

NUCLEAR UTILITY GROUP
ON EQUIPMENT QUALIFICATION

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October 8, 2017

Mr. James Isom
U.S. Nuclear Regulatory Commission
Mail Stop: 13E10
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Subject: Comments of the Nuclear Utility Group on Equipment Qualification
Regarding Design Basis Assurance EQ Program Inspection Procedure

Reference: NRC Memorandum, "Approval of Charter for Improving the Effectiveness
and Efficiency of Engineering Inspections, from Brian Holian (Acting
Director NRR), dated August 7, 2017, Accession No. ML17172A620

Mr. Isom:

Enclosed are comments of the Nuclear Utility Group on Equipment Qualification ("NUGEQ" or "Group")¹ related to the ongoing NRC review to improve the effectiveness and efficiency of engineering inspections. By Memorandum dated August 7, 2017, the Acting Director of the Office of Nuclear Reactor Regulation, B. Holian, issued the approval of a Charter for the NRC staff to review both the effectiveness and efficiency of the suite of engineering inspections within the Reactor Oversight Process. The Charter included an action for the receipt of comments with recommendations by September 29, 2017.

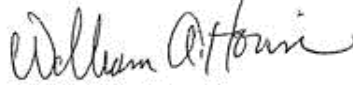
The NUGEQ hereby submits its comments, which focus on the Inspection Procedure IP 71111.21N, "Design Bases Assurance Inspection (Program)," which includes instructions related specifically to the ongoing inspections concerning licensee Environmental Qualification programs under 10 CFR 50.49.

¹ The Nuclear Utility Group on Equipment Qualification is a group of utilities owning and operating nuclear power reactors in the United States and Canada. The Group membership includes utilities currently operating over 90 plants in the United States, and an additional 18 plants in Canada. The Group was founded in 1981, as the NRC staff was evaluating and planning the ultimate promulgation of 10 CFR 50.49, "Environmental qualification of electric equipment important to safety for nuclear power plants." Since its inception the Group has been actively involved in the development and implementation of licensee EQ programs in accordance NRC requirements and guidance, as well as NRC inspection and enforcement and additional regulatory initiatives which impact the EQ arena.

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The Group appreciates the opportunity to submit these comments. If you have any questions, please feel free to contact the undersigned.

Respectfully submitted,



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ENCLOSURE - Comments of the Nuclear Utility Group on Equipment Qualification
(NUGEQ) Regarding NRC EQ Program Inspections Under NRC
Inspection Procedure 71111 Attachment 21N, Attachment 1

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Comments of the Nuclear Utility Group on Equipment Qualification (NUGEQ) Regarding NRC EQ Program Inspections Under NRC Inspection Procedure 71111 Attachment 21N, Attachment 1

Introduction

The Nuclear Utility Group on Equipment Qualification (“NUGEQ” or “Group”) provides below its comments on the EQ Program inspection process under IP 71111, Attachment 21N, Attachment 1, which sets for the inspection process for “Environmental Qualification (EQ) under 50.49 Programs, Processes and Procedures.” The Group’s comments focus on the implementation of the Inspection Procedure, and the conformance of the resulting inspections with the overall intent of the particular reviews involved. At bottom, we focus on specific areas of inquiry that do not conform to plants’ EQ licensing bases, and arguably present generic backfit implications in plant-specific circumstances. We also share data related to the impact of these inspections on licensees, which impact is heightened by the pursuit in this context of the areas of inquiry mentioned. Finally, we provide several recommendations for improvement.

Status of Current EQ Program Inspection Efforts – Overview of Concerns

Following eight (8) “pilot” EQ inspections conducted in 2015/16, the NRC began EQ inspections in accordance with the current inspection procedure in January, 2017. To date, there have been nine (9) inspections for which the inspection report has been issued under the current procedure. Another four (4) inspections are underway (at least a bagman trip has been conducted). The EQ inspections are scheduled to continue through 2019 (many 2018 inspections have already been scheduled).

