Section 2
Seismic Evaluation Personnel

2.0 INTRODUCTION

The purpose of this section is to define the responsibilities and qualifications of the individuals who will implement this generic procedure. The seismic evaluation personnel include individuals who identify safe shutdown equipment, who perform the plant walkdown and verify the seismic adequacy of equipment and cable/conduit raceway systems, and who perform the relay screening and evaluation. This may involve a number of plant and engineering disciplines including structural, mechanical, electrical, systems, earthquake, and plant operations.

Most utilities may prefer to implement this procedure using a designated team of individuals; i.e., a Seismic Review Team (SRT). However, the functions and responsibilities may be assigned to existing utility departments or groups, without definition of a dedicated team, provided the individuals in these utility departments or groups have the appropriate qualifications and training and that the walkdown teams have the required collective qualifications. Similarly, the individuals who undertake the seismic review may be utility or contractor personnel, provided the qualification and training criteria are met. This flexibility allows for the possibility that the functions may be performed by individuals of different disciplines at different times. Utility management is responsible for evaluating the qualifications of the seismic evaluation personnel for compliance with this procedure.

The remainder of this section is organized as follows:

- The requirements to which SQUG utilities commit when adopting the guidelines for personnel responsibilities and qualifications for resolution of USI A-46 are given in Section 2.1.
- The responsibilities and qualifications of the Systems Engineers who identify the safe shutdown equipment are described in Section 2.2.

- The responsibilities of the Plant Operations Personnel who review the Safe Shutdown Equipment List (SSEL) and assist during the seismic walkdown are described in Section 2.3.
- The responsibilities, qualifications, and training of the Seismic Capability Engineers who conduct the seismic walkdown are described in Section 2.4.
- The responsibilities, qualifications, and training of the Relay Review Engineers who perform the relay screening and evaluation are described in Section 2.5.
- The purpose and content of the SQUG training courses are summarized in Section 2.6.

2.1 SQUG COMMITMENTS

Members of SQUG adopting the Generic Implementation Procedure for USI A-46 resolution commit to the following in regard to the qualifications of individuals responsible for implementing the procedure: [1]As specified in GIP, Part I, Section 1.3, any substantial deviations from the SQUG Commitments must be justified to the NRC in writing prior to implementation. Likewise the NRC should be notified of significant or programmatic deviations from the GIP guidance (Sections 2.2 through 2.6) but implementation may begin without first obtaining NRC concurrence (at the licensee's own risk).

2.1.1 Systems Engineers

The licensee will provide Systems Engineers to develop the list of equipment required for safe shutdown described in Section 3. Individuals selected to perform this function will be degreed engineers, or equivalent, with experience in the systems, equipment, and operating procedures of the plant.

2.1.2 Seismic Capability Engineers

The licensee will provide qualified Seismic Capability Engineers to perform the following tasks described in Sections 4, 6, 7, and 8.

1. Conduct a walkdown of plant equipment on the safe shutdown equipment list and cable/conduit raceway systems in the plant.

2. Assess the seismic adequacy of this equipment and raceway systems using the GIP, along with the Seismic Review Team's experience, analyses, and/or engineering judgment.

These individuals will be degreed engineers, or equivalent, who have completed a SQUG-developed training course on seismic adequacy verification of nuclear power plant equipment, and will have at least five years experience in earthquake engineering applicable to nuclear power plants and in structural or mechanical engineering. At least one engineer on each Seismic Review Team will be a licensed professional engineer.

As a group, the engineers on each Seismic Review Team will possess knowledge in:

1. Performance of equipment, systems, and structures during strong motion earthquakes in industrial process and power plants.
2. Conduct of nuclear plant walkdowns.
3. Nuclear design codes and standards.
4. Seismic design, analysis, and test qualification practices for nuclear power plants.

2.1.3 Lead Relay Reviewer

The licensee will also provide a Lead Relay Reviewer to perform the Relay Functionality Review described in Section 6. This individual will be an experienced, degreed electrical engineer or equivalent who has successfully completed a SQUG-developed training course on the relay screening and evaluation procedure.

2.2 SYSTEMS ENGINEERS

The primary responsibility of the Systems Engineer is to develop the Safe Shutdown Equipment Lists (SSELs) as described in Section 3. This involves first identifying the various alternative paths or trains for bringing the plant to, and maintaining it in, a safe shutdown condition during the first 72 hours following a Safe Shutdown Earthquake (SSE). With help from the plant Operations Department, the Systems Engineer should select the preferred safe shutdown

alternative for which seismic adequacy will be verified. All necessary equipment in this selected shutdown path should be identified.

If, after the plant has been walked down, the path selected contains few outliers, further systems evaluation by the Systems Engineer may not be necessary. However, if as a result of the walkdown, numerous outliers are found or outliers which are difficult to resolve are identified, the Systems Engineer may be requested to develop SSELs for an alternative path.

