAL COPPER	DATA NOT AVAILABLE
TOTAL IRON	DATA NOT AVAILABLE
TOTAL NICKEL	DATA NOT AVAILABLE
TOTAL ZINC	DATA NOT AVAILABLE
TOTAL PHOSPHORUS (AS P)	0.00000058
SULFATE	0.034
OIL AND GREASE	DATA NOT AVAILABLE
DISSOLVED OXYGEN	DATA NOT AVAILABLE
TOTAL DISSOLVED SOLIDS	DATA NOT AVAILABLE
TOTAL SUSPENDED SOLIDS	DATA NOT AVAILABLE
BOD5 DAY	DATA NOT AVAILABLE

NOTES:

ID: PERRY PLANT 1,2, CLEVELAND ELEC., COUNTY OF LAKE, STATE OF OH

MAJOR RIVER BASIN	LAKE ERIE
LATITUDE, DEG MIN SEC	041 48 03
LONGITUDE, DEG MIN SEC	081 08 36
DOCKET NUMBER	50440
LICENSING ACTION	CP APPLICATION PENDING
DATE OF LICENSING ACTION	06 25 73
NSSS TYPE	BWR
NO.NUCLEAR UNITS INFO. APPL	2
TOTAL THERMAL CAPACITY, MWT	7158
TOTAL ELECTRICAL CAPACITY,MWE	2410
ADDITIONAL UNITS ONSITE	NO
TALLEST STRUCTURE, FEET	DATA NOT AVAILABLE
COOLING SYSTEM TYPE	ONCE-THROUGH
PLANT LIFETIME, YEARS	30
SOURCE WATERBODY	LAKE
RECEIVING WATERBODY	LAKE
LAND ACREAGE OF STATION FACILITIES	250
TOTAL LAND ACREAGE OF SITE	1100
OFFSITE ACREAGE, TRANSMISSION LINES	1500
OFFSITE ACREAGE, ACCESS ROADWAY	0.0
OFFSITE ACREAGE, ACCESS RAILWAY	12
MIN. DISTANCE TO SITE BOUNDARY, FT	1162
MIN. DIST. LARG. DIFFUSION FACTOR,FT	1162
INTAKE LOCATION	OFFSHORE, SUBMERGED
COOLING SYSTEM WITHDRAWAL,CU FT/SEC	2560
SERVICE WATER WITHDRAWAL, CU FT/SEC	111
APPROACH VELOCITY, FEET PER SECOND	0.5
SCREEN VELOCITY, FEET PER SECOND	DATA NOT AVAILABLE
INTAKE SCREEN MESH, INCHES	0.375
COOLING SYSTEM EVAPORATION,CU FT/SEC	40
SERVICE WATER EVAPORATION,CU FT/SEC	DATA NOT AVAILABLE
DRIFT, PERCENT	NOT APPLICABLE
DISCHARGE LOCATION	OFFSHORE, SUBMERGED
DISCHARGE TYPE	DIFFUSER PIPE
COOLING SYSTEM DISCHARGE, CU FT/SEC	2560
SERVICE WATER DISCHARGE, CU FT/SEC	111
DISCHARGE VELOCITY, FEET PER SECOND	15
DISCHARGE EFFECTIVE AREA, SQ FT	75
COND. COOLING WATER FLOW,CU FT/SEC	NOT APPLICABLE
RETURN COND. TDS RATIO	NOT APPLICABLE
NO. CONDENSER COOLING TOWERS	0.0
COOLING TOWER HEIGHT, FT	NOT APPLICABLE
COOLING TOWER EXIT DIAM.,FT	NOT APPLICABLE
COOLING RANGE, DEG. F	NOT APPLICABLE
COOLING TOWER EXIT VELOCITY, FT/SEC	NOT APPLICABLE
COOLING TOWER DROPLET SIZE, MICRONS	NOT APPLICABLE
CONDENSER TEMP.RISE, DEG. F	32
COOLING SYSTEM TRANSIT TIME, MIN.	DATA NOT AVAILABLE
EFFLUENT TEMP. ABOVE AMBIENT,DEG F	30
NOISE AT BOUNDARY, DECIBELS	DATA NOT AVAILABLE

DISRUPTED ONSITE LAND, ACRES	300
DISPL.EXCAVATION SPOIL,MIL CU YRD	DATA NOT AVAILABLE
DREDGE SPOIL, MIL CU YRD	0.006
AVG. CONSTRUCTION PERSONNEL	2400
OPERATING PERSONNEL	100
NOBLE GAS AIR RELEASE, CURIES/YR	11944
I-131 AIR RELEASE, CURIES/YR	0.7
LIQ. EFFLUENT(NON-H3), CURIES/YR	0.2
TRITIUM LIQUID RELEASE, CURIES/YR	40
CS-137 LIQ. EFFLUENT, CURIES/YR	0.0005
DIRECT RADIATION AT SITE BOUNDARY,MR/YR	228
MAX. GAS STORAGE, CURIES	13548
MAX. LIQUID STORAGE, CURIES	DATA NOT AVAILABLE
RADIOACTIVE SOLID WASTE, CURIES/YR	5400
RADIOACTIVE SOLID WASTE VOL.,DRUMS/YR	1361
MAX. HEAT TO ATMOS.,BBTU/HR	DATA NOT AVAILABLE
MAX. HEAT TO REC. WATER, BBTU/HR	17
TREATMENT CHEMICALS, LBS/YR	
BIOCIDES	
SODIUM HYPOCHLORITE	AMOUNT NOT AVAILABLE
CORROSION AND SCALE INHIBITORS	
CLEANING AND NEUTRALIZING COMPOUNDS	
SODIUM HYDROXIDE	310000
SULFURIC ACID	400000
CHEMICAL EFFLUENTS, PPM	
TOTAL RESIDUAL CHLORINE	0.05
FREE AVAILABLE CHLORINE	0.5
TOTAL CHROMIUM	DATA NOT AVAILABLE
TOTAL COPPER	DATA NOT AVAILABLE
TOTAL IRON	DATA NOT AVAILABLE
TOTAL NICKEL	DATA NOT AVAILABLE
TOTAL ZINC	DATA NOT AVAILABLE
TOTAL PHOSPHORUS (AS P)	5
SULFATE	0.93
OIL AND GREASE	DATA NOT AVAILABLE
DISSOLVED OXYGEN	DATA NOT AVAILABLE
TOTAL DISSOLVED SOLIDS	300
TOTAL SUSPENDED SOLIDS	DATA NOT AVAILABLE
BOD5 DAY	0.85

NOTES:

ID: QUAD-CITIES 1,2, COM ED, IOWA-ILL, COUNTY OF ROCK ISLAND, STATE OF IL

MAJOR RIVER BASIN	UPPER MISSISSIPPI	DISRUPTED ONSITE LAND, ACRES	280
LATITUDE, DEG MIN SEC	041 43 37	DISPL.EXCAVATION SPOIL,MIL CU YRD	DATA NOT AVAILABLE
LONGITUDE, DEG MIN SEC	090 20 30	DREDGE SPOIL, MIL CU YRD	0.187
DOCKET NUMBER	50254	AVG. CONSTRUCTION PERSONNEL	DATA NOT AVAILABLE
LICENSING ACTION	OPERATING	OPERATING PERSONNEL	180
DATE OF LICENSING ACTION	10 01 71	NOBLE GAS AIR RELEASE, CURIES/YR	318000
NSSS TYPE	BWR	I-131 AIR RELEASE, CURIES/YR	0.92
NO.NUCLEAR UNITS INFO. APPL	2	LIQ. EFFLUENT(NON-H3), CURIES/YR	30
TOTAL THERMAL CAPACITY, MWT	5022	TRITIUM LIQUID RELEASE, CURIES/YR	40
TOTAL ELECTRICAL CAPACITY,MWE	1600	CS-137 LIQ. EFFLUENT, CURIES/YR	3
ADDITIONAL UNITS ONSITE	NO	DIRECT RADIATION AT SITE BOUNDARY,MR/YR	DATA NOT AVAILABLE
TALLEST STRUCTURE, FEET	310	MAX. GAS STORAGE, CURIES	DATA NOT AVAILABLE
COOLING SYSTEM TYPE	SPRAY POND/CANAL	MAX. LIQUID STORAGE, CURIES	DATA NOT AVAILABLE
PLANT LIFETIME, YEARS	40	RADIOACTIVE SOLID WASTE, CURIES/YR	18820
SOURCE WATERBODY	RIVER, NONTIDAL	RADIOACTIVE SOLID WASTE VOL.,DRUMS/YR	842
RECEIVING WATERBODY	RIVER, NONTIDAL	MAX. HEAT TO ATMOS.,BBTU/HR	11
LAND ACREAGE OF STATION FACILITIES	160	MAX. HEAT TO REC. WATER, BBTU/HR	0.6
TOTAL LAND ACREAGE OF SITE	560	TREATMENT CHEMICALS, LBS/YR	
OFFSITE ACREAGE, TRANSMISSION LINES	1400	BIOCIDES	
OFFSITE ACREAGE, ACCESS ROADWAY	0.0	SODIUM HYPOCHLORITE	710000
OFFSITE ACREAGE, ACCESS RAILWAY	0.0		
MIN. DISTANCE TO SITE BOUNDARY, FT	2900		
MIN. DIST. LARG. DIFFUSION FACTOR,FT	3444		
INTAKE LOCATION	CANAL		
COOLING SYSTEM WITHDRAWAL,CU FT/SEC	120	CORROSION AND SCALE INHIBITORS	
SERVICE WATER WITHDRAWAL, CU FT/SEC	DATA NOT AVAILABLE	SODIUM SULFITE	370
APPROACH VELOCITY, FEET PER SECOND	1	SODIUM PHOSPHATE, ORTHO, ANHYDROUS	370
SCREEN VELOCITY, FEET PER SECOND	2		
INTAKE SCREEN MESH, INCHES	0.375		
COOLING SYSTEM EVAPORATION,CU FT/SEC	50		
SERVICE WATER EVAPORATION,CU FT/SEC	0.0	CLEANING AND NEUTRALIZING COMPOUNDS	
DRIFT, PERCENT	DATA NOT AVAILABLE	SODIUM HYDROXIDE	80000
DISCHARGE LOCATION	OFFSHORE, SUBMERGED	SULFURIC ACID	97000
DISCHARGE TYPE	DIFFUSER PIPE		
COOLING SYSTEM DISCHARGE, CU FT/SEC	50		
SERVICE WATER DISCHARGE, CU FT/SEC	0.02		
DISCHARGE VELOCITY, FEET PER SECOND	0.2	CHEMICAL EFFLUENTS, PPM	
DISCHARGE EFFECTIVE AREA, SQ FT	234	TOTAL RESIDUAL CHLORINE	0.1
COND. COOLING WATER FLOW,CU FT/SEC	2100	FREE AVAILABLE CHLORINE	DATA NOT AVAILABLE
RETURN COND. TDS RATIO	2	TOTAL CHROMIUM	DATA NOT AVAILABLE
NO. CONDENSER COOLING TOWERS	0.0	TOTAL COPPER	DATA NOT AVAILABLE
COOLING TOWER HEIGHT, FT	NOT APPLICABLE	TOTAL IRON	DATA NOT AVAILABLE
COOLING TOWER EXIT DIAM.,FT	NOT APPLICABLE	TOTAL NICKEL	DATA NOT AVAILABLE
COOLING RANGE, DEG. F	NOT APPLICABLE	TOTAL ZINC	DATA NOT AVAILABLE
COOLING TOWER EXIT VELOCITY, FT/SEC	NOT APPLICABLE	TOTAL PHOSPHORUS (AS P)	DATA NOT AVAILABLE
COOLING TOWER DROPLET SIZE, MICRONS	NOT APPLICABLE	SULFATE	4
CONDENSER TEMP.RISE, DEG. F	23	OIL AND GREASE	DATA NOT AVAILABLE
COOLING SYSTEM TRANSIT TIME, MIN.	7	DISSOLVED OXYGEN	DATA NOT AVAILABLE
EFFLUENT TEMP. ABOVE AMBIENT,DEG F	DATA NOT AVAILABLE	TOTAL DISSOLVED SOLIDS	DATA NOT AVAILABLE
NOISE AT BOUNDARY, DECIBELS	DATA NOT AVAILABLE	TOTAL SUSPENDED SOLIDS	DATA NOT AVAILABLE
		BOD5 DAY	DATA NOT AVAILABLE

NOTES:

ID: RANCHO SECO 1, SACRAMENTO UTIL., COUNTY OF SACRAMENTO, STATE OF CA

MAJOR RIVER BASIN	CALIFORNIA
LATITUDE, DEG MIN SEC	038 20 46
LONGITUDE, DEG MIN SEC	121 07 07
DOCKET NUMBER	50312
LICENSING ACTION	UNDER CONSTRUCTION
DATE OF LICENSING ACTION	10 11 68
NSSS TYPE	PWR
NO.NUCLEAR UNITS INFO. APPL	1
TOTAL THERMAL CAPACITY, MWT	2772
TOTAL ELECTRICAL CAPACITY,MWE	913
ADDITIONAL UNITS ONSITE	NO
TALLEST STRUCTURE, FEET	425
COOLING SYSTEM TYPE	NATURAL DRAFT, WET COOLING TOWER
PLANT LIFETIME, YEARS	30
SOURCE WATERBODY	RESERVOIR
RECEIVING WATERBODY	RIVER, NONTIDAL
LAND ACREAGE OF STATION FACILITIES	185
TOTAL LAND ACREAGE OF SITE	2480
OFFSITE ACREAGE, TRANSMISSION LINES	740
OFFSITE ACREAGE, ACCESS ROADWAY	0.0
OFFSITE ACREAGE, ACCESS RAILWAY	1.1
MIN. DISTANCE TO SITE BOUNDARY, FT	2112
MIN. DIST. LARG. DIFFUSION FACTOR,FT	2112
INTAKE LOCATION	SHORELINE/RIVERBANK
COOLING SYSTEM WITHDRAWAL,CU FT/SEC	32
SERVICE WATER WITHDRAWAL, CU FT/SEC	DATA NOT AVAILABLE
APPROACH VELOCITY, FEET PER SECOND	0.1
SCREEN VELOCITY, FEET PER SECOND	0.35
INTAKE SCREEN MESH, INCHES	0.125
COOLING SYSTEM EVAPORATION,CU FT/SEC	22.3
SERVICE WATER EVAPORATION,CU FT/SEC	0.0
DRIFT, PERCENT	0.01
DISCHARGE LOCATION	OUTLET OR BAY
DISCHARGE TYPE	EFFLUENT PIPE
COOLING SYSTEM DISCHARGE, CU FT/SEC	1.93
SERVICE WATER DISCHARGE, CU FT/SEC	DATA NOT AVAILABLE
DISCHARGE VELOCITY, FEET PER SECOND	2.6
DISCHARGE EFFECTIVE AREA, SQ FT	15.9
COND. COOLING WATER FLOW,CU FT/SEC	1000
RETURN COND. TDS RATIO	DATA NOT AVAILABLE
NO. CONDENSER COOLING TOWERS	2
COOLING TOWER HEIGHT, FT	425
COOLING TOWER EXIT DIAM.,FT	200
COOLING RANGE, DEG. F	28
COOLING TOWER EXIT VELOCITY, FT/SEC	23
COOLING TOWER DROPLET SIZE, MICRONS	DATA NOT AVAILABLE
CONDENSER TEMP.RISE, DEG. F	28
COOLING SYSTEM TRANSIT TIME, MIN.	DATA NOT AVAILABLE
EFFLUENT TEMP. ABOVE AMBIENT,DEG F	DATA NOT AVAILABLE
NOISE AT BOUNDARY, DECIBELS	DATA NOT AVAILABLE

