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ENVIRONMENTAL ASPECTS  
OF THE PROPOSED  
OFFSHORE NUCLEAR POWER PLANT



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Report  
of the  
Air and Water Pollution and Public Health Committee  
of the General Assembly  
(pursuant to Assembly Resolution No. 20, 1972)

December 8, 1972



LETTER OF TRANSMITTAL

December 8, 1972

HONORABLE MEMBERS OF THE GENERAL ASSEMBLY:

The Assembly Committee on Air and Water Pollution and Public Health, pursuant to Assembly Resolution No. 20 (1972), herewith respectfully submits its report on "Environmental Aspects of the Proposed Offshore Nuclear Power Plant."

S/ JOHN I. DAWES  
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Chairman

S/ HERBERT H. KIEHN  
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A REPORT ON ENVIRONMENTAL  
ASPECTS OF THE PROPOSED OFFSHORE  
NUCLEAR POWER PLANT

Pursuant to Assembly Resolution No. 20, the Assembly Committee on Air and Water Pollution and Public Health has been studying the plans of Public Service Electric and Gas Company and several other utilities to build a nuclear power plant off the coast of New Jersey. The Committee has held a public hearing, received reports and other information from concerned parties and discussed the arguments for and against the construction of a nuclear power plant off the coast at Little Egg Harbor Inlet. The Committee has expressed its concern, stated its beliefs and made certain recommendations in this report. However, the basic reason for the presentation of this report to the Legislature is to provide the Legislature with information on the environmental and health aspects of constructing and operating a power plant off the coast of the State.

The proposal to construct the plant is, in a sense, still in the formulation stage. Public Service Electric and Gas Company has made tentative decisions on how to solve many of the problems which they can anticipate. It is admitted by the Company, by concerned environmental groups, and by the State Department of Environmental Protection that a

detailed assessment of many specifics of the proposal cannot be made at this time. For this reason the Committee recommends no action be taken by the Legislature to terminate consideration of this site at this time. Further study and analysis of the proposal should be made by all concerned parties and especially by the several State agencies concerned with various aspects of the problem.

The Committee presents this report to the Legislature to alert the Legislature to the major problem areas which it perceives. Of particular concern is the development of the most modern methods possible to provide complete safety for the public regarding the possibility of a nuclear accident. Of further major concern is the development of procedures to assure environmental safety during the construction of the plant, including the transport and emplacement of materials for the breakwater. Another factor relates to the impact of the construction and operation of the proposed plant and associated facilities on the ecology and marine ecosystem of one of the last remaining virgin inlets in the State. Of further note is the psychological or the visual impact on residents of and visitors to the area adjacent to the proposed plant.

The following sections of this report consider each of these items, other environmental and health factors, some of the reasons for making a proposal such as this, and the Committee's recommendation for (1) the completion of a comprehensive environmental impact statement by Public Service Electric and Gas Company, (2) the complete review of that statement by the Department of Environmental Protection, and (3) the conformance of the Company to the suggestions of the department prior

to the granting or leasing of any State-owned land to the Company and prior to the consideration of a nuclear plant construction permit by the Atomic Energy Commission.

#### Future Power Needs

The phenomenal growth in electric power use in the State is the basic reason why power plants will continue to make such large claims on an increasingly crowded environment. For the past 30 years electric power loads have grown at an average rate of seven percent per year, requiring an approximate doubling of electric power production in each decade. Forecasted load growth to 1990 indicates that expansion can be expected to continue at the same rate.

The growth in need for electricity in New Jersey can be attributed to three basic factors: population growth, industrial expansion and improvement in the standard of living. The continued growth and technological advance of business and industry are necessary to provide employment for New Jersey residents and are dependent on the availability of electricity. The standard of living of the State's residents is continuing to increase, expanding the demand for electricity to run the many modern conveniences required by our consumer-oriented society.

#### The Location of Power Plants

Each power company operating in New Jersey is part of a statewide and interstate system of interconnected power

facilities and transmission lines. This system provides for the transfer of power from one area to another area to meet the peak load needs of the various participants and to compensate for any temporary loss of production in any one area. The map included in the appendix to this report shows the percentage of power distributed within the State by each major power company. A basic principle of the interstate power system is that over the long run the utilities from each State will produce the power required by that State.

Most of the power produced today is generated at hydroelectric plants, at fossil fuel plants or at nuclear plants. Future technology might provide for new or modified methods of power production. For instance, a gas-cooled, in lieu of water-cooled, method of nuclear power production might exert a major influence on the site location process.