In addition to the primary responsibility of developing the SSEL, the Systems Engineer may be asked to provide background information and guidance to (1) the Seismic Capability Engineers who evaluate the seismic adequacy of the equipment, and (2) the Relay Evaluation Personnel who perform the relay functionality review.

The Systems Engineer should be a degreed engineer, or equivalent, and have extensive experience with and broad understanding of the systems, equipment, and procedures of the plant.

2.3 PLANT OPERATIONS PERSONNEL

The plant Operations Personnel have two types of responsibilities during implementation of this procedure. First, they are responsible for reviewing the Safe Shutdown Equipment List (SSEL) (developed in Section 3) to confirm that the SSEL is compatible with approved normal and emergency operating procedures (EOPs) for shutting down the plant. Note that normal plant shutdown procedures would be used for any deliberate, planned shutdown and EOPs would be used for a plant trip or emergency shutdown following an earthquake. Second, plant Operations Personnel may be asked to assist the Seismic Capability Engineers during the Screening Verification and Walkdown and assist the Relay Review Personnel during the Relay Functionality Review.

To fulfill these responsibilities, the plant Operations Personnel should have knowledge of both steady state and transient operations and the associated plant-specific operating procedures. They should be able to supply information on the consequences of, and operator recovery from,

functional anomalies. It is their responsibility to provide information on the function and operation of individual equipment, instrumentation, and control systems.

Plant Operations Personnel may assist the Seismic Capability Engineers either as staff support or as members of an SRT. Though it is not required that the plant Operations Personnel be part of the seismic walkdown team, it is recommended. The plant Operations Personnel should have experience in the specific plant being seismically verified.

2.4 SEISMIC CAPABILITY ENGINEERS

The Seismic Capability Engineers should fulfill the following responsibilities:

- Become familiar with the SQUG approach as defined in the GIP and reference documents.
- Become familiar with the seismic design basis of the plant being evaluated, especially the equipment on the safe shutdown equipment list and the postulated Safe Shutdown Earthquake (SSE).
- Conduct the seismic evaluations and walkdowns of equipment and systems as described in the following sections:
  - Screening Verification and Walkdown (Section 4)
  - Relay Functionality Review (Section 6)
  - Tanks and Heat Exchangers Review (Section 7)
  - Cable and Conduit Raceway Review (Section 8)
- Use the GIP, along with experience and judgment, to verify the seismic adequacy of equipment and systems identified as necessary for safe shutdown.
- Perform additional analyses and calculations, when necessary, to verify the seismic adequacy of the safe shutdown equipment and systems.
- Make recommendations for any additional evaluations or physical modifications to equipment or systems which may be necessary to verify the seismic adequacy of equipment identified as outliers as described in Section 5.

The Seismic Capability Engineers may be assisted in fulfilling the above responsibilities by other individuals. For example, others may do background work to obtain information necessary for performing the seismic evaluations; they may also locate and assist in evaluating existing seismic

qualification documentation; and they may perform backup calculations where necessary. Another example is that Seismic Capability Engineers may ask the Systems Engineers and the Plant Operations Personnel for information on how an item of equipment operates in a system so they may decide whether a malfunction of certain features of the item of equipment will affect its safe shutdown performance. Regardless of what help the Seismic Capability Engineers receive from others, they should remain fully responsible for all the seismic evaluations, engineering judgments, and documentation, including the details and backup documentation.

The Seismic Capability Engineers should be degreed engineers, or equivalent, who have completed a SQUG-developed training course on seismic adequacy verification of nuclear power plant equipment. These engineers should have experience (at least five years) in earthquake engineering applicable to nuclear power plants and in structural or mechanical engineering.

The Screening Verification and Walkdown should be conducted by one or more Seismic Review Teams (SRTs) consisting of at least two Seismic Capability Engineers on each team. The engineers on each team should collectively possess the following knowledge and experience:

- Knowledge of the performance of equipment, systems, and structures during strong motion earthquakes in industrial process and power plants. This should include active mechanical and electrical equipment and process and control equipment.
- Nuclear plant walkdown experience.
- Knowledge of nuclear design standards.
- Experience in seismic design, seismic analysis and test qualification practices for nuclear power plants. This should include active mechanical and electrical equipment and process and control equipment.

It is not necessary for each Seismic Capability Engineer to possess each of the above qualifications: [2]different levels of expertise among the SRT engineers [2]are permitted. However, each SRT should collectively possess the above qualifications and each engineer on the team should have the ability to make judgments regarding the seismic adequacy of equipment.

At least one of the Seismic Capability Engineers on each of the Seismic Review Teams should be a licensed professional engineer to ensure that there is a measure of accountability and personal responsibility in making the judgments called for in the GIP.

In general, the individuals who perform the seismic review walkdown may be required to wear protective clothing, wear a respirator, work in radiation areas, climb ladders, move through crawl spaces, climb over obstacles, and work in high temperatures or other difficult situations. Therefore, the SRT members should be in good physical condition and have the capability and willingness to perform these tasks as necessary.

