

ENVIRONMENTAL PROTECTION AGENCY

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ENVIRONMENTAL IMPACT STATEMENT COMMENTS

Three Mile Island Nuclear Station Units 1 and 2

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INTRODUCTION AND CONCLUSIONS

The Environmental Protection Agency (EPA) has reviewed the draft environmental statement for the Three Mile Island Nuclear Station Units 1 and 2 prepared by the U.S. Atomic Energy Commission (AEC) and issued on June 26, 1972. Following are our major conclusions:

1. Disposing of the radioactive waste solutions created by regeneration of the Unit 2 condensate demineralizer to the Susquehanna River without processing them through the radwaste system cannot be construed as "low as practicable."
2. The AEC is encouraged to apply the provisions of Safety Guide 21 to the effluent monitoring requirements for Three Mile Island.
3. The releases of liquid and gaseous radioactive waste from Three Mile Island are expected to be "low as practicable" if due consideration is given to the recommendations made by EPA. Since the plant has the necessary equipment, the ultimate release of radioactivity will depend on the waste management practices applied by the operator and the requirements of the AEC.

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4. In our opinion, the most serious impact that may result from the operation of the plant will be due to the release of residual chlorine and chlorine by-products (e.g., chloramines) in the cooling water discharge. We recommend, therefore, that the nature and extent of such impacts be evaluated and measures be taken to eliminate or substantially reduce the amounts of chlorine released.
5. We believe the closed-cycle cooling system employing two natural draft cooling towers per unit will enable the Three Mile Island plant to operate in compliance with federally approved state thermal standards. Although no impacts on aquatic biota directly attributable to thermal releases are expected, there may be impacts that arise from the congregation of fish in the vicinity of the discharge point. It is recommended that these potential impacts be addressed in the final statement.
6. As a result of the flooding on the Susquehanna River following Hurricane Agnes, we suggest that the probable maximum flood for the river at Three Mile Island be reevaluated and the adequacy of the plant flood protection be reconfirmed.

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RADIOLOGICAL ASPECTSRadioactive Waste Management

In most respects the capabilities provided by waste management equipment for Three Mile Island Units 1 and 2 are consistent with the concept of "as low as practicable." Two notable exceptions are the discharge of the neutralized regenerant solution from the Unit 2 condensate demineralizer and the discharge of untreated sluice water from the Unit 1 powdex filter-demineralizer to the Susquehanna River.

The intended procedure of discharging untreated radioactive liquids from the sluicing and regenerating operations indicated above is not, in our opinion, "as low as practicable." We strongly encourage the AEC to insure that these radioactive liquids will be treated in the waste management system. A significant portion of the radionuclides from these sources will be long-lived and, thus, will accumulate in the environment, if discharged. The annual contribution of the sluice waste to the total annual discharge of radionuclides cannot be determined from the environmental statement. In order to indicate the potential environmental impact from the discharge of untreated sluice water, the final statement should provide an estimate of the quantities of radionuclides expected from this source.

It is noted that there are provisions for the future addition of a deep-bed condensate demineralizer for Unit 1. If a deep-bed demineralizer is added for Unit 1, the yearly discharge of untreated regenerate solutions could contribute as much as 30 curies to the aquatic environment. It would be appropriate for the final statement to indicate the criteria for the installation of this demineralizer and to provide the result of an evaluation of the environmental effects of its use.

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Similarly, the liquid waste from the turbine building drains (presumably both floor and equipment drains) will be discharged to the river without treatment. Although the turbine building is in a "non-nuclear" area, contaminated leakage is anticipated from the condensate pumps, steam line valves, and other sources. It is recommended that the final statement provide detailed information about leak rates, activity levels in the leakage and in the discharge, and the possibility of treatment before discharge.

The gaseous effluent control systems proposed for Units 1 and 2 are expected to be capable of maintaining the gaseous effluents from the facility at levels below the guidelines of the proposed Appendix I to 10 CFR Part 50. According to the environmental statement, a minimum decay time of 30 days for the reactor coolant off-gases will be provided even though the waste gas decay tanks are designed to provide 90 days decay. We encourage the applicant to fully utilize the off-gas decay tanks to minimize environmental effects from discharges of gaseous radionuclides. This would be consistent with the concept of "as low as practicable" and would appear consistent with the provisions of 10 CFR Part 50.36a.

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Effluent Monitoring

It does not appear that all potential pathways for the release of radioactive effluents are being sampled and monitored. For example, it is not apparent that the liquids from the secondary coolant system (turbine building drain, powdex filter-demineralizer sluice water, and deep-bed demineralizer regenerate solutions) will be sampled and analyzed prior to their release to the Susquehanna River. We believe that such analyses should be made to these potentially contaminated liquids prior to their release. The application of Safety Guide 21 recommendations for effluent monitoring would seem appropriate for this nuclear station. Furthermore, a tabulation should be provided of the quantities of radionuclides (unidentified and ^{131}I) which could be released undetected from any effluent release point due to instrument sensitivity limitations.

