SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
EVALUATION OF CAROLINA POWER & LIGHT COMPANY
RESPONSE TO SUPPLEMENT NO. 1
TO GENERIC LETTER 87-02
H. B. ROBINSON STEAM ELECTRIC PLANT UNIT NO. 2
DOCKET NO.: 50-261

1.0 BACKGROUND

In December 1980, the NRC designated "Seismic Qualification of Equipment in Operating Plants" as Unresolved Safety Issue (USI) A-46. The safety issue of concern was that equipment in nuclear plants for which construction permit applications had been docketed before about 1972 had not been reviewed according to the 1980-81 licensing criteria for the seismic qualification of equipment, such as Regulatory Guide 1.100 (Reference 1), IEEE Standard 344-1975 (Reference 2), and Section 3.10 of the Standard Review Plan (NUREG-0800, July 1981) (Reference 3). To address the USI A-46, affected utilities formed the Seismic Qualification Utility Group (SQUG) in 1982.

The NRC staff issued Generic Letter (GL) 87-02 in February 1987 (Reference 4) to provide guidance for the resolution to USI A-46. It concluded that the seismic adequacy of certain equipment in operating nuclear power plants should be reviewed against seismic criteria not in use when these plants were being constructed. In 1987, SQUG, representing its member utilities, committed to develop a Generic Implementation Procedure (GIP) for implementing the resolution of USI A-46. SQUG requested a deferment of the 60-day response period, as requested in GL 87-02, until after the NRC issues its final safety evaluation report (SER) on the final version of GIP.

On May 22, 1992, the staff issued Supplement No. 1 to GL 87-02 which transmitted its final SER (SSER No. 2, Reference 5) on the then final version of GIP (GIP Revision 2, as corrected on February 14, 1992, or simply GIP-2, Reference 6). In the supplement to GL 87-02, the staff requested that USI A-46 licensees who are members of SQUG to either provide a commitment to use both the SQUG commitments and the implementation guidance described in GIP-2, as supplemented by the staff's SSER No. 2, or else provide an alternative method for responding to GL 87-02. In a letter dated October 15, 1992 (Reference 7), Carolina Power & Light Company (CP&L), the licensee for H. B. Robinson Steam Electric Plant, Unit No. 2 (Robinson 2), and a member of SQUG, committed to the implementation of GIP-2 for resolving USI A-46 at the Robinson 2 Plant. The NRC subsequently approved the licensee's approach and schedule in a letter dated November 19, 1992 (Reference 8).

By letter dated June 30, 1995 (Reference 9), the licensee submitted a report summarizing the results of its USI A-46 implementation program. The staff reviewed the report and issued a request for additional information (RAI) on March 12, 1997 (Reference 10). The licensee subsequently submitted its response to the RAI in a letter dated August 4, 1997 (Reference 11).

Enclosure

This report provides the staff evaluation of the licensee's USI A-46 implementation program based on the staff's review of the summary report, supplemental information and clarification provided by the licensee in response to the staff's RAI..

2.0 DISCUSSION AND EVALUATION

The staff's review of the Robinson 2 USI A-46 summary report (Reference 9) was performed in accordance with the USI A-46 Action Plan, dated July 26, 1994 (Reference 12). In that regard, this effort consisted of a screening-level review of specific sections of the licensee's program, with emphasis placed on identification and resolution of outliers, i.e., equipment items which did not readily pass the GIP-2 screening and evaluation criteria. The report identifies a safe shutdown equipment list (SSEL) and contains the screening verification and walkdown of mechanical and electrical equipment. The report also contains relay evaluations and the evaluation of seismic adequacy for tanks and heat exchangers, cable and conduit raceways, and the identification and resolution of outliers, including the proposed resolution schedules.

