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SUBJECT: Forwards response to 980224 RAI re SQUG resolution of USI
 A-46 seismic adequacy evaluations for ONS, per GL 87-02.

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June 23, 1998

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

Subject: Oconee Nuclear Station
Docket Nos. 50-269, -270, -287
SQUG Resolution of USI A-46 (Generic Letter 87-02)
Response to Request for Additional Information

On May 22, 1992, the NRC Staff issued Generic Letter 87-02, Supplement 1, transmitting the Generic Implementation Procedure (GIP). Adherence to the GIP would provide seismic verification of nuclear plant equipment for the resolution of USI A-46. The transmittal of Supplemental Safety Evaluation Report No. 2 (SSER No.2) on the GIP to the Seismic Qualification Utility Group (SQUG) included the request that all utilities provide to the NRC within 120 days, a schedule for the implementation of the GIP. In a letter dated September 21, 1992, Duke Energy Corporation (Duke) stated that the GIP would be implemented at Oconee Nuclear Station by December 31, 1995.

In a letter dated October 3, 1995, Duke updated the NRC Staff on the progress of the resolution to USI A-46 and revised the submittal date for the USI A-46 report to December 31, 1996. A partial USI A-46 report was submitted as an attachment to a letter dated December 30, 1996. The partial submittal covered the emergency power equipment which is encompassed by the Keowee Hydro Station and the overhead emergency power path through the 230 kV Oconee switchyard up to the high voltage side of the startup transformers (CT-1, CT-2, CT-3). Also, the partial submittal included the underground power path up to the high side of the underground transformer (CT-4).

In the letter dated December 30, 1996, Duke indicated that an expected date for submittal of the remaining portion of

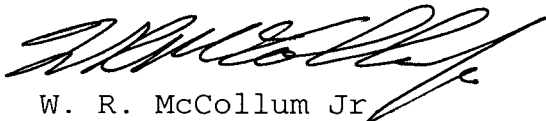
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the USI A-46 report would be provided to the NRC by March 31, 1997. Duke's letter to the NRC dated March 31, 1997, stated that the balance of the USI A-46 submittal would be made by December 15, 1997.

In a letter dated December 15, 1997, Duke submitted the remaining portions of the USI A-46 seismic adequacy evaluations for Oconee Nuclear Station. As part of the review of the Duke submittal, the NRC requested additional information in a letter dated February 24, 1998. Attachment 1 contains the responses to the NRC's request for additional information. This submittal does not contain any new commitments.

Please address any questions on this submittal to Michael Bailey at (864) 885-4390.

Very truly yours,



W. R. McCollum Jr
Site Vice President
Oconee Nuclear Station

Attachment

cc: L. A. Reyes, Regional Administrator
Region II

M. A. Scott, Senior Resident Inspector
Oconee Nuclear Site

D. E. LaBarge, Project Manager
NRR

Question 1

Describe what reviews were performed to determine if any local operator actions required to safely shut down the reactor (i.e., implement the Safe Shutdown Equipment List) could be affected by potentially adverse environmental conditions (such as loss of lighting, excessive heat or humidity, or in-plant barriers) resulting from the seismic event. Describe how staffing was evaluated and describe the reviews that were conducted to ensure operators had adequate time and resources to respond to such events.

Response

The development of the Safe Shutdown Equipment List (SSEL) was performed such that minimal local operator actions would be required to achieve safe shutdown. Any required operator actions are addressed by procedure or standard operator training.

As described in Generic Implementation Procedure, Revision 2 (GIP-2), Part II, Section 3.2.5, the only events which must be considered in the USI A-46 program are a safe shutdown earthquake (SSE) and a potential loss of offsite power (LOOP). Loss of lighting is not expected to be a problem, as all operators have easy access to flashlights. Potentially adverse environmental conditions such as excessive heat and humidity will not be experienced as the USI A-46 accident scenario (SSE or SSE plus LOOP) explicitly excludes the loss of coolant accident (LOCA) and high energy line breaks (HELB). Therefore, the heat and humidity conditions in the plant are postulated to be no worse than those previously considered in a LOOP scenario.

