ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

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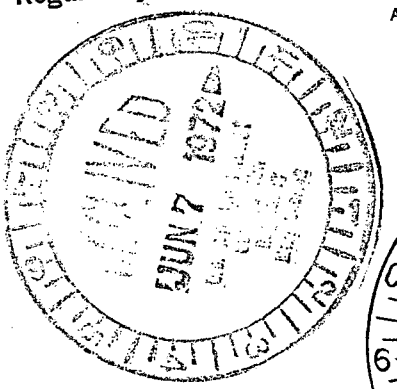

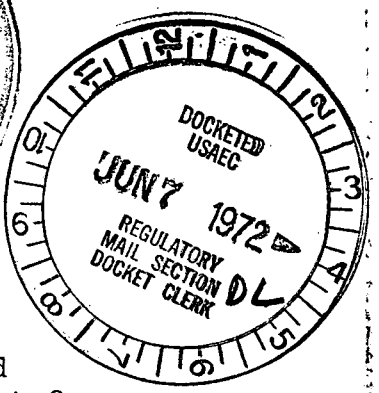

Mr. L. Manning Muntzing
Director of Regulation
U.S. Atomic Energy Commission
Washington, D.C. 20545

Dear Mr. Muntzing:

The Environmental Protection Agency has reviewed the draft environmental statement for the Indian Point-2 Nuclear Plant and we are pleased to provide our comments to you.

The major potential environmental impact of operating the Indian Point-2 Nuclear Plant involves the effects of the once-through cooling system on aquatic biota. We agree with the Atomic Energy Commission that the potential for severe environmental effects exists for this facility and, therefore, are recommending implementation of a closed-cycle cooling system at the earliest date practicable.

Where the evidence indicates that once-through cooling will damage the aquatic environment, a plant under construction may be permitted to operate, but with a commitment to offstream cooling (provided that the environmental impact of the offstream cooling technique adopted is acceptable). In circumstances of substantial environmental impact, the backfitting may have to be done under an implementation schedule that requires reduced heat discharge and restricted operating levels during the times of peak environmental stress. Where the discharger can demonstrate that there is no substantial evidence of damage from once-through cooling, the plant should receive a permit to operate, but with a commitment to perform environmental monitoring and to go to offstream cooling if this monitoring produces evidence of substantial damage.

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With respect to the radiological aspects of the facility, more information should be presented regarding proposed additions to waste treatment systems, and assumptions used in certain dose evaluations should be substantiated.

We will be pleased to discuss our comments with you or members of your staff.

Sincerely,

Sheldon Meyers

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Enclosure

EPA#D-AEC-00047-07
TAD#0026-72

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Washington, D.C. 20460

Received w/Ltr Dated 6-3-72

June 1972

ENVIRONMENTAL IMPACT STATEMENT COMMENTS

Indian Point #2 Nuclear Generating Plant

TABLE OF CONTENTS

INTRODUCTION AND CONCLUSIONS

The Environmental Protection Agency has reviewed the draft environmental impact statement for the Indian Point-2 Power Plant prepared by the U.S. Atomic Energy Commission and issued April 13, 1972. Following are our major conclusions:

1. We agree with the conclusion of the AEC that the present once-through cooling system has a potential for causing significant long-term damage to aquatic biota in the Hudson River. Thus, we recommend the adoption of a closed-cycle cooling system at the earliest date practicable.

2. Should the AEC determine that operation of the plant is essential to meet critical power demands, we believe that power output should be limited to the lowest level necessary to satisfy that demand. We agree that monitoring be performed by the discharger, and believe that a commitment must be made to further limit power output and go to offstream cooling if this monitoring produces evidence of substantial damage. We recommend that estimated environmental damage for various levels of power output be included in the final statement.

3. In order to achieve lowest practicable radwaste discharge levels the present waste treatment system and all proposed modifications should be utilized to their full capabilities.

4. The proposed modifications to the treatment systems should be described in detail in the final statement.

5. The site metorology and all areas of consideration which utilize the diffusion climatology analysis should be reevaluated using more complete on-site data collected during the next 10 years of operation of Indian Point-1.

Radioactive Waste Management

The draft detailed statement evaluates the radioactive waste treatment systems based on the equipment which will be used during the first fuel cycle. The statement indicates that by the end of this first cycle the applicant will have installed additional waste treatment equipment which will further reduce the radioactive discharges below the levels estimated in the statement. These modifications include a blowdown treatment system consisting of a filter-demineralizer; an additional demineralizer on the waste disposal system evaporator condensate line; and charcoal filters on the plant vent to reduce radioactive iodine concentrations from auxiliary building and containment purging.