The NUGEQ is following each of the ongoing inspections and Group members are involved in the inspections at several levels. Many Group representatives have participated in EQ pre-inspection reviews at other members’ plants, and a number of Group representatives have been present at the inspections themselves. Virtually every inspection has either been directly observed and/or results shared among Group members. Since January 2016 the Group has conducted nine (9) Webinars on EQ inspection findings, observations and results. Similar discussions have occurred at three (3) overall Group and industry meetings during that period. Over 50 EQ representatives from across the industry have participated in each Webinar. These discussions have served as opportunities to identify and focus on many aspects of the inspections, but of particular importance here have provided a forum in which to identify the particular topics on which these comments are premised.

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Thus, these comments are premised on a significant amount of discussion and exchange of experiences by licensees involved in the inspections.

The Group overall supports the efforts of the NRC staff to assess the current status of EQ programs and licensee actions to assure that the programs are adequately maintained in accordance with their EQ licensing basis. However, as discussed herein there are certain elements of the inspections that we believe are (1) outside the procedurally defined intended focus of the EQ program inspections, and (2) consist of challenges to generic, primarily technical, positions related to the implementation of EQ programs that have long been accepted by the industry and the NRC.² The current challenges which are the subject of these comments reflect positions that are inconsistent with one of more of the EQ reviews conducted by the NRC and licensees over the last 35 years.

Observations Related to Specific Areas of Inspection Focus

As the inspections have progressed there are certain elements of the inspections which the Group believes reflect a NRC staff effort that is not only outside the framework and intent of the EQ program inspection procedure, but which are simply inquiries into and challenges related to licensees' EQ program licensing bases. These are questions which present perspectives and challenges by NRC inspectors related to fundamental, generic methodologies which have long been accepted as appropriate qualification methodologies throughout the industry.

Thus, the areas of concern addressed in these comments primarily relate to the use of the inspections to "re-evaluate" a plant's EQ licensing basis and its implementation with respect to several technical topics. These re-evaluations we believe are distinct from the intent of the inspections to assess the maintenance of the EQ program in accordance with a plant's EQ licensing basis. In short, those challenges and questions are inappropriate for this inspection process.

² The NRC EQ inspection history is extensive. Since the early 1980's there have been innumerable reviews of EQ programs and licensees' application of technical approaches for assuring qualification. In summary, these include:

- Franklin Research reviews with Technical Evaluation Reports with respect to each licensee's EQ qualification bases (early 1980's)
- NRC Inspection and Enforcement reviews post issuance of the final EQ rule in 1983, consisting of
 - o First round inspections (all licensees) (mid-1980's)
 - o Second round inspections (follow up primarily with licensees with significant first round findings (late 1980's/early 1990's)
- Initial licensing reviews for plants licensed subsequent to the final rule issuance
- License renewal reviews of qualified lives in the context of 60 years of operation
- Power uprates (several forms) review of continued qualification in potential new post-accident profiles
- NRC EQ Task Action Plan technical reviews of several EQ technical topics

NRC EQ Inspection Procedure – Focus on Maintenance of EQ Programs

NRC “Inspection Procedure 71111 Attachment 21N,” “Design Bases Assurance Inspection (Programs),” Attachment 1, sets forth the NRC direction with respect to program inspections related to Environmental Qualification (EQ) Programs implemented under 10 CFR 50.49. This procedure describes generally the purposes of an EQ Program and in particular sets out specific inspection objectives and inspection requirements. Importantly, this direction focuses on providing assurance that EQ programs have been and are being maintained over time.

Of particular guiding importance are the inspection objectives (Section 71111.21N-01), where the procedure focuses on assuring the maintenance of the EQ program over time in accordance with qualification requirements, stating:

The purpose of this inspection procedure is to review the licensee’s implementation of the electrical equipment environmental qualification program, as required by their license, to verify that the licensee is maintaining the qualified status of equipment during the life of the plant. Additionally, this inspection procedure will review the equipment qualification documentation files to verify that electric equipment important-to-safety and located in [a] harsh environment meets the requirements of 10 CFR 50.49(j).