In New Jersey today there are few places where power can be developed from hydroelectric sources. Virtually all of our power must come from fossil fuel or nuclear power plants. Fossil fuel plants have significant problems with air and water pollution and with the acquisition and transportation of fossil fuel. Nuclear plants have problems related to the control of radioactive materials. In both cases thermal pollution is a major problem, which dictates a plant site immediately adjacent to water and preferably in or adjacent to the largest body of water possible.

The immense need for coolant water by the power plants and the equally great need for fresh water for domestic, industrial, public and agricultural uses have tended to force the consideration of non-fresh water sites.

The selection of an offshore location for an electric generating plant is a precedent-setting action by the State's public utilities. An offshore plant will maximize the availability of coolant water and minimize the problem of thermal pollution. The proposed location of a plant three miles offshore of the Little Egg Harbor Inlet also minimizes the proximity of neighbors within a five mile radius of the plant.

The Atomic Energy Commission has developed certain site evaluation criteria which favor areas of lower population density for the location of nuclear power plants. The Committee is concerned with this type of safety criteria and with proposals that result in the location of several nuclear power plants in proximity to each other, as is now occurring in southern Ocean County.

The precedent-setting nature of this endeavor has been noticed by public officials, residents and visitors of the shore communities. These concerned citizens believe that proposals to construct additional power plants would follow the successful completion and operation of this plant. The Committee agrees that this is a likely development. The same concerned citizens also fear proposals for drilling for oil, for constructing bulk transport ports and for other industrial developments off the coast. The Committee believes these are separate questions which do not depend on the outcome of the proposal for an offshore power plant.

The Committee believes that the location and siting of power plants will continue to be of major public concern for many years into the future. Therefore, the development of long-range State procedures to plan for the provision of power and to regulate and

control the site selection process would be one additional method to facilitate the proper solution to the environmental and safety problems associated with this proposal and with others to follow.

### The Proposed Plant

The proposed plant will consist of two 1150 megawatt generating units floating behind a large breakwater and connected to the electrical system through underwater cables. Most of the material presented in this section of the report was provided to the Committee by the Public Service Electric and Gas Company at the public hearing held by the Committee on June 2, 1972, on Long Beach Island.

Referring first to the breakwater, it is to be semi-circular on the ocean side and straight on the shore side and is designed to protect the plant from the most extreme environmental conditions. It will be designed to withstand the following conditions:

a. Tornado wind speed of 300 miles per hour

There has never been a tornado with wind speed even approaching this velocity in the State of New Jersey. However, since it is theoretically possible to have such a storm, the facility will be designed to withstand it.

b. Hurricane force winds with a steady wind speed of 156 miles per hour

Historical records indicate that the maximum wind speed ever recorded with a hurricane in this area is about 91 miles per hour.

c. Maximum wave height of 43 feet

Wave heights which are theoretically possible here are approximately equal to the depth of the water. At this location the water depth is 43 feet. The facility will be constructed to withstand waves of this magnitude.

In order to withstand the environmental considerations just mentioned, the breakwater will be approximately 30 feet wide at the top and will slope downward to a maximum width of about 300 feet at the bottom of the ocean. The sloping portion of the breakwater will be designed to prevent ships from hitting the plant and affecting its operation. It will also dissipate the energy of storm-driven waves. This structure will be the largest and strongest man-made structure ever installed in the ocean. The breakwater will consist of sunken concrete caissons filled with sand and gravel, of rock, sand, gravel and stone and of interlocking pre-cast concrete shapes called "dolosse". The material used in this project would be adequate to build a two-lane highway 200 miles long. This entire breakwater structure is now undergoing model testing to find out if it can meet its design requirements.

Looking now at the plant to be installed inside the breakwater, the utility has selected the firm of Offshore Power Systems, which is a subsidiary of Westinghouse Electric Corporation and Tenneco Corporation, to construct these generating stations. The units will be built in a shipyard in the southern part of the United States and will be completely tested before they are shipped to the site. Each unit is

about 400 feet square and will draw about 30 feet of water. Each will displace approximately 150,000 tons. Since ships in existence today displace nearly 500,000 tons, this is not an abnormally large ship. These units will be exact duplicates of each other. It is expected that there will be other units built in other sections of the United States which will be exact duplicates of these.

The detailed layout of each unit is essentially the same as those which are located on shore. All equipment on the barge is completely conventional in nature. Similar equipment will have had many years of successful operating experience before being installed in this facility.