Since the exclusion area for Three Mile Island includes a substantial area of the Susquehanna River to which public access is uncontrolled, it is possible for individuals to spend considerable time within the exclusion area where the dose rates will be significantly higher than at the exclusion area boundary. The final statement should include details of how the applicant intends to determine that the doses to such individuals are within the applicable guidelines and regulations.

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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. Since these accidents are common to all nuclear power plants, the environmental risk for each type of accident is 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 would result in a better understanding of the environmental risks than a less-detailed examination of the questions on a case-by-case basis. For this reason, we have reached an understanding with the AEC that they will conduct such analyses with EPA participation concurrent with the review of impact statements for individual facilities and will make the results available in the near future. We are taking this approach primarily because we believe that any changes in equipment or operating procedures for individual plants, required as a result of the investigations, could be included without appreciable change in 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 would, of course, make our concerns known.

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The statement concludes "...that the environmental risks due to postulated radiological accidents are exceedingly small." This 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 on January 13, 1972. These comments essentially raised 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 mentioned above will be adequate to resolve these points and that the AEC will apply the results to all licensed facilities.

Even though we agree that accidents should be evaluated on a general basis, the possibility of flood damage at the Three Mile Island site would seem to warrant specific consideration. At least a comparison of flood protection with an updated probable maximum flood (PMF) estimate, which takes into account the floods caused by Hurricane Agnes, should be presented in the final statement. In addition, details of the protection provided for safety-related equipment from floods exceeding the level of the plant dike system, including those equal to and exceeding the PMF, would be particularly appropriate in the final statement. We note also that a large pumped-storage facility is to be constructed on Stony Creek upstream from Three Mile Island, but information on the flood protection provided is not available. The final statement should include consideration of the adequacy of flood protection measures at Three Mile Island relative to the possible failure during the PMF of the planned, upstream pumped-storage project.

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NON-RADIOLOGICAL ASPECTSChemical Effects

It is probable that the most significant impact from operation of the Three Mile Island plant may be due to the release of effluent containing residual chlorine and chloramines to the Susquehanna River. This will occur as a result of the use of elemental chlorine in plant systems to control slime growth. As indicated in the draft statement, the chlorination systems "...will be operated intermittently for several 15 minute to half-hour periods per day, and the additions will be controlled so that the residual chlorine in the effluent cooling water stream is maintained between 0.5 and 1 ppm (parts per million)." Further, it is indicated that if the effluent stream is completely mixed with the receiving water, chlorine levels of .004 ppm and 0.05 ppm are expected under conditions of normal and low river flow, respectively. Such levels, should they routinely occur over an appreciable portion of the receiving water, could constitute a hazard to aquatic biota. Thus, we are inclined to agree with the draft statement that "...the impact on the biota of the river (due to chlorine releases) may be significant." In our opinion, however, additional information is necessary in order to determine the character and extent of the impact. This information should be provided in the final statement.

The assumption of complete mixing used in the draft statement to determine the levels of residual chlorine represents an idealized situation which would rarely, if ever, be realized in the Susquehanna River. Thus, it is unlikely that constant levels of residual chlorine would be observed across the entire width of the river, or York Haven Pool, at points immediately downstream of the discharge. Also, it is

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unlikely that concentrations would uniformly decrease with distance away from the plant site as the chlorine residuals were consumed or dissipated. A more realistic assumption would be that the characteristics of the chemical discharge plume will vary as discharge levels and conditions in the receiving water change. The final statement, in our opinion, should present an analysis of the release of chlorine and consequent effects based on such an assumption. This analysis should be supported by the following information:

details of the schedule for chlorine additions specifying amounts to be added and indicating the frequency and duration of each addition;

predictions of the shape, size, location, and behavior of the discharge plume under various conditions of river flow and chlorine residual discharge rates;

descriptions of the chemistry of free chlorine and chlorine by-products (e.g., chloramines) in the receiving water including concentrations and persistence times;

details of an effective program for monitoring residual chlorine levels in the Susquehanna River; and

additional biological base-line data concentrating on the important species likely to be significantly affected by chlorine releases;

this should emphasize those biological aspects of each species likely to undergo change (e.g., feeding habits, reproductive processes, and migratory patterns).

Such information would facilitate determinations as to the chlorine levels which will provide adequate protection for the aquatic biota near the Three Mile Island site and portions of the river downstream.

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As a general guide, EPA has recommended in the past the following criteria for residual chlorine levels in the receiving water:

<u>TYPE OF CRITERIA</u>	<u>RECOMMENDATION FOR TOTAL RESIDUAL CHLORINE</u>	<u>LEVEL OF PROTECTION</u>
continuous	0.01 mg/liter	This level would probably not protect trout during reproduction, some important fish food organisms, and could prove lethal to sensitive fish species during certain life stages.
continuous	0.002 mg/liter	This level should protect most aquatic organisms.
intermittent	A. 0.1 mg/liter <u>not to exceed 30 minutes per day</u> B. 0.05 mg/liter <u>not to exceed 2 hours per day.</u>	These levels should not result in significant kills of aquatic organisms or adversely affect the aquatic ecology.