2.1 Seismic Demand Determination (Ground Spectra and In-structure Response Spectra)

The licensee stated in Reference 9 that the seismic input ground motion used in the USI A-46 analysis is the plant safe shutdown earthquake (SSE), which is a Housner response spectrum. The SSE horizontal components have a peak ground acceleration of 0.2g. The SSE vertical component is defined as two-thirds of the horizontal component. The seismic input motions and the method for developing the in-structure response spectra (IRS) had been evaluated and accepted by the staff, and were documented in Reference 8. The licensee stated in Reference 7 that the IRS as discussed in the 120-day response to Supplement No.1 to Generic Letter (GL) 87-02 were used in the USI A-46 program implementation. The staff finds this to be acceptable.

2.2 Seismic Evaluation Personnel

The screening verification, walkdown, and outlier identification was performed by a Seismic Review Team (SRT) comprising Seismic Capability Engineers as defined in GIP-2. GIP-2 describes the responsibilities and qualifications of the individuals who implement this generic procedure. For a complete resolution of the USI A-46 issue, the seismic evaluation personnel should include individuals with sufficient expertise to identify safe shutdown equipment, perform the plant walkdown and verify the seismic adequacy of equipment and cable/conduit raceway systems, and to perform the relay screening and evaluation. This involves a number of plant and engineering disciplines including structural, mechanical, electrical, system, earthquake, and plant operations. Based on the information provided in Appendix A to the Robinson 2 USI A-46 Seismic Evaluation Report, the staff concludes that the qualification of the individuals responsible for implementing the resolution of the USI A-46, including the third party reviewers, meet the criteria of GIP-2 and the staff's SSER No. 2, and is, therefore, acceptable.

2.3 Safe Shutdown Path

GL 87-02 specifies that the licensee should be able to bring the plant to, and maintain, a hot shutdown condition during the first 72 hours following a SSE. To meet this provision, in its submittal of June 30, 1995 (Reference 9), the licensee accounted for the following plant safety functions:

reactor reactivity control, pressure control, inventory control, and decay heat removal. A primary and an alternate success paths with their support systems and instrumentation were identified for each of these safety functions to ensure that the plant is capable of being brought to, and maintained in, a safe shutdown condition for 72 hours following a SSE. Appendix B of Reference 9 provides the equipment list, whereas Table 1-1 provides the list of front line systems and support systems.

The reactor decay heat removal function is accomplished by relieving steam from the steam generators via the steam generator safety and relief valves and steam generator power operated relief valves (PORVs). Makeup water to the steam generators will be supplied by the auxiliary feedwater system which takes suction from the condensate storage tank (CST) and from the service water system, once the CST has been depleted. Lake Robinson is the source of makeup water for the service water system. The operators also have the option of performing reactor coolant system (RCS) feed-and-bleed to accomplish decay heat removal. All the equipment necessary to meet the feed-and-bleed functions are included in the SSEL.

The plant Operations Department reviewed the equipment listed in Appendix B against the plant operating procedures and concluded that the plant operating procedures were adequate to establish and maintain the plant in a hot shutdown condition following an SSE.

The staff concludes that the licensee's approach to achieve and maintain a safe shutdown for 72 hours following an SSE is acceptable.

2.4 Seismic Screening Verification and Walkdown of Mechanical and Electrical Equipment

The staff's evaluation focused primarily on the licensee's identification and resolution of equipment outliers, i.e., equipment items which do not comply with all of the screening guidelines provided in GIP-2. GIP-2 screening guidelines are intended to be used as a generic basis for evaluating the seismic adequacy of equipment. If an item of equipment fails to pass these generic screens, however, it may still be shown to be adequate by additional evaluations.

2.4.1 Equipment Seismic Capacity Compared to Seismic Demand

The first screening guideline is the comparison of seismic capacity and seismic demand for the equipment involved. The licensee determined the seismic capacity of safe shutdown equipment using earthquake experience data with capacity defined by the USI A-46 Bounding Spectrum.

The licensee stated that it had used GIP-2 Methods A.1, B.1, and B.2 to evaluate its USI A-46 equipment. The licensee stated in Reference 9 that the SQUG Bounding Spectrum (BS) of 5% of critical damping enveloped the Robinson 2 SSE ground response spectrum, and therefore GIP-2 method A.1 was used for equipment items located within 40 feet of the effective grade and possessing natural frequencies greater than 8 Hz.