We are unable, from the information presented in the statement, to determine if these modifications will, in fact, reduce the effluents from Indian Point-2 to the lowest practicable levels. Therefore, the final statement should describe these modifications in detail, including proposed operating procedures and estimated time schedule of installation and operation. The anticipated effectiveness of reducing the effluents should also be described. A description of the type of demineralizers used in the blowdown treatment system is especially important, since blowdown is indicated as the major source of radioactive liquid effluents. For example, ^{137}Cs, ^{134}Cs and ^{99}Mo contribute the bulk of the blowdown activity, and it may be necessary to employ a special demineralizer, which is particularly effective in removing

these radionuclides, to achieve the anticipated decontamination factor (DF). Dissolved solids in the blowdown may result in rapid loading of the demineralizer and loss of DF. If it will be necessary to regenerate these demineralizers, the regenerant solution should be processed by the evaporator or solidified at the drumming station. If the demineralizers are not regenerable, the load increase to the solid waste disposal facility should be discussed as well as the impact on solid waste transportation.

In the final statement, the discussion of these modifications should include the possibility of alternate or additional techniques of treating radioactive blowdown. Many PWR's are installing evaporator capability to treat steam generator blowdown, and we believe that this alternative is a feasible one that could at least be considered in a cost-benefit analysis.

The liquid waste system diagram in Figure III-14 of the statement shows bypasses of the various treatment systems. A commitment should be made by the applicant to utilize the waste treatment systems it has provided. The commitment is especially important regarding the steam generator blowdown which the statement has shown to be the greatest contributor to liquid radioactive waste in the environment. The applicant should routinely utilize the blowdown treatment system during conditions where primary-to-secondary leakage occurs.

According to the statement, under conditions of primary-to-secondary leakage, steam releases from the blowdown flash tank will contain significant amounts of iodine-131. Recognizing that the amount estimated

by the AEC is 0.62 Ci/yr, which exceeds the facility's technical specifications limit and, according to the applicant's meteorology, appears to exceed 10 CFR 50 Appendix I limits for iodine at the site boundary, the venting of this steam should be avoided. We note that Figure III-15 illustrates a connection between the blowdown flash tank and the main condenser, for the purpose of routing the steam flash. We suggest that routine employment of this path would achieve the desired reduction in the release of ^{131}I to meet the aforementioned standards and specifications.

Experience gained at other PWR's has shown that the magnitude of leakage from the secondary system is comparable to steam generator blowdown. During periods of primary-to-secondary leakage, secondary system leakage will also be contaminated. The draft detailed statement, however, does not provide an estimate of the volume or radionuclide concentrations associated with this leakage. Further, it is not clear from the FSAR or the Environmental Report whether secondary system leakage can be routed to the waste treatment system. The FSAR does indicate, from the anticipated volumes of liquid to be processed by the waste treatment system (Table 11-1.4), that this source has probably not been considered for such treatment. The final detailed statement should provide complete estimates of liquid and gaseous sources of radioactivity from secondary system leakage during primary-to-secondary leakage conditions.

The holdup capacity for the gaseous waste treatment system, which consists of four decay tanks serving Units 1 and 2, is not clearly expressed in the statement for the situation where both units are in operation simultaneously. It is stated that the system has

the capability "...to permit a holdup time of 45 days for Unit-2, and up to 60 days holdup for Unit-1." This can be interpreted to mean that the system has either 45 days capacity for Unit-2 alone or 60 days capacity for Unit-1 alone. Clarification of the combined capability of this system, when both units are operating simultaneously, should be made in the final statement. The applicant's technical specifications for Unit-2 requires a minimum holdup time of only 20 days, even though the capability of the system is stated as 45 days for Unit-2. To be consistent with the intent of "low as practicable," the applicant should utilize the gaseous decay system to the full extent of its capability. This is especially significant since most of the radioactivity (as estimated both by the applicant in his environmental report and the AEC in the statement) is due to xenon-133 with a 5.27 day half-life.

