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SUBJECT: LER 88-026-04:on 881107,unit outside FSAR design basis re hurricane flood protection on w/901017 ltr.

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OCT 17 1990

L-90-330  
10 CFR 50.73

U. S. Nuclear Regulatory Commission  
Attn: Document Control Desk  
Washington, D. C. 20555

Gentlemen:

Re: Turkey Point Unit 3 and Unit 4  
Docket Nos. 50-250 and 50-251  
Reportable Event: 88-026-04  
Date of Event: November 7, 1988  
Units 3 and 4 Outside the Final Safety Analysis Report Design  
Basis with Regard to Hurricane Flood Protection

The attached Licensee Event Report is being provided pursuant to the requirements of 10 CFR 50.73 to provide supplemental information on the subject event.

Very truly yours,

*K. N. HARRIS by P. W. Rouse*  
K. N. Harris  
Vice President  
Turkey Point Plant Nuclear

KNH/DRP/MKA/mka

cc: Stewart D. Ebnetter, Regional Administrator, Region II, USNRC  
Senior Resident Inspector, USNRC, Turkey Point Plant

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## LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) Turkey Point Unit 3										DOCKET NUMBER (2) 0 5 0 0 0 2 5 0 1										PAGE (3) 1 OF 0 6									
TITLE (4) Units 3 and 4 Outside The Final Safety Analysis Report Design Basis With Regard To Hurricane Flood Protection																													
EVENT DATE (5)			LER NUMBER (6)				REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)																			
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES					DOCKET NUMBER(S)															
1	1	0	7	8	8	8	8	0	2	6	0	4	1	0	1	7	9	0	Turkey Point Unit 4					0 5 0 0 0 2 5 1					
OPERATING MODE (9) 5			THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)																										
POWER LEVEL (10) 0			20.402(b)				20.406(a)				80.73(a)(2)(iv)				73.71(b)														
			20.406(a)(1)(i)				80.38(a)(1)				80.73(a)(2)(v)				73.71(a)														
			20.406(a)(1)(ii)				80.38(a)(2)				80.73(a)(2)(vi)				OTHER (Specify in Abstract below and in Text, NRC Form 305A)														
			20.406(a)(1)(iii)				80.73(a)(2)(i)				80.73(a)(2)(vii)(A)																		
			20.406(a)(1)(iv)				80.73(a)(2)(ii)				80.73(a)(2)(vii)(B)																		
			20.406(a)(1)(v)				80.73(a)(2)(iii)				80.73(a)(2)(ix)																		
LICENSEE CONTACT FOR THIS LER (12)																													
NAME David R. Powell - Licensing Superintendent										TELEPHONE NUMBER AREA CODE 3 0 5 2 4 6 1 - 6 5 5 9																			
COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)																													
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC																			
B	N	F		N																									
SUPPLEMENTAL REPORT EXPECTED (14)										EXPECTED SUBMISSION DATE (15)					MONTH DAY YEAR														
YES (If yes, complete EXPECTED SUBMISSION DATE)										X NO																			

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

On November 7, 1988, at approximately 1900, with Unit 3 in cold shutdown and Unit 4 defueled, it was determined that Units 3 and 4 were outside their design basis with regard to hurricane flood protection. The Final Safety Analysis Report states, "The unit is designed for a hurricane tide to an elevation of +20 feet with wave run-up to an elevation of 22.5 feet on the east side of the unit." The following conditions were identified by a Quality Assurance auditor: 1) The diesel oil transfer pumps are mounted at elevation 19.0 feet without flood protection. 2) A section of a flood protection wall between the Emergency Diesel Generator building and the Unit 3 switchgear enclosure has been temporarily removed as a portion of a plant modification. 3) The stop logs on the east face of the Auxiliary Building provide protection only to elevation 20 feet. Subsequent to these concerns, several stop logs on the north, south, and west sides of the plant were identified as being deficient. Items 1 and 2 above were caused by design error. Items 3 and 4 were caused by inadequate plant drawings; No plant drawings exist which clearly identifies the stop log's design criteria. Appropriate compensatory measures have been taken in the event of a hurricane warning, prior to completion of modifications to correct the above concerns. Additionally, several potential areas of flood water intrusion were identified under the Systematic Design Investigation Program.

## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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## DESCRIPTION OF THE EVENT

On November 7, 1988, at approximately 1900, with Unit 3 in cold shutdown and Unit 4 defueled, it was determined that Units 3 and 4 were outside their design basis with regard to hurricane flood protection. Appendix 5A of the Final Safety Analysis Report (FSAR) states, "The unit is designed for a hurricane tide to an elevation of +20 feet with wave run-up to an elevation of 22.5 feet on the east side of the unit." (All elevations are referenced from mean low water level.) Items number 1 through 3, below, were identified by a Quality Assurance auditor on October 19, 1988, and subsequently evaluated by FPL's Nuclear Engineering Organization. The fourth item was identified by an evaluation of the stop logs on the north, south, and west sides of the plant. FPL committed to perform an adequacy evaluation of the stop logs on the north, south, and west sides of the plant in previous revisions to this Licensee Event Report. Item 5 was identified by an evaluation under the Systematic Design Investigation Program.