It should be understood, however, that even the above criteria may not provide an adequate degree of protection in all instances. In our opinion, whether these or more restrictive criteria are appropriate must be determined on a case-by-case basis. Thus, experience at the Three Mile Island plant may indicate that in order to reduce adverse impacts to acceptable levels, the amounts of residual chlorine in the receiving water must be kept substantially below those recommended above. For example, some species of fish show "avoidance" reactions to chlorine (chloramines) at concentrations as low as 0.001 ppm. Should this occur, the effect may make some portion of the York Haven Pool unsuitable as a fish habitat. In addition, possible changes in other aspects of the life patterns of important species could prove significant. We recommend, therefore, considering the importance of this pool as a recreational resource for the Harrisburg, York, and Lancaster area,

that additional studies be instituted to specifically identify the nature and extent of the impact that can be expected should chlorine or chloramines be released at the planned 0.5 to 1 ppm levels. Such studies would aid in determining the degree to which discharge concentrations must be reduced or in estimating the environmental benefits provided by entirely avoiding the use of chlorine as a biocide. In this regard, the final statement should consider and evaluate in detail the following possible alternatives:

significantly reducing the amounts of chlorine used or the frequency of addition, and removal of chlorine prior to release by employing an appropriate treatment process.

The Pennsylvania state water quality standards provide that discharges to high quality waters "...should be required to provide the highest and best practicable means of waste treatment..." and also that "the standards seek to assure optimum, not marginal, conditions to protect uses associated with clean water." In view of such non-degradation strictures, the possible effects of the discharge of dissolved solids should be further considered in the final statement. This should include, in our opinion, any dissolved substance that may cause a significant effect regardless of whether an appropriate state standard exists. For example, the effects of sulfate releases should be considered.

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Thermal Effects

The Three Mile Island Nuclear Station Units 1 and 2 will use a closed-cycle cooling system incorporating two natural draft cooling towers per unit. Blowdown from these towers will be combined with effluent from the nuclear and secondary service systems and routed through two small mechanical (forced) draft towers before discharge to the Susquehanna River. The draft statement indicates that blowdown temperatures will, in general, be approximately equal to the ambient river temperature during most of the year and no greater than 3°F above ambient during the winter months. Thus, in our opinion, this system provides the capability for plant operation in compliance with federally approved state standards which allow a 5°F rise and a maximum of 87°F.

Since, in general, discharge temperature will be close to ambient river temperatures during most of the year, no significant impact on aquatic biota directly attributable to thermal effects is expected. It is possible, however, that during the winter months when discharge temperatures will be appreciably above ambient conditions, certain impacts, related to the presence of warmer water in the discharge plume, may occur. For example, the warm water will undoubtedly cause fish to congregate near the discharge point. This situation could lead to:

exposure of greater numbers of fish to higher residual chlorine levels,
depletion of available food supplies, and
greater susceptibility to thermal shock should it become necessary to shut down the plant or to temporarily curtail the cooling tower anti-icing flow.

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Any or all of these possibilities could result in increased species mortality or reduced vitality. The final statement should address such possibilities and indicate methods by which the adverse effects could be avoided.

Entrainment and Impingement Effects

Due to the low intake velocity (0.2 feet/sec.), it is anticipated that there will be no appreciable impingement of fish. It is likely, however, that entrainment of larval fish, fish eggs, and fish food organisms could lead to a significant environmental impact, particularly during periods of low-flow in the Susquehanna River. The final statement should discuss this potential problem and indicate changes in operational methods or plant systems that would mitigate or avoid any adverse impact that may develop. For example, should entrainment effects result in an unacceptable impact during low-flow periods, it may be possible to operate the cooling towers at higher concentration factors and, consequently, reduce the requirements for make-up water.

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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 Three Mile Island facility. The cumulative effects, 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:

1. A description of the treatment and ultimate disposal of the filtrate from the pressure filters for the sludge treatment;
2. A description of the lighting provisions for the natural draft cooling towers and the measures undertaken to avoid potentially harmful effects on migrating birds;
3. A description of a program for the prevention of spills and the containment and recovery of hazardous materials spilled at Three Mile Island. Additional details are needed concerning the methods used to store and handle hazardous substances (e.g., oil, chlorine, acids, alkalis) so that a reviewer can ascertain that the possibility of spillage has been adequately evaluated and that effective measures to prevent, contain, and counteract such spills have been instituted;
4. The impact of high voltage transmission lines

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discussed in the draft statement does not mention the production of ozone by the lines. Since little information concerning the production of ozone by high voltage transmission lines is available, the EPA is preparing to study this problem. It would also be desirable for the AEC to provide whatever available information the utility companies may have in the final statement.

5. A description of the air pollution control techniques provided for the onsite concrete plant; and
6. A description of the annual fuel quantities used and sulfur content of fuel used in the diesel generators.

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