Dose Assessment

The dose estimates for the ingestion of fish as presented in the statement are not consistent with the liquid effluent discharge estimates given. It appears that effluents due to the discharge of steam generator blowdown, [illegible]ary leakage, have been neglected in computing this ingestion dose. The final statement should discuss the assumptions for liquid effluent levels and concentration factors used to calculate the dose due to the ingestion of fish.

The doses computed from release of liquid effluents assume a dilution flow from the cooling system of approximately 10^6 gal/min. Considering the problems of fish kills due to the high condenser cooling flow and the possibility of the necessity to reduce the cooling flow considerably to avoid or reduce these fish kills, the statement should discuss the effect of such reduced flow on the doses involved both on individual and man-rem bases.

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is short, the applicant expects the number of visitors to the center to be large. Because of the proximity of the information center to the plant (as compared to off-site population groups), estimates of the population radiation dose (expressed as man-rem/yr) should be made, including the expected number of visitors per year and the average external radiation dose rate from plant effluents and direct shine at the visitors center.

Transportation and Reactor Accidents

In its review of nuclear power plants, EPA has identified a need for additional information on two types of accidents which could result in radiation exposure to the public; (1) those involving transportation of spent fuel and radioactive wastes and (2) in-plant accidents involving reactor systems.

Many of the factors in accident analysis are common to all nuclear power plants; the environmental risk for each type of accident is therefore amenable to a general analysis. Although the AEC has done considerable work for a number of years on the safety aspects of such accidents, we believe that a thorough analysis of the probabilities of occurrence and the expected consequences of such accidents is necessary. A general study would result in a better understanding of the environmental risks than would a less-detailed examination of the questions on a case-by-case basis. An understanding has been reached with the AEC that they will conduct such analyses, with EPA participation, concurrent with reviews of impact statements for individual facilities and

will make the results public in the near future. We believe that any changes in equipment or operating procedures for individual plants, required as a result of these analyses, could be included without appreciably changing the overall plant design. If major redesign of the plants to include engineering changes were expected, or if an immediate public or environmental risk were being taken while these two issues were being resolved, we will, of course, make our concerns known and an updated impact statement may be necessary.

The statement concludes "...that the environmental risks due to postulated radiological accidents are exceedingly small." The conclusion is based on the standard accident assumptions and guidance issued by the AEC for light-water-cooled reactors as a proposed amendment to Appendix D of 10 CFR Part 50 on December 1, 1971. EPA commented on this proposed amendment in a letter to the Commission of January 13, 1972, indicating the necessity for a detailed discussion of the technical bases of the assumptions involved in determining the various classes of accidents and expected consequences. We believe that the general analysis of accidents mentioned above will be adequate to resolve these points and that the AEC will apply the results to all licensed facilities.

Site Meteorology

We note that the AEC stated it has used the applicant's meteorological data from the environmental report supplement to estimate doses due to the discharge of gaseous effluents at Indian Point.

We feel that use of this data is questionable, since it appears to be based primarily on 1955-1957 work done by New York University and some intermittent data gathered since that time. Although the applicant began meteorological monitoring in 1955, and this monitoring has been more or less continuous since that time, the data used to establish the climatology is only partial data from the years 1955, 1956, 1957, 1969, and 1970. The period of record of this data is not clearly defined, but it appears to vary from ten months to as little as two months in any given year.

Since Consolidated Edison has had an operating nuclear power reactor at this site since 1962, at least ten years of continuous on-site meteorological data should be available. We feel that this data should be employed to establish the climatology for the site, and that the results of the meteorological analysis using this data should be utilized to establish the various dose estimates for the operations at the site. The reevaluation should be presented in the final environmental statement.

NON-RADIOLOGICAL ASPECTS

Water Quality and Biological Effects

In general, the draft environmental impact statement properly identifies and assesses most of the probable significant water quality and biological effects that will arise as a consequence of power generation at the Indian Point nuclear plant and indicates areas where additional information is necessary. Thus, after consideration of these factors, we agree with the conclusion of the AEC that, in the operation of this plant, there is "...potential for long-term environmental impact on the aquatic biota inhabiting the Hudson River..." This impact, due to the operational characteristics of the once-through cooling system, will arise primarily because of impingement on the protective screens of the intake structure; chemical, mechanical, and thermal effects of entrainment; and the excessive heat loads in the river created by the cooling water discharge. Also, we agree with the AEC that this impact on aquatic biota may result in "...permanent damage to the fish population in the Hudson River, Long Island Sound, the adjacent New Jersey coast, and the New York Bight."