- 1) The diesel oil transfer pumps are located adjacent to the northeast corner of the Emergency Diesel Generator (EDG) building at elevation 19.0 feet. No flood protection is provided for these pumps.
- 2) A section of wall approximately 8 feet in length between the EDG building and the Unit 3 switchgear enclosure has been temporarily removed as a portion of a plant modification. This wall serves as a flood protection barrier. The modification package identified this wall as a flood wall and provides requirements to restore the wall following implementation of the modification, but does not provide compensatory measures in the event of a hurricane. The modification package was prepared by a FPL contractor. The wall was removed in approximately mid-June, 1988.
- 3) The stop logs on the east face of the Auxiliary Building provide protection only to elevation 20 feet. Based on interviews with plant personnel, it appears that these stop logs were originally constructed of wood. At some point in time, the wood stop logs were replaced with diamond plate. However, the plate did not provide protection to the correct height. Plant drawings provide details for the channels that the stop logs fit into, but do not provide details on the stop logs themselves. It is believed that the wood stop logs were replaced with plate because the wood became warped or rotted.
- 4) Several stop logs on the north, south, and west sides of the plant did not satisfy the applicable stress and deflection acceptance criteria. In addition, the guide channels of a stop log on the west side of the plant were found to be deficient.
- 5) Several potential areas of flood water intrusion were identified under the Systematic Design Investigation (SDI) Program.
  - a. Pipe trenches (which have flood walls installed) entering the east side of the Auxiliary Building (Safety Injection Pump Room) have gaps at the piping penetrations.
  - b. Pipe trenches entering the east side of the Auxiliary Building (Component Cooling Water Heat Exchanger Area) do not have flood walls installed.
  - c. Perimeter flood walls have suspect anchorages.

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- d. Lack of backflow prevention in the plant clean water drainage systems could allow flood water intrusion within the flood protected Turbine and CCW areas if the hurricane flood tide rises to above El. 18.0'. The open CCW and Turbine areas could be additionally impacted due to the potential effects of an intense rainfall that can occur during a realistic hurricane storm.

#### CAUSE OF THE EVENT

Item 1 above was caused by inadequate design in that no provisions were made for flood protection of the diesel oil transfer pumps.

Item 2 above was caused by a design oversight. It was recognized that the wall was a flood barrier, however, the modification package did not provide for compensatory measures in the event of a hurricane warning.

Items 3 and 4 were a result of inadequate plant drawings. Plant drawings did not exist which provided clear design criteria for the stop logs.

Items 5a & 5b were the result of some "Field Sketch" drawings not being fully implemented (physically in the plant) during initial construction.

Item 5c was initiated by the following: a truck backed into a portion of the floodwall and was able to significantly move the wall.

Item 5d was the result of no backflow prevention provided in the plant clean water drainage system.

#### ANALYSIS

A technical assessment of the five concerns was performed by FPL'S Nuclear Engineering Organization. This assessment includes a technical evaluation of the required flood protection (stop log heights) for openings on the east side of the Auxiliary Building. This evaluation concluded that the plant was designed to provide flood protection to an elevation of +20 feet for hurricane tide, with wave run-up to an elevation of +22 feet on the east side of the Auxiliary Building and +22.5 feet for the Intake Cooling Water pumps. A review of original plant calculations for hurricane flooding indicated that the maximum probable hurricane tide would occur at elevation 18.3 feet and the maximum wave run-up would occur at elevation 21 feet for the east side of the Auxiliary Building. Additionally, wave run-up to 22.5 feet was predicted for the area of the intake structures. The plant grade is at elevation 18 feet. Following is an assessment of each of the five concerns.

##### 1) Flood protection not provided for the diesel oil transfer pumps.

The diesel oil transfer pumps are located adjacent to the northeast corner of the EDG enclosure. The pumps are mounted on a 1 foot tall concrete pedestal which would place the base of the pumps at elevation 19 feet. The pump motors are located 6 inches above the base, which would make the pump vulnerable to



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any wave run-up or water surge that exceeds elevation 19.5 feet. The maximum water stage for a maximum probable hurricane at Turkey Point is to elevation 18.3 feet. Thus, the pump motors are in no danger of being immersed, but could experience splashing from wave run-up. Since the pumps are designed for outside service, they should be unaffected by conditions short of immersion. Furthermore, the fuel transfer pumps are located in an area of the plant where wave run-up is not a significant concern. Any wave run-up would be significantly retarded and dampened due to the numerous structures located east of the pumps.

2) Temporary removal of a portion of flood protection wall.

In the event of a hurricane warning (which is issued prior to a hurricane striking the coast) plant emergency procedures require installation and inspection of the flood protection stoplogs. The required stoplog which abuts the subject wall would not be able to be installed due to the absence of the wall. Although plant procedures do not provide specific actions to be taken when a stoplog cannot be installed, it is reasonable to assume that this condition would be noted and compensatory measures initiated. If compensatory measures could not be completed prior to the maximum probable hurricane flood at elevation 18.3 feet, some localized flooding could occur. The effect of this potential flooding is not known.