When the units have been built and tested they will be towed to the site, installed behind the breakwater and permanently moored. The only permanent physical connection that the plant will have with the shore is through the electrical cables required to carry the power from the plant to the people of the State of New Jersey. These cables will be run underwater from the plant to the mainland and underground from the shoreline to the switching station, which will be located northwest of Tuckerton. From there they will join the electric company grid for distribution to the customers of the New Jersey electric companies.

When major components or nuclear fuel must be removed from the plant and sent away for reprocessing or repairs, they would be transported by a special barge which would go directly from the plant to an out-of-state port location. Such a barge would

not come into the small land-based facility adjacent to the plant.

The Committee believes that Public Service Electric and Gas Company has an obligation to educate and inform the public on the merits of this proposal. The public attitude must be considered, separate and apart from any successful solution to the environmental and other problems associated with this project. Serious social and political consequences may follow such a proposal if public perception of this project is based upon a misunderstanding. Therefore, the Company is obligated to conduct such an educational program to prevent the possible detrimental consequences which would follow such a lack of public understanding.

#### Radiation Control

There are three categories of concern in radiation management at a nuclear power plant. The first is the treatment of waste with low levels of radioactivity, such as gaseous, liquid and solid wastes, which are evolved during the course of operating nuclear power plants. The second concerns the handling of the waste nuclear fuel which must be replaced once a year with new nuclear fuel. The third concerns the possibility of a major disaster and the accidental release of a significant quantity of radioactive materials.

On the first concern, the power company indicated at the public hearing that the releases of radiation will be so low that they will be unmeasurable once they are released to

the environment. Operating experience with many nuclear facilities in the United States supports the contention that the normal releases of radioactivity to the environment from a nuclear power plant are well within safe limits.

The Company indicated that the major component of waste nuclear fuel would be removed by ship and never cross land in the State of New Jersey. The Committee is concerned that every precaution be taken to assure that the excellent safety record established at existing nuclear plants for the removal of spent nuclear fuel be maintained at the proposed Egg Harbor Inlet plant and at any other nuclear plant to be constructed in this State.

The Committee views with utmost concern the possibility of an unanticipated accident, perhaps as an act of sabotage or war, occurring at the proposed Egg Harbor Inlet power plant. The Committee is aware that the Atomic Energy Commission and many scientists, engineers, physicians and other specialists have conducted exhaustive studies and tests and have concluded that there is only a small theoretical chance that a major disaster could occur at a properly constructed nuclear power plant. The Committee is further aware that a small number of scientists remain deeply concerned that such a major accident is possible.

The following description of a major accident was presented to the Committee by the Save the Ocean Society. The material was prepared for the Society by Professor James J. MacKenzie, a nuclear physicist from M.I.T.

An enormous amount of heat is generated during the operation of a nuclear power plant. A large volume of water is required to cool and contain the process. The water, which is heated to create steam, passes up through what is called a core or a large block of fuel. The steam's force drives a turbine, which turns a generator to produce electricity

During normal operation the fuel becomes very hot and the water carries the heat away from this core. If the pipes carrying this water through the core should break, then the cooling water would be lost and a loss-of-coolant accident would occur.

An accident such as this has not yet occurred. However, Professor MacKenzie indicated that such an accident might occur within the next five or ten years. The consequences of a loss-of-coolant accident are so serious that it is the overriding consideration in terms of nuclear safety. If emergency water were not supplied to the reactor, then that great block of nuclear fuel would start melting within 45 seconds of the time that the water left the reactor. If the fuel melted in a reactor because emergency water was not supplied, there would undoubtedly be large releases of radioactivity and there could be lethal effects for an area covering many square miles.

To prevent the results of a loss-of-coolant accident certain steps can be taken to prevent the accident and to contain the results of such an accident. To prevent the accident, separate, entirely independent emergency core coolant systems can be engineered into the system. Both low-pressure and high-pressure emergency core coolant systems can be constructed into the

system to compensate for various types of accidents which might occur to the primary core coolant system. In addition, various filter systems have been developed to inhibit the spread of any accidental release of radioactive materials to the atmosphere. Public Service Electric and Gas Company has assured the Committee that the most modern and the most comprehensive safety procedures possible will be used to guard against the possibility of a loss-of-coolant accident and to contain the results of any such accident.

Most nuclear experts believe that nuclear plants can be constructed and operated safely by utilizing the most modern safety practices developed to date. Some other scientists have questioned the effectiveness of those practices. In addition many members of the general public, including many citizens in Ocean and Atlantic Counties, believe that a serious safety problem exists.