The potential for in-plant barriers caused by failure of plant structures and equipment is not considered a credible obstacle to local operator actions for safely shutting down the plant. Earthquake experience has shown that typical industrial structures are able to withstand earthquakes larger than the SSEs for the eastern United States' nuclear plants without collapse or failure. The potential for local failure of architectural features (such as suspended ceilings in the control room) and the potential for adverse seismic spatial interactions in the vicinity of safe shutdown equipment, where local operator actions may be required, was explicitly evaluated as required in GIP-2, Part II, Section 4.5 and Appendix D. For example, this review included a check that the

Attachment 1

masonry walls near safe shutdown equipment are seismically adequate or have been included in the IE Bulletin 80-11 program.

The systems and equipment selected for seismic review in Oconee Nuclear Station's submittal dated December 15, 1997, are those for which Normal, Abnormal, and Emergency Operating Procedures are available to bring the unit from a normal operating mode to a safe shutdown condition. As required by GIP-2, Part II, Sections 3.2.8 and 3.7, the SSEL was reviewed by the Oconee Operations Department to confirm that the SSEL is compatible with the existing procedures. Since the existing procedures have been previously validated to ensure that adequate time and resources are available for operators to respond to other plant transients, it was not necessary to re-validate these procedures or to re-evaluate staffing for the USI A-46 program.

Question 2

As part of your review, were any control room structures that could impact the operator's ability to respond to the seismic event identified? Such items might include but are not limited to: Main Control Room ceiling tiles, nonbolted cabinets, and nonrestrained pieces of equipment (i.e., computer keyboards, monitors, stands, printers, etc.). Describe how each of these potential sources of interactions has been evaluated and describe the schedule for implementation of the final resolutions.

Response

Control Room structures and components which could potentially impact the operator's ability to respond to a safe shutdown earthquake include suspended ceilings and lights, unanchored cabinets and miscellaneous stands, unrestrained computer equipment, and other miscellaneous desk top items and furniture. These structures and components were evaluated as part of Oconee Nuclear Station's USI A-46 review.

The method used for evaluating these potential sources of seismic spatial interaction is described in GIP-2, Part II, Section 4.5 and Appendix D. In most cases the computer equipment, desktop items, and furniture were not deemed to be a seismic concern having a significant impact on the operator's ability to respond to the seismic event. After performing our review, we concluded that all of the above control room structures and components passed the GIP screening criteria except for the following:

- Some portions of the control room ceilings at Oconee and Keowee,
- Two free standing printers in the Oconee Unit 1 and 2 control room,
- Printers in two unrestrained drawers in the Oconee Unit 3 control room,
- Unanchored file cabinets in the Oconee control rooms,
- Drawing stick sets in the Oconee control rooms, and
- Operator's chairs on casters in the Keowee control room.

These outlier issues will be resolved in accordance with the outlier resolution schedule.

Question 3

Describe what reviews were performed to determine if any local operator actions were required to reposition "bad actor relays." For any such activities describe how adverse environmental conditions (such as loss of lighting, excessive heat or humidity, or in-plant barriers) resulting from the seismic event were analyzed and dispositioned. Describe how staffing was evaluated and describe the reviews that were conducted to ensure operators had adequate time and resources to respond to such events.

Response

During the USI A-46 review for Oconee Nuclear Station, some "bad actor" relays were identified. These "bad actor" relays are located in control rooms and near major switchgear. As part of the USI A-46 relay outlier resolution, these relays are being replaced with functionally equivalent relays which have adequate seismic capacity for the postulated seismic event. Resolution of potential relay chatter using operator action was not proposed for the contact chatter assessments provided in our December 15, 1997, submittal.