This specific section of 10 CFR 50.49 requires a record of the qualification, including documentation in paragraph (d) of this section, must be maintained in an auditable form for the entire period during which the covered item is installed in the nuclear power plant or is stored for future use to permit verification that each item of electric equipment important to safety covered by this section is qualified for its application; and meets its specified performance requirements when it is subjected to the conditions predicted to be present when it must perform its safety function up to the end of its qualified life.

Further, in the inspection requirements provisions of the procedure (Section 71111.21N-02), the enumerated inspection tasks are focused on actions that are consistent with the above objectives of assuring EQ program maintenance over time, including actions such as reviewing preventive maintenance conformance, updating files for license renewal, assuring qualification is based on current maximum temperatures, equipment replacement and modification capture by the EQ Master List, justification for component removals (previous 20 years), storage requirements, and corrective action program activities related to EQ issues.

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Again, the NUGEQ fully supports the inspection goals of obtaining assurance that EQ programs are being maintained on an ongoing basis, consistent with each program's EQ licensing basis. We do not support use of these EQ Program Inspections to revisit basic qualification approaches and conclusions long-considered resolved.

EQ Topics of Inspection Focus Which Challenge Current EQ Licensing Bases

Attachment 1 hereto provides a summary of the topics raised by the NRC staff which appear to follow approaches that are contrary to historical treatment of those topic areas. Briefly, these include:

- Activation Energy Calculation
- Application of the Arrhenius Methodology
- Uncertainty and Limits of Extrapolation
- Validation of Aging Characteristics for In-Kind Replacements

The consequences of these inquiries can be significant from a regulatory and a resource standpoint.

From a regulatory perspective, the approaches apparently adopted by the inspectors can impact other equipment and other analyses already qualified and already finalized. Presenting such questions in the context of individual inspections is not an efficient use of licensee or industry or NRC resources. If there is a question noted by the inspectors that falls into this category, it is better raised as a potential generic question and pursued through the channels for such consideration. The EQ field has experience in such approaches, having already pursued (in fact some of the same questions listed above), in the NRC's EQ Task Action Plan. That plan involved significant resources and time to address the same or similar questions almost two decades ago.

From a resource perspective, as noted below these inspections already create significant resource demands on licensees. The pursuit of these questions, with often identical inquiries, at multiple sites raises the level of resources needed to be responsive and informative as to the original EQ licensing basis and its relationship to these factors.

Direct Licensee Resource Impacts from Inspections

A majority of the plants which have had their inspection reports issued filled out a survey prepared by the Group related to the impact/resources at different phases of the inspection (preparation, self-assessment, bagman, inspection weeks and midweek periods). In addition, the resource impacts were broken down by department (design engineering, station engineering, licensing, maintenance, work planning, operations, procurement, etc.) as well as separate information on support position (managers, contractors, peers, clerical). While certainly not absolutely precise (time cards were not used), the inspection managers were aware of how many people they had brought in for different functions and for different periods of the inspection. Based on the inspections to date, the resource demands to prepare for and support the conduct of the EQ Design Basis Assurance inspection is significant. So inquiries trying to revisit historical accepted practices adds time and burden unnecessarily with no real safety gain.

Recommendations

The Group has considered a number of options to address the concerns here, recognizing that the topics addressed in the Attachment may or may not be the full range of similar-type inquiries that may occur over the 3 year period of these inspections. The Group therefore proposes specific actions to assure that such issues do not bog down the inspections, while preserving the issues as generic topics to be pursued if so intended by the NRC staff. We believe that a concerted effort in these areas would not require suspension of the inspections.

1. Treatment of alternative qualification assumptions/approaches. The inspection procedure should be revised to note that the current EQ licensing basis for each plant is accepted and that alternative qualification approaches, assumptions or methodologies not consistent with those licensing bases are to be brought to the attention of staff management and a disposition, future direction will be addressed at that point and in that context.

2. Additional training. While the staff inspectors undertook training prior to commencing these inspections, it was not sufficient to address the full EQ licensing history. Among the topics not addressed was the EQ Task Action Plan. That effort was an intense effort by the industry and NRC staff to consider a number of topics from a generic standpoint and consider whether additional efforts were needed to provide reasonable assurance of qualification. A full understand of the EQ Task Action Plan and even earlier NRC sponsored research, such as summarized in

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NUREG/CR-4301, is an important element of understanding EQ inspections and issues.