For these reasons the Committee recommends that the State Department of Environmental Protection strengthen its surveillance and review of all aspects of radiation management at the proposed plant and that it present its findings to the Atomic Energy Commission and to the State Legislature before said Commission grants the Company a nuclear plant construction permit.

#### Thermal Pollution

Nuclear power plants, as well as fossil fuel power plants, produce a large amount of waste heat which must be dissipated in the environment. The most economical method of disposing of

waste heat is to discharge it directly into adjacent bodies of water. A site in the ocean should provide the best site possible for minimizing environmental damage due to the dissipation of waste heat.

Current studies by Public Service Electric and Gas Company indicate that outside of a small area of approximately five acres at the discharge point the temperature increase will be less than five degrees above the natural ocean temperature.

#### Visual Impact

The proposed Little Egg Harbor Inlet nuclear power plant will be clearly visible to the residents and users of the beach on the southern portion of Long Beach Island. Such a plant, no matter how pleasantly designed, will seem out of place and unaesthetic to many people viewing it. The Committee does not know whether the visual and psychological impact of an offshore plant would have a negative, positive or negligible impact on the public's desire to visit or live in the adjacent area.

#### Beach and Ocean Floor Erosion

Current studies completed by the Company indicate that there will be little change to the beach and ocean floor erosion patterns which now exist in the area.

#### Impact on Marine Organisms

Testimony presented to the Committee by Dr. Edward C. Raney, ecologist and marine biologist, indicates that there

will be negligible damage to the marine environment. It was indicated that some organisms, including small fish, might perish at the intake pipes, which will be screened. Furthermore, a small percentage of organisms will be shocked as they pass through the condenser.

Because of the area of warmer water the small marine organisms should multiply faster than their loss at the pipes and condenser. The existence of the breakwater should further promote the breeding and growth of the small organisms which provide food for fish. The breakwater ought to exert an effect like that of a huge pile of rocks or abandoned wrecks and attract numerous species of fish. Sport fishing should be greatly improved in this area.

The plant might very well exert a larger impact than can be predicted at this point on the marine environment, on Little Egg Harbor Inlet, on migration patterns of sport fish and on other aspects of the marine ecosystem. The development of additional information will be helpful in assessing the impact of the plant on marine organisms.

#### Special Problems during Construction

During the construction period a temporary shore site will have to be developed to provide a base point to assemble and construct the materials to be contained in the breakwater structure. This site would be a large area, perhaps on Raritan Bay in Monmouth County. Heavy construction materials would be moved to this site by land and by water for processing.

The materials would then be moved to the site in the ocean by 16 tugs and 32 barges working continuously for a period of several years. At the ocean site several derrick barges and their large crews would be involved in lowering these materials into the water. The assembly, construction and emplacement of these materials might provide more environmental, health and safety problems than will the normal operation of the plant.

### Conclusion

The Committee on Air and Water Pollution and Public Health believes that the State's major utilities have initiated a precedent-setting course in their proposal to construct an offshore nuclear power plant adjacent to Little Egg Harbor Inlet. The Committee is aware that the proposal is still in the formulation stage and is subject to further modification and to possible rejection for a variety of reasons. The Committee is aware that over 65 permits must be obtained from various federal and State regulatory agencies and that the issuance of many of these permits is dependent on the results of public hearings. The Committee is impressed with the scientific, engineering and environmental studies initiated or completed by Public Service Electric and Gas Company. Nevertheless, it recognizes the need for and awaits the completion of independent studies by various federal and State regulatory agencies and by concerned outside sources.

Recommendations

-- The Committee recommends that no action be taken by the Legislature to terminate consideration of the proposal to construct a nuclear power plant at the Little Egg Harbor Inlet site at this time.

-- The Committee further recommends that Public Service Electric and Gas Company prepare a comprehensive environmental impact statement for presentation to the Department of Environmental Protection and that the department should conduct an independent and continuous review of that statement and of all developments relating to this proposal. This review should include a departmental analysis of the environmental impact statement and recommendations by the department to the Company indicating what steps need be taken by the Company to maintain environmental quality at acceptable levels. It would be expected that the Company would conform to the recommendations of the department prior to the granting or leasing of any State-owned land to the Company.

-- Finally, the Committee recommends that the department should form an independent technical opinion on the possible dangers of a nuclear accident and should present its findings to the Legislature and to the Atomic Energy Commission before said Commission grants a permit to construct the first offshore nuclear power plant in the world.