2.5 RELAY EVALUATION PERSONNEL

The Relay Evaluation Personnel include those individuals who will perform the Relay Functionality Review described in Section 6 and Reference 8. This evaluation includes reviewing electrical circuit drawings, documenting the review conclusions, performing the relay walkdowns, and providing associated support activities.

Electrical engineering will be the primary engineering discipline involved in the relay review; however, the evaluation may also use a number of other engineering disciplines: including structural, mechanical, systems, and earthquake engineering. Information and assistance from plant personnel regarding plant operations and maintenance may also be required.

The capabilities and responsibilities of the various Relay Evaluation Personnel are listed below:

2.5.1 Lead Relay Reviewer

The Lead Relay Reviewer should be a degreed, or equivalent, electrical engineer with experience who is familiar with the Relay Functionality Review procedure described in Section 6 and Reference 8. The Lead Relay Reviewer should successfully complete the SQUG-developed relay training course. The relay walkdown described in Section 6 is not expected to involve entries into radiation areas nor any special physical demands.

The Lead Relay Reviewer should either perform the review or assist reviewers in interpreting electrical design drawings and in identifying essential relays in the safe shutdown systems. The Lead Relay Reviewer should have a good understanding of circuit design logic and the consequences of relay malfunction in essential circuits.

2.5.2 Assistant Relay Reviewer

An Assistant Relay Reviewer with an electrical engineering background can be used to document the relay review and obtain support documentation such as electrical drawings, technical specifications, operator reference manuals, and procedures. Additional assistant reviewers with other backgrounds could also be used.

2.5.3 Systems Personnel

Systems Engineers and/or plant Operations Personnel who are capable of providing information on the operation of the safe shutdown systems and plant operating procedures should be used in the Relay Functionality Review. Their assistance will be needed to identify safe shutdown equipment and essential control and power circuits which may be tripped as a result of an earthquake. They should also be able to provide information on the instrumentation and controls available to monitor and control the equipment affected by relays.

2.5.4 Plant Maintenance Representative

A plant staff electrical and/or instrumentation and controls maintenance representative should be available to provide assistance during the Relay Functionality Review to help establish the location, mounting, types, and characteristics of relays in the safe shutdown circuits.

2.5.5 Seismic Capability Engineers

The Seismic Capability Engineers should perform certain appropriate evaluations in support of the Relay Functionality Review. These evaluations can be performed during the Screening Verification and Walkdown (described in Section 4) and include:

- Identifying potential instances of seismic spatial interaction.

- Giving special consideration to expansion anchor bolts which secure cabinets containing essential relays.
- Establishing in-cabinet amplification factors for cabinets containing essential relays.

2.6 SQUG TRAINING COURSES

Two training courses were developed by SQUG to provide additional guidance on how to implement USI A-46 using the GIP and the referenced documents. These courses include:

- The Walkdown Training Course provides guidance for the Screening Verification and Walkdown (Section 4), the Outlier Identification and Resolution (Section 5), the Tanks and Heat Exchangers Review (Section 7), and the Cable and Conduit Raceway Review (Section 8). Guidance is also provided on estimating in-cabinet amplification factors for electrical cabinets containing essential relays (Section 6) and documenting the USI A-46 evaluation (Section 9).

  This course is provided primarily for the Seismic Capability Engineers, however others who may support these engineers may also take this course.

- The Safe Shutdown Equipment Selection and Relay Screening and Evaluation Training Course provides instructions on the Identification of Safe Shutdown Equipment (Section 3) and how to perform the Relay Functionality Review (Section 6).

  This course is provided primarily for the Lead Relay Reviewers. The Systems Engineers and others may also take this course.

The objectives of these SQUG training courses are as follows:

- Provide additional information on the background, philosophy, and general approach developed by SQUG to resolve USI A-46.
- Provide additional guidance in the use of the GIP and applicable references to select safe shutdown equipment and to verify their seismic adequacy.

REASONS FOR CHANGES TO GIP, PART II, SECTION 2

Listed below are the specific reasons for making the changes marked with a vertical line in the margin of this section to create GIP-3A from GIP-3, Updated 5/16/97. The endnote numbers listed below correspond to the bracketed numbers (e.g., [1]) located in the text of this section where the changes are made.

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[1] SSER No. 2, Sec. II.4.1 – The Staff position is that the licensee must commit to both the SQUG commitments and the use of the entire implementation guidance provided in GIP-2, unless otherwise justified to the staff as described in GIP-2 and SSER No. 2.

The GIP has been amended in the "SQUG Commitments" sections of Part II to reiterate the requirement contained in the GIP, Part I, Section 1.3 to (1) provide written justification to the NRC for prior approval of any substantial deviations from the SQUG commitments and (2) notify the NRC of significant or programmatic deviations from the GIP guidance no later than the summary report.

[2] Typographical error corrected.