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AUTH.NAME AUTHOR AFFILIATION
ZIMMERMAN,S.R. Carolina Power & Light Co.
RECIP.NAME RECIPIENT AFFILIATION
DENTON,H.R. Office of Nuclear Reactor Regulation, Director (post 851125

SUBJECT: Responds to confirmatory items identified in SSER 3 (NUREG-1038),Section 3.10.1, "Operability Qualification of Mechanical Equipment." Draft revised list of active valves expected by 860612. Justification for qualification encl.

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Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
United States Nuclear Regulatory Commission
Washington, DC 20555

SHEARON HARRIS NUCLEAR POWER PLANT
UNIT NO. 1 - DOCKET NO. 50-400
PUMP AND VALVE OPERABILITY REVIEW

Dear Mr. Denton:

Carolina Power & Light Company hereby responds to confirmatory items identified in the Shearon Harris Safety Evaluation Report (SER), NUREG-1038, Supplement No. 3, Section 3.10.1, *Operability Qualification of Mechanical Equipment.*

LIST OF ACTIVE VALVES

As indicated in our January 27, 1986 letter, the FSAR will be revised upon completion of the ongoing active valve list reviews. We will submit by June 12, 1986 a draft revised list of active valves (Tables 3.9.3-13 and 14) containing changes which have resulted from reviews completed to date and will docket a final list prior to fuel load.

QUALIFICATION BY ANALYSIS

The Staff requests in the SER, Supplement No. 3 submittal of the following additional information to support qualification of safety-related valves by analysis only.

Identification of Valves

The Staff requests that safety-related valves that have been qualified by analysis only be identified. For this purpose, we will add a new column to the draft list of active valves referenced above. The column will contain specific information on the qualification methodology (e.g., analysis only, combination of tests and analysis).

Justification of Method of Qualification

Enclosure 1 describes the qualification methodology used at Shearon Harris. We have also included a comparison of actual accelerations to the analyses accelerations for ten valves to illustrate the margin of safety in our calculations.

In addition, Shearon Harris pipe stress analysis has inherent conservatisms which include:

- enveloped response spectra,
- low damping values,
- left out force for rigid mode consideration,
- peak spreading of response spectra
- absolute summation of closely spaced modes, and
- spectral peaks and seismic displacements assumed to occur at the same time.

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Our confidence that mechanical equipment will operate during and following the Safe Shutdown Earthquake has also been reinforced by the results of the work performed by the Seismic Qualification Utility Group. We have reviewed the seismic experience database which has shown that mechanical equipment has inherent seismic ruggedness and a demonstrated capability to withstand significant seismic motion without structural damage.

Operability Assurance

Operability assurance stems from the factors stated above. Design specifications, manufacturer's test and analysis reports, design calculations, hydrostatic tests, leakage rate tests, the inherent conservatism in the pipe stress analysis, and seismic experience data provide reasonable assurance of equipment operability.

CONCLUSION

Shearon Harris has a sound and strong pump and valve operability review program. This is witnessed by the FSAR and the December 3-6, 1985 on-site NRC audit conducted by members of your staff and consultants, whom are experienced in the review of other utility programs and valve vendors.

If you have any questions, please contact Mr. Pedro Salas at (919) 836-8015.

Yours very truly,

S. R. Zimmerman
Manager
Nuclear Licensing Section

SRZ/CGL/pgp (3955CGL)

Attachments

cc:
Mr. G. Bagchi (NRC)
Mr. B. C. Buckley (NRC)
Mr. G. F. Maxwell (NRC-SHNPP)
Dr. J. Nelson Grace (NRC-RII)
Mr. Travis Payne (KUDZU)
Mr. Daniel F. Read (CHANGE/ELP)
Mr. T. S. Moore (ASLAB)
Wake County Public Library
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Dr. Richard D. Wilson
Mr. G. O. Bright (ASLB)
Mr. J. L. Kelley (ASLB)
Dr. J. H. Carpenter (ASLB)
Dr. R. L. Gotchy (ASLAB)
Mr. H. A. Wilber (ASLAB)

ENCLOSURE 1

JUSTIFICATION OF METHOD OF QUALIFICATION

The operability of active pumps and valves is assured by design and safety review during the construction and operational phases of the following items:

1) specification of safety conservative performance requirements and service conditions,

2) manufacturer's tests and/or analyses in accordance with ASME, IEEE, and other codes and standards as modified by NRC guidance, if any, and

3) start-up and in-service testing as required for the safe operation of the plant.

The equipment is also verified operational during its installed life by a surveillance and maintenance program. The loading combinations and design transients for safety-related active valves are described in Section 3.9.3.1 of the FSAR.