DISRUPTED ONSITE LAND, ACRES	325
DISPL.EXCAVATION SPOIL,MIL CU YRD	DATA NOT AVAILABLE
DREDGE SPOIL, MIL CU YRD	0.0
AVG. CONSTRUCTION PERSONNEL	650
OPERATING PERSONNEL	81
NOBLE GAS AIR RELEASE, CURIES/YR	12258
I-131 AIR RELEASE, CURIES/YR	0.011
LIQ. EFFLUENT(NON-H3), CURIES/YR	0.01
TRITIUM LIQUID RELEASE, CURIES/YR	100
CS-137 LIQ. EFFLUENT, CURIES/YR	0.00315
DIRECT RADIATION AT SITE BOUNDARY,MR/YR	DATA NOT AVAILABLE
MAX. GAS STORAGE, CURIES	DATA NOT AVAILABLE
MAX. LIQUID STORAGE, CURIES	DATA NOT AVAILABLE
RADIOACTIVE SOLID WASTE, CURIES/YR	DATA NOT AVAILABLE
RADIOACTIVE SOLID WASTE VOL.,DRUMS/YR	497
MAX. HEAT TO ATMOS.,BBTU/HR	6.2
MAX. HEAT TO REC. WATER, BBTU/HR	0.061
TREATMENT CHEMICALS, LBS/YR	
BIOCIDES	
CHLORINE	AMOUNT NOT AVAILABLE
CORROSION AND SCALE INHIBITORS	
SULFURIC ACID	1100000
CLEANING AND NEUTRALIZING COMPOUNDS	
SULFURIC ACID	148000
SODIUM HYDROXIDE	74500
BORIC ACID	414
AMMONIUM HYDROXIDE	AMOUNT NOT AVAILABLE
CHEMICAL EFFLUENTS, PPM	
TOTAL RESIDUAL CHLORINE	41
FREE AVAILABLE CHLORINE	0.1
TOTAL CHROMIUM	0.17
TOTAL COPPER	DATA NOT AVAILABLE
TOTAL IRON	DATA NOT AVAILABLE
TOTAL NICKEL	DATA NOT AVAILABLE
TOTAL ZINC	0.3
TOTAL PHOSPHORUS (AS P)	0.65
SULFATE	430
OIL AND GREASE	DATA NOT AVAILABLE
DISSOLVED OXYGEN	5
TOTAL DISSOLVED SOLIDS	800
TOTAL SUSPENDED SOLIDS	DATA NOT AVAILABLE
BOD5 DAY	DATA NOT AVAILABLE

NOTES:

ID: RIVER BEND NPS, GULF STATES UTIL, COUNTY OF WEST FELICIANA, STATE OF LA

MAJOR RIVER BASIN	MISSOURI RIVER	DISRUPTED ONSITE LAND, ACRES	850
LATITUDE, DEG MIN SEC	030 45 26	DISPL.EXCAVATION SPOIL,MIL CU YRD	0.4
LONGITUDE, DEG MIN SEC	091 19 54	DREDGE SPOIL, MIL CU YRD	DATA NOT AVAILABLE
DOCKET NUMBER	50458	AVG. CONSTRUCTION PERSONNEL	1400
LICENSING ACTION	CP APPLICATION PENDING	OPERATING PERSONNEL	95
DATE OF LICENSING ACTION	09 24 73	NOBLE GAS AIR RELEASE, CURIES/YR	7248
NSSS TYPE	BWR	I-131 AIR RELEASE, CURIES/YR	0.16
NO.NUCLEAR UNITS INFO. APPL	2	LIQ. EFFLUENT(NON-H3), CURIES/YR	6
TOTAL THERMAL CAPACITY, MWT	5788	TRITIUM LIQUID RELEASE, CURIES/YR	40
TOTAL ELECTRICAL CAPACITY,MWE	1868	CS-137 LIQ. EFFLUENT, CURIES/YR	0.0126
ADDITIONAL UNITS ONSITE	NO	DIRECT RADIATION AT SITE BOUNDARY,MR/YR	7
TALLEST STRUCTURE, FEET	219	MAX. GAS STORAGE, CURIES	DATA NOT AVAILABLE
COOLING SYSTEM TYPE	MECHANICAL DRAFT, WET COOLING TOWER	MAX. LIQUID STORAGE, CURIES	DATA NOT AVAILABLE
PLANT LIFETIME, YEARS	40	RADIOACTIVE SOLID WASTE, CURIES/YR	9000
SOURCE WATERBODY	RIVER, TIDAL	RADIOACTIVE SOLID WASTE VOL.,DRUMS/YR	2600
RECEIVING WATERBODY	RIVER, TIDAL	MAX. HEAT TO ATMOS.,BBTU/HR	14.2
LAND ACREAGE OF STATION FACILITIES	278	MAX. HEAT TO REC. WATER, BBTU/HR	0.2
TOTAL LAND ACREAGE OF SITE	2679	TREATMENT CHEMICALS, LBS/YR	
OFFSITE ACREAGE, TRANSMISSION LINES	2200	BIOCIDES	
OFFSITE ACREAGE, ACCESS ROADWAY	31	SODIUM HYPOCHLORITE	1200000
OFFSITE ACREAGE, ACCESS RAILWAY	0.0		
MIN. DISTANCE TO SITE BOUNDARY, FT	2600		
MIN. DIST. LARG. DIFFUSION FACTOR,FT	2300		
INTAKE LOCATION	INLET OR FOREBAY		
COOLING SYSTEM WITHDRAWAL,CU FT/SEC	62.4	CORROSION AND SCALE INHIBITORS	
SERVICE WATER WITHDRAWAL, CU FT/SEC	0.1		
APPROACH VELOCITY, FEET PER SECOND	0.3		
SCREEN VELOCITY, FEET PER SECOND	0.5		
INTAKE SCREEN MESH, INCHES	0.75		
COOLING SYSTEM EVAPORATION,CU FT/SEC	47.7		
SERVICE WATER EVAPORATION,CU FT/SEC	0.0	CLEANING AND NEUTRALIZING COMPOUNDS	
DRIFT, PERCENT	0.002	SULFURIC ACID	31000000
DISCHARGE LOCATION	SHORELINE	SODIUM HYDROXIDE	16000000
DISCHARGE TYPE	EFFLUENT PIPE	BORIC ACID	11000
COOLING SYSTEM DISCHARGE, CU FT/SEC	12		
SERVICE WATER DISCHARGE, CU FT/SEC	0.005		
DISCHARGE VELOCITY, FEET PER SECOND	3	CHEMICAL EFFLUENTS, PPM	
DISCHARGE EFFECTIVE AREA, SQ FT	4.9	TOTAL RESIDUAL CHLORINE	0.1
COND. COOLING WATER FLOW,CU FT/SEC	2261	FREE AVAILABLE CHLORINE	0.001
RETURN COND. TDS RATIO	5	TOTAL CHROMIUM	DATA NOT AVAILABLE
NO. CONDENSER COOLING TOWERS	6	TOTAL COPPER	DATA NOT AVAILABLE
COOLING TOWER HEIGHT, FT	59	TOTAL IRON	DATA NOT AVAILABLE
COOLING TOWER EXIT DIAM.,FT	31	TOTAL NICKEL	DATA NOT AVAILABLE
COOLING RANGE, DEG. F	25.5	TOTAL ZINC	DATA NOT AVAILABLE
COOLING TOWER EXIT VELOCITY, FT/SEC	30	TOTAL PHOSPHORUS (AS P)	DATA NOT AVAILABLE
COOLING TOWER DROPLET SIZE, MICRONS	100	SULFATE	1210
CONDENSER TEMP.RISE, DEG. F	27	OIL AND GREASE	DATA NOT AVAILABLE
COOLING SYSTEM TRANSIT TIME, MIN.	DATA NOT AVAILABLE	DISSOLVED OXYGEN	7
EFFLUENT TEMP. ABOVE AMBIENT,DEG F	21.9	TOTAL DISSOLVED SOLIDS	2130
NOISE AT BOUNDARY, DECIBELS	56	TOTAL SUSPENDED SOLIDS	DATA NOT AVAILABLE
		BOD5 DAY	DATA NOT AVAILABLE

NOTES:

ID: ROBINSON-2, CAROLINA POWER, COUNTY OF DARLINGTON, STATE OF SC

MAJOR RIVER BASIN	SOUTHEAST	DISRUPTED ONSITE LAND, ACRES	DATA NOT AVAILABLE
LATITUDE, DEG MIN SEC	034 24 12	DISPL.EXCAVATION SPOIL,MIL CU YRD	DATA NOT AVAILABLE
LONGITUDE, DEG MIN SEC	080 09 30	DREDGE SPOIL, MIL CU YRD	DATA NOT AVAILABLE
DOCKET NUMBER	50261	AVG. CONSTRUCTION PERSONNEL	DATA NOT AVAILABLE
LICENSING ACTION	OPERATING	OPERATING PERSONNEL	77
DATE OF LICENSING ACTION	07 31 70	NOBLE GAS AIR RELEASE, CURIES/YR	4260
NSSS TYPE	PWR	I-131 AIR RELEASE, CURIES/YR	0.62
NO.NUCLEAR UNITS INFO. APPL	1	LIQ. EFFLUENT(NON-H3), CURIES/YR	29
TOTAL THERMAL CAPACITY, MWT	2200	TRITIUM LIQUID RELEASE, CURIES/YR	1000
TOTAL ELECTRICAL CAPACITY,MWE	700	CS-137 LIQ. EFFLUENT, CURIES/YR	0.91
ADDITIONAL UNITS ONSITE	YES, FOSSIL	DIRECT RADIATION AT SITE BOUNDARY,MR/YR	DATA NOT AVAILABLE
TALLEST STRUCTURE, FEET	250	MAX. GAS STORAGE, CURIES	1092
COOLING SYSTEM TYPE	COOLING POND/CANAL	MAX. LIQUID STORAGE, CURIES	DATA NOT AVAILABLE
PLANT LIFETIME, YEARS	30	RADIOACTIVE SOLID WASTE, CURIES/YR	312
SOURCE WATERBODY	RESERVOIR	RADIOACTIVE SOLID WASTE VOL.,DRUMS/YR	312
RECEIVING WATERBODY	RESERVOIR	MAX. HEAT TO ATMOS.,BBTU/HR	0.15
LAND ACREAGE OF STATION FACILITIES	2450	MAX. HEAT TO REC. WATER, BBTU/HR	5.2
TOTAL LAND ACREAGE OF SITE	4750	TREATMENT CHEMICALS, LBS/YR	
OFFSITE ACREAGE, TRANSMISSION LINES	1024	BIOCIDES	
OFFSITE ACREAGE, ACCESS ROADWAY	0.0	SODIUM HYPOCHLORITE	AMOUNT NOT AVAILABLE
OFFSITE ACREAGE, ACCESS RAILWAY	0.0		
MIN. DISTANCE TO SITE BOUNDARY, FT	1320		
MIN. DIST. LARG. DIFFUSION FACTOR,FT	1320		
INTAKE LOCATION	SHORELINE/RIVERBANK		
COOLING SYSTEM WITHDRAWAL,CU FT/SEC	1074	CORROSION AND SCALE INHIBITORS	
SERVICE WATER WITHDRAWAL, CU FT/SEC	71.3	PHOSPHATES AND POLYPHOSPHATES	550
APPROACH VELOCITY, FEET PER SECOND	0.0		
SCREEN VELOCITY, FEET PER SECOND	2.1		
INTAKE SCREEN MESH, INCHES	0.375		
COOLING SYSTEM EVAPORATION,CU FT/SEC	20		
SERVICE WATER EVAPORATION,CU FT/SEC	DATA NOT AVAILABLE	CLEANING AND NEUTRALIZING COMPOUNDS	
DRIFT, PERCENT	NOT APPLICABLE	SODIUM HYDROXIDE	AMOUNT NOT AVAILABLE
DISCHARGE LOCATION	CANAL	SULFURIC ACID	AMOUNT NOT AVAILABLE
DISCHARGE TYPE	WEIR	SODIUM SULFATE	24800
COOLING SYSTEM DISCHARGE, CU FT/SEC	1074		
SERVICE WATER DISCHARGE, CU FT/SEC	71.3		
DISCHARGE VELOCITY, FEET PER SECOND	3.5	CHEMICAL EFFLUENTS, PPM	
DISCHARGE EFFECTIVE AREA, SQ FT	425	TOTAL RESIDUAL CHLORINE	0.5
COND. COOLING WATER FLOW,CU FT/SEC.	NOT APPLICABLE	FREE AVAILABLE CHLORINE	DATA NOT AVAILABLE
RETURN COND. TDS RATIO	NOT APPLICABLE	TOTAL CHROMIUM	DATA NOT AVAILABLE
NO. CONDENSER COOLING TOWERS	0.0	TOTAL COPPER	DATA NOT AVAILABLE
COOLING TOWER HEIGHT, FT	NOT APPLICABLE	TOTAL IRON	DATA NOT AVAILABLE
COOLING TOWER EXIT DIAM.,FT	NOT APPLICABLE	TOTAL NICKEL	DATA NOT AVAILABLE
COOLING RANGE, DEG. F	NOT APPLICABLE	TOTAL ZINC	DATA NOT AVAILABLE
COOLING TOWER EXIT VELOCITY, FT/SEC	NOT APPLICABLE	TOTAL PHOSPHORUS (AS P)	0.000091
COOLING TOWER DROPLET SIZE, MICRONS	NOT APPLICABLE	SULFATE	0.0056
CONDENSER TEMP.RISE, DEG. F	20	OIL AND GREASE	DATA NOT AVAILABLE
COOLING SYSTEM TRANSIT TIME, MIN.	0.12	DISSOLVED OXYGEN	DATA NOT AVAILABLE
EFFLUENT TEMP. ABOVE AMBIENT,DEG F	21	TOTAL DISSOLVED SOLIDS	DATA NOT AVAILABLE
NOISE AT BOUNDARY, DECIBELS	DATA NOT AVAILABLE	TOTAL SUSPENDED SOLIDS	DATA NOT AVAILABLE
		BOD5 DAY	10