New York State classifies the Hudson River at Indian Point as Type SB. Under state water quality standards for SB waters thermal discharges may not be injurious to "...edible fish or shellfish or the culture or propagation thereof." Since fish

will be killed, clearly state water quality standards will be violated.

We commend the AEC for their forthright expression of the probable environmental impacts and identification of areas where information is lacking. Thus, we support their commitment to protect the environment by requiring the applicant to initiate additional studies of alternate cooling systems and to design and implement a comprehensive monitoring program to determine the practicality and need of a closed-cycle cooling system. We believe, however, that, based on currently available information, if the Indian Point plant is to operate within applicable New York State standards and in a manner adequate to protect aquatic biota, a closed-cycle cooling system will be necessary.

We appreciate the difficulty in balancing the objective to protect the environment with that of supplying needed additional electrical power in the New York City area. In response to this demand, the AEC suggests it will be beneficial to operate the Indian Point plant while the additional studies are being conducted and while monitoring data is being collected. From an environmental standpoint, however, we cannot support operation of this plant unless it can be demonstrated that such operation will not result in a violation of New York State water quality standards or lead to a significant adverse impact on aquatic biota. The final statement should describe any measures

that will be taken to attain these goals, should it prove necessary to operate the plant before resolution of current environmental problems. Should the AEC determine that electrical energy needs of the region override environmental considerations, the final statement should predict the extent of both short- and long-term environmental damage expected at 25, 50, 75, and 100% of full power.

Our analysis of the engineering aspects of the Indian Point plant, the hydrologic characteristics of the Hudson River at the plant site, and the biological system of the lower Hudson indicates that in order to adequately protect the aquatic biota, the following thermal criteria should be applied:

I. Passageway

a) Maximum Temperature — 83°F October-June
86°F July-September

b) Increase in Temperature ΔT

October-June $T = 4°$ to max of 83°F
July-September $T = 1.5°F$ to max of 83°F, if T norm is $\leq$ 83°F
$T = 1.5°F$ to max of 86°F, if T norm is $\geq$ 83°F

c) Passageway to be 50% of cross-section and/or volumetric passageway or artificial fishway; in addition 1/3 of surface from water edge to water edge.

II Non-Passageway

a) Maximum Temperature 90°F

b) Mixing Zone Dimensions

No standards as to dimensions

Note: (1) Temperature measurements applicable to any part in stream.
(2) Increase in temperature based on elevation above monthly average of daily maximum temperature.

These criteria embody the strictest standards from the Federally approved New York State standards as published in "Technical Bulletin No. 36 - Thermal Aspects of Discharges on Water Resources "and New York State promulgated standards as described in "Criteria Governing Thermal Discharges (Heated Liquids)." We recommend that the ability to meet these criteria be considered in the evaluation of various alternative cooling systems.

The draft statement indicates that fish kills due to impingement will probably be higher for Unit 2 than that experienced for Unit 1. Although operating the Indian Point plant on a load-following basis will probably reduce such kills during some periods, the AEC should consider requiring the applicant to modify the intake structure and/or install mid-stream protective screens. The final statement should describe any such measures that will be taken to prevent excessive impingement during the period when the once-through cooling system is to be used.

Since excessive amounts of residual chlorine are extremely toxic to aquatic life, it is suggested that, either the quantities of sodium hypochlorite used be reduced to a safe level, or alternative means of condenser cleaning be explored. In the past, EPA has recommended that levels of chlorine in the receiving water should not exceed 0.1 mg/l for more than 30 minutes/day or 0.05 mg/l for more than 2 hours/day. The final statement should specify the procedures to be used to assure that the discharges of chlorine are below levels that would cause significant environmental damage.

The draft statement indicates that a number of chemicals will be discharged from the Indian Point plant. Although the toxic levels of most of these will not be exceeded routinely, the final statement should consider the synergistic effect of two or more chemicals that are present at concentrations near their respective toxic levels. Also, the effect of water temperature in the discharge plume on the toxic effects of the various chemicals should be discussed.

