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NUCLEAR REGULATORY COMMISSION

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Docket Nos. 50-413, 50-414

MEMORANDUM FOR: David B. Matthews, Director
Project Directorate II-3
Division of Reactor Projects I/II

FROM: Conrad E. McCracken, Chief
Plant Systems Branch
Division of Systems Safety and Analysis

SUBJECT: RESULTS OF THE ON-SITE EQ REVIEW AT CATAWBA NUCLEAR STATION
(TAC M85648)

During the period from February 14 through February 17, 1994, Christopher Gratton and Ann Dummer of my staff, along with Frank Quinn of SCIENTECH (an NRC contractor), performed an on-site review of EQ-related information at the Catawba Nuclear Station in support of the staff's task action plan to identify and address existing EQ issues and concerns. The purpose of this review was to gather information and not to assess licensee compliance with NRC regulations. The results of the staff's review is included as Enclosure 1, and Enclosure 2 provides the contents of a draft letter that may be used for transmitting this information to the licensee.

If you should have any questions regarding the review that was conducted at Catawba, please contact Chris Gratton of my staff at 504-1055.

Original signed by

Conrad E. McCracken, Chief
Plant Systems Branch
Division of Systems Safety and Analysis

Enclosures:
As stated

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NRC STAFF ON-SITE REVIEW OF EQ INFORMATION AT THE CATAWBA NUCLEAR STATION

1.0 INTRODUCTION

As a result of the staff's activities related to license renewal, environmental qualification (EQ) was identified as an area that required further review. A major concern in this regard was whether the EQ requirements for older plants (i.e., those with EQ programs developed under DOR Guidelines or NUREG-0588, Category II, requirements) were adequate to support license renewal. Consequently, the staff concluded that differences in EQ requirements between older and newer plants constituted a potential generic issue which should be evaluated for backfit independent of the license renewal activities.

Separate from the activities supporting license renewal and in response to issues that were raised by the Office of the Inspector General (OIG) in a report dated August 12, 1992, the NRC staff conducted an assessment of fire protection requirements. The staff's report dated February 27, 1993, identified a number of weaknesses and made specific recommendations for improving the NRC fire protection program. In view of the weaknesses that were identified, the staff concluded that other NRC programs such as EQ should also be reviewed to identify and correct any programmatic weaknesses that may exist.

Consequently, the NRC established a task action plan for identifying and addressing issues and concerns that currently exist in the area of EQ. One element of this task action plan involves a number of site visits by the staff to gather first-hand information on EQ and to discuss current issues, problems and trends with nuclear power plant personnel. It is emphasized that the purpose of these site visits is not to assess licensee compliance with NRC regulations.

The Catawba Nuclear Station was the third plant selected for the staff's on-site EQ review activity. The review was performed from February 14 through February 17, 1994, by Christopher Gratton and Ann Dummer of the NRC, Office of Nuclear Reactor Regulation, and by Frank Quinn of SCIENTECH, an NRC contractor. This report is a brief summary of the on-site review activity that was conducted, and serves to document the results of the staff's efforts in this regard.

2.0 BACKGROUND INFORMATION RELEVANT TO CATAWBA NUCLEAR STATION

Catawba Nuclear Station is operated by the Duke Power Corporation et al (Duke or the licensee); Catawba 1 began commercial operation on June 29, 1985 and Catawba 2 began commercial operations on August 19, 1986. Each unit is powered by a pressurized water reactor (Westinghouse) rated for 3411 Megawatts thermal. Catawba 1 and 2 construction permit SER was issued on October 12, 1973; therefore, the licensee follows the environmental qualification

guidelines found in Category II of NUREG-0588, "Interim Staff Position on Environmental Qualification of Safety-Related Electrical Equipment."

3.0 REVIEW DETAILS

The staff's on-site review activity is directed toward gathering EQ-related information in support of a generic programmatic review, and it is the staff's desire to promote an atmosphere of cooperation and support during each of the site visits. The staff's review plan calls for gathering information through licensee presentations, discussions with plant personnel, and document reviews.

3.1 Licensee Presentations

As part of the review team's orientation to the Catawba EQ program, the licensee presented specific information relevant to Catawba and provided a tour of EQ components located in accessible areas at the site. The licensee explained the hierarchy of the EQ group's organizational structure, gave a brief overview of the EQ program, described the various training on EQ available to site personnel, explained the EQ documentation requirements, and discussed other topics relevant to EQ.

