Docket No. 50-219

ATTACHMENT D

OYSTER CREEK NUCLEAR GENERATING STATION

FLOOD LEVEL STUDIES



December, 1979

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MAILING ADDRESS
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RICHARD O. EATON, P. E.
CONSULTING ENGINEER

REFER TO: 2700-03

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April 27, 1970

Subject:
W.O. 2700-03
Jersey Central Power & Light Company
Forked River Nuclear Station-Unit 1
Report on Probable Maximum Hurricane
Flood Level

Mr. R. P. Giloth, Project Manager
Burns and Roe, Inc.
700 Kinderkamack Road
Oradell, New Jersey 07649

Dear Mr. Giloth:

In response to your letter April 16, 1970, we have elected to completely rewrite our earlier report on the above subject. Because of our now rather long experience in debating this general subject with AEC Consultants we have fallen into the habit of analyzing and writing more for their perusal than that of our clients who are perhaps not as likely to be familiar either with terminology or the basis of reasoning with which the numbers we propose are supported.

We have done our best to rectify this in the new version of our report. If anything remains unclear please inform me and we will do what we can to provide additional clarification.

It will doubtless be evident to you, as well as to other reviewers, that a substantial factor in the validity of our analysis is the extent of overtopping which will occur over the barrier beach at the maximum water stage on the open coast. While the report by my Associate could be interpreted to imply that our reasoning is based upon experience along the Florida coasts (both Atlantic and Gulf), I must explain that our reasoning applies also to careful analyses which I have made over many years of storm overtopping of the barrier beaches of the Carolinas, Virginia, Maryland, New Jersey and New York.

In all of my experience in the studies which could be made on the basis of data available I have reached a firm conclusion that the overtopping which occurs at the extreme height of ocean level, while it creates small fissures through the beach, does not produce major breaches. These occur when the transit of the storm produces a rapid lowering of ocean sea level and impounded bay waters, seeking exit under substantial head, scour new channels through the beach. This is amply born out by such data as have been obtained after storms and by elder fishermen on the Carolina Banks who are quite astute observers of coastal phenomena.

What I have said above is simply in support of our method of analysis of extreme tidal flooding conditions. I believe that we have been sound and properly conservative and we would be pleased to defend the numbers we have presented if need should arise.

Also enclosed are instructions for correcting exhibits previously submitted which your draftsmen will find quite easy to follow. We are submitting a revised version of the 1/250 year event which will presumably be used for non-critical plant elements and for construction planning. We regret this but it appeared to be the simplest procedure.

Sincerely yours,

Richard O. Eaton

Richard O. Eaton, P.E.
Consulting Engineer

ROE:w
Encls. Revised Report-TEH-4/25/70
Exhibits Instructions
Hurricane Tide Estimate;1/250 year event

cc Mr.J.V.Neely,JCP&L w/out enclosures

## FOREWORD

### DEFINITION OF A PROBABLE MAXIMUM HURRICANE

This report postulates an occurrence of a probable maximum hurricane at the Forked River Unit 1 Nuclear Power Plant and stipulates a set of conditions associated with its occurrence which, in combination, is considered to be critical and will result in a probable maximum hurricane surge elevation. The definition of that storm, as contained in Appendix A - Glossary of Terms, of the U.S. Army Coastal Engineering Research Center Technical Report No. 4, is as follows:

> PROBABLE MAXIMUM HURRICANE - "A hypo-hurricane that might result from the most severe combination of hurricane parameters that is considered reasonably possible in the region involved, if the hurricane should approach the point under study along a critical path and at optimum rate of movement."

Each of the basic parameters defining the characteristics of a probable maximum hurricane, and its derivation is contained in U.S. Department of Commerce, ESSA, Weather Bureau, Memorandum HUR 7-97A. A definition and/or description of each of those basic parameters, as contained in those reports is as follows:

CENTRAL PRESSURE INDEX (CPI) - The central pressure index ($p_o$) is the minimum surface pressure in the eye (approximate center) of a particular hurricane. For the probable maximum hurricane the CPI was determined on a probability basis to represent a minimum pressure in each of various zones along the Atlantic and Gulf coasts

having a return frequency of near 1 in 1,000 years.

PERIPHERAL PRESSURE ($p_n$) - The peripheral pressure in a probable maximum hurricane is the surface pressure at the outer limits of the hurricane where the hurricane circulation ends. It is, in effect, a "real" pressure normally found in the periphery of a hurricane where the cyclonic isobars give way to straight or anti-cyclonic isobars.

ASYMPTOTIC PRESSURE ($p_m$) - The asymptotic pressure of a probable maximum hurricane is a parameter for defining the intensity of the pressure gradient and wind in the inner portion of the storm and, as such, has no real physical counterpart in the pressure field of the storm. The asymptotic pressure is a theoretical pressure at "infinite distance" and can exceed the peripheral pressure by a considerable margin.

RADIUS OF MAXIMUM WINDS (R) - The radius of maximum winds in all hurricanes is the distance from the eye of the storm, where surface wind velocities are zero, to the locus of maximum surface wind velocities.

FORWARD SPEED (T) - The forward speed of the hurricane is the rate of forward movement of the eye (center) usually averaged over several hours.

MAXIMUM WIND ($V_x$) - The absolute highest surface wind speed in the zone of maximum winds occurring at a 30 foot level above the surface of the water and averaged over a 10-minute period generally defines the term $V_x$. Its derivation is mathematical based on the equation $V_x = 0.865 \quad V_{gx} + 0.5T$, where $V_{gx}$ is the maximum gradient wind in

the storm as defined by the pressure gradient and other meteorological considerations.

ISOVEL PATTERN - The isovel or wind pattern in a hurricane is a graphical representation of the 30-foot overwater wind speeds at a particular instant. Wind directions are indicated thereon by arrows or deflection angles. Standard procedures are used for deriving an isovel pattern, as contained in HUR 7-97.