COST-BENEFIT ANALYSIS

This statement is the first to incorporate the AEC proposed guidelines for cost-benefit analyses. This approach is helpful in providing a tabular format for comparing environmental effects. Its application in this statement, however, points out several major weaknesses. The environmental cost tabular format does not allow for estimating the combined effects of thermal, mechanical, and chemical effects on aquatic life. The format does not provide for the incorporation of the time variable, making it virtually impossible to separate short and long term effects (assuming the data were available). Several of the items are difficult to relate to environmental costs. For example, the evaluations of cooling capacity in units of BTU/hr (or acre-ft. of elevated temperature) and consumption of water in millions of gallons per day are not meaningful numbers per se. Several other items--for example, salt deposition and fogging--require considerably more analysis to be meaningful indicators of environmental costs. To date, a meaningful measure of the principal benefits of electric power has not been identified.

The statement does not provide an adequate base of information to choose between the six proposed alternate coolant systems. In fact, the practicality and availability of brackish water cooling towers are questioned by the AEC (p. XI-0).

A spray pond, on the other hand, is estimated to exert severe adverse environmental effects in the form of salt deposition, water consumption, fogging, and icing. Estimates of chemical discharges from cooling towers, however, are "...not available at this time." It is recommended that the costs and benefits of the various alternative cooling systems be described in some detail, since these alternatives will be considered to reduce the environmental impact of the operation of Indian Point-2.

The statement points out the need for a broader perspective in environmental considerations than current procedures provide. By the end of the decade, the electric generating capacity on the Hudson River within five miles of the Indian Point site will increase from the current 800 Mwe to over 6000 Mwe. The Bowline Unit I will be operational within the next few months and the Lovett Plant, already in service, is situated less than a mile downstream from Indian Point. Yet the statement only considers the combined impact of Indian Point Units I and II. There should be an analysis of the combined impact of Indian Point I, II, and III as well as the previously mentioned plants on nearby sites.

ADDITIONAL COMMENTS

During the review we noted in certain instances that the statement does not present sufficient information to substantiate the conclusions presented. We recognize that much of this information is not of major importance in evaluating the environmental impact of the Indian Point-2 Nuclear Plant. The cumulative effect, however, could be significant. It would, therefore, be helpful in determining the impact of the plant if the following information were included in the final statement:

Radiological Aspects

1. In estimating radioactivity releases from the liquid waste disposal system, a decontamination factor (DF) of 10,000 for all radionuclides, except iodine and tritium is assumed for the waste evaporator. Actual experience, however, has shown much lower DF's. The bases for such a high DF should be presented in the final statement.

2. Table III-7 indicates conditions at Unit-2 may result in operation at ^{131}I discharge levels which would exceed the technical specifications limit of 0.18 Ci/yr for ^{131}I, if not controlled. It should be noted, however, that even at this limit, using the applicant's meteorological diffusion parameters for the site boundary and the AEC's suggested deposition velocity, it appears the 10 CFR 50 Appendix I guidelines would be exceeded. The final statement should discuss this problem.

3. The dose from the ingestion of fish presented in the statement could not be verified using the various effluent levels and concentration factors presented in the statement. The assumptions and sources used to evaluate this dose should be given in the final statement.

Non-Radiological Aspects

1. Ozone is an air pollutant which has been included in the National Primary and Secondary Ambient Air Quality Standards, therefore, the production of ozone by the high voltage transmission lines constructed to distribute electricity generated at this facility should be discussed. Concentrations of ozone in the vicinity of these lines should be estimated for various atmospheric conditions, and related to potential effects on man and wildlife.

2. The AEC states that the Hudson River has a high buffering capacity for sodium hydroxide, lithium hydroxide, and sulfuric acid. According to the Raytheon Report, however, the discharge of ion exchange resins caused pH changes of up to 2 units. The AEC should provide additional information which shows that discharge of sodium hydroxide, lithium hydroxide, and sulfuric acid will not alter the pH.

3. The septic tank system appears inadequate to meet secondary effluent quality. This condition will deteriorate completely when Unit No. 3 goes on line. Therefore, we recommend re-evaluation of provisions for the handling of sanitary and

laundry wastes. The final statement should include information on septic tank sludge disposal.

4. The effects of soda ash and potassium chromate (toxic to some organisms in the discharge canal) should be evaluated in conjunction with the effects of other chemicals.

5. As impingement on the intake screens has resulted in significant fish losses, detailed reference should be included on the proposed disposition of those organisms impinged.

