



NUCLEAR MANAGEMENT AND RESOURCES COUNCIL

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December 21, 1993

Mr. Ashok C. Thadani, Director  
Division of Systems Safety and Analysis  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555

Dear Mr. Thadani:

In our letter of October 12, 1993, we indicated that NUMARC was working with the Nuclear Utility Group on Equipment Qualification (NUGEQ) on a survey to gather up-to-date information from utilities on environmental qualification (EQ) of equipment, and that the results of the survey would be provided to the NRC when available. This survey has now been completed, and the results are enclosed. Although all utility licensees are not NUGEQ members, we believe these results represent a significant portion of the industry.

The survey of NUGEQ members focused on equipment aging qualification. The purpose of the survey was to obtain a general indication of the principal aging technique relied upon at nuclear plants, regardless of their licensing basis. The results of the survey illustrate that a substantial portion of equipment at DOR and NUREG-0588 Category II plants has been either qualified with preaging or upgraded to NUREG-0588 Category I standards, and only a small portion relies on analysis for aging qualification. Thus, we believe that the results of the survey confirm that aging qualification is not a significant generic safety concern. A majority of the licensees responded, and thus the results should be representative of the industry. However, please note that the names of the responding plants have been deleted. Specific details on the results are explained in the enclosure.

As previously discussed with the NRC staff, this survey was performed to assist the NRC in assessing the adequacy of EQ equipment. We believe that the information contained in the survey, together with other activities being implemented under the staff's

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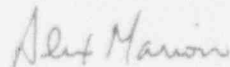
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Task Action Plan on EQ, can provide the NRC further assurance that there are no significant safety issues in the EQ area. Please contact me or George Wu of the NUMARC staff if there are any questions.

Sincerely,



Alex Marion  
Manager, Technical

AM/GCW/ljw  
Enclosure

c: Conrad McCracken, NRC (w/ enclosure)  
John Carey, EPRI (w/ enclosure)  
Bill Horin, Winston & Strawn (w/o enclosure)

## NUCLEAR UTILITY GROUP ON EQUIPMENT QUALIFICATION

### QUALIFICATION STATUS SURVEY

#### Purpose of Survey

Following the initiation of the Staff's EQ Task Action Plan, the Nuclear Utility Group on Equipment Qualification initiated a survey of its members to ascertain certain information related to the qualification status of 10 CFR 50.49 equipment. The principal purpose of the survey was to obtain a general indication of the extent to which either preaging (thermal and/or radiation) or analysis was principally relied upon for aging qualification of 10 CFR 50.49 equipment.

A tabulation of the results of the survey is attached.

Specifically, the survey requested that licensees sort equipment into three categories - by whether it's qualification aging methodology was in accordance with (1) NUREG-0588, Category I, (2) DOR Guidelines/NUREG-0588, Category II based principally on analysis, or (3) DOR Guidelines/NUREG-0588, Category II based principally on preaging. Licensees were to respond based on the qualification of equipment actually installed, regardless of the plant's qualification licensing basis.

Further, the survey was designed to obtain information related to all plant equipment, both inside and outside containment. However, the survey allowed licensees to respond either by identifying specific equipment, or to focus generally on total equipment and cable. In either case, information provided was to be divided between inside and outside containment.

It should be noted that some of the information sought was not readily available to licensees in the format requested, particularly where installed equipment was qualified to a mixture of qualification criteria. Further, licensees were asked not to expend significant resources to research and develop detailed answers to the questions involved. Accordingly, many responses were premised on reasoned estimates of the relative amounts of equipment falling within the qualification categories noted above. Thus, responses varied in form (e.g., estimated percentages, numbers of individual components or overall totals, or equipment types), requiring some assimilation into a standard format, often necessitating followup questioning of the licensee. Accordingly, the enclosed summary provides a reasonable indication of the relative distribution of equipment in each qualification status category. However, the numbers should not be interpreted as precise.

### Results of Survey

Overall, the survey provides a reasonable indication of the degree to which plants have installed 10 CFR 50.49 equipment which relies principally on preaging, rather than analysis, for qualification aging, regardless of their 10 CFR 50.49 licensing basis.

