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MILLER,J.R. Operating Reactors Branch 3

SUBJECT: Forwards responses to Structural Engineering Branch questions re pressurizer heater transformer barrier.

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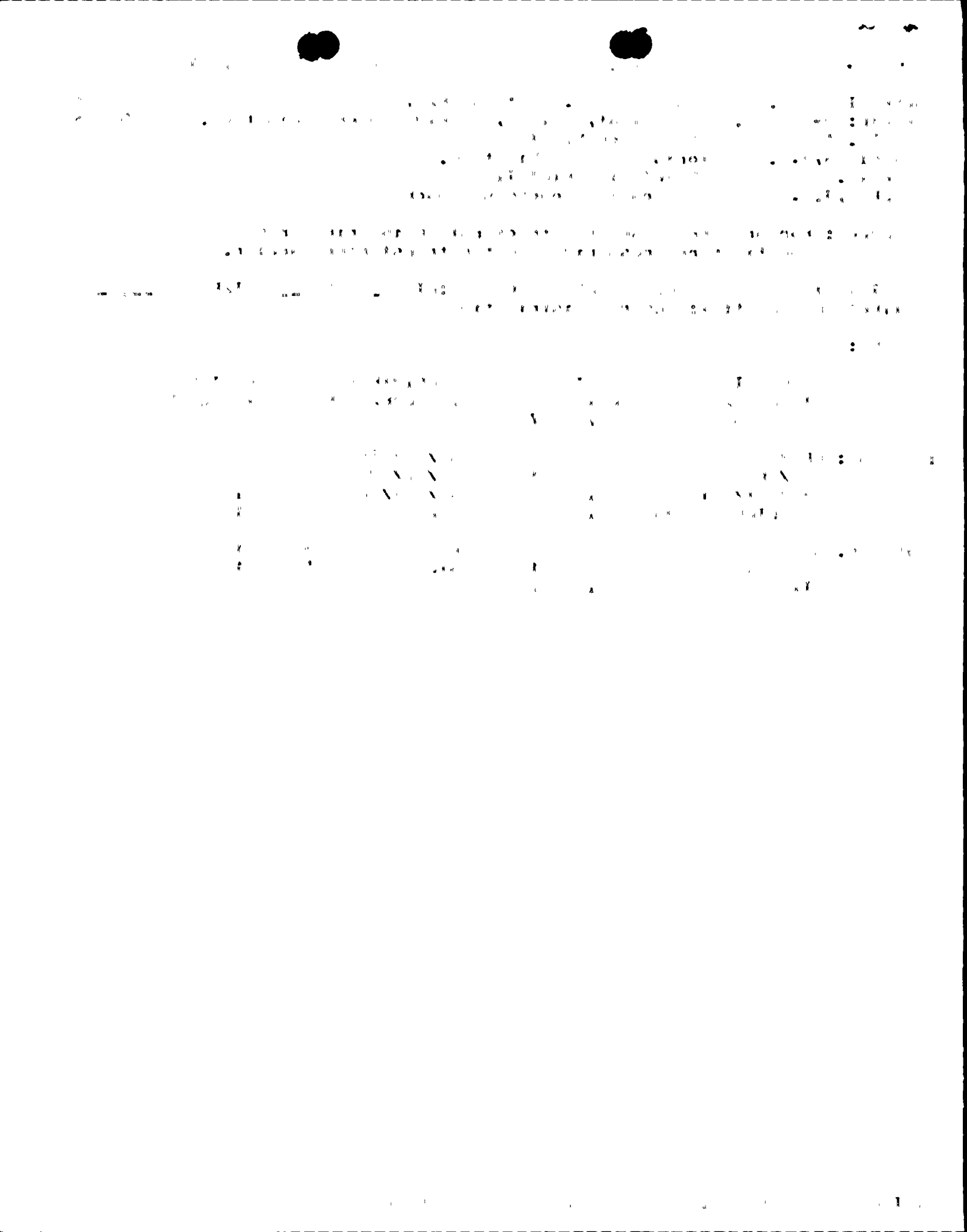

O. BOX 14000, JUNO BEACH, FL 33408

FLORIDA POWER & LIGHT COMPANY

June 27, 1984
L-84-160

Office of Nuclear Reactor Regulation
Attention: Mr. James R. Miller, Chief
Operating Reactors Branch #3
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Miller:

Re: St. Lucie Unit 2
Docket No. 50-389
Condition of License 2.C.9
Barrier For High Energy Equipment

The referenced license condition requires Florida Power & Light Company to install a missile barrier around the pressurizer heater transformer located in the cable spreading area prior to startup following the first refueling outage. Design of the barrier is required to be reviewed and approved by NRC prior to installation.

FPL submitted a conceptual design for the subject barrier by Letter L-84-44 dated February 27, 1984. Recently, during NRC's Structural Engineering Branch's (SEB) review of the design, questions were asked concerning the barrier design by the reviewer. The attachment to this letter provides the formal response to NRC's questions. This information has previously been transmitted informally to NRC via mail and telephone conversations.

Should you have any questions regarding this submittal, please contact us.

