

February 7, 1994

Docket No. 50-302

MEMORANDUM FOR: Herbert N. Berkow, Director
Project Directorate II-2
Division of Reactor Projects

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

SUBJECT: RESULTS OF THE ON-SITE EQ REVIEW AT THE CRYSTAL RIVER 3
NUCLEAR POWER PLANT (TAC M85648)

During the period from January 11 through January 13, 1994, James Tatum and Christopher Gratton of my staff, along with Marshall David of SCIENTECH (an NRC contractor), performed an on-site review of EQ-related information at the Crystal River 3 Nuclear Power Plant 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 Crystal River 3, please contact Chris Gratton of my staff at 504-1055.

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

Enclosure:
As stated

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See next page

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NRC STAFF ON-SITE REVIEW OF EQ INFORMATION
AT THE CRYSTAL RIVER 3 NUCLEAR POWER PLANT

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 Crystal River 3 nuclear power plant was the second plant selected for the staff's on-site EQ review activity. The review was performed from January 11 through January 13, 1994, by James Tatum and Christopher Gratton of the NRC, Office of Nuclear Reactor Regulation, and by Marshall David 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 CRYSTAL RIVER 3 NUCLEAR POWER PLANT

Crystal River 3 nuclear plant is operated by the Florida Power and Light Corporation et al (FPL or the licensee), and began commercial operation on March 13, 1977. The power source is a pressurized water reactor (B & W) rated for 2544 Megawatts thermal. Crystal River's construction permit was issued on September 25, 1968; the licensee follows the requirements found in the Division of Operating Reactors (DOR) environmental qualification guidelines.

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 review.

3.1 Licensee Presentations

As part of the review team's orientation to the Crystal River EQ program, the licensee presented specific information relevant to Crystal River and provided a tour of EQ components located in accessible areas at the site. The licensee's presentation explained the organizational structure of the EQ group, gave a brief history of EQ at Crystal River (including a detailed discussion of the "EQ enhancement program" designed to improve the program following a civil penalty in 1989), reviewed the major components of the EQ program, and described the various training that site personnel receive on EQ.

The licensee's tour of accessible areas of the plant concentrated on those areas with safety-related electrical equipment qualified for harsh environmental conditions outside the containment and areas containing "radiation harsh only" zones. Equipment that was specifically highlighted during the tour included, for example, Target Rock valves, motor operated valves (Limitorques), Rosemount transmitters, and NAMCO limit switches. 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 the training

<u>Functional Discussion Groups:</u>	<u>Number of Participants:</u>
1. I & C (included EQ engineer, I&C planners, trainer, scheduler, QC inspector, and technician)	7
2. Electrical Group (includes EQ engineer, scheduler, planner, QC inspector, and technicians)	6
3. Engineering Group (includes EQ engineer, systems engineer, I&C project engineer, procurement engineer, design engineer)	6

organization (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, station personnel interviewed were very aware of EQ requirements and were sensitive and inquisitive about conditions in the plant that could impact the environmental qualification of safety-related electric equipment.

3.3 Document Review

The review team examined the Crystal River EQ Master List, the shutdown logic and safety function diagrams used to generate the list, and the processes used to assure control and completeness of the list. The team reviewed the 68 Vendor Qualification Packages (VQPs) for the safety-related electrical equipment on the EQ Master List (nine VQPs for DOR qualified equipment; 59 VQPs for NUREG-0588 Category I equipment). All VQPs followed a standard, well-organized format and contained a qualification summary, system and component evaluation worksheets, related analyses and calculations, vendor document references, EQ maintenance requirements, and related I&E Bulletin and Notice responses. The team also reviewed the walkdown package files for the comprehensive equipment walkdown program that the plant staff accomplished over the last several years.

3.4 Results

Based on the information that was obtained at Crystal River 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 learned about some of the EQ-related problems and concerns that currently exist.

Noteworthy EQ-Related Program Elements and Practices:

- Management support and personnel awareness. Programs and practices developed for the EQ program are actively supported by Crystal River senior management. All levels of staff exhibited a keen awareness of EQ requirements and their responsibilities regarding EQ.
- Staff coordination and cooperation. Coordination of staff activities related to EQ were organized, with tasks and responsibilities well defined. Automated work control aided work order coordination activities on EQ equipment.
- Involvement with industry groups. The licensee participates in various industry working groups, and is a member of Nuclear Utility Group on EQ (NUGEQ). As a member of NUGEQ, the licensee shares information and solves EQ-related problems with other member plants through the use of EQFAX, a network of fax machines linking key EQ individuals at participating power plants.