NOTES:

ID: SALEM STN 1, 2, PUBLIC SERV ELEC, COUNTY OF SALEM, STATE OF NJ

MAJOR RIVER BASIN	NORTH ATLANTIC	DISRUPTED ONSITE LAND, ACRES	220
LATITUDE, DEG MIN SEC	039 27 46	DISPL.EXCAVATION SPOIL,MIL CU YRD	DATA NOT AVAILABLE
LONGITUDE, DEG MIN SEC	075 32 08	DREDGE SPOIL, MIL CU YRD	0.29
DOCKET NUMBER	50272	AVG. CONSTRUCTION PERSONNEL	2000
LICENSING ACTION	UNDER CONSTRUCTION	OPERATING PERSONNEL	125
DATE OF LICENSING ACTION	09 25 68	NOBLE GAS AIR RELEASE, CURIES/YR	5600
NSSS TYPE	PWR	I-131 AIR RELEASE, CURIES/YR	0.42
NO.NUCLEAR UNITS INFO. APPL	2	LIQ. EFFLUENT(NON-H3), CURIES/YR	10
TOTAL THERMAL CAPACITY, MWT	6773	TRITIUM LIQUID RELEASE, CURIES/YR	2000
TOTAL ELECTRICAL CAPACITY,MWE	2205	CS-137 LIQ. EFFLUENT, CURIES/YR	1.32
ADDITIONAL UNITS ONSITE	NO	DIRECT RADIATION AT SITE BOUNDARY,MR/YR	0.1
TALLEST STRUCTURE, FEET	190	MAX. GAS STORAGE, CURIES	5766
COOLING SYSTEM TYPE	ONCE-THROUGH	MAX. LIQUID STORAGE, CURIES	DATA NOT AVAILABLE
PLANT LIFETIME, YEARS	30	RADIOACTIVE SOLID WASTE, CURIES/YR	DATA NOT AVAILABLE
SOURCE WATERBODY	ESTUARY, WELL MIXED	RADIOACTIVE SOLID WASTE VOL.,DRUMS/YR	DATA NOT AVAILABLE
RECEIVING WATERBODY	ESTUARY, WELL MIXED	MAX. HEAT TO ATMOS.,BBTU/HR	NOT APPLICABLE
LAND ACREAGE OF STATION FACILITIES	220	MAX. HEAT TO REC. WATER, BBTU/HR	15.3
TOTAL LAND ACREAGE OF SITE	700	TREATMENT CHEMICALS, LBS/YR	
OFFSITE ACREAGE, TRANSMISSION LINES	3900	BIOCIDES	
OFFSITE ACREAGE, ACCESS ROADWAY	11	SODIUM HYPOCHLORITE	780000
OFFSITE ACREAGE, ACCESS RAILWAY	0.0		
MIN. DISTANCE TO SITE BOUNDARY, FT	634		
MIN. DIST. LARG. DIFFUSION FACTOR,FT	634		
INTAKE LOCATION	INLET OR FOREBAY		
COOLING SYSTEM WITHDRAWAL,CU FT/SEC	4950	CORROSION AND SCALE INHIBITORS	
SERVICE WATER WITHDRAWAL, CU FT/SEC	150	PHOSPHATES AND POLYPHOSPHATES	4000
APPROACH VELOCITY, FEET PER SECOND	DATA NOT AVAILABLE	HYDRAZINE	15
SCREEN VELOCITY, FEET PER SECOND	1.2	MORPHOLINE	AMOUNT NOT AVAILABLE
INTAKE SCREEN MESH, INCHES	DATA NOT AVAILABLE		
COOLING SYSTEM EVAPORATION,CU FT/SEC	DATA NOT AVAILABLE		
SERVICE WATER EVAPORATION,CU FT/SEC	DATA NOT AVAILABLE	CLEANING AND NEUTRALIZING COMPOUNDS	
DRIFT, PERCENT	0.0	SULFURIC ACID	580000
DISCHARGE LOCATION	OFFSHORE, SUBMERGED	SODIUM HYDROXIDE	370000
DISCHARGE TYPE	EFFLUENT PIPE	BORIC ACID	3600
COOLING SYSTEM DISCHARGE, CU FT/SEC	4950		
SERVICE WATER DISCHARGE, CU FT/SEC	150		
DISCHARGE VELOCITY, FEET PER SECOND	10.7	CHEMICAL EFFLUENTS, PPM	
DISCHARGE EFFECTIVE AREA, SQ FT	471	TOTAL RESIDUAL CHLORINE	0.0051
COND. COOLING WATER FLOW,CU FT/SEC	NOT APPLICABLE	FREE AVAILABLE CHLORINE	0.1
RETURN COND. TDS RATIO	NOT APPLICABLE	TOTAL CHROMIUM	DATA NOT AVAILABLE
NO. CONDENSER COOLING TOWERS	0.0	TOTAL COPPER	0.004
COOLING TOWER HEIGHT, FT	NOT APPLICABLE	TOTAL IRON	DATA NOT AVAILABLE
COOLING TOWER EXIT DIAM.,FT	NOT APPLICABLE	TOTAL NICKEL	DATA NOT AVAILABLE
COOLING RANGE, DEG. F	NOT APPLICABLE	TOTAL ZINC	DATA NOT AVAILABLE
COOLING TOWER EXIT VELOCITY, FT/SEC	NOT APPLICABLE	TOTAL PHOSPHORUS (AS P)	0.00014
COOLING TOWER DROPLET SIZE, MICRONS	NOT APPLICABLE	SULFATE	0.058
CONDENSER TEMP.RISE, DEG. F	13.6	OIL AND GREASE	DATA NOT AVAILABLE
COOLING SYSTEM TRANSIT TIME, MIN.	2	DISSOLVED OXYGEN	DATA NOT AVAILABLE
EFFLUENT TEMP. ABOVE AMBIENT,DEG F	13.3	TOTAL DISSOLVED SOLIDS	DATA NOT AVAILABLE
NOISE AT BOUNDARY, DECIBELS	DATA NOT AVAILABLE	TOTAL SUSPENDED SOLIDS	0.04
		BOD5 DAY	DATA NOT AVAILABLE

ID: SAN ONOFRE 2,3, S CAL ED, SDG+E, COUNTY OF SAN DIEGO, STATE OF CA

MAJOR RIVER BASIN	CALIFORNIA	DISRUPTED ONSITE LAND, ACRES	46
LATITUDE, DEG MIN SEC	033 22 06	DISPL.EXCAVATION SPOIL,MIL CU YRD	2.67
LONGITUDE, DEG MIN SEC	117 33 15	DREDGE SPOIL, MIL CU YRD	DATA NOT AVAILABLE
DOCKET NUMBER	50361	AVG. CONSTRUCTION PERSONNEL	1000
LICENSING ACTION	UNDER CONSTRUCTION	OPERATING PERSONNEL	70
DATE OF LICENSING ACTION	09 04 74	NOBLE GAS AIR RELEASE, CURIES/YR	7124
NSSS TYPE	PWR	I-131 AIR RELEASE, CURIES/YR	0.58
NO.NUCLEAR UNITS INFO. APPL	2	LIQ. EFFLUENT(NON-H3), CURIES/YR	10
TOTAL THERMAL CAPACITY, MWT	6780	TRITIUM LIQUID RELEASE, CURIES/YR	2000
TOTAL ELECTRICAL CAPACITY,MWE	2280	CS-137 LIQ. EFFLUENT, CURIES/YR	0.72
ADDITIONAL UNITS ONSITE	YES, NUCLEAR	DIRECT RADIATION AT SITE BOUNDARY,MR/YR	0.0
TALLEST STRUCTURE, FEET	185	MAX. GAS STORAGE, CURIES	3460
COOLING SYSTEM TYPE	ONCE-THROUGH	MAX. LIQUID STORAGE, CURIES	DATA NOT AVAILABLE
PLANT LIFETIME, YEARS	30	RADIOACTIVE SOLID WASTE, CURIES/YR	9455
SOURCE WATERBODY	OCEAN, OFFSHORE SHELF	RADIOACTIVE SOLID WASTE VOL.,DRUMS/YR	1830
RECEIVING WATERBODY	OCEAN, OFFSHORE SHELF	MAX. HEAT TO ATMOS.,BBTU/HR	DATA NOT AVAILABLE
LAND ACREAGE OF STATION FACILITIES	33	MAX. HEAT TO REC. WATER, BBTU/HR	13.26
TOTAL LAND ACREAGE OF SITE	84	TREATMENT CHEMICALS, LBS/YR	
OFFSITE ACREAGE, TRANSMISSION LINES	7	BIOCIDES	
OFFSITE ACREAGE, ACCESS ROADWAY	0.0	SODIUM HYPOCHLORITE	312000
OFFSITE ACREAGE, ACCESS RAILWAY	0.0		
MIN. DISTANCE TO SITE BOUNDARY, FT	200		
MIN. DIST. LARG. DIFFUSION FACTOR,FT	200		
INTAKE LOCATION	OFFSHORE, SUBMERGED		
COOLING SYSTEM WITHDRAWAL,CU FT/SEC	3530	CORROSION AND SCALE INHIBITORS	
SERVICE WATER WITHDRAWAL, CU FT/SEC	160	SODIUM NITRITE	3280
APPROACH VELOCITY, FEET PER SECOND	7.3	SODIUM NITRATE	6130
SCREEN VELOCITY, FEET PER SECOND	2.5	HYDRAZINE	1.8
INTAKE SCREEN MESH, INCHES	NOT APPLICABLE	NALCO-39	26000
COOLING SYSTEM EVAPORATION,CU FT/SEC	NOT APPLICABLE	SODIUM PHOSPHATE, ORTHO, ANHYDROUS	4540
SERVICE WATER EVAPORATION,CU FT/SEC	NOT APPLICABLE	CLEANING AND NEUTRALIZING COMPOUNDS	
DRIFT, PERCENT	NOT APPLICABLE	AMMONIA	130
DISCHARGE LOCATION	OFFSHORE, SUBMERGED	SODIUM SULFITE	1380
DISCHARGE TYPE	DIFFUSER PIPE		
COOLING SYSTEM DISCHARGE, CU FT/SEC	3690		
SERVICE WATER DISCHARGE, CU FT/SEC	DATA NOT AVAILABLE		
DISCHARGE VELOCITY, FEET PER SECOND	20	CHEMICAL EFFLUENTS, PPM	
DISCHARGE EFFECTIVE AREA, SQ FT	188.5	TOTAL RESIDUAL CHLORINE	0.3
COND. COOLING WATER FLOW,CU FT/SEC	NOT APPLICABLE	FREE AVAILABLE CHLORINE	DATA NOT AVAILABLE
RETURN COND. TDS RATIO	NOT APPLICABLE	TOTAL CHROMIUM	DATA NOT AVAILABLE
NO. CONDENSER COOLING TOWERS	0.0	TOTAL COPPER	0.014
COOLING TOWER HEIGHT, FT	NOT APPLICABLE	TOTAL IRON	DATA NOT AVAILABLE
COOLING TOWER EXIT DIAM.,FT	NOT APPLICABLE	TOTAL NICKEL	0.0014
COOLING RANGE, DEG. F	NOT APPLICABLE	TOTAL ZINC	DATA NOT AVAILABLE
COOLING TOWER EXIT VELOCITY, FT/SEC	NOT APPLICABLE	TOTAL PHOSPHORUS (AS P)	0.0026
COOLING TOWER DROPLET SIZE, MICRONS	NOT APPLICABLE	SULFATE	3.82
CONDENSER TEMP.RISE, DEG. F	20	OIL AND GREASE	DATA NOT AVAILABLE
COOLING SYSTEM TRANSIT TIME, MIN.	8	DISSOLVED OXYGEN	DATA NOT AVAILABLE
EFFLUENT TEMP. ABOVE AMBIENT,DEG F	20	TOTAL DISSOLVED SOLIDS	150000
NOISE AT BOUNDARY, DECIBELS	DATA NOT AVAILABLE	TOTAL SUSPENDED SOLIDS	560
		BOD5 DAY	DATA NOT AVAILABLE

NOTES:

