

Environmental Protection Agency

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Environmental Impact Statement Comments

Oyster Creek Nuclear Generating Station

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INTRODUCTION AND CONCLUSIONS

The Environmental Protection Agency (EPA) has reviewed the draft environmental impact statement for the Oyster Creek Nuclear Generating Station prepared by the U.S. Atomic Energy Commission and issued on July 9, 1973. The following are our major conclusions.

1. Based on operating experience at the Oyster Creek Nuclear Generating Station, the current releases of radioactive liquids and gases from the plant and subsequent offsite population doses cannot be considered "as low as practicable." A modified waste treatment system is proposed which should reduce the releases and doses to "as low as practicable levels." The final statement should discuss those proposed modifications in greater detail.

2. The cumulative population dose within 50 miles cannot be considered "as low as practicable." We recommend that the proposed augmented radioactive gas treatment system be installed expeditiously since most of the calculated population dose results from the radiogas release from the plant off-gas system.

3. During the joint EPA-AEC studies at Oyster Creek, problems with the on-site meteorological tower were noted. We, therefore, believe that the historic on-site meteorological data are not useful in evaluating the environmental impact of the Oyster Creek Station. If not already instituted, an appropriate on-site meteorological program, based upon the requirements of the AEC Regulatory Guide 1.23, should be initiated as soon as possible so that accurate dose assessments may be made in the future using the plant's operating data.

4. The final statement should (either directly or by publicly available reference) provide information on the nature, expected schedule, and level of effort of those generic studies which are expected to lead to a basis for a subsequent assessment by the AEC concerning the risk from all potential accident classes in the Oyster Creek Station.

5. The quantity and types of information contained in the impact statement do not permit the evaluation of the extent of biological damage to Barnegat Bay resulting from plant operation. Expanded biological monitoring programs should be instituted which will

accurately determine the extent of impingement and entrainment losses and the effect of these losses on the aquatic ecosystem of Barnegat Bay. These studies should be completed and the results analyzed prior to the issuance of a full-term operating permit. We concur with the AEC staff's opinion on the types of studies needed as described in Section 6.2.3. Where possible, the results of other studies relative to this site should also be utilized.

6. The results of EPA aerial infrared photography indicate that the thermal plume affects the entire width of Barnegat Bay to the extent that the proposed New Jersey thermal standards are violated. The State proposes to allow no greater than a 1.5°F temperature rise in summer outside of a designated mixing zone. The results of EPA's study show a 4-5°F rise three miles from the plant. In view of this, the applicant should undertake a more detailed study of alternate cooling systems.

7. The statement lacks a characterization of the adjacent waters with respect to physiochemical data. Oxygen concentrations in the near bay area may be lower than acceptable. Water quality data concerning

dissolved oxygen concentrations in the bay and the effect that the heated effluents have on these concentrations should be provided in the final statement.

RADIOLOGICAL ASPECTS

Radioactive Waste Treatment

Based on operating experience at the Oyster Creek Nuclear Generating Station, the releases of radioactive liquids and gases from the plant and subsequent offsite population doses cannot be considered "as low as practicable." We note that both the applicant and the AEC staff recognized that current radioactive releases do not represent "as low as practicable" discharges and that the applicant has proposed to modify the liquid and gaseous radwaste systems to insure compliance with the AEC's "as low as practicable" guidelines. Although the doses to individuals are low with the current waste systems, the off-gas system needs to be augmented, as planned, to reduce the potentially high population doses, as discussed below.

The draft statement discussed several specific problems with the waste treatment system and indicated a few modifications that will be implemented. Neither the proposed modifications nor the applicant's design basis objectives were discussed in the draft statement or the Environmental Report. In order that an independent analysis of the modified waste treatment systems may be made, the final statement should discuss the proposed modifications in greater detail, or at least it should provide the design objectives of the modified system, and should indicate the time schedule for modifying the system.

Dose Assessment

The calculated maximum doses to an individual from gaseous and liquid discharges from the Oyster Creek radwaste treatment systems are within the dose guidelines of the proposed Appendix I to 10 CFR Part 50.

However, the cumulative population dose within 50 miles cannot be considered "as low as practicable," since currently available "state-of-the-art" technology to control the reactor's gaseous effluents is not presently provided. Thus, we recommend that the proposed augmented radioactive gas treatment system be installed expeditiously, since most of one calculated population dose results from the radiogas release from the plant off-gas system.