Since these new relays will have a seismic capacity which is equal to or greater than the seismic demand induced by the seismic event, contact chatter will not be a concern and no operator action will be required to reposition these relays during or following the seismic event. Therefore, adverse environmental conditions and staffing consideration are not concerns.

Question 4

Describe which of the operator actions associated with resetting Safe Shutdown Equipment List equipment affected by postulated relay chatter are considered to be routine and consistent with the skill of the craft. If not considered skill of the craft, what training and operational aids were developed to ensure the operators will perform the actions required to reset affected equipment?

Response

During the USI A-46 review for Oconee Nuclear Station, some relays were identified for which contact chatter was not acceptable. It is our intent to demonstrate adequate seismic capacity or replace all relays having potential contact chatter affecting SSEL equipment with relays having sufficient seismic capacity to preclude the effects of contact chatter resulting from the postulated seismic event. Resolution of potential relay chatter using operator action was not proposed for the contact chatter assessments provided in our December 15, 1997, submittal. Therefore, no operator action will be required to reset SSEL equipment due to contact chatter either during or following the seismic event.

Question 5

Assume the alarms associated with "bad actor relays" are expected to annunciate during the seismic event. Do the operators have to respond to those annunciators and review the annunciator response procedures associated with them for potential action? How would those additional actions impact the operator's ability to implement the Normal, Abnormal, and Emergency Operating Procedures required to place the reactor in a safe shutdown condition?

Response

As described in EPRI Report NP-7148, Section 3.5.3, following an earthquake which causes the turbine to trip and the reactor to scram, several alarms are expected to annunciate. In addition to this large number of alarms, there may be several earthquake-induced spurious alarms resulting from such events as water sloshing in tanks, oil sloshing in transformers, actuation of vibration protective instrumentation on rotating equipment, and contact chatter of relays. When the alarms occur, the operator will clearly be aware that the plant has tripped. Plant procedures and operator training require that operators respond to the turbine trip and reactor scram by confirming the scram and trip and checking important levels, temperatures, pressures, flows, and electrical switching resulting from associated power transfers. These confirmatory checks will take more than a minute to go through, during which time the operators will be busy making these checks and not responding to specific alarms. The earthquake motion is assumed to last less than a minute and the causes of the spurious alarms will have gone away during this period while the operators are responding to the plant trip.

The NRC staff and SQUG representatives discussed this topic extensively, including discussions held at one or more meetings. The results of that evaluation and review are summarized in EPRI NP-7148, Section 3.5.3 where the following conclusion is reached.

"Accordingly, there appear to be no reasonable bases or evidence which would suggest that spurious alarms resulting from an earthquake may lead to abnormal operator responses. Therefore, special operating procedures or relay evaluation actions to address potential spurious alarms are not considered warranted

and relays affecting alarms need not be seismically adequate."

EPRI NP-7148, page 3-12

The NRC staff accepted the relay functionality review procedure summarized in GIP-2 and described in detail in EPRI NP-7148 (including the above conclusion) in Supplemental Safety Evaluation Report No. 2 on GIP-2. Therefore, we do not consider it necessary to perform any additional reviews of the effect spurious alarms caused by "bad actor" relays or other causes as a result of a seismic event.

As noted in the response to Question 3 above, all "bad actor" relays which were identified during the USI A-46 review for Oconee Nuclear Station are being replaced with functionally equivalent relays having adequate seismic capacity for the postulated seismic event. Therefore, no operator action will be required to respond to annunciator alarms initiated by these relays, and no additional duties will be expected of the operators.

Question 6

To the extent that Normal, Abnormal, and Emergency Operating Procedures were modified to provide plant staff with additional guidance on mitigating the A-46 Seismic Event, describe what training was required and provided to the licensed operators, non-licensed operators, and other plant staff required to respond to such events.

Response

As a result of the USI A-46 assessment, Oconee Nuclear Station minimal procedure changes were required. All plant operators were trained in a manner consistent with typical training associated with procedure revisions.