6. An oil spill prevention, containment, and countermeasure plan should be included in the statement.

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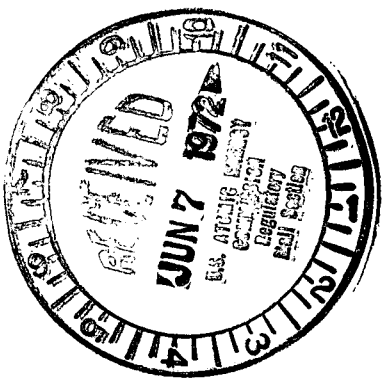

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A limited number of measurements made at operating pressurized water reactors have indicated that direct external radiation exposure from large outdoor water storage tanks (such as the condensate storage tank) could be a significant contributor to the radiation dose received by people living close to the plant. Neither the applicant nor the AEC has estimated the potential radiation exposure from this source; such estimates should be included in the final statement. The location of the tanks in relation to the nearest residence and the visitor's information center should be indicated. Although the period of exposure

is short, the applicant expects the number of visitors to the center to be large. Because of the proximity of the information center to the plant (as compared to off-site population groups), estimates of the population radiation dose (expressed as man-rem/yr) should be made, including the expected number of visitors per year and the average external radiation dose rate from plant effluents and direct shine at the visitors center.

Transportation and Reactor Accidents

In its review of nuclear power plants, EPA has identified a need for additional information on two types of accidents which could result in radiation exposure to the public; (1) those involving transportation of spent fuel and radioactive wastes and (2) in-plant accidents involving reactor systems.

Many of the factors in accident analysis are common to all nuclear power plants; the environmental risk for each type of accident is therefore amenable to a general analysis. Although the AEC has done considerable work for a number of years on the safety aspects of such accidents, we believe that a thorough analysis of the probabilities of occurrence and the expected consequences of such accidents is necessary. A general study would result in a better understanding of the environmental risks than would a less-detailed examination of the questions on a case-by-case basis. An understanding has been reached with the AEC that they will conduct such analyses, with EPA participation, concurrent with reviews of impact statements for individual facilities and

will make the results public in the near future. We believe that any changes in equipment or operating procedures for individual plants, required as a result of these analyses, could be included without appreciably changing the overall plant design. If major redesign of the plants to include engineering changes were expected, or if an immediate public or environmental risk were being taken while these two issues were being resolved, we will, of course, make our concerns known and an updated impact statement may be necessary.

The statement concludes "...that the environmental risks due to postulated radiological accidents are exceedingly small." The conclusion is based on the standard accident assumptions and guidance issued by the AEC for light-water-cooled reactors as a proposed amendment to Appendix D of 10 CFR Part 50 on December 1, 1971. EPA commented on this proposed amendment in a letter to the Commission of January 13, 1972, indicating the necessity for a detailed discussion of the technical bases of the assumptions involved in determining the various classes of accidents and expected consequences. We believe that the general analysis of accidents mentioned above will be adequate to resolve these points and that the AEC will apply the results to all licensed facilities.

Site Meteorology

We note that the AEC stated it has used the applicant's meteorological data from the environmental report supplement to estimate doses due to the discharge of gaseous effluents at Indian Point.

We feel that use of this data is questionable, since it appears to be based primarily on 1955-1957 work done by New York University and some intermittent data gathered since that time. Although the applicant began meteorological monitoring in 1955, and this monitoring has been more or less continuous since that time, the data used to establish the climatology is only partial data from the years 1955, 1956, 1957, 1969, and 1970. The period of record of this data is not clearly defined, but it appears to vary from ten months to as little as two months in any given year.

Since Consolidated Edison has had an operating nuclear power reactor at this site since 1962, at least ten years of continuous on-site meteorological data should be available. We feel that this data should be employed to establish the climatology for the site, and that the results of the meteorological analysis using this data should be utilized to establish the various dose estimates for the operations at the site. The reevaluation should be presented in the final environmental statement.

NON-RADIOLOGICAL ASPECTS

Water Quality and Biological Effects

In general, the draft environmental impact statement properly identifies and assesses most of the probable significant water quality and biological effects that will arise as a consequence of power generation at the Indian Point nuclear plant and indicates areas where additional information is necessary. Thus, after consideration of these factors, we agree with the conclusion of the AEC that, in the operation of this plant, there is "...potential for long-term environmental impact on the aquatic biota inhabiting the Hudson River..." This impact, due to the operational characteristics of the once-through cooling system, will arise primarily because of impingement on the protective screens of the intake structure; chemical, mechanical, and thermal effects of entrainment; and the excessive heat loads in the river created by the cooling water discharge. Also, we agree with the AEC that this impact on aquatic biota may result in "...permanent damage to the fish population in the Hudson River, Long Island Sound, the adjacent New Jersey coast, and the New York Bight."