Responses reflected in the attached results represent 29 utilities, with 61 individual units. This breaks down to 13 units with Category I licensing basis, 20 units with a Category II licensing basis, and 28 units with a DOR licensing basis.<sup>1/</sup>

Significantly, it is apparent that, for this sample of plants the aging qualification for much of the equipment at DOR or Category II plants, and in particular for cables inside containment, relied principally on preaging, rather than analysis.<sup>2/</sup> In fact, several of those plants indicated that all cable inside containment was qualified to Category I criteria. Specifically, 16 of the 48 DOR/Category II licensing basis units indicated that all cable inside containment was qualified to Category I criteria or otherwise relied principally on preaging for aging qualification. For the remaining 32 DOR/Category II licensing basis units, the relative amount of cable inside containment which relied principally on preaging was at least approximately 70% of the total cable.

Further, for the DOR/Category II plants by far the greater portion of equipment (including cable) inside containment included preaging. In contrast, outside containment those plants had smaller relative amounts of equipment that had relied principally on preaging for aging qualification. We observe that this status is reasonable from an overall safety perspective in that outside containment worst case post-accident environments are less severe than inside containment. In fact, some 10 CFR 50.49 harsh environments are so designated only because of post-accident

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<sup>1/</sup> The licensing basis for each plant (reflected in the enclosed results) was generally premised simply on the date of issuance of the construction permit, as indicated in Regulatory Guide 1.89.

<sup>2/</sup> Of course, while the relative amounts of equipment inside containment that relies principally on analysis for aging qualification may be small, we note that the survey does not reflect the absolute amounts, or the specific applications, of that equipment. Thus, it should be observed that this survey provides no indication of the effort or costs that may be associated with upgrading that equipment.

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radiation levels premised on the radiation source term, even though other environmental parameters may not change significantly following an accident. Thus, the equipment that is subject to the most severe post-accident conditions, i.e., inside containment, is most likely to have relied principally on preaging for aging qualification.

Attachment

# NUGEQ Qualification Survey Data

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## CABLES INSIDE CONTAINMENT

Plant	EQ Qualification Licensing Basis	Cable Qualification Distribution
Plant A (2 Units)	Cat. I	100% Cat. I
Plant B (2 Units)	Cat. I	100% Cat. I
Plant C <sup>1/</sup>	Cat. I	100% Cat. I
Plant D (3 Units)	Cat. I	100% Cat. I
Plant E (2 Units)	Cat. I	100% Cat. I
Plant F	Cat. I	100% Cat. I
Plant G	Cat. I	100% Cat. I
Plant H	Cat. I	100% Cat. I
Plant I	Cat. II	100% Cat. I
Plant J	Cat. II	100% Cat. I
Plant K (2 Units)	Cat. II	100% Cat. I
Plant L	Cat. II	100% Cat. I
Plant M	Cat. II	100% Cat. I
Plant N	Cat. II	100% Cat. I
Plant O (2 Units)	Cat. II	100% Cat. I
Plant P (2 Units)	Cat. II	100% Cat. I
Plant Q (2 Units)	Cat. II	100% Cat. I or PA
Plant R (2 Units)	Cat. II	35% Cat. I/65% PA
Plant S (2 Units)	Cat. II	100% PA <sup>2/</sup>

<sup>1/</sup> Unless otherwise noted, values have been determined for individual units.

<sup>2/</sup> PA = Category II/DOR aging qualification relying primarily on Preaging. Remaining portion of equipment or cable is Category II/DOR aging qualification relying primarily on analysis.

# NUGEQ Qualification Survey Data

(Continued)

Plant	EQ Qualification Licensing Basis	Cable Qualification Distribution
Plant T (2 Units)	Cat. II	100% PA
Plant U (2 Units)	DOR/Cat. II	20% Cat. I/80% PA
Plant V (2 Units)	DOR	100% Cat. I
Plant W	DOR	100% Cat. I
Plant X	DOR	100% Cat. I
Plant Y	DOR	100% Cat. I
Plant Z (2 Units)	DOR	100% Cat. I or PA
Plant AA (2 Units)	DOR	100% Cat. I or PA
Plant BB (2 Units)	DOR	100% Cat. I or PA
Plant CC	DOR	99% Cat. I
Plant DD	DOR	98% Cat. I/2% PA
Plant EE	DOR	90% Cat. I/10% PA
Plant FF	DOR	85% Cat. I/15% PA
Plant GG	DOR	77% Cat. I/15% PA
Plant HH	DOR	75% Cat. I/25% PA
Plant II	DOR	73% Cat. I/1% PA
Plant JJ (2 Units)	DOR	71% Cat. I/1% PA
Plant KK (2 Units)	DOR	67% Cat. I/11% PA
Plant LL	DOR	60% Cat. I/9% PA
Plant MM	DOR	10% Cat. I/80% PA
Plant NN	DOR	100% PA
Plant OO (2 Units)	DOR	100% PA

