NORTHEAST UTILITIES

THE CONNECTICUT LIGHT AND POWER COMPANY
THE HARTFORD ELECTRIC LIGHT COMPANY
WESTERN MASSACHUSETTS ELECTRIC COMPANY
HOLYOKE WATER POWER COMPANY
NORTHEAST UTILITIES SERVICE COMPANY
NORTHEAST NUCLEAR ENERGY COMPANY

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June 26, 1981

Docket No. 50-245
A01452

Director of Nuclear Reactor Regulation
Attn: Mr. Dennis M. Crutchfield, Chief
Operating Reactors Branch #5
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

References: (1) D. G. Eisenhut letter to SEP Plant Licensees, dated January 14, 1981.
(2) W. G. Counsil letter to D. G. Eisenhut, dated February 27, 1981.

Gentlemen:

Millstone Nuclear Power Station, Unit No. 1
SEP Topic II-3.B, Flooding Potential
and Protection Requirements

As part of the redirection of the Systematic Evaluation Program, Reference (1), Northeast Nuclear Energy Company (NNECO) committed to develop Safety Assessment Reports (SAR's) for certain SEP topics which would be submitted for Staff review. NNECO detailed this commitment and provided a schedule for submittal of SAR's in Reference (2). In accordance with this commitment, NNECO hereby provides the Safety Assessment Report for SEP Topic II-3.B, Flooding Potential and Protection Requirements, which is included as Attachment 1.

We trust the Staff will appropriately use this information to develop a Safety Evaluation Report for this SEP topic.

Very truly yours,

NORTHEAST NUCLEAR ENERGY COMPANY

W. G. Counsil

W. G. Counsil
Senior Vice President

Docket No. 50-245

Attachment 1

Safety Assessment Report

SEP Topic II-3.B, Flooding Potential and Protection Requirements

June, 1981

Millstone Nuclear Power Station, Unit no. 1
SEP Safety Assessment Report

## Topic II-3.B; Flooding Potential and Protection Requirements

### 1.0 INTRODUCTION

The objective of this topic is to assure that structures, systems, and components required for safe shutdown are adequately protected against floods. This topic reviews the design basis flooding conditions and resulting protection requirements against current criteria. Topic II-3.B-1 will review the capability of the plant to cope with the design basis flood conditions.

### 2.0 CRITERIA

Regulatory Guide 1.59 (Revision 2) states that:

> The conditions resulting from the worst site related flood probable at a nuclear power plant; i.e., PMF, seismically induced flood, hurricane, seiche, surge, heavy local precipitation, with attendant wind-generated wave activity constitute the design basis flood conditions that safety-related structures, systems, and components identified in Regulatory Guide 1.29 must be designed to withstand and retain capability for cold shutdown and maintenance thereof.

### 3.0 DISCUSSION

The controlling event for flooding at the Millstone Point Site is a storm surge resulting from a hypothetical hurricane. There are no major rivers or streams in the vicinity of Millstone Point nor are there any water courses on the site. A number of small brooks flow into Jordan Cove, east of the site, and into the Niantic River and Bay, west of the site.

Since there are no major rivers or streams in the vicinity of Millstone Point, the effects of potential dam failures are not applicable.

The areas of the North American continent susceptible to tsunamis are those bordering the Pacific Ocean and the Gulf of Mexico. Millstone Point is located on the North Atlantic coastline where there is an extremely low probability of tsunamis. Therefore, tsunamis are not considered to be a credible natural phenomena which might affect the safety of Unit 1.

NNECO has no knowledge of any history of ice in Niantic Bay or ice jam formation in the area of the circulating and service water pump house. It is considered highly unlikely that ice would form or collect in a manner or amount sufficient to obstruct the flow to safety-related pumps.

There are no cooling water canals, reservoirs, or channel diversions which would have any effect on safety-related equipment.

Millstone Unit No. 1 was originally designed based on a detailed study of flooding potential from a design basis hurricane. This study was based on a transition of a severe hurricane at Cape Hatteras in September 1944. The plant was designed for a flood protection level of 19.0 (MSL).