ID: SEABROOK 1&2, PUBLIC SERVICE, COUNTY OF ROCKINGHAM, STATE OF NH

MAJOR RIVER BASIN	NORTHEAST
LATITUDE, DEG MIN SEC	042 53 53
LONGITUDE, DEG MIN SEC	070 51 05
DOCKET NUMBER	50443
LICENSING ACTION	CP APPLICATION PENDING
DATE OF LICENSING ACTION	07 09 73
NSSS TYPE	PWR
NO.NUCLEAR UNITS INFO. APPL	2
TOTAL THERMAL CAPACITY, MWT	6822
TOTAL ELECTRICAL CAPACITY,MWE	2400
ADDITIONAL UNITS ONSITE	NO
TALLEST STRUCTURE, FEET	180
COOLING SYSTEM TYPE	ONCE-THROUGH
PLANT LIFETIME, YEARS	40
SOURCE WATERBODY	OCEAN, OFFSHORE SHELF
RECEIVING WATERBODY	OCEAN, OFFSHORE SHELF
LAND ACREAGE OF STATION FACILITIES	45
TOTAL LAND ACREAGE OF SITE	715
OFFSITE ACREAGE, TRANSMISSION LINES	1050
OFFSITE ACREAGE, ACCESS ROADWAY	51
OFFSITE ACREAGE, ACCESS RAILWAY	0.0
MIN. DISTANCE TO SITE BOUNDARY, FT	2920
MIN. DIST. LARG. DIFFUSION FACTOR,FT	2920
INTAKE LOCATION	OFFSHORE, SUBMERGED
COOLING SYSTEM WITHDRAWAL,CU FT/SEC	1640
SERVICE WATER WITHDRAWAL, CU FT/SEC	0.2
APPROACH VELOCITY, FEET PER SECOND	0.8
SCREEN VELOCITY, FEET PER SECOND	1.5
INTAKE SCREEN MESH, INCHES	NOT APPLICABLE
COOLING SYSTEM EVAPORATION,CU FT/SEC	44.6
SERVICE WATER EVAPORATION,CU FT/SEC	0.0
DRIFT, PERCENT	NOT APPLICABLE
DISCHARGE LOCATION	OFFSHORE, SUBMERGED
DISCHARGE TYPE	DIFFUSER PIPE
COOLING SYSTEM DISCHARGE, CU FT/SEC	1640
SERVICE WATER DISCHARGE, CU FT/SEC	0.2
DISCHARGE VELOCITY, FEET PER SECOND	15
DISCHARGE EFFECTIVE AREA, SQ FT	95
COND. COOLING WATER FLOW,CU FT/SEC	1640
RETURN COND. TDS RATIO	NOT APPLICABLE
NO. CONDENSER COOLING TOWERS	NOT APPLICABLE
COOLING TOWER HEIGHT, FT	NOT APPLICABLE
COOLING TOWER EXIT DIAM.,FT	NOT APPLICABLE
COOLING RANGE, DEG. F	NOT APPLICABLE
COOLING TOWER EXIT VELOCITY, FT/SEC	NOT APPLICABLE
COOLING TOWER DROPLET SIZE, MICRONS	NOT APPLICABLE
CONDENSER TEMP.RISE, DEG. F	39
COOLING SYSTEM TRANSIT TIME, MIN.	0.25
EFFLUENT TEMP. ABOVE AMBIENT,DEG F	37.8
NOISE AT BOUNDARY, DECIBELS	DATA NOT AVAILABLE

DISRUPTED ONSITE LAND, ACRES	250
DISPL.EXCAVATION SPOIL,MIL CU YRD	0.5
DREDGE SPOIL, MIL CU YRD	0.0
AVG. CONSTRUCTION PERSONNEL	1600
OPERATING PERSONNEL	150
NOBLE GAS AIR RELEASE, CURIES/YR	2600
I-131 AIR RELEASE, CURIES/YR	0.32
LIQ. EFFLUENT(NON-H3), CURIES/YR	0.2
TRITIUM LIQUID RELEASE, CURIES/YR	700
CS-137 LIQ. EFFLUENT, CURIES/YR	0.0038
DIRECT RADIATION AT SITE BOUNDARY,MR/YR	0.01
MAX. GAS STORAGE, CURIES	DATA NOT AVAILABLE
MAX. LIQUID STORAGE, CURIES	DATA NOT AVAILABLE
RADIOACTIVE SOLID WASTE, CURIES/YR	16500
RADIOACTIVE SOLID WASTE VOL.,DRUMS/YR	2100
MAX. HEAT TO ATMOS.,BBTU/HR	NOT APPLICABLE
MAX. HEAT TO REC. WATER, BBTU/HR	16
TREATMENT CHEMICALS, LBS/YR	
BIOCIDES	
CHLORINE	440000
CORROSION AND SCALE INHIBITORS	
HYDRAZINE	360
COPPER SULFATE	70000
NICKEL SALTS	30000
CLEANING AND NEUTRALIZING COMPOUNDS	
SODIUM HYDROXIDE	170000
SULFURIC ACID	190000
SODIUM PHOSPHATE, ORTHO, ANHYDROUS	2900
CHEMICAL EFFLUENTS, PPM	
TOTAL RESIDUAL CHLORINE	0.1
FREE AVAILABLE CHLORINE	0.001
TOTAL CHROMIUM	0.003
TOTAL COPPER	0.05
TOTAL IRON	0.15
TOTAL NICKEL	0.003
TOTAL ZINC	0.01
TOTAL PHOSPHORUS (AS P)	0.01
SULFATE	2700
OIL AND GREASE	DATA NOT AVAILABLE
DISSOLVED OXYGEN	7
TOTAL DISSOLVED SOLIDS	NOT APPLICABLE
TOTAL SUSPENDED SOLIDS	DATA NOT AVAILABLE
BOD5 DAY	11

NOTES:

ID: SEQUOYAH 1,2, TENN VALLEY AUTH, COUNTY OF HAMILTON, STATE OF TN

MAJOR RIVER BASIN	TENNESSEE RIVER
LATITUDE, DEG MIN SEC	035 13 30
LONGITUDE, DEG MIN SEC	085 05 12
DOCKET NUMBER	50327
LICENSING ACTION	UNDER CONSTRUCTION
DATE OF LICENSING ACTION	05 27 70
NSSS TYPE	PWR
NO.NUCLEAR UNITS INFO. APPL	2
TOTAL THERMAL CAPACITY, MWT	6846
TOTAL ELECTRICAL CAPACITY,MWE	2280
ADDITIONAL UNITS ONSITE	NO
TALLEST STRUCTURE, FEET	516
COOLING SYSTEM TYPE	ONCE-THROUGH, COOLING TOWER HELPER
PLANT LIFETIME, YEARS	35
SOURCE WATERBODY	RESERVOIR
RECEIVING WATERBODY	RESERVOIR
LAND ACREAGE OF STATION FACILITIES	22
TOTAL LAND ACREAGE OF SITE	525
OFFSITE ACREAGE, TRANSMISSION LINES	2700
OFFSITE ACREAGE, ACCESS ROADWAY	0.0
OFFSITE ACREAGE, ACCESS RAILWAY	15
MIN. DISTANCE TO SITE BOUNDARY, FT	1500
MIN. DIST. LARG. DIFFUSION FACTOR,FT	2299
INTAKE LOCATION	OFFSHORE, SURFACE
COOLING SYSTEM WITHDRAWAL,CU FT/SEC	2500
SERVICE WATER WITHDRAWAL, CU FT/SEC	DATA NOT AVAILABLE
APPROACH VELOCITY, FEET PER SECOND	0.5
SCREEN VELOCITY, FEET PER SECOND	2.2
INTAKE SCREEN MESH, INCHES	0.375
COOLING SYSTEM EVAPORATION,CU FT/SEC	73
SERVICE WATER EVAPORATION,CU FT/SEC	DATA NOT AVAILABLE
DRIFT, PERCENT	0.01
DISCHARGE LOCATION	OFFSHORE, SUBMERGED
DISCHARGE TYPE	DIFFUSER PIPE
COOLING SYSTEM DISCHARGE, CU FT/SEC	2427
SERVICE WATER DISCHARGE, CU FT/SEC	DATA NOT AVAILABLE
DISCHARGE VELOCITY, FEET PER SECOND	10
DISCHARGE EFFECTIVE AREA, SQ FT	250
COND. COOLING WATER FLOW,CU FT/SEC.	2500
RETURN COND. TDS RATIO	2
NO. CONDENSER COOLING TOWERS	2
COOLING TOWER HEIGHT, FT	516
COOLING TOWER EXIT DIAM.,FT	413
COOLING RANGE, DEG. F	29.5
COOLING TOWER EXIT VELOCITY, FT/SEC	DATA NOT AVAILABLE
COOLING TOWER DROPLET SIZE, MICRONS	DATA NOT AVAILABLE
CONDENSER TEMP.RISE, DEG. F	29.5
COOLING SYSTEM TRANSIT TIME, MIN.	DATA NOT AVAILABLE
EFFLUENT TEMP. ABOVE AMBIENT,DEG F	29.5
NOISE AT BOUNDARY, DECIBELS	DATA NOT AVAILABLE

DISRUPTED ONSITE LAND, ACRES	237
DISPL.EXCAVATION SPOIL,MIL CU YRD	DATA NOT AVAILABLE
DREDGE SPOIL, MIL CU YRD	DATA NOT AVAILABLE
AVG. CONSTRUCTION PERSONNEL	2200
OPERATING PERSONNEL	250
NOBLE GAS AIR RELEASE, CURIES/YR	9747
I-131 AIR RELEASE, CURIES/YR	900647
LIQ. EFFLUENT(NON-H3), CURIES/YR	2
TRITIUM LIQUID RELEASE, CURIES/YR	350
CS-137 LIQ. EFFLUENT, CURIES/YR	0.502
DIRECT RADIATION AT SITE BOUNDARY,MR/YR	0.036
MAX. GAS STORAGE, CURIES	21400
MAX. LIQUID STORAGE, CURIES	DATA NOT AVAILABLE
RADIOACTIVE SOLID WASTE, CURIES/YR	10500
RADIOACTIVE SOLID WASTE VOL.,DRUMS/YR	1500
MAX. HEAT TO ATMOS.,BBTU/HR	DATA NOT AVAILABLE
MAX. HEAT TO REC. WATER, BBTU/HR	16.6
TREATMENT CHEMICALS, LBS/YR	
BIOCIDES	
CHLORINE	13000
ACROLEIN	2800
CORROSION AND SCALE INHIBITORS	
SODIUM PHOSPHATE, ORTHO, ANHYDROUS	7900
HYDRAZINE	4100
AMMONIA	1100
SODIUM CHROMATE	AMOUNT NOT AVAILABLE
LITHIUM HYDROXIDE	AMOUNT NOT AVAILABLE
CLEANING AND NEUTRALIZING COMPOUNDS	
ALUMINUM SULFATE	64000
SODIUM HYDROXIDE	190000
SULFURIC ACID	240000
SODIUM CARBONATE	24000
BORIC ACID	AMOUNT NOT AVAILABLE
CHEMICAL EFFLUENTS, PPM	
TOTAL RESIDUAL CHLORINE	0.0065
FREE AVAILABLE CHLORINE	DATA NOT AVAILABLE
TOTAL CHROMIUM	0.05
TOTAL COPPER	0.02
TOTAL IRON	0.71
TOTAL NICKEL	0.05
TOTAL ZINC	0.15
TOTAL PHOSPHORUS (AS P)	0.0006
SULFATE	0.059
OIL AND GREASE	DATA NOT AVAILABLE
DISSOLVED OXYGEN	DATA NOT AVAILABLE
TOTAL DISSOLVED SOLIDS	0.11
TOTAL SUSPENDED SOLIDS	DATA NOT AVAILABLE
BOD5 DAY	DATA NOT AVAILABLE

NOTES:

ID: SHOREHAM STATION, LONG ISLAND L CO, COUNTY OF SUFFOLK, STATE OF NY

MAJOR RIVER BASIN	NORTHEAST
LATITUDE, DEG MIN SEC	040 57 30
LONGITUDE, DEG MIN SEC	072 52 00
DOCKET NUMBER	50322
LICENSING ACTION	UNDER CONSTRUCTION
DATE OF LICENSING ACTION	04 14 73
NSSS TYPE	BWR
NO.NUCLEAR UNITS INFO. APPL	1
TOTAL THERMAL CAPACITY, MWT	2436
TOTAL ELECTRICAL CAPACITY,MWE	819
ADDITIONAL UNITS ONSITE	NO
TALLEST STRUCTURE, FEET	240
COOLING SYSTEM TYPE	ONCE-THROUGH
PLANT LIFETIME, YEARS	30
SOURCE WATERBODY	LONG ISLAND SOUND
RECEIVING WATERBODY	LONG ISLAND SOUND
LAND ACREAGE OF STATION FACILITIES	80
TOTAL LAND ACREAGE OF SITE	880
OFFSITE ACREAGE, TRANSMISSION LINES	0.0
OFFSITE ACREAGE, ACCESS ROADWAY	0.0
OFFSITE ACREAGE, ACCESS RAILWAY	0.0
MIN. DISTANCE TO SITE BOUNDARY, FT	870
MIN. DIST. LARG. DIFFUSION FACTOR,FT	1312
INTAKE LOCATION	CANAL
COOLING SYSTEM WITHDRAWAL,CU FT/SEC	1275
SERVICE WATER WITHDRAWAL, CU FT/SEC	38
APPROACH VELOCITY, FEET PER SECOND	1
SCREEN VELOCITY, FEET PER SECOND	2
INTAKE SCREEN MESH, INCHES	0.375
COOLING SYSTEM EVAPORATION,CU FT/SEC	DATA NOT AVAILABLE
SERVICE WATER EVAPORATION,CU FT/SEC	DATA NOT AVAILABLE
DRIFT, PERCENT	NOT APPLICABLE
DISCHARGE LOCATION	OFFSHORE, SUBMERGED
DISCHARGE TYPE	DIFFUSER PIPE
COOLING SYSTEM DISCHARGE, CU FT/SEC	1325
SERVICE WATER DISCHARGE, CU FT/SEC	NOT APPLICABLE
DISCHARGE VELOCITY, FEET PER SECOND	13.75
DISCHARGE EFFECTIVE AREA, SQ FT	110.4
COND. COOLING WATER FLOW,CU FT/SEC	NOT APPLICABLE
RETURN COND. TDS RATIO	NOT APPLICABLE
NO. CONDENSER COOLING TOWERS	0.0
COOLING TOWER HEIGHT, FT	NOT APPLICABLE
COOLING TOWER EXIT DIAM.,FT	NOT APPLICABLE
COOLING RANGE, DEG. F	NOT APPLICABLE
COOLING TOWER EXIT VELOCITY, FT/SEC	NOT APPLICABLE
COOLING TOWER DROPLET SIZE, MICRONS	NOT APPLICABLE
CONDENSER TEMP.RISE, DEG. F	19.7
COOLING SYSTEM TRANSIT TIME, MIN.	12.7
EFFLUENT TEMP. ABOVE AMBIENT,DEG F	19.7
NOISE AT BOUNDARY, DECIBELS	DATA NOT AVAILABLE