The licensee's tour of accessible areas of the plant concentrated on those areas with condition monitoring (temperature) equipment, maintenance areas where EQ training mock-ups were located, and some examples of EQ equipment located in "radiation harsh only" areas. Equipment that was specifically highlighted during the tour included local temperature monitoring equipment in the "dog house" used to monitor the ambient air temperature around solenoid operated valves, various level and pressure transmitters, ASCO and Valcor solenoid valves, armored cabling, and Swagelok electrical quick disconnects. Due to plant conditions at the time of the site visit, containment entry was not permitted.

3.2 Discussions with Plant Personnel

Over a three day period, the EQ review team participated in group discussions about EQ issues with station personnel from the engineering, maintenance, operations, quality control, planning and scheduling, and procurement organizations (see Table 1). The purpose of these discussions was to learn about programs that had been established for implementing and maintaining equipment qualification, and to learn about specific problems and concerns that existed as a result of EQ requirements and how those problems and concerns were being addressed. In general, the station personnel were aware of EQ requirements and the program and practices established to implement EQ at Catawba.

<u>Functional Discussion Groups:</u>	<u>Number of Participants:</u>
1. Site EQ engineers (Components Engineering)	2
2. Plant Operators	3
3. Systems Engineers	3
4. Work Control/ Planners	4
5. Instrumentation and Electronics Engineers and Crafts	5
6. Procurement	2

3.3 Document Review

The NRC site visit team reviewed the specific documents regarding the EQ of equipment and components at Catawba. These documents included both Duke Power Co. and Catawba Nuclear Station procedures and manuals. The documents reviewed were the Environmental Qualification Master List (EQML CNLT-1780-03.01), the Environmental Qualification Maintenance Manual (EQMM-1393.01), the Environmental Qualification Criteria Manual, the Environmental Qualification Program manual (Nuclear System Directive 303), Catawba's response to NUREG-0588, and several typical EQ calibration and maintenance procedures. The EQMM and EQ Program manual are controlled by Duke's corporate office. All other manuals and procedures are site specific.

Duke Power Co. does not prepare auditable file packages (AFP) like those seen during the two previous site visits. Instead, the licensee lists all relevant vendor test reports in the appropriate section of the EQMM and data normally found in the AFPs is contained in Catawba's Response to NUREG-0588.

3.4 Results

Based on the information that was obtained at Catawba during the on-site EQ review, the staff found that a number of program elements and practices seemed to be important for establishing and maintaining equipment qualification. The staff also documented some of the EQ-related problems and concerns that were discussed as part of the site visit.

Noteworthy EQ-Related Program Elements and Practices:

The licensee has developed a "Job Sponsorship" program to assign responsibility for the timely completion of maintenance tasks to specific individuals. The program included many noteworthy practices, including:

- forming teams of dedicated engineers and crafts to work specific equipment, creating teams of experts. These teams share operating and maintenance experience with other nuclear stations owned by the licensee through communication with the corporate office.
- conducting job-specific training and certification of the crafts prior to the start of the maintenance. Included in the training is the extensive use of training aids and mock-ups of more complex components.
- assigning overall scheduling responsibility for EQ repetitive maintenance to the job sponsor to ensure the maintenance is properly scheduled and completed before the equipment's qualified life expires.
- conducting post-maintenance critiques to incorporate lessons learned and solicit ideas for procedure and training improvement. The crafts often use this opportunity to relay information about the condition of equipment undergoing maintenance so that it can be factored back into the maintenance program.

The job sponsorship approach to maintenance appears to foster better communication between the functional groups (e.g., engineers, QA/QC, crafts) assembled to complete a task, and enhances the individual's pride-in-craftsmanship and job ownership.

The licensee has begun a program to monitor the ambient air temperatures around EQ equipment located outside the containment. The licensee plans to use data from the local area monitors to more accurately determine the qualified life of EQ components. The data is collected remotely, and can be integrated over substantial periods of time. The current program monitors the temperatures around eight solenoid operated valves.

The licensee has consolidated all EQ-related maintenance instructions into a single reference, the EQ Maintenance Manual (EQMM), that is applicable to equipment at all Duke Power Co. nuclear stations. The EQMM serves as a reference for site personnel when developing maintenance procedures and conducting maintenance. The combined operating experience of the three Duke nuclear power stations is reflected in the EQMM.