The methods utilized in the demonstration of operability are described below:

a) Components are designed to be capable of performing their safety function(s) during and following design basis events (i.e., LOCA, MSLB, HELB, etc.). The design specification includes the applicable loading conditions and requires the manufacturer to perform analyses and/or tests to demonstrate operability.

b) Analyses and tests are used to demonstrate the operability of components under applicable seismic and dynamic loadings. Seismic and dynamic qualification is described in detail in Section 3.10 of the FSAR. Testing is used as the method for seismic qualification if the component is mechanically or structurally complex, such that this performance cannot be adequately predicted by analysis.

c) Components are reviewed and inspected to assure compliance of critical parameters with specification and drawings. This confirms that the design bases, environmental conditions, and functional requirements which are listed in specifications and/or design drawings are met (e.g., confirming that specified materials and processes are used, that wall thicknesses meet code requirements, and that fits and finishes meet the specification requirements). These parameters include design conditions and performance requirements such as pressure, temperature, radiation, chemical spray, submergence, flow, pump head, available NPSH, pump speed, stall current, valve opening and closing times, and maximum differential pressure.

d) Testing is performed to verify adequacy of as-built components. These tests (i.e., hydrostatic test, leakage rate test, etc.) confirm the operability and the pressure retaining capability, leakage characteristics, and structural integrity of active pumps and valves.

e) Pre-operational, start-up, and periodic in-service testing in conjunction with a surveillance and maintenance program demonstrate operability readiness throughout the life of the plant.

f) Electric operators and other electrical appurtenances required for safety operation are seismically qualified in accordance with IEEE 344-1971/1975 and satisfy the requirements of 10CFR50.49 for harsh environments.

The environmental qualification program for electrical and mechanical equipment is described in Section 3.11 of the FSAR.

Active pumps and valves have been reviewed to confirm the adequacy of the equipment structural and operational integrity under normal, accident, and post-accident conditions. The review involved three major areas of the specific equipment application in the plant; namely, general component information, equipment function, and equipment qualification. The reference material consulted to complete the review included the following:

- Design Specifications
- Design Drawings from Vendor
- Manufacturers Test and Analysis Reports
- Instruction Manuals and Catalogs
- Valve List and Line List
- System Flow Diagrams
- Equipment Specifications
- FSAR
- Design Calculations
- Vendor Correspondence
- Plant Operations Manuals

The above description describes the methodology used in the SHNPP PVORT Program.

A comparison of actual versus calculated accelerations has been prepared for a sample of ten active valves. The results are shown in Table I.

TABLE I

ACTIVE VALVE
ACTUAL VS TEST/ANALYSIS COMPARISON
FOR PVORT

VALVE #	DESCRIPTION	ACTUAL ACCEL. (g)	TESTED ACCEL.	ANALYSIS ACCEL. (g)	REMARKS
BOP SUPPLY					
2AF-V162SAB	1" Globe, ITT Hammel Dahl	1.091(x) .863(y) .296(z)	NA (>33Hz)	3.0(x) 2.0(y) 3.0(z)	
2BD-P7-SB	2" Globe, ITT Hammel Dahl	.900(x) 1.364(y) .683(z)	NA (>33Hz)	3.0(x) 2.0(y) 3.0(z)	
2CM-B5-SA	3" Butterfly, BIF Valve with Bettis Operator	.408(x) .690(y) .407(z)	NA (>33Hz)	3.0(x) 4.0(y) 3.0(z)	
3SC-V26-SA	3" Globe, ITT Hammel Dahl	.599(x) .399(y) .399(z)	NA (>33Hz)	3.0(x) 2.0(y) 3.0(z)	
3FO-V-258SA	2" Globe, Yarway	.562(x) .378(y) .920(z)	NA (>33Hz)	5.0(x) 5.0(y) 5.0(z)	
2FW-V-27SAB	16" Gate, Borg Warner	1.121(x) 1.399(y) .921(z)	NA (>33Hz)	5.20 All Directions	
<u>NSSS Scope</u>					
2CC-V169SA-1 (9430A)	6" Gate, Velan (6GM62FB)	.401(x) 2.640(y) .519(z)	NA	5.0 g's Resultant	NRC Selected Item

TABLE I (CONT'D)

ACTIVE VALVE
ACTUAL VS TEST/ANALYSIS COMPARISON FOR PVORT

VALVE #	DESCRIPTION	ACTUAL ACCEL. (g)	TESTED ACCEL.	ANALYSIS ACCEL. (g)	REMARKS
NSSS Scope (Cont'd)					
1CS-V510SB (8153)	1" Globe, Copes Vulcan	1.06(x) 1.00(y) 1.06(z)	4g's All Directions	2.1g's All Directions	
3SI-V-503SA (8803A)	3" Gate, Westinghouse	.461(x) 1.055(y) .467(z)	4.0g's All Directions (Static)	4.0g's All Directions	
2RH-V-507SA (8706B)	8" Gate, Westinghouse	1.176(x) 1.428(y) .966(z)	4.0g's All Directions (Static)	4.0g's All Directions	