3) Stop logs on the east side of the Auxiliary Building provide protection to only 20 feet.

Results from the original wave run-up analysis indicate that the maximum wave run-up at the east face of the Auxiliary Building would be to elevation 21 feet. This value was obtained without modeling any barriers or ground elevation changes between the intake structure and the Auxiliary Building. A review of the existing configuration east of the Auxiliary Building shows numerous barriers and an elevated roadway (elevation 19 feet, 1 inch) between the Auxiliary Building and the intake structure. It is assumed that the barriers and the elevated roadway would retard and reduce wave run-ups from that of the original model, however, it is not known to what extent this would occur.

4) Several stop logs on the north, south, and west sides of the plant were identified as not being able to provide flood protection to elevation 20.0 feet.

Results from the original plant calculations for hurricane flooding indicate that the maximum probable hurricane tide would occur at elevation 18.3 feet. An evaluation of the as-found conditions of the deficient stop logs on the north, south, and west sides of the plant concluded that the subject stop logs could have provided flood protection to an elevation of 18.3 feet.

5) Several potential areas of water intrusion were identified under the Systematic Design Investigation Program.

As stated in 4) above, original plant calculations for hurricane flooding indicated the maximum probable hurricane tide would occur at elevation 18.3 feet.

Items 5a & 5b: The absence of flood walls or gaps in floodwalls located in the trenches would allow less than 4" of water intrusion into the Safety Injection Pump Room and CCW HX area, where all Safety Related equipment would be protected by elevation.

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Items 5c: An evaluation concluded that the floodwalls could have provided flood protection to an elevation of 18.3 feet.

Item 5d: Lack of backflow prevention would allow less than 4" of floodwater intrusion into the open Turbine and CCW areas and would render the plant clean water drainage system incapable of draining rainwater accumulator within the plant perimeter flood walls of these areas. Although plant procedures do not provide specific actions to be taken when water accumulation occurs, it is reasonable to assume that this condition would be noted and compensatory measures initiated. If compensatory measures could not be completed prior to the maximum probable flood at El. 18.3, some localized flooding could occur.

#### CORRECTIVE ACTIONS

- 1) A safety evaluation was prepared by FPL's Nuclear Engineering Organization. This evaluation delineates requirements for temporary flood protection of the diesel oil transfer pumps. The safety evaluation requires that, in the event of a hurricane warning, temporary flood protection dikes be constructed using sandbags and polyethylene sheet. This is a short term action until the permanent action identified in corrective action 8 below can be completed.
- 2) The modification package which removed the flood protection wall has been revised to provide instructions and details for the erection of a temporary flood barrier in the event of the issuance of a hurricane warning during implementation of the modification.
- 3) Emergency Plan Implementing Procedure, EPIP-20106, was revised to require the erection of a temporary flood barrier, in the event of a hurricane warning, as described by corrective action 1.
- 4) The Engineering Contractor responsible for preparation of the modification package has issued a memo to appropriate personnel identifying this event and the need to provide compensatory measures when a modification requires breaching a flood barrier.
- 5) The Engineering Contractor responsible for preparation of the modification package revised its procedure for preparation of Turkey Point engineering packages to require compensatory measures be provided when a modification requires breaching a flood barrier.
- 6) The flood protection wall which was removed was removed following completion of the modification, as required by the modification package.
- 7) Flood protection stop logs on the east face of the Auxiliary Building were modified to provide protection to elevation 22 feet.
- 8) Permanent flood protection will be provided for the diesel oil transfer pumps. This action will be completed during the dual unit outage for the EDG Upgrade Project, due to extensive unavailability of the EDGs during the construction period. The EDG Upgrade Project is on the Integrated Schedule.



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- 9) A drawing identifying the network of flood protection barriers, and a drawing identifying the flood protection stop log sections and details for the east face of the Auxiliary Building have been prepared and placed in the FPL Drawing Control System via a Design Equivalent Engineering Package (DEEP).
- 10) Revision 9 of the FSAR, when issued in 1991, will contain drawings showing the network of barriers for external flood protection.
- 11) The stop logs on the north, south and west sides of the plant were evaluated for adequacy, and it was determined that some of the stop logs should be replaced or repaired. An engineering package has been issued to repair, replace, and enhance some of the flood protection stop logs on the north, south, and west sides of the plant.
- 12) To fortify the stop logs identified in corrective action number 11, an On the Spot Change to the Emergency Plan Implementing Procedure 20106 was issued. This change provided instructions to erect temporary flood barriers in the event of a hurricane warning.
- 13) Pipe trenches entering the east side of the Auxiliary Building (Safety, Injection Pump Room and the CCW HX Area) will have permanent flood protection provided via a plant change modification. This corrective action will be completed by December 1992.
- 14) The plant perimeter floodwall will be evaluated and repaired as necessary, via a plant change modification. This corrective action will be completed by December 1992.
- 15) An Engineering Safety Assessment was issued on July 6, 1990, to provide a procedure for adding backflow prevention to the plant clean water drainage system and providing pumps for removal of water from areas that could experience heavy rainfall accumulations.

## ADDITIONAL INFORMATION

Similar events: none