New York State classifies the Hudson River at Indian Point as Type SB. Under state water quality standards for SB waters thermal discharges may not be injurious to "...edible fish or shellfish or the culture or propagation thereof." Since fish

will be killed, clearly state water quality standards will be violated.

We commend the AEC for their forthright expression of the probable environmental impacts and identification of areas where information is lacking. Thus, we support their commitment to protect the environment by requiring the applicant to initiate additional studies of alternate cooling systems and to design and implement a comprehensive monitoring program to determine the practicality and need of a closed-cycle cooling system. We believe, however, that, based on currently available information, if the Indian Point plant is to operate within applicable New York State standards and in a manner adequate to protect aquatic biota, a closed-cycle cooling system will be necessary.

We appreciate the difficulty in balancing the objective to protect the environment with that of supplying needed additional electrical power in the New York City area. In response to this demand, the AEC suggests it will be beneficial to operate the Indian Point plant while the additional studies are being conducted and while monitoring data is being collected. From an environmental standpoint, however, we cannot support operation of this plant unless it can be demonstrated that such operation will not result in a violation of New York State water quality standards or lead to a significant adverse impact on aquatic biota. The final statement should describe any measures

that will be taken to attain these goals, should it prove necessary to operate the plant before resolution of current environmental problems. Should the AEC determine that electrical energy needs of the region override environmental considerations, the final statement should predict the extent of both short- and long-term environmental damage expected at 25, 50, 75, and 100% of full power.

Our analysis of the engineering aspects of the Indian Point plant, the hydrologic characteristics of the Hudson River at the plant site, and the biological system of the lower Hudson indicates that in order to adequately protect the aquatic biota, the following thermal criteria should be applied:

I. Passageway

a) Maximum Temperature — 83°F October-June
86°F July-September

b) Increase in Temperature ΔT

October-June $T = 4°$ to max of 83°F
July-September $T = 1.5°F$ to max of 83°F, if T norm is $\leq$ 83°F
$T = 1.5°F$ to max of 86°F, if T norm is $\geq$ 83°F

c) Passageway to be 50% of cross-section and/or volumetric passageway or artificial fishway; in addition 1/3 of surface from water edge to water edge.

II Non-Passageway

a) Maximum Temperature 90°F

b) Mixing Zone Dimensions

No standards as to dimensions

Note: (1) Temperature measurements applicable to any part in stream.
(2) Increase in temperature based on elevation above monthly average of daily maximum temperature.

These criteria embody the strictest standards from the Federally approved New York State standards as published in "Technical Bulletin No. 36 - Thermal Aspects of Discharges on Water Resources "and New York State promulgated standards as described in "Criteria Governing Thermal Discharges (Heated Liquids)." We recommend that the ability to meet these criteria be considered in the evaluation of various alternative cooling systems.

The draft statement indicates that fish kills due to impingement will probably be higher for Unit 2 than that experienced for Unit 1. Although operating the Indian Point plant on a load-following basis will probably reduce such kills during some periods, the AEC should consider requiring the applicant to modify the intake structure and/or install mid-stream protective screens. The final statement should describe any such measures that will be taken to prevent excessive impingement during the period when the once-through cooling system is to be used.

Since excessive amounts of residual chlorine are extremely toxic to aquatic life, it is suggested that, either the quantities of sodium hypochlorite used be reduced to a safe level, or alternative means of condenser cleaning be explored. In the past, EPA has recommended that levels of chlorine in the receiving water should not exceed 0.1 mg/l for more than 30 minutes/day or 0.05 mg/l for more than 2 hours/day. The final statement should specify the procedures to be used to assure that the discharges of chlorine are below levels that would cause significant environmental damage.

The draft statement indicates that a number of chemicals will be discharged from the Indian Point plant. Although the toxic levels of most of these will not be exceeded routinely, the final statement should consider the synergistic effect of two or more chemicals that are present at concentrations near their respective toxic levels. Also, the effect of water temperature in the discharge plume on the toxic effects of the various chemicals should be discussed.