The EPA expects that the results from current and planned joint EPA-AEC and industry cooperative field studies in the environs of operating nuclear power facilities will greatly increase knowledge of the processes and mechanisms involved in the exposure of man to radiation produced through the use of nuclear power. We believe that the overall cumulative assumptions utilized to estimate various human doses are conservative. As more information is developed, the models used to estimate human exposures will be modified to reflect the best data and most realistic situations possible.

During the joint EPA-AEC studies at Oyster Creek, problems with the on-site meteorological tower were noted. We, therefore, believe that the historic on-site meteorological data are not useful in evaluating the environmental impact of the Oyster Creek station. It is also questionable whether the data available from other locations will be valid for this site since local features, such as Barnegat Bay, have a significant effect on the local meteorology. Furthermore, the data from Atlantic City, which have been utilized, may not be applicable to the conditions at Oyster Creek since the meteorological tower there is comparatively short and, thus, does not provide information at the

elevations of interest. Therefore, if not already instituted, an appropriate on-site meteorological program, based upon the requirements of the AEC Regulatory Guide 1.23, should be initiated as soon as possible so that accurate dose assessments may be made in the future using the plant's operating data.

We agree with the conclusion of the AEC staff that there are a number of deficiencies, as indicated by the AEC, within the applicant's existing environmental surveillance program. EPA has recently published a document entitled "Environmental Radioactivity Surveillance Guide" which contains detailed information to assist operators of nuclear power plants in planning an adequate environmental surveillance program. The final statement should provide the details of the updated program which eliminate these deficiencies. Also, a suitable laboratory analysis quality control program, for both effluent and environmental samples, should be instituted utilizing cross-check samples with an outside laboratory.

Data from the environmental radiation surveillance program at the plant have been collected over a number of years. Based on these data, the AEC staff concluded that no radiological environmental problems have resulted from radionuclide releases from the plant. The final statement should present a summary of this data.

Transportation

EPA, in its earlier reviews of the environmental impact of transportation of radioactive material, agreed with the AEC that many aspects of this problem could best be treated on a generic basis. The generic approach has reached the point where on February 5, 1973, the

AEC published for comment in the Federal Register a rulemaking proposal concerning the Environmental Effects of Transportation of Fuel and Waste from Nuclear Power Reactors. EPA commented on the proposed rulemaking by a letter to the AEC, dated March 23, 1973, and by an appearance at the public hearing on April 2, 1973.

Until such time as a generic rule is established, the EPA is continuing to assess the adequacy of the quantitative estimates of environmental radiation impact resulting from transportation of radioactive materials provided in environmental statements. The estimates provided for this station are deemed adequate based on currently available information.

Reactor Accidents

EPA has examined the AEC analyses of accidents and their potential risks which AEC has developed in the course of its engineering evaluation of reactor safety in the design of nuclear plants. Since these accidents are common to all nuclear power plants of a given type, EPA concurs with the AEC's approach to evaluate the environmental risk for each accident class on a generic basis. The AEC has in the past and still continues to devote extensive efforts to assure safety through plant design and accident analyses in the licensing process on a case-by-case basis. EPA, however, favors the additional step now being undertaken by the AEC of a thorough analysis on a more quantitative basis of the risk of potential accidents in all ranges. We continue to encourage this effort and urge the AEC to press forward to its timely completion and publication. EPA believes this will result in a better understanding of the possible risks to the environment.

In order to provide a fuller understanding of the direction of these efforts, it is requested that the final statement (either directly or by publicly available reference) provide information on the nature, expected schedule, and level of effort of those generic studies which are expected to lead to a basis for a subsequent assessment by the AEC concerning the risk from all potential accidents classes in the Oyster Creek station. It is recognized that this subsequent assessment may be either generic or specific in nature depending on the outcome of the generic studies. In addition, the final statement should include an AEC commitment that this assessment will be made publicly available within a reasonable time period following completion of the generic studies. Clearly, if the above efforts indicate that unwarranted risks are being taken at the Oyster Creek station, we are confident that the AEC will assure appropriate corrective action. Similarly, if EPA efforts related to the accident area uncover any environmentally unacceptable conditions related to the safety of the Oyster Creek station, we will make our views known.