The USI A-46 equipment items are located in the containment structure, the reactor auxiliary building, the inner structure, the circulating water structure, and the turbine buildings. The grade elevation for all the buildings is located at 226 feet except the circulating water structure which is located at the 182.5 feet. The licensee stated that the Reference Spectrum, which is 1.5 times the

SQUG BS, bounds the IRS at all elevations of the inner and circulating water structures, elevation 325 feet of the containment structure and elevation 258 feet of the reactor auxiliary building; however, it does not generally bound the mezzanine elevation of the turbine building. Plots of IRS compared to 1.5 x BS for the reactor auxiliary and turbine buildings are provided in Reference 13. For equipment evaluated by the GIP-2 Method A.1, in situations where the IRS are not bounded by 1.5 x BS, the licensee used GIP Methods B.1 or B.2 to provide additional justification for equipment acceptance.

The staff finds that the licensee has followed the GIP-2 procedures for comparing equipment seismic capacity to seismic demand, and that the evaluation is adequate for the resolution of USI A-46 at the Robinson 2 plant.

2.4.2 Assessment of Equipment Caveats

As a second screening guideline, the licensee verified the seismic adequacy of an item of mechanical or electrical equipment by confirming that (1) the equipment characteristics are generally similar to the earthquake experience equipment class or the generic seismic testing equipment class, and (2) the equipment meets the intent of the specific caveats for the equipment class. This review is necessary only when the BS or the GERS is used to represent the seismic capacity of equipment. If equipment-specific seismic qualification data is used instead, then only the specific restrictions applicable to that equipment-specific qualification data need be applied.

The "caveats" are defined as a set of inclusion and exclusion rules, which are established to represent specific characteristics and features particularly important for seismic adequacy of a particular class of equipment. Appendix B of GIP-2 contains a summary of the caveats for the earthquake experience equipment class and for the generic seismic testing equipment class.

Another aspect of verifying the seismic adequacy of equipment included within the scope of this procedure is explained by the "rule of the box." For the equipment included in either the earthquake or testing equipment class, all of the components mounted on or inside this equipment are considered to be part of that equipment and do not have to be evaluated separately. However, suspicious details or uncommon situations which could make the equipment item vulnerable have been examined by the walkdown engineers.

When evaluating an item of equipment, engineering judgment was often used to determine whether the specific seismic concern addressed by the caveat was met. Each item of equipment has been evaluated to determine whether it meets the specific wording of the applicable caveats or their intent. If an item of equipment was judged to have met the intent, but not the specific wording of a caveat, that item would be considered to have met the caveat.

At Robinson 2, a few interpretations were relied upon in situations where the intent of GIP-2 caveats was used. During the walkdowns, there were instances where the letter of the caveats was clearly not met. However, the SRT exercised engineering judgment to determine if they meet the intent of the applicable caveats. Those instances where the SRT demonstrated the use of engineering judgment are presented in Appendix D of the Seismic Evaluation Report. The staff has reviewed the information provided and found the SRT's interpretations and measures to meet the intent of GIP-2 caveats acceptable.

2.4.3 Equipment Anchorages

As a third screening guideline, the licensee described in Section 5.1.3 of the Seismic Evaluation Report the procedure used for verifying the seismic adequacy of equipment anchorage. Based on GIP-2, the licensee performed an inspection to determine the adequacy of anchorage installation and an evaluation of anchorage capacity.

The licensee stated that all accessible anchorages were visually inspected, and a check was made of the following anchorage attributes (1) equipment characteristics, (2) types of anchorage, (3) size and location of anchorage, (4) installation adequacy, (5) embedment length, (6) gap at threaded anchors, (7) spacing between anchorages, and (8) edge distance. Tightness checks were performed on accessible expansion anchors. Typically, the team used a standard size box or open end wrench on the bolt head or nut and applied a torque by hand to determine if the bolt or nut was wrench tight. Reasonable means to gain access including removing access panels, opening doors, and scheduling the walkdowns during plant and equipment outages were used. Anchors that could not be accessed, such as those in high radiation areas, are documented in the Screening and Evaluation Work Sheets. All accessible anchorages were examined to ensure that no loose connections exist. Since the embedment length for the sleeve type anchors could not be determined easily, the SRT removed some of the bolts from the sleeves to get an accurate measurement of the length. For some of the non-sleeve bolts that were embedded in concrete, an ultrasonic testing method was used to establish the bolt embedment length. These bolt embedment lengths were used for seismic capacity calculations. The SRT reviewed components in the same equipment class with similar anchorage installation and selected the worst bounding case for anchorage adequacy analysis.