DISRUPTED ONSITE LAND, ACRES	119
DISPL.EXCAVATION SPOIL,MIL CU YRD	DATA NOT AVAILABLE
DREDGE SPOIL, MIL CU YRD	0.04
AVG. CONSTRUCTION PERSONNEL	900
OPERATING PERSONNEL	65
NOBLE GAS AIR RELEASE, CURIES/YR	10380
I-131 AIR RELEASE, CURIES/YR	0.5
LIQ. EFFLUENT(NON-H3), CURIES/YR	5
TRITIUM LIQUID RELEASE, CURIES/YR	20
CS-137 LIQ. EFFLUENT, CURIES/YR	0.19
DIRECT RADIATION AT SITE BOUNDARY,MR/YR	DATA NOT AVAILABLE
MAX. GAS STORAGE, CURIES	3636
MAX. LIQUID STORAGE, CURIES	DATA NOT AVAILABLE
RADIOACTIVE SOLID WASTE, CURIES/YR	550
RADIOACTIVE SOLID WASTE VOL.,DRUMS/YR	1360
MAX. HEAT TO ATMOS.,BBTU/HR	DATA NOT AVAILABLE
MAX. HEAT TO REC. WATER, BBTU/HR	5.41
TREATMENT CHEMICALS, LBS/YR	
BIOCIDES	
CHLORINE	AMOUNT NOT AVAILABLE
CORROSION AND SCALE INHIBITORS	
PHOSPHATES AND POLYPHOSPHATES	8
CLEANING AND NEUTRALIZING COMPOUNDS	
SODIUM HYDROXIDE	38000
SULFURIC ACID	46000
CHEMICAL EFFLUENTS, PPM	
TOTAL RESIDUAL CHLORINE	0.003
FREE AVAILABLE CHLORINE	DATA NOT AVAILABLE
TOTAL CHROMIUM	DATA NOT AVAILABLE
TOTAL COPPER	0.006
TOTAL IRON	DATA NOT AVAILABLE
TOTAL NICKEL	DATA NOT AVAILABLE
TOTAL ZINC	DATA NOT AVAILABLE
TOTAL PHOSPHORUS (AS P)	0.00049
SULFATE	15
OIL AND GREASE	DATA NOT AVAILABLE
DISSOLVED OXYGEN	DATA NOT AVAILABLE
TOTAL DISSOLVED SOLIDS	DATA NOT AVAILABLE
TOTAL SUSPENDED SOLIDS	DATA NOT AVAILABLE
BOD5 DAY	DATA NOT AVAILABLE

NOTES:

ID: SURRY STN 1,2, VIRGINIA ELEC., COUNTY OF SURRY, STATE OF VA

MAJOR RIVER BASIN	NORTH ATLANTIC
LATITUDE, DEG MIN SEC	037 09 59
LONGITUDE, DEG MIN SEC	076 41 49
DOCKET NUMBER	50280
LICENSING ACTION	OPERATING
DATE OF LICENSING ACTION	05 25 72
NSSS TYPE	PWR
NO.NUCLEAR UNITS INFO. APPL	2
TOTAL THERMAL CAPACITY, MWT	4882
TOTAL ELECTRICAL CAPACITY,MWE	1576
ADDITIONAL UNITS ONSITE	YES, FOSSIL
TALLEST STRUCTURE, FEET	DATA NOT AVAILABLE
COOLING SYSTEM TYPE	ONCE-THROUGH
PLANT LIFETIME, YEARS	40
SOURCE WATERBODY	ESTUARY, WELL MIXED
RECEIVING WATERBODY	ESTUARY, WELL MIXED
LAND ACREAGE OF STATION FACILITIES	110
TOTAL LAND ACREAGE OF SITE	840
OFFSITE ACREAGE, TRANSMISSION LINES	4420
OFFSITE ACREAGE, ACCESS ROADWAY	0.0
OFFSITE ACREAGE, ACCESS RAILWAY	0.0
MIN. DISTANCE TO SITE BOUNDARY, FT	1650
MIN. DIST. LARG. DIFFUSION FACTOR,FT	1650
INTAKE LOCATION	SHORELINE/RIVERBANK
COOLING SYSTEM WITHDRAWAL,CU FT/SEC	3740
SERVICE WATER WITHDRAWAL, CU FT/SEC	DATA NOT AVAILABLE
APPROACH VELOCITY, FEET PER SECOND	1.03
SCREEN VELOCITY, FEET PER SECOND	DATA NOT AVAILABLE
INTAKE SCREEN MESH, INCHES	0.375
COOLING SYSTEM EVAPORATION,CU FT/SEC	NOT APPLICABLE
SERVICE WATER EVAPORATION,CU FT/SEC	NOT APPLICABLE
DRIFT, PERCENT	NOT APPLICABLE
DISCHARGE LOCATION	CANAL
DISCHARGE TYPE	CANAL
COOLING SYSTEM DISCHARGE, CU FT/SEC	3740
SERVICE WATER DISCHARGE, CU FT/SEC	DATA NOT AVAILABLE
DISCHARGE VELOCITY, FEET PER SECOND	6
DISCHARGE EFFECTIVE AREA, SQ FT	623
COND. COOLING WATER FLOW,CU FT/SEC	NOT APPLICABLE
RETURN COND. TDS RATIO	NOT APPLICABLE
NO. CONDENSER COOLING TOWERS	0.0
COOLING TOWER HEIGHT, FT	NOT APPLICABLE
COOLING TOWER EXIT DIAM.,FT	NOT APPLICABLE
COOLING RANGE, DEG. F	NOT APPLICABLE
COOLING TOWER EXIT VELOCITY, FT/SEC	NOT APPLICABLE
COOLING TOWER DROPLET SIZE, MICRONS	NOT APPLICABLE
CONDENSER TEMP.RISE, DEG. F	14
COOLING SYSTEM TRANSIT TIME, MIN.	27
EFFLUENT TEMP. ABOVE AMBIENT,DEG F	14
NOISE AT BOUNDARY, DECIBELS	DATA NOT AVAILABLE

DISRUPTED ONSITE LAND, ACRES	453
DISPL.EXCAVATION SPOIL,MIL CU YRD	1.5
DREDGE SPOIL, MIL CU YRD	DATA NOT AVAILABLE
AVG. CONSTRUCTION PERSONNEL	1450
OPERATING PERSONNEL	135
NOBLE GAS AIR RELEASE, CURIES/YR	6718
I-131 AIR RELEASE, CURIES/YR	0.9
LIQ. EFFLUENT(NON-H3), CURIES/YR	105
TRITIUM LIQUID RELEASE, CURIES/YR	2000
CS-137 LIQ. EFFLUENT, CURIES/YR	13.29
DIRECT RADIATION AT SITE BOUNDARY,MR/YR	DATA NOT AVAILABLE
MAX. GAS STORAGE, CURIES	6102
MAX. LIQUID STORAGE, CURIES	DATA NOT AVAILABLE
RADIOACTIVE SOLID WASTE, CURIES/YR	DATA NOT AVAILABLE
RADIOACTIVE SOLID WASTE VOL.,DRUMS/YR	200
MAX. HEAT TO ATMOS.,BBTU/HR	DATA NOT AVAILABLE
MAX. HEAT TO REC. WATER, BBTU/HR	11.9
TREATMENT CHEMICALS, LBS/YR	
BIOCIDES	
CHLORINE	AMOUNT NOT AVAILABLE
CORROSION AND SCALE INHIBITORS	
CYCLOHEXYLAMINE	190
SULFURIC ACID	AMOUNT NOT AVAILABLE
CLEANING AND NEUTRALIZING COMPOUNDS	
SODIUM HYDROXIDE	1900
BORON	2700
SULFURIC ACID	360000
HYDRAZINE	AMOUNT NOT AVAILABLE
CHEMICAL EFFLUENTS, PPM	
TOTAL RESIDUAL CHLORINE	DATA NOT AVAILABLE
FREE AVAILABLE CHLORINE	0.0000029
TOTAL CHROMIUM	DATA NOT AVAILABLE
TOTAL COPPER	DATA NOT AVAILABLE
TOTAL IRON	DATA NOT AVAILABLE
TOTAL NICKEL	DATA NOT AVAILABLE
TOTAL ZINC	DATA NOT AVAILABLE
TOTAL PHOSPHORUS (AS P)	0.000052
SULFATE	0.051
OIL AND GREASE	DATA NOT AVAILABLE
DISSOLVED OXYGEN	6.7
TOTAL DISSOLVED SOLIDS	DATA NOT AVAILABLE
TOTAL SUSPENDED SOLIDS	DATA NOT AVAILABLE
BOD5 DAY	DATA NOT AVAILABLE

NOTES:

ID: SUSQUEHANNA 1&2, PENN POWER & LIGHT, COUNTY OF LUZERNE, STATE OF PA

MAJOR RIVER BASIN	NORTH ATLANTIC
LATITUDE, DEG MIN SEC	041 06 00
LONGITUDE, DEG MIN SEC	076 09 00
DOCKET NUMBER	50387
LICENSING ACTION	UNDER CONSTRUCTION
DATE OF LICENSING ACTION	11 02 73
NSSS TYPE	BWR
NO.NUCLEAR UNITS INFO. APPL	2
TOTAL THERMAL CAPACITY, MWT	6586
TOTAL ELECTRICAL CAPACITY,MWE	2100
ADDITIONAL UNITS ONSITE	NO
TALLEST STRUCTURE, FEET	500
COOLING SYSTEM TYPE	NATURAL DRAFT, WET COOLING TOWER
PLANT LIFETIME, YEARS	40
SOURCE WATERBODY	RIVER, NONTIDAL
RECEIVING WATERBODY	RIVER, NONTIDAL
LAND ACREAGE OF STATION FACILITIES	24
TOTAL LAND ACREAGE OF SITE	955
OFFSITE ACREAGE, TRANSMISSION LINES	1800
OFFSITE ACREAGE, ACCESS ROADWAY	0.0
OFFSITE ACREAGE, ACCESS RAILWAY	0.0
MIN. DISTANCE TO SITE BOUNDARY, FT	1800
MIN. DIST. LARG. DIFFUSION FACTOR,FT	6040
INTAKE LOCATION	SHORELINE/RIVERBANK
COOLING SYSTEM WITHDRAWAL,CU FT/SEC	84.5
SERVICE WATER WITHDRAWAL, CU FT/SEC	0.21
APPROACH VELOCITY, FEET PER SECOND	0.75
SCREEN VELOCITY, FEET PER SECOND	1.5
INTAKE SCREEN MESH, INCHES	0.375
COOLING SYSTEM EVAPORATION,CU FT/SEC	62.4
SERVICE WATER EVAPORATION,CU FT/SEC	0.0
DRIFT, PERCENT	0.02
DISCHARGE LOCATION	OFFSHORE, SUBMERGED
DISCHARGE TYPE	DIFFUSER PIPE
COOLING SYSTEM DISCHARGE, CU FT/SEC	23
SERVICE WATER DISCHARGE, CU FT/SEC	0.04
DISCHARGE VELOCITY, FEET PER SECOND	6
DISCHARGE EFFECTIVE AREA, SQ FT	3.84
COND. COOLING WATER FLOW,CU FT/SEC.	2005
RETURN COND. TDS RATIO	3.15
NO. CONDENSER COOLING TOWERS	2
COOLING TOWER HEIGHT, FT	500
COOLING TOWER EXIT DIAM.,FT	DATA NOT AVAILABLE
COOLING RANGE, DEG. F	35
COOLING TOWER EXIT VELOCITY, FT/SEC	DATA NOT AVAILABLE
COOLING TOWER DROPLET SIZE, MICRONS	DATA NOT AVAILABLE
CONDENSER TEMP.RISE, DEG. F	34
COOLING SYSTEM TRANSIT TIME, MIN.	2
EFFLUENT TEMP. ABOVE AMBIENT,DEG F	33
NOISE AT BOUNDARY, DECIBELS	DATA NOT AVAILABLE

DISRUPTED ONSITE LAND, ACRES	120
DISPL.EXCAVATION SPOIL,MIL CU YRD	DATA NOT AVAILABLE
DREDGE SPOIL,• MIL CU YRD	DATA NOT AVAILABLE
AVG. CONSTRUCTION PERSONNEL	1882
OPERATING PERSONNEL	77
NOBLE GAS AIR RELEASE, CURIES/YR	5800
I-131 AIR RELEASE, CURIES/YR	0.036
LIQ. EFFLUENT(NON-H3), CURIES/YR	1.6
TRITIUM LIQUID RELEASE, CURIES/YR	40
CS-137 LIQ. EFFLUENT, CURIES/YR	0.034
DIRECT RADIATION AT SITE BOUNDARY,MR/YR	1
MAX. GAS STORAGE, CURIES	424
MAX. LIQUID STORAGE, CURIES	DATA NOT AVAILABLE
RADIOACTIVE SOLID WASTE, CURIES/YR	5500
RADIOACTIVE SOLID WASTE VOL.,DRUMS/YR	626
MAX. HEAT TO ATMOS.,BBTU/HR	16
MAX. HEAT TO REC. WATER, BBTU/HR	0.103
TREATMENT CHEMICALS, LBS/YR	
BIOCIDES	
CHLORINE	730000
SODIUM HYPOCHLORITE	1900
CORROSION AND SCALE INHIBITORS	
SULFURIC ACID	3100000
CLEANING AND NEUTRALIZING COMPOUNDS	
SODIUM HYDROXIDE	25000
ALUMINUM SULFATE	5800
CHEMICAL EFFLUENTS, PPM	
TOTAL RESIDUAL CHLORINE	0.002
FREE AVAILABLE CHLORINE	0.0
TOTAL CHROMIUM	DATA NOT AVAILABLE
TOTAL COPPER	DATA NOT AVAILABLE
TOTAL IRON	2.04
TOTAL NICKEL	DATA NOT AVAILABLE
TOTAL ZINC	DATA NOT AVAILABLE
TOTAL PHOSPHORUS (AS P)	0.075
SULFATE	308.3
OIL AND GREASE	DATA NOT AVAILABLE
DISSOLVED OXYGEN	5
TOTAL DISSOLVED SOLIDS	624.2
TOTAL SUSPENDED SOLIDS	DATA NOT AVAILABLE
BOD5 DAY	DATA NOT AVAILABLE