NON-RADIOLOGICAL ASPECTS

Thermal Effluent Considerations -

The Oyster Creek station employs a once through cooling system which draws water from a dredged, semicircular canal having its termini on Barnegat Bay. The steam condenser cooling system requires 450,000 gallons per minute (gpm). Turbine and reactor building component cooling require an additional 10,000 and 12,000 gpm respectively. At a power level of 1930 MWt, the temperature rise across the condensers is 23°F. Three dilution pumps, each having a capacity of 260,000 gpm, are available to augment flow in the discharge canal.

On July 13, 1973, EPA took aerial infrared photographs of the Oyster Creek plant's thermal plume. The results of this study are now available in draft form, and a copy of the completed report will be transmitted to the AEC in the next few weeks. The study shows that the thermal influence of the plant's discharge extends across the entire width of Barnegat Bay, a distance of approximately three miles. The isotherms show frequent temperature variations all the way across, probably due the shallowness of the bay. A temperature rise of from 4 to 5°F is shown near the barrier beach on the east side of the bay.

New Jersey proposes to amend their water quality standards to allow no greater than a 1.5°F temperature rise in summer outside of a designated mixing zone. Our study results show that compliance with this regulation would not be possible even if the State were to designate the entire bay as a mixing zone.

In accordance with the Federal Water Pollution Control Act Amendments of 1972 (FWPCA), discharges from the Oyster Creek Nuclear Generating Station are subject to effluent limitations reflecting the "best practicable control technology currently available" by July 1, 1977, or to stricter limitations if they are necessary to meet applicable water quality standards. By July 1, 1983, dischargers must achieve effluent controls reflecting the "best available technology economically achievable." (For the thermal component of discharges, a reevaluation of the limitations imposed by the Administrator of EPA is possible under Section 316, FWPCA.)

Definitions of the technology-based terms are scheduled for promulgation in October 1973. As noted above, we anticipate that the thermal discharge from the Oyster Creek plant will be in violation of a revision to New Jersey standards now pending under the FWPCA. Furthermore, the discharge would, in all probability, fail to meet the effluent limitations

guidelines, once promulgated. The applicant should, therefore, evaluate alternative heat dissipation systems for this facility, including closed-cycle system alternatives. This evaluation should be included in the final statement and the system with minimum impact on the aquatic environment should be identified.

Biological Effects

The quantity and types of information contained in the impact statement do not permit an evaluation of the extent of biological damage to Barnegat Bay from plant operation. Data are lacking in a number of critical areas, namely:

- a) the extent of biological damage to fish and other organisms by impingement and entrainment,
- b) the configuration of the thermal plume with different tidal stages,
- c) physiochemical characterization of the intake and discharge water.

A major cause of biological damage is impingement of crabs and fish on the plant's intake screens. The impact statement presents the results of a single impingement study carried out between April 11 and July 1, 1971, for a total of thirty sampling hours. Thirty hours represent 0.1% of the approximately 30,000 hours that the plant has been operating. The results

of this study cannot be said adequately to characterize losses of this type, for reasons contained in the following discussion.

The study indicated an increasing rate of impingement of blue crabs from April 12 to July 1. This could be expected since the maximum number of blue crabs occurs late in the summer, in late July, August, and early September. The maximum figure cited in the impingement rate study represents only the beginning of the period of maximum abundance and activity of blue crabs in the area.

The applicant arrives at the total number of crabs killed/year by the following method:

(average impingement rate over period of study) X
(hours in 6 months) X (immediate screen mortality) =
killed/year, or, 147 crabs/hr X 4380 hr X 0.05 =
32,000 crabs/year.

We feel that the average impingement rate factor is much too low as it does not consider time of maximum abundance. Using the attached figure prepared by EPA's Region II, which is an extrapolation of the applicant's data, and projecting the impingement rates for the six months of maximum abundance, we arrive at an impingement rate for the period April-October, of 466 crabs/hour.