The licensee stated that larger components are usually anchored by cast-in-place bolts and embedded steel plates and that their structural and installation details were shown in the engineering drawings. Although the drawings were available, no documented analysis was available to the SRT. The anchorage of these components was, therefore, recommended by the SRT for further analysis.

Overall, most component anchorages were determined to have adequate seismic capacity on the basis of field inspection, analytical calculation, and engineering judgment. Those components whose anchorage adequacy could not be determined by these methods, are identified in Table 5-3 as outliers and are scheduled for repairs by the end of Refueling Outage 18 in late 1998 (see Section 2.9 of this evaluation).

The staff finds that the licensee has followed the GIP-2 procedures of verifying the equipment anchorage adequacy, and is, therefore, acceptable.

2.4.4 Seismic Spatial Interaction Evaluation

As a part of the screening provision for verifying the seismic adequacy of an item of mechanical or electrical equipment, the licensee addressed potential spatial interaction effects for the equipment in Section 5.1.4 of the Seismic Evaluation Report. This serves to ensure that there are no adverse seismic spatial interactions between the equipment under consideration and nearby equipment, systems, and structures which could cause the equipment to fail to perform its intended safe

shutdown function. The interactions of concern are (1) proximity effects, (2) structural failure and falling, and (3) flexibility of attached lines and cables. Guidelines for judging interaction effects, when verifying the seismic adequacy of equipment, are presented in Appendix D of GIP-2.

During the plant walkdowns at Robinson 2, the SRT evaluated credible and significant interaction hazards for all of the safe shutdown components and documented them on the Seismic Evaluation Work Sheets (SEWS). The SRT has identified only a few interaction concerns, primarily due to excessive flexibility of conduits and adjacent cabinets not being bolted together. These are identified as outliers in Table 5-3 of the Seismic Evaluation Report, along with the SRT's recommendation for resolution. The staff has reviewed the information provided and found it to be acceptable.

2.5 Tanks and Heat Exchangers

For the evaluation of tanks and heat exchangers, GIP-2 specifies that licensees perform checks of (1) tank wall stability to prevent buckling, (2) anchor bolt and bolt embedment strength, and (3) anchorage connection strength between the bolts and the shell of the tanks or heat exchanger.

The licensee stated that there are thirty-one (31) tanks and heat exchangers, which had been identified as safe shutdown components, and that their anchorages were evaluated and found to be adequate. The licensee stated in Reference 14 that among the 31 tanks and heat exchangers, the diesel oil storage tank, refueling water storage tank and condensate storage tank are large, flat-bottom vertical tanks. The licensee stated that the tank wall buckling stress and the capacity of anchor chairs and associated connections were evaluated in accordance with the provisions of GIP-2, Section 7.3, and were found to be within the allowable limits and, therefore, they are acceptable. The staff finds the licensee's evaluation of tanks and heat exchangers to be adequate for the resolution of USI A-46 program.

2.6 Cable and Conduit Raceways

The GIP specifies that licensees perform a plant walkdown for cable and conduit raceways and an analytical check of selected worst-case supports. The licensee stated that it performed a walkdown in September 1994 and found that sixteen (16) items needed to be repaired, which were scheduled to be implemented during refueling outage 16 in Spring 1995. Reference 15 indicated that one item was analytically evaluated and found acceptable, while the other 15 items were found to require repairs. The licensee also stated in Reference 14 that Limited Analytical Reviews were performed on selected cable tray and conduit supports considered to be bounding or worst-case samples in accordance with the provisions of GIP-2, Section 8.3, and the results were found acceptable. The staff finds the licensee's evaluation of the cable and conduit raceways to be adequate for the resolution of the USI A-46 program.