# NUGEQ Qualification Survey Data

## CABLES OUTSIDE CONTAINMENT

Plant	EQ Qualification Licensing Basis	Cable Qualification Distribution
Plant A (2 Units)	Cat. I	100% Cat. I
Plant B (2 Units)	Cat. I	100% Cat. I
Plant C	Cat. I	100% Cat. I
Plant D (3 Units)	Cat. I	100% Cat. I
Plant E (2 Units)	Cat. I	100% Cat. I
Plant F	Cat. I	100% Cat. I
Plant G	Cat. I	100% Cat. I
Plant H	Cat. I	100% Cat. I
Plant I	Cat. II	100% Cat. I
Plant J	Cat. II	N/A <sup>3/</sup>
Plant K (2 Units)	Cat. II	90% Cat. I
Plant L	Cat. II	99% Cat I or PA
Plant M	Cat. II	31% Cat. I/69% PA
Plant N	Cat. II	100% Cat. I
Plant O (2 Units)	Cat. II	100% PA
Plant P (2 Units)	Cat. II	100% Cat. I
Plant Q (2 Units)	Cat. II	100% Cat. I
Plant R (2 Units)	Cat. II	30% Cat. I/70% PA
Plant S (2 Units)	Cat. II	100% PA
Plant T (2 Units)	Cat. II	100% PA
Plant U (2 Units)	DOR/Cat. II	20% Cat. I/80% PA

<sup>3/</sup> N/A = licensee provided insufficient information to determine the proportional distribution of equipment and/or cables by qualification standard.



# NUGEQ Qualification Survey Data

(Continued)

Plant	EQ Qualification Licensing Basis	Cable Qualification Distribution
Plant V (2 Units)	DOR	95% Cat. I/5% PA
Plant W	DOR	97% Cat. I or PA
Plant X	DOR	60% Cat. I/40% PA
Plant Y	DOR	100% Cat. I
Plant Z (2 Units)	DOR	100% Cat. I or PA
Plant AA (2 Units)	DOR	100% Cat. I or PA
Plant BB (2 Units)	DOR	100% Cat. I or PA
Plant CC	DOR	100% Cat. I
Plant DD	DOR	90% Cat. I/10% PA
Plant EE	DOR	1% Cat. I/99% PA
Plant FF	DOR	85% Cat. I/15% PA
Plant GG	DOR	59% Cat. I/35% PA
Plant HH	DOR	90% Cat. I/5% PA
Plant II	DOR	55% Cat. I/25% PA
Plant JJ (2 Units)	DOR	49% Cat. I/1% PA
Plant KK (2 Units)	DOR	60% Cat. I/20% PA
Plant LL	DOR	66% Cat. I/9% PA
Plant MM	DOR	10% Cat. I/80% PA
Plant NN	DOR	100% PA
Plant OO (2 Units)	DOR	100% Cat. I or PA

# NUGEQ Qualification Survey Data

## *EQUIPMENT INSIDE CONTAINMENT*

Plant	EQ Qualification Licensing Basis	Equipment Qualification Distribution
Plant A (2 Units)	Cat. I	100% Cat. I
Plant B (2 Units)	Cat. I	100% Cat. I
Plant C	Cat. I	100% Cat. I
Plant D (3 Units)	Cat. I	100% Cat. I
Plant E (2 Units)	Cat. I	100% Cat. I
Plant F	Cat. I	100% Cat. I
Plant G	Cat. I	100% Cat. I
Plant H	Cat. I	100% Cat. I
Plant I	Cat. II	98% Cat. I
Plant J	Cat. II	100% Cat. I
Plant K	Cat. II	81% Cat. I/1% PA
Plant L	Cat. II	100% Cat. I
Plant M	Cat. II	21% Cat. I/79% PA
Plant N	Cat. II	100% Cat. I
Plant O (2 Units)	Cat. II	96% Cat. I/1% PA
Plant P (2 Units)	Cat. II	100% Cat. I
Plant Q (2 Units)	Cat. II	54% Cat. I/28% PA
Plant R (2 Units)	Cat. II	1% Cat. I/99% PA
Plant S (2 Units)	Cat. II	1% Cat. I/99% PA
Plant T (2 Units)	Cat. II	100% Cat. I or PA
Plant U (2 Units)	DOR/Cat. II	N/A
Plant V (2 Units)	DOR	90% Cat. I
Plant W	DOR	94% Cat. I/1% PA