In 1966, a study of flood potential from the probable maximum hurricane (PMH) was developed and is included in the May 1980 revision of the Millstone Unit 1 FSAR. The study utilized the hydrometeorological section ESSA, HUR 7-97 interim report, "Meteorological Characteristics of the Probable Maximum Hurricane, Atlanta and Gulf Coast of U.S." The conclusions reached in this study showed a maximum still water level of 16 MSL and a maximum runup to elevation 17-18 MSL at the reactor building. This still water surge was calculated by combining the rise due to atmospheric reduction, wind setup, and an astronomical tide. The still water level caused by the PMH would be about 1.7 feet (elevation 16 MSL versus elevation 14.3 MSL) higher than for the hurricane used in plant design.

It is noted that an investigation was subsequently made to determine the effects of increasing the astronomical tide by 1 foot with a coincidental 2 foot forerunner on sea level anomaly. A recheck also was made using a wind stress factor of 1.10 and a slightly modified storm track. A still water level of 19.17 (MSL) resulted. The storm surge would exceed elevation 19 msl for 36 minutes, elevation 18 msl for 108 minutes, elevation 17 msl for 172 minutes, and elevation 16 for 236 minutes.

The Millstone Unit 2 FSAR concludes that no such phenomenon has been evident in any of the surges along the New England Coast as plotted in the weather bureau technical paper No. 48. No mention has been made of the forerunner in the Corps of Engineers' hurricane studies for New London and Stratford, Connecticut. In technical paper No. 48, it is stated that "...the data presented in this report give little support for the concept of a forerunner heralding the approach of a hurricane" and also states that "...short period anomolies in mean sea level not related to the hurricane but not fully explained may account for some of the reported forerunners." The only area NNECO is aware of where a forerunner or anomoly of 2 feet has been used by the Corps of Engineers is in the Galveston area where the monthly mean sea level from 1919-1961 period varied by a little more than 2 feet. Along the New England coast during this same period, the monthly mean sea level has varied less than 1 foot.

Based on the above, NNECO concludes that this investigation is not appropriate as a design basis and that the effects of the probable maximum hurricane (PMH) used as a basis for the Millstone Units 2 and 3 flood protection designs is appropriate for this site.

The plant design protection level of elevation 19'0" (MSL) fulfills the requirements of this analysis. Since the maximum height of the wind generated waves above site grade would be small (maximum wave depth would be 4 feet), the dynamic effects of wave loads to the reactor building, turbine building, or gas turbine building, including the installed flood gates, would be insignificant. This will be verified under Topic III-3.A. The intake structure provides protection for the design basis clapotis to elevation 32.4. Information on the effects of this standing wave (the deep intake channel precludes the wave from breaking) combined with the still water elevation of 16 MSL is also not known at the time of this submittal and will be developed under Topic III-3.A. In the intake structure, the service water pump motors are at 19.25' (MSL). Therefore, these motors are protected from the design still water elevation including any in leakage from wave runup.

## 3.1 ASSOCIATED SEP TOPICS

- o II-3.A Hydrologic Description
- o II-3.B-1 Capability of Operating Plant to Cope with DBF Conditions
- o II-3.C Safety-Related Water Supply (UHS)
- o III-3.A Effects of High Water Level on Structures
- o III-3.C In-Service Inspection of Water Control Structures

## 4.0 CONCLUSIONS

Pending resolution of the structural concerns of SEP Topic III-3.A, NNECO concludes based on this analysis that the safety-related structures, systems, and components of Millstone Unit 1 are adequately protected against site flooding. The results of this evaluation should be used as the basis for the Staff's evaluation of Topic III-3.A.

## 5.0 REFERENCES

1. Regulatory Guide 1.59, "Design Basis Floods for Nuclear Power Plants"

2. Standard Review Plan Section

   - 2.4.3 Probable Maximum Flood (PMF) on Streams and Rivers
   - 2.4.4 Potential Dam Failures (Seismically Induced)
   - 2.4.5 Probable Maximum Surge and Seiche Flooding
   - 2.4.7 Ice Effects
   - 2.4.10 Flooding Protection Requirements

3. 10 CFR Parts 50 and 100