REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR:8006180361 DOC.DATE: 80/06/12 NOTARIZED: NO DOCKET #
FACIL:50-261 H. B. Robinson Plant, Unit 2, Carolina Power and Ligh 05000261
AUTH.NAME AUTHOR AFFILIATION
UTLEY,E.E. Carolina Power & Light Co.
RECIP.NAME RECIPIENT AFFILIATION
VARGA,S. Operating Reactors Branch 1

SUBJECT: Forwards evaluation of postulated tornado plus single active failure to capacity of auxiliary feedwater sys. Oversize drawing available in Central Files only.

DISTRIBUTION CODE: A039S COPIES RECEIVED:LTR 1 ENCL 1 SIZE: 6
TITLE: Resp to Lesson Learn Task Force - Westinghouse

NOTES: SEND DRWGS TO TERA (RETURN TO REG FILES AFTER FILMING)

	RECIPIENT ID CODE/NAME		COPIES LTTR	COPIES ENCL	RECIPIENT ID CODE/NAME		COPIES LTTR	COPIES ENCL
ACTION:	BC VARGA,S.	10	7	7				
INTERNAL:	ANDERSON,N.		1	1	AUX SYS BR	24	1	1
	BURDION,J.	07	1	1	EMERG PREP	20	1	1
	FIELDS,M.		1	1	HUM FACT ENG BR		1	1
	I&E	17	2	2	KERRIGAN,J.	06	1	1
	LIC QUAL BR		1	1	NRC PDR	02	1	1
	O'REILLY,P.		1	1	OELD		1	0
	OLSHINSKI,J.	05	1	1	OP LIC BR		1	1
	OR ASSESS BR	23	1	1	PROC/TST REV	25	1	1
	REG FILE	01	1	1	TELFORD,J.T.		2	2
	WILLIS,C.	08	1	1				
EXTERNAL:	ACRS	26	16	16	LPDR	03	1	1
	NSIC	04	1	1				

JUN 19 1980

TOTAL NUMBER OF COPIES REQUIRED: LTTR 46 ENCL 45

CP&L
Carolina Power & Light Company

June 12, 1980

File: NG-3514(R) Serial No.: NO-80-897

Office of Nuclear Reactor Regulation
Attention: Mr. Steven A. Varga, Chief
Operating Reactors Branch No. 1
United States Nuclear Regulatory Commission
Washington, D. C. 20555

H. B. ROBINSON STEAM ELECTRIC PLANT UNIT NO. 2
DOCKET NO. 50-261
LICENSE NO. DPR-23
AUXILIARY FEEDWATER SYSTEM

Dear Mr. Varga:

Please find attached Carolina Power & Light Company's (CP&L) response to specific long-term recommendation No. 4 of D. G. Eisenhut's letter of September 21, 1979. The attachment provides an evaluation of the consequences of a postulated tornado plus a single active failure to the capability of the Auxiliary Feedwater System (AFW) to assure sufficient water supply to the Steam Generators. This response fulfills the commitment made in CP&L's letter of October 31, 1979 to provide this evaluation.

If you have any further questions on this subject, please contact our staff.

Yours very truly,

for E. E. Utley
Executive Vice President
Power Supply and
Engineering & Construction

JJS/jc (823-853)
Attachment

A039
S
1/1
SEND DRAWINGS to TERA (Return to REG. Files after filming)

411 Fayetteville Street • P. O. Box 1551 • Raleigh, N. C. 27602

CAROLINA POWER & LIGHT COMPANY
H. B. ROBINSON UNIT NO. 2
AUXILIARY FEEDWATER SYSTEM RESPONSE

This attachment contains the response by Carolina Power & Light Company to NRC letter (D. G. Eisenhut) dated September 21, 1979, long term plant specific recommendation 4 which requested an evaluation considering a postulated tornado plus a single active failure to assure a sufficient AFW water supply.

The H. B. Robinson Unit 2 final safety analysis report provides a summary of the historical climatological data for the site region which provides a fifty-year history of observed tornados. From this data and similar data appropriate to the southeastern United States, a probability of a tornado strike at or near the site was derived. The calculated probability of a tornado striking any given point within a one degree latitude square including the site is 5.82×10^{-4} with an associated recurrence interval of once in 1708 years.

As outlined in the general design criterion (GDC) the design basis for protection against natural phenomena of 10CFR50 applies to structures, systems, and components important to safety which are designed to withstand the effects of natural phenomena such as storms, tornados, or hurricanes without loss of capability to perform their safety function. The design basis reflects appropriate consideration of the most severe historical recorded storm as well as combinations of the effects of the storm generated interference with normal and accident conditions.