NOTES:

ID: TROJAN NUC PLANT, PORTLAND ELEC CO, COUNTY OF COLUMBIA, STATE OF OR

MAJOR RIVER BASIN	PACIFIC NORTHWEST
LATITUDE, DEG MIN SEC	046 02 14
LONGITUDE, DEG MIN SEC	122 53 05
DOCKET NUMBER	50344
LICENSING ACTION	UNDER CONSTRUCTION
DATE OF LICENSING ACTION	02 08 71
NSSS TYPE	PWR
NO.NUCLEAR UNITS INFO. APPL	1
TOTAL THERMAL CAPACITY, MWT	3423
TOTAL ELECTRICAL CAPACITY,MWE	1130
ADDITIONAL UNITS ONSITE	NO
TALLEST STRUCTURE, FEET	499
COOLING SYSTEM TYPE	NATURAL DRAFT, WET COOLING TOWER
PLANT LIFETIME, YEARS	40
SOURCE WATERBODY	RIVER, TIDAL
RECEIVING WATERBODY	RIVER, TIDAL
LAND ACREAGE OF STATION FACILITIES	35
TOTAL LAND ACREAGE OF SITE	634
OFFSITE ACREAGE, TRANSMISSION LINES	1260
OFFSITE ACREAGE, ACCESS ROADWAY	0.0
OFFSITE ACREAGE, ACCESS RAILWAY	0.0
MIN. DISTANCE TO SITE BOUNDARY, FT	2000
MIN. DIST. LARG. DIFFUSION FACTOR,FT	5600
INTAKE LOCATION	SHORELINE/RIVERBANK
COOLING SYSTEM WITHDRAWAL,CU FT/SEC	77.3
SERVICE WATER WITHDRAWAL, CU FT/SEC	28.4
APPROACH VELOCITY, FEET PER SECOND	0.5
SCREEN VELOCITY, FEET PER SECOND	1.55
INTAKE SCREEN MESH, INCHES	0.14
COOLING SYSTEM EVAPORATION,CU FT/SEC	32.5
SERVICE WATER EVAPORATION,CU FT/SEC	NOT APPLICABLE
DRIFT, PERCENT	0.01
DISCHARGE LOCATION	OFFSHORE, SUBMERGED
DISCHARGE TYPE	DIFFUSER PIPE
COOLING SYSTEM DISCHARGE, CU FT/SEC	25
SERVICE WATER DISCHARGE, CU FT/SEC	DATA NOT AVAILABLE
DISCHARGE VELOCITY, FEET PER SECOND	8.5
DISCHARGE EFFECTIVE AREA, SQ FT	2.95
COND. COOLING WATER FLOW,CU FT/SEC	947
RETURN COND. TDS RATIO	9.5
NO. CONDENSER COOLING TOWERS	1
COOLING TOWER HEIGHT, FT	499
COOLING TOWER EXIT DIAM.,FT	260
COOLING RANGE, DEG. F	37
COOLING TOWER EXIT VELOCITY, FT/SEC	DATA NOT AVAILABLE
COOLING TOWER DROPLET SIZE, MICRONS	DATA NOT AVAILABLE
CONDENSER TEMP.RISE, DEG. F	38
COOLING SYSTEM TRANSIT TIME, MIN.	0.67
EFFLUENT TEMP. ABOVE AMBIENT,DEG F	8.2
NOISE AT BOUNDARY, DECIBELS	51

DISRUPTED ONSITE LAND, ACRES	211
DISPL.EXCAVATION SPOIL,MIL CU YRD	DATA NOT AVAILABLE
DREDGE SPOIL, MIL CU YRD	DATA NOT AVAILABLE
AVG. CONSTRUCTION PERSONNEL	DATA NOT AVAILABLE
OPERATING PERSONNEL	60
NOBLE GAS AIR RELEASE, CURIES/YR	3244.2
I-131 AIR RELEASE, CURIES/YR	0.24
LIQ. EFFLUENT(NON-H3), CURIES/YR	5
TRITIUM LIQUID RELEASE, CURIES/YR	1000
CS-137 LIQ. EFFLUENT, CURIES/YR	0.98
DIRECT RADIATION AT SITE BOUNDARY,MR/YR	DATA NOT AVAILABLE
MAX. GAS STORAGE, CURIES	1140
MAX. LIQUID STORAGE, CURIES	DATA NOT AVAILABLE
RADIOACTIVE SOLID WASTE, CURIES/YR	17650
RADIOACTIVE SOLID WASTE VOL.,DRUMS/YR	220
MAX. HEAT TO ATMOS.,BBTU/HR	7.9
MAX. HEAT TO REC. WATER, BBTU/HR	0.022
TREATMENT CHEMICALS, LBS/YR	
BIOCIDES	
CHLORINE	250000
CORROSION AND SCALE INHIBITORS	
SULFURIC ACID	3500000
SODIUM ORTHOPHOSPHATE, HYDROUS	1800
BORIC ACID	73
CLEANING AND NEUTRALIZING COMPOUNDS	
AMMONIUM HYDROXIDE	300
SODIUM HYDROXIDE	62000
HYDRAZINE	300
ALUMINUM SULFATE	18000
MORPHOLINE	300
CHEMICAL EFFLUENTS, PPM	
TOTAL RESIDUAL CHLORINE	0.0
FREE AVAILABLE CHLORINE	0.0
TOTAL CHROMIUM	0.035
TOTAL COPPER	DATA NOT AVAILABLE
TOTAL IRON	DATA NOT AVAILABLE
TOTAL NICKEL	DATA NOT AVAILABLE
TOTAL ZINC	0.28
TOTAL PHOSPHORUS (AS P)	0.88
SULFATE	240
OIL AND GREASE	DATA NOT AVAILABLE
DISSOLVED OXYGEN	DATA NOT AVAILABLE
TOTAL DISSOLVED SOLIDS	1800
TOTAL SUSPENDED SOLIDS	DATA NOT AVAILABLE
BOD5 DAY	DATA NOT AVAILABLE

NOTES:

ID: ZION STATION 1,2, COMMONWEALTH ED, COUNTY OF LAKE, STATE OF IL

MAJOR RIVER BASIN	WESTERN GREAT LAKES
LATITUDE, DEG MIN SEC	042 27 33
LONGITUDE, DEG MIN SEC	087 48 21
DOCKET NUMBER	50295
LICENSING ACTION	OPERATING
DATE OF LICENSING ACTION	04 06 73
NSSS TYPE	PWR
NO.NUCLEAR UNITS INFO. APPL	2
TOTAL THERMAL CAPACITY, MWT	5520
TOTAL ELECTRICAL CAPACITY,MWE	1786
ADDITIONAL UNITS ONSITE	NO
TALLEST STRUCTURE, FEET	189
COOLING SYSTEM TYPE	ONCE-THROUGH
PLANT LIFETIME, YEARS	40
SOURCE WATERBODY	LAKE
RECEIVING WATERBODY	LAKE
LAND ACREAGE OF STATION FACILITIES	31
TOTAL LAND ACREAGE OF SITE	250
OFFSITE ACREAGE, TRANSMISSION LINES	124
OFFSITE ACREAGE, ACCESS ROADWAY	0.0
OFFSITE ACREAGE, ACCESS RAILWAY	0.0
MIN. DISTANCE TO SITE BOUNDARY, FT	1470
MIN. DIST. LARG. DIFFUSION FACTOR,FT	1600
INTAKE LOCATION	OFFSHORE, SUBMERGED
COOLING SYSTEM WITHDRAWAL,CU FT/SEC	3400
SERVICE WATER WITHDRAWAL, CU FT/SEC	DATA NOT AVAILABLE
APPROACH VELOCITY, FEET PER SECOND	1.2
SCREEN VELOCITY, FEET PER SECOND	2
INTAKE SCREEN MESH, INCHES	0.375
COOLING SYSTEM EVAPORATION,CU FT/SEC	NOT APPLICABLE
SERVICE WATER EVAPORATION,CU FT/SEC	NOT APLICABLE
DRIFT, PERCENT	0.0
DISCHARGE LOCATION	OFFSHORE, SUBMERGED
DISCHARGE TYPE	DIFFUSER PIPE
COOLING SYSTEM DISCHARGE, CU FT/SEC	3400
SERVICE WATER DISCHARGE, CU FT/SEC	DATA NOT AVAILABLE
DISCHARGE VELOCITY, FEET PER SECOND	9.5
DISCHARGE EFFECTIVE AREA, SQ FT	588
COND. COOLING WATER FLOW,CU FT/SEC.	NOT APPLICABLE
RETURN COND. TDS RATIO	NOT APPLICABLE
NO. CONDENSER COOLING TOWERS	0.0
COOLING TOWER HEIGHT, FT	NOT APPLICABLE
COOLING TOWER EXIT DIAM.,FT	NOT APPLICABLE
COOLING RANGE, DEG. F	NOT APPLICABLE
COOLING TOWER EXIT VELOCITY, FT/SEC	NOT APPLICABLE
COOLING TOWER DROPLET SIZE, MICRONS	NOT APPLICABLE
CONDENSER TEMP.RISE, DEG. F	20
COOLING SYSTEM TRANSIT TIME, MIN.	DATA NOT AVAILABLE
EFFLUENT TEMP. ABOVE AMBIENT,DEG F	20
NOISE AT BOUNDARY, DECIBELS	DATA NOT AVAILABLE

DISRUPTED ONSITE LAND, ACRES	DATA NOT AVAILABLE
DISPL.EXCAVATION SPOIL,MIL CU YRD	DATA NOT AVAILABLE
DREDGE SPOIL, MIL CU YRD	0.2
AVG. CONSTRUCTION PERSONNEL	1800
OPERATING PERSONNEL	200
NOBLE GAS AIR RELEASE, CURIES/YR	5684
I-131 AIR RELEASE, CURIES/YR	0.4
LIQ. EFFLUENT(NON-H3), CURIES/YR	10
TRITIUM LIQUID RELEASE, CURIES/YR	2000
CS-137 LIQ. EFFLUENT, CURIES/YR	1.22
DIRECT RADIATION AT SITE BOUNDARY,MR/YR	DATA NOT AVAILABLE
MAX. GAS STORAGE, CURIES	3204
MAX. LIQUID STORAGE, CURIES	DATA NOT AVAILABLE
RADIOACTIVE SOLID WASTE, CURIES/YR	DATA NOT AVAILABLE
RADIOACTIVE SOLID WASTE VOL.,DRUMS/YR	1800
MAX. HEAT TO ATMOS.,BBTU/HR	DATA NOT AVAILABLE
MAX. HEAT TO REC. WATER, BBTU/HR	15
TREATMENT CHEMICALS, LBS/YR	
BIOCIDES	
SODIUM HYPOCHLORITE	8000
CORROSION AND SCALE INHIBITORS	
LITHIUM HYDROXIDE	9
HYDRAZINE	30000
MORPHOLINE	5220
ALUMINUM SULFATE	9840
BORON	630
CLEANING AND NEUTRALIZING COMPOUNDS	
BORIC ACID	1000
SODIUM HYDROXIDE	84000
SULFURIC ACID	90000
DETERGENTS, MISC.	2000
PHOSPHATES AND POLYPHOSPHATES	1500
CHEMICAL EFFLUENTS, PPM	
TOTAL RESIDUAL CHLORINE	0.032
FREE AVAILABLE CHLORINE	DATA NOT AVAILABLE
TOTAL CHROMIUM	DATA NOT AVAILABLE
TOTAL COPPER	DATA NOT AVAILABLE
TOTAL IRON	DATA NOT AVAILABLE
TOTAL NICKEL	DATA NOT AVAILABLE
TOTAL ZINC	DATA NOT AVAILABLE
TOTAL PHOSPHORUS (AS P)	0.013
SULFATE	200
OIL AND GREASE	DATA NOT AVAILABLE
DISSOLVED OXYGEN	DATA NOT AVAILABLE
TOTAL DISSOLVED SOLIDS	175
TOTAL SUSPENDED SOLIDS	DATA NOT AVAILABLE
BOD5 DAY	DATA NOT AVAILABLE

APPENDIX C

WATER, LAND, AND MANPOWER REQUIREMENTS FOR NUCLEAR POWER PLANTS

The following tables provide data which were obtained primarily from a survey of 61 Environmental Statements (Draft and Final) available as of August 1973. The data regarding estimated start of operation and total net capacity were obtained from a separate source.[1] Those parameters reported in the tables include:

1. Annual rate of water consumption
2. Water supply rate
3. Land areas devoted to the station, site, transmission corridors, and miscellaneous land uses[2]
4. Peak and average number of construction workers
5. Number of station operating personnel
6. Average annual payroll for construction and operating personnel

Explanatory notes and a key to abbreviations are presented at the end of each table.

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[1] "Nuclear Reactors Built, Being Built, or Planned in the United States as of June 30, 1973," USAEC, TID-8200-R28, 1973.

[2] Additional information available in "Land Use and Nuclear Power Plants," by W. Ramsay and P. R. Reed, USAEC, WASH-1319, 1974.