For the last factor in the equation, the applicant is using the immediate screen mortality rate (.05). The assumption is

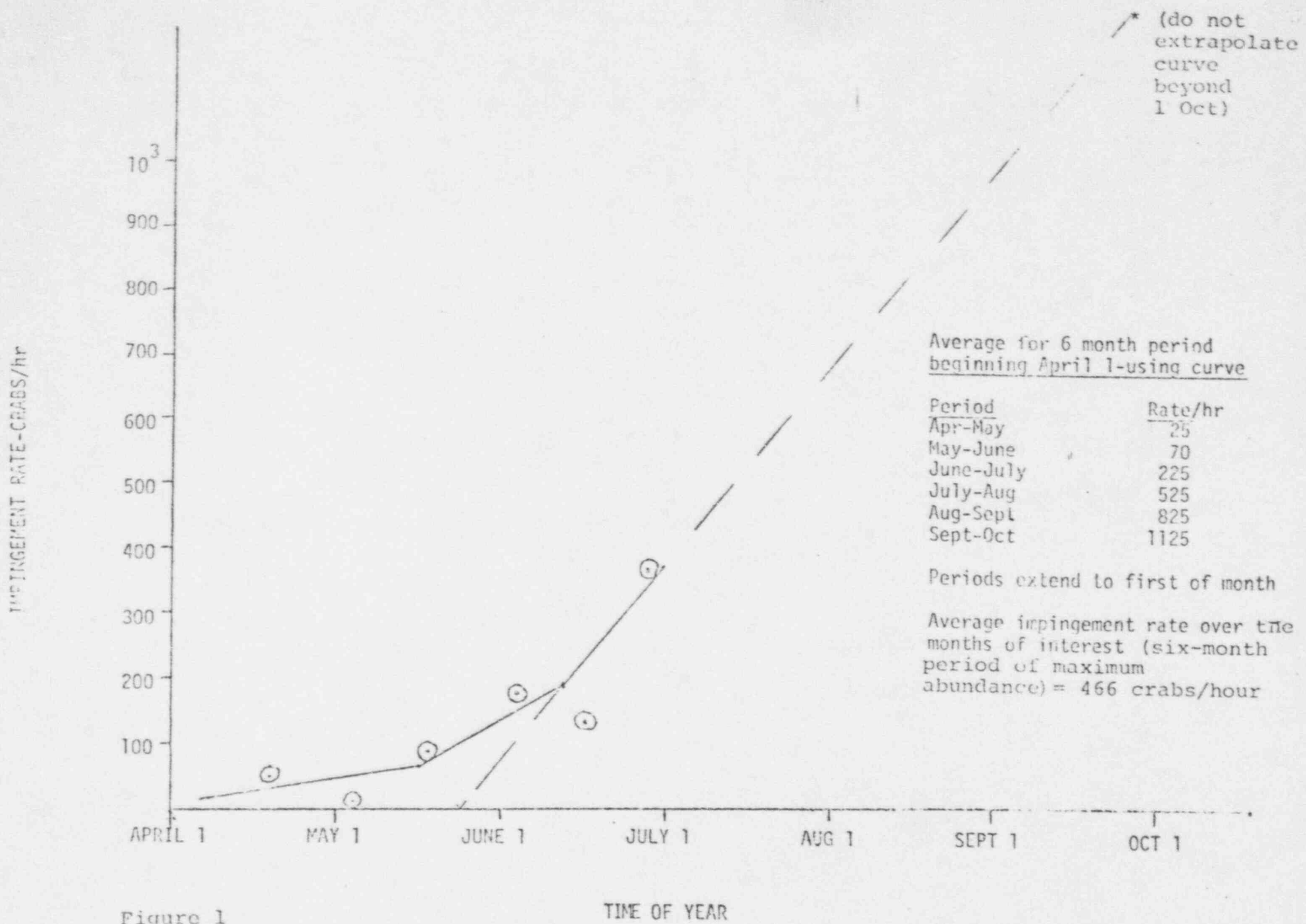


Figure 1

TIME OF YEAR

that the impingement experience will cause no further harm to live crabs dumped with other screen washings into the discharge canal. In our opinion, this assumption is unfounded; we would propose a figure more on the order of 0.50 for a total mortality rate. This figure considers such factors as mechanical shock and dumpage into a canal in which temperatures have been measured at 104°F.

Having re-estimated the applicant's factors, and calculating, $(4.66 \times 10^2 \text{ crabs/hr}) \times (4.38 \times 10^3 \text{ hr}) \times (0.50) = 1.02 \times 10^6$ crabs lost.

The resulting figure is significant in itself. It does not, however, consider losses due to entrainment of larvae and young. EPA believes that losses on this order of magnitude have the potential of affecting the population in the area and possibly in the bay as a whole.