COST-BENEFIT ANALYSIS

This statement is the first to incorporate the AEC proposed guidelines for cost-benefit analyses. This approach is helpful in providing a tabular format for comparing environmental effects. Its application in this statement, however, points out several major weaknesses. The environmental cost tabular format does not allow for estimating the combined effects of thermal, mechanical, and chemical effects on aquatic life. The format does not provide for the incorporation of the time variable, making it virtually impossible to separate short and long term effects (assuming the data were available). Several of the items are difficult to relate to environmental costs. For example, the evaluations of cooling capacity in units of BTU/hr (or acre-ft. of elevated temperature) and consumption of water in millions of gallons per day are not meaningful numbers per se. Several other items--for example, salt deposition and fogging--require considerably more analysis to be meaningful indicators of environmental costs. To date, a meaningful measure of the principal benefits of electric power has not been identified.

The statement does not provide an adequate base of information to choose between the six proposed alternate coolant systems. In fact, the practicality and availability of brackish water cooling towers are questioned by the AEC (p. XI-0).

A spray pond, on the other hand, is estimated to exert severe adverse environmental effects in the form of salt deposition, water consumption, fogging, and icing. Estimates of chemical discharges from cooling towers, however, are "...not available at this time." It is recommended that the costs and benefits of the various alternative cooling systems be described in some detail, since these alternatives will be considered to reduce the environmental impact of the operation of Indian Point-2.

The statement points out the need for a broader perspective in environmental considerations than current procedures provide. By the end of the decade, the electric generating capacity on the Hudson River within five miles of the Indian Point site will increase from the current 800 Mwe to over 6000 Mwe. The Bowline Unit I will be operational within the next few months and the Lovett Plant, already in service, is situated less than a mile downstream from Indian Point. Yet the statement only considers the combined impact of Indian Point Units I and II. There should be an analysis of the combined impact of Indian Point I, II, and III as well as the previously mentioned plants on nearby sites.

ADDITIONAL COMMENTS

During the review we noted in certain instances that the statement does not present sufficient information to substantiate the conclusions presented. We recognize that much of this information is not of major importance in evaluating the environmental impact of the Indian Point-2 Nuclear Plant. The cumulative effect, however, could be significant. It would, therefore, be helpful in determining the impact of the plant if the following information were included in the final statement:

Radiological Aspects

1. In estimating radioactivity releases from the liquid waste disposal system, a decontamination factor (DF) of 10,000 for all radionuclides, except iodine and tritium is assumed for the waste evaporator. Actual experience, however, has shown much lower DF's. The bases for such a high DF should be presented in the final statement.

2. Table III-7 indicates conditions at Unit-2 may result in operation at ^{131}I discharge levels which would exceed the technical specifications limit of 0.18 Ci/yr for ^{131}I, if not controlled. It should be noted, however, that even at this limit, using the applicant's meteorological diffusion parameters for the site boundary and the AEC's suggested deposition velocity, it appears the 10 CFR 50 Appendix I guidelines would be exceeded. The final statement should discuss this problem.

3. The dose from the ingestion of fish presented in the statement could not be verified using the various effluent levels and concentration factors presented in the statement. The assumptions and sources used to evaluate this dose should be given in the final statement.

Non-Radiological Aspects

1. Ozone is an air pollutant which has been included in the National Primary and Secondary Ambient Air Quality Standards, therefore, the production of ozone by the high voltage transmission lines constructed to distribute electricity generated at this facility should be discussed. Concentrations of ozone in the vicinity of these lines should be estimated for various atmospheric conditions, and related to potential effects on man and wildlife.

2. The AEC states that the Hudson River has a high buffering capacity for sodium hydroxide, lithium hydroxide, and sulfuric acid. According to the Raytheon Report, however, the discharge of ion exchange resins caused pH changes of up to 2 units. The AEC should provide additional information which shows that discharge of sodium hydroxide, lithium hydroxide, and sulfuric acid will not alter the pH.

3. The septic tank system appears inadequate to meet secondary effluent quality. This condition will deteriorate completely when Unit No. 3 goes on line. Therefore, we recommend re-evaluation of provisions for the handling of sanitary and

laundry wastes. The final statement should include information on septic tank sludge disposal.

4. The effects of soda ash and potassium chromate (toxic to some organisms in the discharge canal) should be evaluated in conjunction with the effects of other chemicals.

5. As impingement on the intake screens has resulted in significant fish losses, detailed reference should be included on the proposed disposition of those organisms impinged.

6. An oil spill prevention, containment, and countermeasure plan should be included in the statement.