2.7 Essential Relays

A review of relays associated with safe shutdown equipment is required as part of the resolution of USI A-46 program. The purpose of the relay review is to verify that safe shutdown systems would not be prevented from performing their safe shutdown functions because of relay (contact) chatter during the period of strong ground motion associated with an SSE.

2.7.1 Methodology of Relay Evaluation

Industry experiences have indicated that demonstration of the relay seismic adequacy cannot be accomplished by merely verifying that the relay is comparable to that in conventional plants which have successfully withstood significant earthquakes. First, the types of relays used in power plants are diverse and not easily grouped in generic equipment classes. Second, there have been instances of relay malfunction in earthquakes and in seismic shake table tests at acceleration levels which may be near nuclear plant design levels. For these reasons, the Electric Power Research Institute (EPRI) established a project to develop a methodology for evaluating relay seismic functionality in operating nuclear power plants. The project resulted in the development of EPRI Reports NP-7148-SL, dated December 1990 (Reference 16), and NP-7148-SL Volume 2: Addendum, dated September 1993 (Reference 17). These EPRI reports form the basis of the GIP-2 relay evaluation guidelines, and, therefore, were also referenced in the Robinson 2 relay evaluation.

2.7.2 Relay Screening Procedure

The SRT performed the relay screening based on the following steps:

1. Prepared a separate list of relay SSEL, which includes those relays whose malfunction could affect electrically controlled or powered safe shutdown equipment in the equipment SSEL. The SRT then reduced the relay SSEL to a list of essential relays through the elimination of relays which could be verified to not perform a function required for safe shutdown or when the failure of the device would not challenge the safe shutdown process for Robinson 2.

2. All identified essential relays were then checked against a list of low ruggedness relays ("Bad Actors"). Each of the low ruggedness relays was then evaluated for the consequences of relay malfunction. In addition, checks were also made for generically rugged devices, such as solid state relays and mechanically actuated contacts.

3. The seismic adequacy of the relays which directly control the operation of switchgears were screened to determine acceptability (Screening Level 0) based on the guidelines provided in Section 6.4.2 of GIP-2.

4. The relay GERS and test data, which represent relay seismic capacity, were compared to Robinson 2 seismic demand levels to assess the adequacy of the reduced list of the essential relays.

5. Those relays which could not be shown as seismically adequate by the comparison of capacity to demand were identified, along with the low ruggedness relays (step 2), for further system consequence review.

Relays that are low rugged, either having seismic demand exceeding seismic capacity, or failing the system consequence review were designated as relay outliers. In addition, relays that are housed in cabinets with unresolved anchorage or interaction issues constituted a set of relays that were also addressed by the licensee to complete its relay review.

2.7.3 Relay Walkdowns

The SRT performed plant walkdowns of relays and their enclosures, in accordance with the GIP-2 provisions. The purpose of the walkdown was to: (1) obtain information needed to determine cabinet types and cabinet-specific amplification factors for seismic capacity screening; (2) verify the seismic adequacy of cabinets or enclosures which contain essential relays; (3) spot check mounting of essential relays to determine if they are in accordance with manufacturer's recommendations; and (4) confirm that relay types and locations are consistent with documentation sources used to establish relay types and locations during the relay circuit reviews. Under the USI A-46 program, relay mountings are assumed to be in accordance with manufacturer's recommendations, and plant documentations of relay types and locations are assumed to be accurate. The objective of the spot checks made during the relay walkdown was to confirm, on a sampling basis, that these assumptions are accurate.

2.7.4 Results of Relay Screening and Evaluation

As stated in the licensee's Relay Evaluation Report, there were seven-hundred-and-eighty-nine (789) relays that were identified as essential for the safe shutdown of Robinson 2. As a result of the licensee's USI A-46 relay screening and evaluation, a total of seven-hundred-and-forty-five (745) relays passed the capacity Screening Levels 0, 1, and 2. Forty-four (44) relays which could not be screened were subjected to further evaluation or remedial action.