This same line of inquiry can also be pursued with respect to finfish. For example, young menhaden would be expected to peak on the intake screens in fall. The study, however, did not consider this time of year. The study neglected March and early April, months when winter flounder are abundant. Also, "snapper" bluefish would be expected to peak during high summer and early fall. This period was not included in the study.

The impact statement contains only a two-page discussion of entrainment losses. No data were presented concerning fish and crab larvae and young. The data presented on phytoplankton cell counts, chlorophyll and productivity were collected during the period of minimum productivity--June through October. In general, the actual data for entrainment losses are not sufficient to determine adequately the extent of these losses.

Studies at other plants have shown significant effects with regard to entrainment of fish larvae. For example, an EPA study showed 165 million menhaden larvae killed at the Brayton Point plant of New England Electric in one day. Despite such indications of significant potential effect, and despite the fact that the Oyster Creek plant has operated for three and one-half years, the draft statement presents no data for this plant on actual entrainment losses.

Using other data, the AEC projects a total larval kill by entrainment of 100 million per year at Oyster Creek. To show that this may be a serious underestimate, the EPA study quoted above showed a higher actual kill for one day of one species than AEC's estimate for all species for a whole year at Oyster Creek.

There is no characterization of the bay waters in the area of the plant with regard to physiochemical data. No information

concerning dissolved oxygen and biochemical oxygen demand (BOD) is provided. This may be critical since temperatures of up to 104°F have been recorded in the discharge canal. The solubility of oxygen at 17,500 mg/l salinity and 104°F is only about 5.20 mg/l. It seems very likely that thermal enhancement of BOD could very well drive oxygen concentrations in the near bay to unacceptably low levels, possibly in violation of Federal-State water quality standards.

Chemical Effects

According to the draft statement, continuous discharge of a chlorine residual in the range of 0.1 to 0.2 mg/l can be expected from this plant. While the maximum recommended concentrations of chlorine to be applied continuously for slime control in brackish water cooling systems have not yet been determined by EPA, chlorine concentrations used at this plant do exceed the concentrations of 0.002 mg/l continuous discharge with a 0.1 mg/l 30 minute peak which are considered satisfactory for the protection of freshwater biota. For this reason, efforts should be made to reduce the chlorine residual level as much as is practicable.

Monitoring for both short and long-term chlorine effects on representative aquatic biota should be conducted at appropriate locations in the cooling-water canal and outfall

areas. Such information (at least for short-term effects) may already be available through the chemical-discharge testing program instituted in 1971 as mentioned on page 1-2 of this draft statement. The chlorine and other appropriate chemical test results should be discussed in the final statement.

ADDITIONAL COMMENTS

During the review we noted in certain instances that the draft statement did 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 Oyster Creek station. The cumulative effects, however, could be significant. It would, therefore, be helpful in determining the impact of the station if the following topics were addressed in the final statement.

1. The final statement should include an estimate of the P-32 released with the liquid radwaste from the station as well as the potential total body and bone doses due to ingestion of this radionuclide.
2. EPA has conducted surveys of direct radiation exposure along Route 9 in front of the Oyster Creek station. These surveys indicate that there is some source of direct radiation over a short portion of this highway, which causes an increased radiation exposure above ambient background. A thorough survey of this area should be performed by the applicant to determine the source of the direct radiation and to estimate the individual and population dose received by persons using the highway.
3. A large portion of the turbine building ventilation air passes to the atmosphere through the turbine building roof vents. The draft statement did not indicate that this release pathway would be monitored for radioactivity. Provisions should be made to monitor this effluent pathway according to the guidance presented in the AEC Regulatory Guide 1.21.

4. The final statement should include dose estimates based on the Oyster Creek release history with the data normalized to a 30% load factor. These estimates would provide a possibly more realistic dose assessment of the environmental effects of this plant and would provide a comparison with the effects based on the standard AEC model. As available, details should be presented of the isotopic inventories of the effluents discharged.

5. The following information regarding chemical effects was not included in the draft statement and should be addressed in the final statement:

- A. Concentrations of chemicals in cleaning and laboratory effluent solutions,
- B. Results of chemical analysis of the plant's intake and discharge waters as reported in applicant's Environmental Report, Table 5.3-1,

6. Pertinent aspects, if available, of the ongoing Barnegat Bay ecological studies by the New Jersey Department of Environmental Protection, the U.S. Department of Commerce, and Ichthyological Associates (as mentioned on page 6-6 of the draft statement) should be included in the final statement.