The parameters applicable to the design basis of a tornado are currently drawn from Regulatory Guide 1.76. Although this document was developed much more recently than the H. B. Robinson Unit 2 FSAR, it is generally in good agreement with the design parameters for wind loading and missile energy used to develop the conclusions shown in the H. B. Robinson Unit 2 FSAR. The current Regulatory Guide does include some additional conservatism in the number and types of tornado generated missiles; however, the concomitant applied loads of wind load and differential pressure load which determine the total tornado load together with the missile effects as presented in the FSAR remain valid when compared with the current Design Basis Tornado (DBT). This is also true of the ability of seismic category I structures to perform despite failure of structures not designed for tornado loads.

The selection of tornado generated missiles is taken from typical materials which may be found common to an operating plant site. While the selection is somewhat arbitrary, the choice includes the most penetrating, worst case,

most damaging of these possible projectiles. These missiles include steel pipes or rods of several sizes, a wood plank, a utility pole and an automobile. The following table lists the characteristics of these tornado generated missiles.

Characteristics of Tornado-Generated Missile Spectrum

	Missile	Weight In Lbs.	Impact Area AM Sq. Ft.	Impact Velocity VM * FPS
1)	Wood Plank 4 in. x 12 in. x 12 ft. long	200	.333	422
2)	Steel Pipe 3 in. diameter x 10 ft. long schedule 40	73	.0155	211
3)	Steel Rod 1 in. diameter x 3 ft. long	8	.00545	317
4)	Steel Pipe 6 in. diameter x 15 ft. long, schedule 40	285	.0388	211
5)	Steel Pipe 12 in. diameter x 15 ft. long, schedule 40	743	.1014	211
6)	Utility Pole 13-1/2 in. diameter x 35 ft. long	1490	.994	211
7)	Automobile	4000	20	106

A local damage prediction is derived from evaluation of local effects which include consideration of penetration depth, thickness to prevent perforation and punching shear effects. For a ductile missile, characterized by significant local deformation of the missile during impact (wood plank, utility pole or steel pipe), the impact force is assumed to be the product of the tensile stress of the missile and the net cross section area of the missile.

Using this criterion, an evaluation was conducted to determine the potential tornado missile impact effects on each of the normal and alternate sources of AFW water supply. The effects of missile induced damage combined with an assumed single active failure confirmed the conclusions described in the H. B. Robinson FSAR as described in the summary below.

The auxiliary feedwater sources of water supply are the Condensate Storage Tank (CST), the Service Water System (SWS), and the Deep Well System (DWS). Each of the AFW water sources are briefly described below. The widely dispersed location of the normal and alternate AFW water sources is shown on the H. B. Robinson plot plan drawing G-190180.

The CST is a 200,000 gallon water tank 35 feet in diameter x 29 feet high. This tank includes redundant level indicators and alarms together with a six-inch supply pipe and valve to the AFW pumps which extends approximately three feet above grade level. The remainder of the AFW pump supply piping is below grade in a fully protected covered pipe trench. The CST shell is fabricated of 15 lb/sq ft stainless steel welded plate.

Four service water pumps are located at the intake structure. This structure was designed to meet the Class I earthquake criteria. In addition, the pumps are located below the water level and are inherently protected from tornado effects. Only the pump motor and the service water discharge valve are above the intake structure deck level. The service water piping is buried and also inherently protected from tornado effects.

The three deep well pumps are an alternate back-up supply source to the AFW pump suction. These pumps are dispersed by a separation of approximately 600 feet. The pumps are below grade level and are inherently protected from tornado effects. Only the pump motor and the pump discharge valve are above grade. The discharge piping is also below grade level except for the normally locked closed valves which provide an alternate connection to the AFW pump suction which are located adjacent to the turbine building.

Summary

Evaluation of the AFW water Supply sources has been developed. This includes an examination of the seven types of missiles described as the tornado generated missile spectrum. The results indicate that the shell of the condensate water storage tank could be punctured by a tornado driven missile. Failure of a service water pump motor may result from missile impact. Similarly, missile damage could result in deep well pump motor failure.

The evaluation of a single active failure concomitant with postulated tornado damage includes the AFW system worst single failure contained in the AFW system evaluation transmitted by CP&L letter dated April 29, 1980. This includes a single active failure with any one of the following:

A. A/C Power Train Failure
B. Turbine Driven Pump Failure
C. Motor Driven Pump Failure
D. AFW Check Valve Failure

Postulated tornado missile damage of the AFW water supply sources has been evaluated for each of the following tornado missile induced failures.

1. CST Tank Puncture Failure
2. Service Water Pump Motor Failure
3. Deep Well Pump Motor Failure
4. AFW Supply Valve Failure
5. Service Water Supply Valve Failure

The conclusion of this evaluation confirms the findings reported in the addenda to the H. B. Robinson Unit 2 FSAR as follows:

"All equipment necessary for safe operation, located outdoors and exposed to damage from tornado debris, are parts of redundant systems and as such have sufficient backup to provide reasonable assurance that no loss-of-function of the system will result because of tornado damage."