The licensee has developed an Automated Work Management Systems (WMS) that assists planners in the scheduling of EQ-related repetitive tasks. Required maintenance related to EQ is identified at least one year in advance, or tied to a specific maintenance outage, so that planners and

engineers have ample time to complete the tasks before the equipment exceeds its qualified life.

The licensee has the capability to conduct environmental qualification testing in-house, including thermal preaging, radiation exposure, and LOCA testing. Where beneficial, Duke uses this capability to extend the qualified life of equipment beyond that certified by the vendor.

Members of the Component Engineering group receive a quarterly report of the maintenance conducted on EQ equipment. This information is used to identify components requiring excessive maintenance or exhibiting premature failure characteristics.

Portions of the EQ program common to the three Duke nuclear stations is administered from the corporate office. The corporate office is responsible for, among other things, providing overall program management for EQ, providing technical support for EQ-related issues, and resolving generic EQ problems. Operational performance and maintenance experience is shared by the three nuclear stations through this common office.

The licensee participates in various industry working groups and is a member of Nuclear Utility Group on EQ (NUGEQ).

The licensee conducts a biennial review of all EQ equipment to determine whether the equipment needs to be replaced. The licensee has developed a checklist to guide the reviewer through the equipment upgrade decision process.

All station employees received EQ training during the program's restructuring in 1987-88. New employees receive EQ training as part of their employee orientation. If required, component engineers provide job-specific EQ training to personnel prior to commencing a specific maintenance task.

Problem Areas/Areas of Concern Expressed by Plant Personnel:

Catawba currently has EQ equipment installed that meets Category I design requirements, but because the plant was licensed under NUREG-0588 Category II requirements, the licensee maintains only the documentation necessary to support qualification to Category II. The regulations state that when this equipment is replaced, Category I equipment must be used unless there are sound reasons to the contrary. Because the equipment already meets the requirements of Category I, the licensee believes that it would be wasting significant resources purchasing the additional documentation.

Equipment located in "radiation-harsh only" zones is required to be operable to prevent an accident, yet fall under the EQ regulations because of the post-accident radiation exposure levels. Most equipment sees far less operational exposure than predicted, yet costly repetitive

maintenance and record keeping is still required to preserve its operability due to the post-accident radiation exposure.

- The licensee noted decreasing support from some vendors of qualified equipment. Some original EQ equipment suppliers are no longer available to provide qualified replacement equipment. Third party vendors supply the qualified equipment, but at an increasing cost to the licensee.
- Licensee management has been reluctant to invest resources in sophisticated condition monitoring equipment unless the data can be used to extend the qualified life of the equipment. The NRC has not been clear whether the data taken from these monitors can be used to support a recalculation of a component's qualified life.
- There is no flexibility allowed for scheduling EQ repetitive maintenance items. EQ components are considered inoperable at the end of qualified life, even though the method used to determine qualified life contains many assumptions and conservatisms.
- Currently, there are no provisions for the short term relaxation of boundary requirements to conduct maintenance based on a risk assessment. The compensatory actions that must be taken for a short term breach of a mild-harsh boundary are excessive compared with the probability of a LOCA/HELB during the maintenance.

4.0 CONCLUSIONS

The review team found that plant personnel at Catawba were very open and receptive to the NRC visit, and expressed no reservations in sharing plant practices and experiences. Consequently, the on-site EQ review at Catawba was very worthwhile and productive, helping the NRC staff to better understand and appreciate the programs and practices being implemented in order to satisfy EQ requirements, and also highlighting some of the problems and concerns that currently exist. The information obtained during the Catawba site visit is very useful and will be factored into the staff's generic programmatic review of EQ.

Boiler Plate Letter - Contents

During the period from February 14 through February 17, 1994, the NRC performed an on-site review of EQ-related information at the Catawba Nuclear Station in support of the staff's task action plan to identify and address existing EQ issues and concerns. The purpose of this review was not to assess compliance with NRC regulations, but rather to gather information that is critical to the staff's ongoing EQ review. Due to the support and cooperation that was afforded by plant personnel at all levels, the time spent by the NRC staff at Catawba was very productive and worthwhile. We appreciate very much the time and effort that was spent by your staff in assisting us in this effort. The results of the staff's EQ review is enclosed for your information.

In addition to the standard distribution for Catawba, please include the following addressees on the cc list:

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