# NUGEQ Qualification Survey Data

(Continued)

Plant	EQ Qualification Licensing Basis	Equipment Qualification Distribution
Plant X	DOR	99% Cat. I/1% PA
Plant Y	DOR	100% Cat. I
Plant Z (2 Units)	DOR	N/A
Plant AA (2 Units)	DOR	N/A
Plant BB (2 Units)	DOR	N/A
Plant CC	DOR	100% Cat. I
Plant DD	DOR	85% Cat. I/15% PA
Plant EE	DOR	88% Cat. I/12% PA
Plant FF	DOR	80% Cat. I/20% PA
Plant GG	DGR	100% Cat. I
Plant HH	DOR	N/A
Plant II	DOR	73% Cat. I/18% PA
Plant JJ (2 Units)	DOR	88% Cat. I/1% PA
Plant KK (2 Units)	DOR	89% Cat. I/7% PA
Plant LL	DOR	73% Cat. I/16% PA
Plant MM	DOR	56% Cat. I/11% PA
Plant NN	DOR	100% Cat. I or PA
Plant OO (2 Units)	DOR	45% Cat. I

# NUGEQ Qualification Survey Data

## *EQUIPMENT OUTSIDE CONTAINMENT*

Plant	EQ Qualification Licensing Basis	Equipment Qualification Distribution
Plant A (2 Units)	Cat. I	100% Cat. I
Plant B (2 Units)	Cat. I	100% Cat. I
Plant C	Cat. I	100% Cat. I
Plant D (3 Units)	Cat. I	100% Cat. I
Plant E (2 Units)	Cat. I	100% Cat. I
Plant F	Cat. I	100% Cat. I
Plant G	Cat. I	100% Cat. I
Plant H	Cat. I	100% Cat. I
Plant I	Cat. II	98% Cat. I
Plant J	Cat. II	N/A
Plant K (2 Units)	Cat. II	84% Cat. I
Plant L	Cat. II	71% Cat. I/22% PA
Plant M	Cat. II	45% Cat. I/53% PA
Plant N	Cat. II	100% Cat. I
Plant O (2 Units)	Cat. II	24% Cat. I/72% PA
Plant P (2 Units)	Cat. II	83% Cat. I/17% PA
Plant Q (2 Units)	Cat. II	72% Cat. I/23% PA
Plant R (2 Units)	Cat. II	86% Cat. I/3% PA
Plant S (2 Units)	Cat. II	96% PA
Plant T (2 Units)	Cat. II	N/A
Plant U (2 Units)	DOR/Cat. II	N/A
Plant V (2 Units)	DOR	92% Cat. I/2% PA
Plant W	DOR	74% Cat. I/1% PA

# NUGEQ Qualification Survey Data

(Continued)

Plant	EQ Qualification Licensing Basis	Equipment Qualification Distribution
Plant X	DOR	79% Cat. I/19% PA
Plant Y	DOR	100% Cat. I
Plant Z (2 Units)	DOR	N/A
Plant AA (2 Units)	DOR	N/A
Plant BB (2 Units)	DOR	N/A
Plant CC	DOR	97% Cat. I/2% PA
Plant DD	DOR	75% Cat. I/25% PA
Plant EE	DOR	88% Cat. I/12% PA
Plant FF	DOR	80% Cat. I/15% PA
Plant GG	DOR	62% Cat. I/4% PA
Plant HH	DOR	N/A
Plant II	DOR	73% Cat. I/18% PA
Plant JJ (2 Units)	DOR	65% Cat. I/15% PA
Plant KK (2 Units)	DOR	75% Cat. I/3% PA
Plant LL	DOR	70% Cat. I/9% PA
Plant MM	DOR	42% Cat. I/24% PA
Plant NN	DOR	100% Cat. I or PA
Plant OO (2 Units)	DOR	72% Cat. I/15% PA