The licensee has performed further evaluation of the unscreened relays and found them acceptable based on: (1) modifications of the associated racks, cabinets, and panels; (2) chattering not found to impact the operation of equipment; and (3) operator actions. Further discussion on operator actions are provided in Section 2.8 of this evaluation. Overall, there were no outstanding or unresolved relay outliers for the Robinson 2 USI A-46 relay review, and all seven-hundred-and-eighty-nine (789) essential relays were found acceptable. This is acceptable to the staff.

2.8 Human Factor Aspects

The licensee's operations department has used one or more of the GIP-2 methods for conducting the review of the SSEL, and has considered aspects of human performance in determining what operator actions could be used to achieve and maintain safe shutdown (e.g., resetting relays, manual operation of plant equipment).

In its submittals of June 30, 1995 (Reference 9) and February 5, 1996 (Reference 18), which responded to the staff's RAI of December 26, 1995 (Reference 19) on operator actions, the licensee provided information which outlined the use of the "desk-top" evaluation method by experienced operations department personnel to verify that existing normal, abnormal and emergency operating procedures were adequate to mitigate the postulated transient and that operators could place and maintain the plant in a safe shutdown condition. The staff verified that the licensee has considered its operator training programs and has verified that the training that was provided was sufficient to ensure those actions specified in the procedures could be accomplished by the operating crews. In addition, the staff requested verification that the licensee has adequately evaluated potential challenges to operators, such as lost or diminished lighting, harsh environmental conditions, potential for damaged equipment interfering with the operator's tasks, and the potential for placing

an operator in unfamiliar or inhospitable surroundings. The licensee provided information regarding plant emergency lighting in the control room and at local areas of the plant which might need to be accessed by plant operators. The licensee provided information regarding its seismic interaction evaluations and "desk-top" evaluations to substantiate that operator actions could be accomplished in a time frame required to mitigate the consequences of a transient. The staff reviewed the licensee's responses and determined that the licensee has adequately substantiated that operator actions could be accomplished in a time frame required to mitigate the consequences caused by a seismic event, and that the licensee's USI A-46 implementation is in conformance with the methodology outlined in GIP-2 and is, therefore, acceptable.

2.9 Outlier Identification and Resolution

As stated previously, an outlier is defined as an item of equipment which does not meet the GIP-2 screening guidelines. An outlier may be shown to be adequate for seismic loadings, by performing an additional evaluation using alternate methods or seismic qualification techniques acceptable to the staff. During the course of the seismic evaluation, some equipment components were found not to meet the requirements of GIP-2, and were deemed to be outliers. Many of these outliers were judged to be minor in scope and it was felt that their resolution could be achieved simply by further assessment or minor remedial action. These items are provided in Tables 5-1 and 5-2 of the Seismic Evaluation Report as walkdown work ticket items.

While performing USI A-46 walkdowns for the SSEL components, the SRT noted certain housekeeping issues; generally, in rooms and areas within the plant where SSEL components were located. Identified housekeeping issues were typically not recorded on SEWS forms for specific safe shutdown equipment unless the SRT judged the housekeeping issue to potentially impact the safe shutdown equipment directly. Most issues were noted for general cleanliness and/or safety reasons and were identified as items that could easily be remedied without modifications.

Several other outliers were more significant, and their resolution required further analytical evaluation or modification. Twenty-two (22) such outlier categories, consisting of a total of thirty-four (34) unique SSEL components, were identified. These outlier items are listed in Table 5-3 of the Seismic Evaluation Report, along with the licensee's proposal for their resolution. The staff has reviewed the repairs and modifications proposed by the licensee and found the proposed approaches acceptable for resolution of these outliers.

As stated previously, for a total of 789 essential relays which were identified, there were no outstanding or unresolved relay outliers that required corrective action, and all 789 essential relays were found acceptable.