Very truly yours,

J.W. Williams, Jr.
Vice President
Nuclear Energy Department

JWW/RJS/DCB/mp

cc: J.P. O'Reilly, Director Region II
Harold F. Reis, Esquire

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ST. LUCIE UNIT 2
PRESSURIZER HEATER TRANSFORMER BARRIER
USNRC - SEB REQUEST FOR
ADDITIONAL INFORMATION

QUESTION: What was the Ballistic Research Laboratory (BRL) formula used for?

ANSWER: BRL formula was used to check for local penetration of the grating. Adjustments were made to the formula to account for reduction in contact area and Poisson's ratio. These adjustments were required due to differences in the characteristics of plates versus grating.

QUESTION: What were the load combinations used in evaluating the barrier?

ANSWER: The following load combinations were considered in the design:

1) Dead Load + Missile Load
2) Dead Load + Seismic Load

QUESTION: How was the barrier analyzed from a seismic standpoint?

ANSWER: The seismic design of the barrier was performed as outlined below:

- A frequency check of the over all structure was performed. The barrier was modeled as a planar portal frame with the majority of its mass concentrated at the top girder level and the balance as a distributed mass along each column. The grating was modeled as a simple beam with a lumped mass. The Stardyne computer program was used for the frequency check. Results of the frequency check:

  - 4.386 hertz for structure
  - 21 hertz for grating

- Used "g" values from appropriate floor response spectra using 2% damping (RAB - 43.0' elevation)
  "g" value for 4.386 hertz is 0.70g. 1.0 g used for design.

- Performed static equivalent analysis of structure using "g" valve noted above. Analysis was performed by hand.

QUESTION: What missiles were assumed when designing the barrier?

ANSWER: The attached table provides a list of missiles that were evaluated during the design of the barrier.

TABLE 1

POTENTIAL MISSILES

OBJECT	VENDOR ITEM NO (2998-429)	WEIGHT (lbs)	VELOCITY (fps)	IMPACT AREA (in^2)	ATTACHMENT	POTENTIAL TARGET (A=2A3) (B=2B3)	REMARKS
GROUP 1 OBJECTS WITH TRAJECTORIES WEST (TOWARD CABLE SPREADING AREA)							
Airtest Valve	13	0.5	28	0.785	Treaded	A) Reactor Trip SWGR (15 feet) B) CEDMCS Cabinet (Non-Safety)	Cannot escape transformer without impacting transformer cooling fan enclosure.
4 1/2" Flange	Not Listed	0.85	390	0.85 (4-1/2 X 3/16 edge)	4 Bolts	A) Reactor Trip SWGR (15 feet) B) CEDMCS Cabinet (Non-Safety)	Cannot escape transformer without impacting transformer cooling fan enclsoure.
GROUP 2 OBJECTS WITH TRAJECTORIES UPWARD							
Manhole Cover	14	17	135	240	22 Bolts	A) Tray L2321 (Non-Safety) B) Conduits Near Ceiling	Barrier distance chosen to prevent twisting of projectile.
Plug	16	0.5	141	1.23	Threaded	A) Tray L2321 (Non-Safety) B) Conduits Near Ceiling	
Relief Valve	17	20 35	43 43	28 50	6 Bolts	A) Tray L2321 (Non-Safety) or Ceiling B) Conduits Near Ceiling	
Sudden Pressure Relay	27	10	68	24	8 Bolts	A) Conduit Near Ceiling B) Tray Support or Conduits Near Ceiling	Conduit attached to device.
GROUP 3 OBJECTS WITH TRAJECTORIES EAST (AWAY FROM CABLE SPREADING AREA)							
Drain Valve	5	23	34	13	Threaded	A) Conduit B) Electrical Box 2352	
Thermometer	7	1	60	10	Threaded	A) PRHTR SCR Controller (Non-Safety) B) Electrical Box 2354	Conduit attached to device.

TABLE 1

POTENTIAL MISSILES

OBJECT	VENDOR ITEM NO (2998-429)	WEIGHT (lbs)	VELOCITY (fps)	IMPACT AREA (in^2)	ATTACHMENT	POTENTIAL TARGET (A=2A3) (B=2B3)	REMARKS
Liquid Level Gage	8	1 2	318 225	8 8	Threaded	A) Communication Box (Non-Safety) Electrical Box 2875 B) Electrical Box 2851	Conduit attached to device
Pressure Gage	9	2	28	6	Threaded	A) PRHTR SCR Controller (Non-Safety) B) Electrical Box 2851	
Tap Changer	15	10 20	75 53	7 7	Multiple Welds and/or Bolts	A) Communications Box (Non-Safety) or Electrical Box 2875 B) Electrical Box 2851 or 2354	
Thermometer	25	6	130	24	4 Bolts	A) PRHTR SCR Controller (Non-Safety) B) Electrical Box 2851 or 2354	2 Conduits attached to device
Brass Fitting & Cap (1")	Not Listed	1	80	0.785	Threaded	A) PRHTR SCR Controller (Non-Safety) B) Electrical Box 2354	Device behind cooling tubes & fins; low probability of escape
Plug (1/2") (Part of Sudden Pressure Relay)	Not Listed	0.34	70	0.2	Threaded	A) PRHTR SCR Controller (Non-Safety) B) Electrical Box 2354	