3. Implementation of Enhanced Backfitting Training. Separately from the effort undertaken here with respect to the Program Inspection review, the NRC has underway a comprehensive effort to assure that backfitting principles are fully understood and applied by the NRC staff. Among the efforts to be undertaken in that context is additional training of NRC inspectors related to backfitting³. The Group suggests that this training, which is intended to be performed and completed by early 2018, be provided collectively to the NRC EQ inspectors and that it be conducted with priority as soon as the training modules and plan are completed.

Attachment:

³ Letter from V.M. McCree, NRC/EDO, "Tasking in Response to [CRGR] Report on the NRC's Implementation of Backfitting and Issue Finality Requirements," dated July 19, 2017 at Page 2, Accession No. ML17198C141

Attachment 1

Examples of EQ Inspection Focus Which Challenge Current EQ Licensing Bases

As previously noted, the NUGEQ supports the efforts of the NRC staff to assess the current status of EQ programs and licensee actions to assure that the programs are adequately maintained in accordance with their EQ licensing basis. However, there have been multiple examples where the EQ inspections have focused on various elements of qualification, often in the context of aging analyses that is not necessarily consistent with the methodology that has been relied on by licensees, endorsed by the NRC, and reflected in current EQ licensing bases. In some instances this new analysis can be characterized as efforts to impose accuracy expectations that are not consistent with the inherent limitations in the application of the Arrhenius methodology to environmental qualification in the first instance. Those limitations are well known and the state-of-the-art for aging analysis has not changed since the early 1980s and is specifically recognized in RG 1.89. Yet there have been multiple instances of inspection questions and apparent positions by inspectors that would challenge those long-accepted methodologies and known, yet accepted, boundaries of reasoned analysis.

The following examples are provided to highlight situations which reflect an expectation inconsistent with plants' EQ licensing bases and NRC acceptance of, for want of a better term, a degree of accuracy, in the application of the Arrhenius methodology to establish a thermal qualified life of equipment or materials.

- Activation Energy

The inspections have appropriately focused on the basis and reasonableness of the activation energies used to establish a thermal qualified life of equipment. However, these inspections have challenged various methods on how the activation energy values were originally determined. Some examples include;

- a) Challenging the use of the activation energy specified in the qualification test report
- b) Questioning the original derivation of activation energy values based on an Arrhenius plot.

- Uncertainty and Limits of Extrapolation

Several inspections have brought up that the principles of qualification in IEEE 323-1974 states that qualification of Class 1E equipment includes assurance that any extrapolations or inference be justified by allowances for known potential failure modes and the mechanisms leading to them. Consistent with IEEE 323-1974, these considerations are taken into account during the design of the

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qualification test program. The disposition of Recommendation 6 of the EQ Task Action Plan (EQ-TAP) supports this position that no specific programmatic requirements are necessary to compensate for the various limitations and uncertainties that exist relative to equipment qualification. Test margin and built-in conservatism of EQ based on type testing compensate for the various limitations and uncertainties that may exist relative to equipment qualification, and provide assurance of continued qualification over time.

- Validation of Aging Characteristics for In-Kind Replacements

Some of the inspections have focused on whether the dedication of an in-kind replacement item needs to re-validate the activation energy or other relevant aging properties. The examples to date primarily involve elastomeric seals or other subcomponents, which are routinely replaced during normal maintenance activities. Even if these items were originally qualified to the DOR Guidelines or NUREG-0588 Category II, it is not necessary to retest or upgrade the qualification basis based on Section C.6 of RG 1.89 Revision 1. The historical approach by the industry is to treat qualification and dedication as separate activities with qualification occurring as part of the design process. Once qualification is established for an equipment item or material, the approach to dedication occurs during the procurement process to confirm that the item received is the same as the tested item. This distinction between qualification and dedication is specifically described in EPRI 3002002982 (which is endorsed by RG 1.164).