An independent third party seismic peer review was also performed for the Robinson 2 USI A-46 Program, and the audit report was included in Appendix E of the Seismic Evaluation Report. The peer reviewers conducted a two-day plant visit of all accessible areas, excluding containment and high radiation or dress-out areas. SEWS forms for each of the equipment classes and data packages were sampled subsequent to the walkdowns to compare field notes with the SRT recorded observations and conclusions. A brief review of a number of back up evaluations and anchorage analyses was performed by the peer reviewers at the licensee's offices.

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The walk through by the peer reviewers of the representative components in the accessible areas of the power block, including turbine building, reactor building, and yard and service water intake, provided a sampling of the various equipment types, distributed systems, housekeeping practice, and Seismic Category II/I considerations. The peer reviewers stated that the previous SRT findings appeared to be consistent with their observations and expectations. In fact, the vast majority of observed conditions that were noted during the peer reviewers' plant visit were previously identified by the SRT as requiring further evaluations or upgrades.

The peer review of the pertinent documents related to safe shutdown equipment selection and relay review work completed for Robinson 2 was also performed against the guidance provided in GIP-2. The methodology utilized by the licensee to select and document the safe shutdown paths and equipment selection was found to meet the intent of GIP-2.

In addition to reviewing the above documents against GIP-2, the peer reviewers also performed a detailed check of the auxiliary feedwater (AFW) and residual heat removal (RHR) systems and component selection process with their respective flow diagrams. The purpose of the review was to determine if all applicable components were identified, and whether the correct review types (i.e., seismic and/or relay) were specified.

As a result of these reviews, several observations and comments were made by the peer reviewers. However, the majority of comments concerned clarifications which the peer reviewers believed would make these documents more explicit and precise, and do not necessarily indicate that an error or omission had been made. The staff finds the above peer review to be acceptable.

In regard to the seismic margin assessment (SMA) methodology, as described in EPRI Report, NP-6041, "A Methodology for Assessment of Nuclear Power Plant Seismic Margin" (Reference 20), the licensee stated in its letter of August 4, 1997 (Reference 11) that this methodology has not been used to resolve the Robinson 2 USI A-46 outlier conditions. Since this report has not been approved by NRC, the staff found this to be acceptable.

In Reference 11, the licensee also stated that under its Corrective Action Program, all outlier conditions were assessed for their potential design deficiencies, including their cumulative effect. No challenges to operability were identified; however, these outliers were categorized according to their impact on the design basis requirements. Those identified as design deficiencies were already corrected in the Refueling Outage which ended June 21, 1995. As indicated in the Seismic Evaluation Report, the remaining findings were scheduled for repair or modification by the end of Refueling Outage 18, which is scheduled in late 1998. On this basis, the licensee determined that the resolution of these outliers is not deemed to affect safe operation of the facility. The staff finds the licensee's assertion reasonable.

3.0 SUMMARY OF MAJOR STAFF FINDINGS

The staff's review of the licensee's USI A-46 implementation program, as provided for each area discussed above, did not identify significant or programmatic deviation from the GIP-2 regarding the walkdown and the seismic adequacy evaluations at Robinson 2.

4.0 CONCLUSIONS

The licensee's USI A-46 program at Robinson 2 was established in response to Supplement 1 to GL 87-02 through a 10 CFR 50.54(f) letter. The licensee conducted the USI A-46 implementation in accordance with GIP-2. The licensee has noted a few interaction concerns, primarily due to excessive flexibility of conduits and adjacent cabinets not bolted together. A total of twenty-two (22) outlier items were identified to be more significant. The licensee has committed to resolve all remaining outliers by the end of Refueling Outage 18, which is scheduled in late 1998. The licensee has also indicated that there were no outstanding or unresolved issues as a result of the Robinson 2 relay review, and that all seven-hundred-and-eight-nine (789) essential relays were acceptable. The licensee's implementation report did not identify any instance where the operability of a particular system or component was questionable. As described in Section 3.0, the staff's review did not identify any areas where the licensee's program deviated from GIP-2 and the staff's SSER No. 2 on SQUG/GIP-2 issued in 1992.