NUCLEAR PLANT WATER AND LAND REQUIREMENTS[a]

No.	Plant Name	Source of Data	Start of Operation[c]	Total Net Capacity MWe[c]	Cooling System	Annual Water Consumption Total (Acre Ft.)	Annual Water Consumption (Acre Ft. Per 1,000 MWe)	Water Intake (cfs)	Acreage Station (ST)	Acreage Other (O)	Acreage Site (S) (ST+O)	Acreage Misc. (M)	Acreage Trans. Corr. (T)	Acreage Total Land (S+M+T)	Land Requirements for Fossil Fuel Alternatives
1	Oconee 1, 2 & 3	FES-OL Mar. '72	1972 1973, 1974	2,658	OT	38,150 (max)	14,500 (max)	4,733	150	1,850-U	2,000[e]	n.a.	7,800	9,800	n.a.
2	Midland 1 & 2	FES-CP Mar. '72	1977, 1979	1,300	OT-ACL	25,300 (max) 18,800 (avg)	19,400 (max) 14,400 (avg)	200	100	880-ACL 220-U	1,200	n.a.	958	2,158	1,200-acre site required for coal or oil fired plant
3	Pilgrim 1	FES-OL May '72	1972	655	OT	n.a. [b]	n.a. [b]	710	60	457-U	517	n.a.	187[d]	704	517-acre site required for coal or oil fired plant
4	Point Beach 1 & 2	FES-OL May '72	1970, 1972	994	OT	n.a.	n.a.	1,566	37	2,028-A	2,065	n.a.	3,562[d]	5,627	400-acre site required for coal plant--100-acre site required for oil fired plant
5	Surry 1 & 2	FES-OL May '72	1972, 1973	1,640	OT	23,860 (max)	14,600 (max)	3,740	453	387-U	840	n.a.	4,420	5,260	n.a.
6	Farley 1 & 2	FES-CP May '72	1974, 1976	1,658	MDCT	43,380 (max)	26,100 (max)	174	483	65-WI 1,302-U	1,850	76-RS	5,342	7,268	1,850-acre site required for coal fired plant
7	Palisades	FES-OL June '72	1971	700	MDCT (BF)	19,500 (max)	27,900 (max)	136	55[d]	432-U	487	n.a.	2,250	2,737	n.a.
8	Vermont Yankee	FES-OL July '72	1972	514	OT or MDCT	6,630 (max) or 7,953 (max)	12,900 (max) or 15,500 (max)	840 or 33	60	65-U	125	n.a.	1,550	1,675	250-acre site required for oil fired plant--no data re coal plant
9	Enrico Fermi 2	FES-OL July '72	1975	1,123	NDCT	31,300 (max) 21,000 (avg)	27,800 (max) 18,600 (avg)	70	150	888-RF 50-WI	1,088	n.a.	180	1,268	n.a.
10	Turkey Point 3 & 4	FES-OL July '72	1972, 1973	1,386	OT-CC	n.a. [b]	n.a. [b]	2,800	150	7,000-CC 16,850-U	24,000	n.a.	817	24,817	Site also includes one oil and one gas fired unit
11	Maine Yankee	FES-OL July '72	1972	790	OT	n.a. [b]	n.a. [b]	950	30	250-RF 450-U 10-WI	740	n.a.	182[d]	922	n.a.
12	Fort St. Vrain	FES-OL Sept. '72	1973	330	MDCT	3,615 (max)	10,900 (max)	9	80	2,158-A	2,238	n.a.	260[d]	2,498	100-acre station required for coal fired plant
13	Fort Calhoun	FES-OL Aug. '72	1973	475	OT	4,400 (avg)	9,250 (avg)	800	20	362-A	382	n.a.	182	564	n.a.
14	Zimmer	FES-CP Sept. '72	1977	810	NDCT	19,521 (max)	24,200 (max)	92	280	526-U 6-WI	632	n.a.	363[d]	995	n.a.
15	Quad Cities 1 & 2	FES-OL Sept. '72	1971, 1972	1,600	SC (BF)	36,150 (max)	22,600 (max)	120	100[d]	400-U 60-SC	560	n.a.	1,400	1,960	n.a.
16	Indian Point 1 & 2	FES-OL Sept. '72	1962, 1973	1,138	OT	18,400 (max)	16,200 (max)	2,650	35	110-U 94-RF	239	n.a.	13[d]	252	n.a.
17	Arkansas Nuclear One (Unit 1)	FES-OL-73	1973	820	OT	8,300 (avg)	10,100 (avg)	1,737	150	1,014-U	1,164	n.a.	3,700	4,864	n.a.
	(Unit 2)	FES-CP-72	1976	902	NDCT	16,300 (avg)	18,300 (avg)	40							
18	Shoreham	FES-OL Sept. '72	1977	819	OT	n.a. [b]	n.a. [b]	1,316	80	800-U	880	n.a.	39	919	n.a.

NUCLEAR PLANT WATER AND LAND REQUIREMENTS[a] (continued)

No.	Plant Name	Source of Data	Start of Operation[c]	Total Net Capacity MWe[c]	Cooling System	Annual Water Consumption		Water Intake (cfs)	Acreage						Land Requirements for Fossil Fuel Alternatives
						Total (Acre Ft.)	(Acre Ft. Per 1,000 MWe)		Station (ST)	Other (O)	Site (S) (ST+O)	Misc. (M)	Trans. Corr. (T)	Total Land (S+M+T)	
19.	McGuire 1 & 2	FES-CP Oct. '72	1975, 1976	2,360	OT	27,510 (max)	11,600 (max)	4,520	180[d]	238-U 47-WI	465[f]	n.a.	40	505	n.a.
20.	Hatch 1 & 2	FES-OL Oct. '72	1974, 1978	1,581	MDCT	37,000 (max)	23,000 (max)	106	197	2,047-U	2,244	6-RS	4,691	6,941	242-acre station required for coal fired plant
21.	Monticello	FES-OL Nov. '72	1970	545	OT or MDCT	5,000 (max) 13,014 (max)	9,200 (max) 23,800 (max)	645 54	60	1,105-A 160-U	1,325	n.a.	1,560[d]	2,885	n.a.
22.	Zion 1 & 2	FES-OL Dec. '72	1973	2,100	OT	n.a.	n.a.	3,400	100	150-U	250	n.a.	156[d]	406	n.a.
23.	Three Mile Island 1 & 2	FES-OL Dec. '72	1974, 1976	1,724	NDCT	33,400 (max)	19,300 (max)	104	200	272-RF	472	n.a.	1,790	2,262	n.a.
24.	Hanford 2 (WPPSS Nuclear Project Unit 2)	FES-CP Dec. '72	1977	1,103	MDCT	26,600 (max)	24,000 (max)	51	30	1,069-U	1,089	n.a.	480	1,569	n.a.
25.	Kewaunee	FES-OL Dec. '72	1973	541	OT	7,840 (max)	14,500 (max)	918	110	798-U	908	n.a.	1,066	1,974	n.a.
26.	Virgil Summer	FES-OL Jan. '73	1976	900	OT	12,100 (max)	14,200 (max)	1,180	200	265-U	465[g]	n.a.	1,813	2,278	n.a.
27.	La Salle 1 & 2	FES-CP Feb. '73	1978	2,156	OT-ACL	24,300 (max) 14,600 (avg)	11,300 (max) 6,700 (avg)	87	150	2,190-ACL[h] 630-U	2,970[h]	275-PL & PS 120-RS	2,444[d]	5,809	n.a.
28.	Bailly 1	FES-CP Feb. '73	1979	660	NDCT	11,568 (max)	17,500 (max)	45	40	*	350	n.a.	n.a.	350	*Existing coal fired unit on site.
29.	Forked River	FES-CP Feb. '73	1978	1,070	NDCT	19,521 (max)	18,250 (max)	160	80	1,336	1,416	n.a.	2,000	3,416	816-acre site required for oil fired plant
30.	Cooper	FES-OL Feb. '73	1973	778	OT	7,300 (max)	9,400 (max)	1,450	55	1,035	1,090	n.a.	4,034[d]	5,124	n.a.
31.	Duane Arnold	FES-OL Mar. '73	1973	530	MDCT	11,200 (max)	21,000 (max)	28	40	460-U	500	n.a.	1,155	1,655	110-acre station required for coal fired plant
32.	Davis-Besse	FES-CP Mar. '73	1974	906	NDCT	14,460 (avg)	15,950 (avg)	66	160	794-U	954	n.a.	1,800	1,754	n.a.
33.	Rancho Seco 1	FES-OL Mar. '73	1973	804	NDCT	15,906 (max)	19,300 (max)	31	100[d]	2,225-U 165-WI	2,480	n.a.	936[d]	3,416	n.a.
34.	FitzPatrick	FES-OL Mar. '73	1973	821	OT	8,676 (avg)	10,600 (avg)	822	102	600-WLR	702	n.a.	1,273	1,975	n.a.
35.	Waterford 3	FES-CP Mar. '73	1977	1,113	OT	6,507 (avg)	5,850 (avg)	2,172	100	*	3,600	n.a.	280	3,880	*Two existing oil fired units on site
36.	San Onofre 1, 2 & 3	FES-CP-73 DES-OL-73	1968, 1978, 1979	2,710	OT	n.a.[b]	n.a.[b]	4,465	68	16-U	84	n.a.	1,100	1,184	n.a.

NUCLEAR PLANT WATER AND LAND REQUIREMENTS[a] (continued)

No.	Plant Name	Source of Data	Start of Operation[c]	Total Net Capacity MWe[c]	Cooling System	Annual Water Consumption		Water Intake (cfs)	Acreage						Land Requirements for Fossil Fuel Alternatives
						Total (Acre Ft.)	(Acre Ft. Per 1,000 MWe)		Station (ST)	Other (O)	Site (S) (ST+O)	Misc. (M)	Trans. Corr. (T)	Total Land (S+M+T)	
37.	Salem 1 & 2	FES-OL Apr. '73	1974, 1975	2,205	OT	n.a.[b]	n.a.[b]	5,100	220	480-U	700	n.a.	3,900	4,600	n.a.
38.	Calvert Cliffs 1 & 2	FES-OL Apr. '73	1973, 1974	1,690	OT	n.a.[b]	n.a.[b]	5,490	100	1,035-U	1,135	n.a.	1,990[d]	3,125	200 acre-sites req'd. for coal or gas fired plant Exclusion areas req'd = 535 ±
39.	North Anna 1, 2, 3 & 4	FES-CP OL Apr. '73	1975, 1975, 1977, 1978	3,610	OT-ACL	57,800 (avg)	16,500 (avg)	8,420	200[d]	13,000-ACL 5,443-U	18,643	n.a.	3,528	22,171	n.a. *Including natural evaporation from lake
40.	Peach Bottom 1, 2 & 3	FES-OL Apr. '73	1966, 1973, 1974	2,170	OT + MDCT	36,150 (max)	17,000 (max)	3,350	140	420-U 60-WI	620	n.a.	1,030	1,650	Station would need 20 additional acres for coal or oil fired plant
41.	Shearon Harris 1, 2, 3 & 4	FES-CP Jan. '74	1977, 1980 1980, 1981	3,660	NDCT	75,000 (avg)	20,800 (avg)	85	150	4,325-R 6,269-U	10,744	79-RS	3,500	14,323	n.a.
42.	Prairie Island 1 & 2	FES-OL May '73	1973, 1974	1,060	MDCT or OT	27,500 (max)	26,000 (max)	188	60	500-U	560	n.a.	973	1,533	n.a.
43.	Crystal River 3	FES-CP May '73	1974	825	OT	n.a.[b]	n.a.[b]	1,520	30	4,708-U	4,738	n.a.	2,140	6,878	2 existing oil fired units on site
44.	Diablo Canyon 1 & 2	DES-OL Dec. '72	1974, 1975	2,120	OT	n.a.[b]	n.a.[b]	3,864	51	699-U	750	n.a.	6,000	6,750	n.a.
45.	Millstone 1, 2, & 3	FES-OL '73 DES-CP '73	1970 1974, 1978	2,630	OT	n.a.[b]	n.a.[b]	4,155	40	350-U 60-RF, 50-WLR	500	n.a.	927	1,427	n.a.
46.	Nine Mile Point 1 & 2	FES-CP June '73	1969, 1978	1,705	OT	12,200 (avg)	7,160 (avg)	1,784	90	810-U	900	n.a.	133	1,033	n.a.
47.	St. Lucie 1	FES-OL June '73	1975	801	OT	n.a.[b]	n.a.[b]	1,180	300	832-U	1,132	n.a.	760	1,892	n.a.
48.	Limerick 1 & 2	DES-CP Aug. '73	1978, 1979	2,130	NDCT	39,000 (max)	18,300 (max)	74	85	502-U	587	n.a.	7	594	500-acre add'l. station area req'd. for ash storage at coal fired plant 20-acre add'l. station area req'd. for tanks at oil fired plant
49.	Susquehanna 1 & 2	FES-CP June '73	1979, 1981	2,104	NDCT	45,000 (max) 36,150 (avg)	21,400 (max) 16,700 (avg)	72	115	450-RF 390-U	955	n.a.	1,800	2,755	500-acres required for coal fired plant 400-acres required for oil fired plant
50.	Cook, D.C., 1 & 2	FES-OL Aug. '73	1973, 1974	2,120	OT	28,920 (avg)	15,000 (avg)	3,650	180	450-U	630	n.a.	3,300	3,930	n.a.
51.	Trojan	FES-OL Aug. '73	1975	1,130	NDCT	23,500 (max)	20,800 (max)	44	35	200-RF 1,740-U	634	n.a.	1,260	1,894	400-acres required for coal fired plant 100-acres required for oil fired plant
52.	Beaver Valley 1 & 2	FES-CP, OL July '73	1975, 1979	1,704	NDCT	28,000 (avg)	16,400 (avg)	120	30	419-U	449	n.a.	0	449	32-additional acres required for coal fired plant 50-additional acres required for station for oil fired plant
53.	Grand Gulf 1 & 2	FES-CP Aug. '73	1979	2,580	NDCT	57,840 (max)	22,400 (max)	129	300	2,100-U	2,300	n.a.	2,300	4,600	n.a.
54.	Ginna 1	DES-OL April '73	1969	420	OT	5,300 (max)	12,600 (max)	892	30	308-U	338	n.a.	280	618	n.a.