Dedication to upgrading DOR equipment. The licensee has made a significant effort to replace equipment qualified under the DOR guidelines with equipment that meets NUREG-0588 Category I requirements; fully 59 of the 68 VQPs contain equipment that has been upgraded to the newer standards.

The EQ Enhancement Program. Subsequent to an NRC followup inspection that included a civil penalty, the licensee took several actions to improve their implementation of EQ requirements. The actions included the formation of a dedicated EQ group with specific responsibilities that ranged from pre-job planning and training, to post-closure walkdowns.

The EQ group completed extensive documentation of EQ components. To ensure all EQ equipment was included in the program, the EQ master list was reverified and each system was walked down. During the system walkdowns, a unique tag number was assigned to each EQ component (e.g. each splice, each section of cable, etc.). The "baselining" of EQ equipment allows the licensee to effectively track and trend maintenance of equipment, and provides the engineers with extensive information about each component in the system. The EQ group continues to conduct periodic walkdowns, especially after non-routine maintenance.

The EQ group also reviewed, verified, and organized the vendor qualification packages (VQPs) as part of the enhancement program, and currently conducts biennial reviews of each VQP. Detailed drawings containing EQ closure requirements were created to aid the installation and maintenance of EQ equipment. Master procedures were developed for routine maintenance and included pre-approved EQ specifications. All procedures that include EQ equipment are automatically marked for easy identification by engineering, maintenance, and quality control personnel. All levels of staff are given EQ awareness training or job-specific EQ training as needed.

Development of the configuration management information system (CMIS). CMIS is used by the licensee for planning, scheduling, and work order processing, as well as tracking and trending of EQ maintenance activities. The system identifies EQ equipment by tag number and automatically includes unique EQ specifications for each repetitive task. Among other things, the system aids planners and engineers by providing easy access to the maintenance history of each component in the plant.

Environmental and Seismic Qualification Program Manual (E/SQPM). The E/SQPM details the history of the EQ program at Crystal River and identifies the programs and practices relevant to the EQ program in a single document.

Isodose drawings. The licensee developed isodose drawing of those portions of the plant containing EQ equipment. The drawings were initially used to qualify all EQ components in a specific area to a single radiation level. Currently, engineers are using the drawings to

update the qualified life of some "radiation harsh only" equipment by conducting more accurate point source calculations.

- Temperature and radiation monitoring initiatives. The licensee has established low cost methods of monitoring radiation and temperatures in areas where they believe original design estimates were unduly conservative. The licensee uses data from the localized area monitoring to more accurately determine the qualified life of EQ components.
- Periodic audits of the EQ program. The licensee uses technical experts from outside the Florida Power organization to obtain unbiased feedback during periodic EQ audits.
- Tagging EQ equipment in the plant. Each piece of EQ equipment in the plant is marked with an orange "EQ" tag for ease of identification.
- In-house determination of equipment qualification based on test report information. Each qualification report is reviewed and verified by the EQ group to ensure its completeness and accuracy.

Problem Areas/Areas of Concern Expressed by Plant Personnel:

- Equipment operating time requirements for post-accident scenarios. Most components are qualified for at least 6 months post-accident, a time considered too conservative by the licensee.
- "Radiation-harsh only" areas. Equipment located in these areas are required to be operable to prevent an accident, and only fall under EQ regulations because of post-accident source term radiation levels. Equipment is subject to the costly documentation and maintenance practices associated with EQ equipment.
- Lack of cooperation or support from vendors of qualified equipment was cited as a potential problem for the EQ group. Many of the original suppliers no longer manufacture replacement equipment.
- Use of analysis is discouraged as a means of qualifying equipment. The licensee stated that qualification by testing is preferred by the NRC and that other methods of qualification (e.g. analysis) are discouraged.
- 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.
- Current source term requirements are too conservative and create costly documentation and maintenance requirements for equipment in radiation-harsh only areas.
- Differences in NRC inspector's EQ knowledge level and inconsistent interpretation of the EQ requirements can have a severe impact on licensee's EQ programs.

- Currently there are no provisions for short term relaxation of EQ boundary requirements to conduct maintenance (e.g. disassembly of a harsh-mild boundary to aid in the installation of a large component; the probability a LOCA\HELB event while the boundary is disassembled for a short period is considered very low).
- EQ-related Information Notices 92-81 and 93-33 lacked the necessary focus and created confusion for the licensee.

4.0 CONCLUSIONS

The review team found that plant personnel at Crystal River 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 Crystal River 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 Crystal River 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 January 11 through January 13, 1994, the NRC performed an on-site review of EQ-related information at the Crystal River Nuclear Power Plant 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 Crystal River 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 Crystal River, please include the following addressees on the cc list:

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