The staff concludes that the licensee's USI A-46 implementation program has, in general, met the purpose and intent of the criteria in GIP-2 and the staff's SSER No. 2 for the resolution of USI A-46. The staff has determined that the licensee's already completed actions have resulted in safety enhancements which, in certain aspects, are beyond the original licensing basis. As a result, the licensee's actions provide sufficient basis to close the USI A-46 review at the facility. The staff also concludes that the licensee's implementation program to resolve USI A-46 at the facility has adequately addressed the purpose of the 10 CFR 50.54(f) request. Licensee activities related to the USI A-46 implementation may be subject to NRC inspection.

Regarding future use of GIP-2 in licensing activities, the licensee may revise its licensing basis in accordance with the guidance in Section I.2.3 of the staff's SSER No. 2 on SQUG/GIP-2, and the staff's letter to SQUG's Chairman, Neil Smith on June 19, 1998 (Reference 21). The primary consideration in the licensee's determination to incorporate GIP-2 in the licensing basis is completing the resolution of outliers not yet resolved, in accordance with its commitment, by the end of Refueling Outage 18. Where plants have specific commitments in the licensing basis with respect to seismic qualification, these commitments should be carefully considered. The overall cumulative effect of the incorporation of the GIP-2 methodology, considered as a whole, should be assessed in making a determination under 10 CFR 50.59. An overall conclusion that no Unresolved Safety Questions (USQ) is involved is acceptable so long as any changes in specific commitments in the licensing basis have been thoroughly evaluated in reaching the overall conclusion. If the overall cumulative assessment leads a licensee to conclude a USQ is involved, incorporation of the GIP-2 methodology into the licensing basis would require the licensee to seek an amendment under the provision of 10 CFR 50.90.

5.0 REFERENCES

1. Regulatory Guide 1.100, "Seismic Qualification of Electric and Mechanical Equipment for Nuclear Power Plants," Revision 2, 1987.

2. IEEE Standard 344-1975, "IEEE Recommended Practices for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations," dated January 31, 1975.

3. NRC Standard Review Plan (NUREG-0800), Section 3.10, "Seismic and Dynamic Qualification of Mechanical and Electrical Equipment," Revision 2, July 1981.

4. NRC Generic Letter GL 87-02, "Verification of Seismic Adequacy of Mechanical and Electrical Equipment in Operating Reactors, Unresolved Safety Issue (USI) A-46," February 1987.

5. "Supplemental Safety Evaluation Report No. 2 on Seismic Qualification Utility Group's Generic Implementation Procedure, Revision 2, corrected February 14, 1992."

6. "Generic Implementation Procedure (GIP) for Seismic Verification of Nuclear Power Plant Equipment," Revision 2, corrected February 14, 1992, Seismic Qualification Utility Group.

7. Letter, CP&L to NRC Document Control Desk, "Response to Supplement 1 to Generic Letter 87-02, SQUG Resolution of USI A-46," dated October 15, 1992.

8. Letter, NRC to CP&L, "Evaluation of the H. B. Robinson Steam Electric plant, Unit No. 2, 120-Day Response to Supplement No. 1 to Generic Letter 87-02," dated November 19, 1992.

9. Letter, CP&L to NRC Document Control Desk, "Generic Letter 87-02, Summary Report for Resolution of USI A-46," dated June 30, 1995.

10. Letter, NRC to CP&L, "Request for Additional Information," dated March 12, 1997.

11. Letter, CP&L to NRC Document Control Desk, "Response to Request for Additional Information Regarding Seismic Qualification of Mechanical and Electrical Equipment," dated August 4, 1997.

12. Memo, B. W. Sheron to A. C. Thadani, "Task Action Plan for Performing Plant-Specific Review of the Implementation of the Resolution for Unresolved Safety Issue (USI) A-46," dated July 26, 1994.

13. Letter, T. M. Wilkerson (CP&L) to NRC Document Control Desk, "H. B. Robinson Steam Electric Plant, Unit No. 2, Response to Request for Additional Information Regarding Seismic Qualification of Mechanical and Electrical Equipment," dated August 4, 1997.

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