NUCLEAR PLANT WATER AND LAND REQUIREMENTS[a] (continued)

No.	Plant Name	Source of Data	Start of Operation[c]	Total Net Capacity MWe[c]	Cooling System	Annual Water Consumption		Water Intake (cfs)	Acreage						Land Requirements for Fossil Fuel Alternatives
						Total (Acre Ft.)	(Acre Ft. Per 1,000 MWe)		Station (ST)	Other (O)	Site (S) (ST+O)	Misc. (M)	Trans. Corr. (T)	Total Land (S+M+T)	
55.	Connecticut Yankee	DES-OL Mar. '73	1967	575	OT	4,350 (avg)	7,530 (avg)	830	30	505-U	525	n.a.	985	1,510	100-acres required for oil fired plant
56.	Catawba 1 & 2	DES-CP Apr. '73	1978, 1979	2,360	OT	29,200 (avg)	12,400 (avg)	4,630	134	271-U	425	79-RS	584	1,088	Additional 204 acres required for coal fired plant
57.	Brunswick 1 & 2	DES-OL June '73	1974, 1975	1,642	OT	n.a.[b]	n.a.[b]	2,900	150	1,380-CC 1,383-U	2,913	n.a.	3,500	6,413	n.a.
58.	Robinson, H. B., 2	DES-OL Apr. '73	1970	700	OT-ACL	11,100 (avg)	15,900 (avg)	1,120	100	2,250-ACL-R 2,400-U	4,750	n.a.	1,024	5,774	Existing 185 MWe coal fired plant on site
59.	Oyster Creek 1	DES-OL July '73	1969	640	OT	n.a.[b]	n.a.[b]	1,040	25	1,391-U	1,416	n.a.	322	1,738	452-acre site required for oil fired plant 752-acre site required for coal fired plant
60.	Dresden 1, 2 & 3	DES-OL June '73	1959 1970, 1971	1,818	OT & OT-ACL+SC	28,200 (max)	15,500 (max)	525	200[d]	1,573-ACL&CC 727-U	2,500	n.a.	2,250[d]	4,750	n.a.
61.	Vogtle 1, 2, 3 & 4	DES-CP Aug. '73	1980, 1981, 1982, 1983	4,484	NDCT	96,500 (avg)	21,500 (avg)	202	426	2,501-U 250-TL	3,177	245-RS	12,660	16,082	n.a.

NUCLEAR PLANT WATER AND LAND REQUIREMENTS[a/] (continued)

LEGEND

DES - Draft Env. Statement
FES - Final Env. Statement
CP - Construction Permit
OL - Operating License
OT - Once Through
CT - Cooling Towers
MD - Mechanical Draft
ND - Natural Draft
ACL - Artificial Cooling Lake
SC - Spray Canal
WI - Water Impoundment
WLR - Wild Life Refuge
RF - Recreation Facilities
BF - Back Fit
U - Unused
R - Reservoir
A - Agriculture
RS - Rail Spur
CC - Cooling Channels
PL - Pipeline
PS - Pumping Station
n.a.- Not available

EXPLANATORY NOTES

a/See legend.

b/Sea coast site.

c/Source: U.S. Atomic Energy Commission, Nuclear Reactors Built, Being Built or Planned in the United States as of June 30, 1973, TID 8200-R28.

d/Estimated area based on information in Environmental Statement.

e/Estimated area of land and water within the one mile exclusion radius. The nuclear plant is located on an 18,500 acre hyro reservoir. A 7,500 acre impoundment for a pumped storage facility is also located above the upstream end of the reservoir. The total land owned by the utility on which the three projects are sited is 157,000 acres.

f/Estimated area of land and water within the 2,500 ft. exclusion radius. The nuclear plant is located on a pre-existing 32,510 acre hydro reservoir. The total land owned or controlled by the utility on which the two projects are located is 62,510 acres.

g/Estimated area of land and water within the 2,500 ft. exclusion radius. The nuclear plant is located adjacent to a 6,800 acre pumped storage reservoir. The project also includes a 2,500 acre enlargement of an adjacent 1,850 acre hydro reservoir. The total land owned or controlled by the utility on which the three projects are sited is 11,350 acres.

h/Estimated area based on board decision to reduce the artificial cooling lake and the site to provide for two units in lieu of four.

MANPOWER REQUIREMENTS FOR CONSTRUCTION AND OPERATION OF NUCLEAR PLANTS

No.	Plant Name	Net Capacity Under Const'n. MWe[a]	Const'n. Period (Years)[b]	CONSTRUCTION MANPOWER YEARLY 1	2	3	4	5	6	PEAK [c]	AVERAGE [c]	Average Annual Construction Payroll	Operating Manpower [c]	Annual Operating Payroll
1.	Oconee 1, 2 & 3	2,653	6.0	1,125	2,200	2,750	2,650	2,000	1,000	2,800 (1,050)	1,930 (730)	$27,200,000	170 (64)	$1,500,000
2.	Midland 1 & 2	1,300	4.0 & 5.5 (5.5)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	700 (540)	n.a.	80 (62)	n.a.
3.	Pilgrim	655	5.0	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	75 (114)	n.a.
4.	Point Beach 1 & 2	994	4.0 & 5.5 (5.5)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1,100 (1,110)	600 (605)	6,800,000	86 (86)	1,100,000
5.	Surrey 1 & 2	1,640	4.0 & 5.0 (5.0)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	2,000 (1,220)	n.a.	n.a.	135 (82)	n.a.
6.	Farley 1 & 2	1,658	4.0 & 6.0 (6.0)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	2,200 (1,330)	n.a.	n.a.	125 (75)	1,610,000
7.	Palisades	700	4.0	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
8.	Vermont Yankee	514	4.5	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1,200 (2,340)	n.a.	n.a.	70 (136)	500,000
9.	Enrico Fermi 2	1,123	5.5	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1,400 (1,250)	n.a.	n.a.	100 (89)	n.a.
10.	Turkey Point 3 & 4	1,386	5.0 & 6.0 (6.0)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1,200 (864)	n.a.	n.a.	100	n.a.
11.	Maine Yankee	790	4.5	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1,338 (1,700)	1,000 (1,270)	n.a.	n.a.	n.a.
12.	Fort St. Vrain	330	5.0	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	65 (197)	n.a.
13.	Fort Calhoun 1	475	5.0	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1,000 (2,110)	400 (841)	n.a.	60 (126)	n.a.
14.	Zimmer	810	5.5	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1,000 (1,240)	n.a.	65 (80)	n.a.
15.	Quad Cities 1 & 2	1,600	4.0 & 5.0 (5.0)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	180 (112)	2,500,000
16.	Indian Point 1 & 2	(2) 873	7.0	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1,200 (1,370)	1,000 (1,150)	n.a.	n.a.	1,200,000
17.	Arkansas 1 & 2	1,722	5.0 & 5.0 (8.0)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1,000 (550)	n.a.	6,000,000	100 (58)	440,000
18.	Shoreham	819	4.2	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	900 (1,100)	20,400,000	65 (79)	800,000

MANPOWER REQUIREMENTS FOR CONSTRUCTION AND OPERATION OF NUCLEAR PLANTS (continued)

No.	Plant Name	Net Capacity Under Const'n. MWe[a/]	Const'n. Period (Years)[b/]	CONSTRUCTION MANPOWER YEARLY 1	2	3	4	5	6	PEAK [c/]	AVERAGE [c/]	Average Annual Construction Payroll	Operating Manpower [c/]	Annual Operating Payroll
19.	McGuire 1 & 2	2,360	5.0 & 6.0 (6.0)	850	1,540	1,810	1,654	950	200	1,810 (763)	1,170 (496)	$10,590,000	n.a.	$ 737,000
20.	Hatch 1 & 2	1,581	4.5 & 6.5 (9.0)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1,500 (950)	n.a.	n.a.	100 (63)	n.a.
21.	Monticello	545	4.5	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1,000 (1,840)	750 (1,380)	n.a.	75 (138)	n.a.
22.	Zion 1 & 2	2,100	5.0	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1,800 (860)	n.a.	23,000,000	200 (95)	2,000,000
23.	Three Mile Island 1 & 2	1,724	6.0 & 6.0 (8.0)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	2,200 (1,270)	n.a.	n.a.	150 (87)	2,500,000
24.	Hanford 2	1,103	4.5	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	900 (815)	545 (494)	14,400,000	65 (59)	n.a.
25.	Kewaunee	541	5.0	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	760 (1,400)	612 (1,130)	9,650,000	70 (129)	900,000
26.	Virgil Summer	900	4.5	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1,000 (1,110)	n.a.	n.a.	n.a.	n.a.
27.	LaSalle 1 & 2	2,156	5.0 & 6.0 (6.0)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1,500 (695)	n.a.	n.a.	180 (83)	2,500,000
28.	Bailly 1	660	3.5	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
29.	Forked River	1,070	5.0	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1,500 (1,400)	n.a.	n.a.	n.a.	n.a.
30.	Cooper	778	6.0	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1,230 (1,610)	n.a.	n.a.	n.a.	n.a.
31.	Duane Arnold	530	3.5	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	70 (132)	n.a.
32.	Davis-Besse	906	4.5	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1,650 (1,820)	n.a.	n.a.	89 (98)	n.a.
33.	Rancho Seco 1	804	5.5	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1,200 (1,500)	n.a.	10,000,000	83 (103)	1,100,000
34.	Fitzpatrick	821	4.0	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	65 (79)	n.a.
35.	Waterford 3	1,113	5.0	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1,200 (1,060)	n.a.	14,000,000	45 (40)	700,000
36.	San Onofre 1, 2 & 3 (2&3)	2,280	5.0 & 6.0 (6.0)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1,700 (745)	1,000 (440)	n.a.	70 (31)	1,800,000

MANPOWER REQUIREMENTS FOR CONSTRUCTION AND OPERATION OF NUCLEAR PLANTS (continued)

No.	Plant Name	Net Capacity Under Const'n. MWe[a]	Const'n. Period (Years)[b]	CONSTRUCTION MANPOWER YEARLY 1	2	3	4	5	6	PEAK [c]	AVERAGE [c]	Average Annual Construction Payroll	Operating Manpower [c]	Annual Operating Payroll
37.	Salem 1 & 2	2,205	5.5 & 6.5 (6.5)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	2,000 (910)	n.a.	$ n.a.	125 (57)	$ n.a.
38.	Calvert Cliffs 1 & 2	1,690	4.0 & 5.0 (5.0)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	100 (59)	n.a.
39.	North Anna 1, 2, 3 & 4	3,610	4.5, 5.0, 4.0, 5.0 (7.0)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
40.	Peach Bottom 1, 2 & 3	(2&3) 2,138	5.0 & 6.0 (6.0)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	3,500 (1,640)	n.a.	n.a.	150 (70)	n.a.
41.	Shearon Harris 1, 2, 3 & 4	3,660	5.0, 6.0, 7.0, 8.0 (8.0)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1,800 (492)	n.a.	180 (49)	2,000,000
42.	Prairie Island 1 & 2	1,060	6.0 & 7.0 (7.0)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1,300 (1,230)	490 (453)	n.a.	100 (94)	2,250,000
43.	Crystal River 3	825	6.0	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1,300 (1,580)	n.a.	n.a.	80 (97)	1,000,000
44.	Diablo Canyon 1 & 2	2,120	7.0 & 5.3 (8.0)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1,530 (723)	870 (410)	12,900,000	70 (33)	1,400,000
45.	Millstone 1, 2 & 3	(1&2) 1,480	7.0	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1,200 (810)	714 (483)	12,700,000	160 (108)	7,000,000
		(3) 1,150	5.0	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1,200 (1,040)	890 (773)	13,400,000	70 (61)	n.a.
46.	Nine Mile Point 1 & 2	(1) 625	4.5	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	68 (109)	1,000,000
		(2) 1,080	5.0	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1,200 (1,110)	n.a.	18,000,000	60 (55)	840,000
47.	St. Lucie 1	801	5.0	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1,200 (1,500)	n.a.	n.a.	n.a.	n.a.
48.	Limerick 1 & 2	2,130	7.0	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	2,500 (1,170)	1,460 (686)	n.a.	150 (70)	n.a.
49.	Susquehanna 1 & 2	2,104	5.5 & 7.5 (7.5)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	2,500 (1,190)	n.a.	n.a.	77 (37)	n.a.
50.	Cook, D.C. 1 & 2	2,120	5.0 & 6.0 (6.0)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	3,000 (1,410)	n.a.	n.a.	125 (59)	1,400,000
51.	Trojan	1,130	4.0	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	60 (53)	n.a.
52.	Beaver Valley 1 & 2	(1) 852	4.5	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	14,000,000	n.a.	n.a.
		(2) 852	5.0	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	14,000,000	n.a.	n.a.
53.	Grand Gulf 1 & 2	(1) 2,580	5.0	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	2,600 (1,010)	n.a.	n.a.	85 (33)	1,400,000
54.	Ginna 1	420	3.5	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	100 (238)	1,500,000

MANPOWER REQUIREMENTS FOR CONSTRUCTION AND OPERATION OF NUCLEAR PLANTS (continued)

No.	Plant Name	Net Capacity Under Const'n. MWe[a]	Const'n. Period (Years)[b]	CONSTRUCTION MANPOWER YEARLY 1	2	3	4	5	6	PEAK [c]	AVERAGE [c]	Average Annual Construction Payroll	Operating Manpower [c]	Annual Operating Payroll
55.	Connecticut Yankee	575	3.0	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1,000 (1,740)	n.a.	$ n.a.	73 (127)	$1,000,000
56.	Catawba 1 & 2	2,360	4.0 & 5.0 (5.0)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	2,100 (890)	1,500 (636)	n.a.	84 (36)	1,200,000
57.	Brunswick 1 & 2	1,642	4.5 & 5.5 (5.5)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	3,100 (1,890)	n.a.	11,000,000	140 (85)	n.a.
58.	Robinson, H. B. 2	700	3.3	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	77 (110)	776,000
59.	Oyster Creek 1	640	5.0	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n. a.	100 (156)	n.a.
60.	Dresden 1, 2 & 3	(2&3) 1,618	4.0 & 5.0 (5.0)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	150 (93)	1,500,000
61.	Vogtle 1, 2, 3 & 4	4,480	6.5, 7.5, 8.5, 9.5 (9.5)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	3,450 (770)	1,540 (344)	24,640,000	150 (33)	1,500,000

MANPOWER REQUIREMENTS FOR CONSTRUCTION AND OPERATION OF NUCLEAR PLANTS (continued).

EXPLANATORY NOTES

a/The number in parenthesis is the unit number under construction

b/The number in parenthesis is the total construction period.

c/The number in parenthesis is the manpower required per 1000 MWe.

n.a. - Not available.

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