ENCLOSURE 1

Seismic Walkdown Report In Response To The 50.54(f) Information Request Regarding Fukushima Near-Term Task Force Recommendation 2.3: Seismic, Updated Transmittal #1 (Annex A) for the Three Mile Island Nuclear Station, Unit 1, Report No. RS-14-032

(201 Pages)

SEISMIC WALKDOWN REPORT

IN RESPONSE TO THE 50.54(f) INFORMATION REQUEST REGARDING FUKUSHIMA NEAR-TERM TASK FORCE RECOMMENDATION 2.3: SEISMIC

UPDATED TRANSMITTAL # 1 (ANNEX A)

for the

THREE MILE ISLAND GENERATING STATION UNIT 1
ROUTE 441S P.O. BOX 480, MIDDLETON PA 17057
Renewed Facility Operating License No. DPR-50
NRC Docket No. 50-289
Correspondence No.: RS-14-032

Exelon

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SEISMIC WALKDOWN REPORT

IN RESPONSE TO THE 50.54(f) INFORMATION REQUEST REGARDING FUKUSHIMA NEAR-TERM TASK FORCE RECOMMENDATION 2.3: SEISMIC

for the

THREE MILE ISLAND GENERATING STATION UNIT 1
ROUTE 441S P.O. BOX 480, MIDDLETON PA 17057
Renewed Facility Operating License No. DPR-50
NRC Docket No. 50-289
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Executive Summary

The purpose of this report is to provide information as requested by the Nuclear Regulatory Commission (NRC) in its March 12, 2012 letter issued to all power reactor licensees and holders of construction permits in active or deferred status. (Ref. 5) In particular, this report provides information requested to address Enclosure 3, Recommendation 2.3: Seismic, of the March 12, 2012 letter. (Ref. 5)

Following the accident at the Fukushima Dai-ichi nuclear power plant resulting from the March 11, 2011, Great Tohoku Earthquake and subsequent tsunami, the NRC established the Near Term Task Force (NTTF) in response to Commission direction. The NTTF issued a report - *Recommendations for Enhancing Reactor Safety in the 21st Century: The Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident* - that made a series of recommendations, some of which were to be acted upon "without unnecessary delay." (Ref. 6) On March 12, 2012, the NRC issued a letter to all power reactor licensees in accordance with 10CFR50.54(f). The 50.54(f) letter requests information to assure that certain NTTF recommendations are addressed by all U.S. nuclear power plants. (Ref. 5) The 50.54(f) letter requires, in part, all U.S. nuclear power plants to perform seismic walkdowns to identify and address degraded, non-conforming or unanalyzed conditions and to verify the current plant configuration is within the current seismic licensing basis. This report documents the seismic walkdowns performed at Three Mile Island (TMI) Generating Station Unit 1 in response, in part, to the 50.54(f) letter issued by the NRC.

The Nuclear Energy Institute (NEI), supported by industry personnel, cooperated with the NRC to prepare guidance for conducting seismic walkdowns as required in the 50.54(f) letter, Enclosure 3, Recommendation 2.3: Seismic. (Ref. 5) The guidelines and procedures prepared by NEI and endorsed by the NRC were published through the Electric Power Research Institute (EPRI) as EPRI Technical Report 1025286, *Seismic Walkdown Guidance for Resolution of Fukushima Near-Term Task Force Recommendation 2.3: Seismic,* dated June 2012; henceforth, referred to as the "EPRI guidance document." (Ref. 1) Exelon/TMI has utilized this NRC endorsed guidance as the basis for the seismic walkdowns and this report. (Ref. 1)

The EPRI guidance document was used to perform the engineering walkdowns and evaluations described in this report. In accordance with the EPRI guidance document, the following topics are addressed in the subsequent sections of this report.

- Seismic Licensing Basis
- Personnel Qualifications
- Selection of Systems, Structures, and Components (SSC)
- Seismic Walkdowns and Area Walk-Bys
- Seismic Licensing Basis Evaluations
- IPEEE Vulnerabilities Resolution Report
- Peer Review

Seismic Licensing Basis

The Seismic Licensing Basis is briefly described in Section 2 of this report. The safe shutdown earthquake for the Three Mile Island site is 0.12g horizontal ground acceleration and 0.08g vertical ground acceleration. (Ref. 2 section 5.1.2)

Personnel Qualifications

Personnel qualifications are discussed in Section 3 of this report. The personnel who performed the key activities required to fulfill the objectives and requirements of the 50.54(f) letter are qualified and trained as required in the EPRI guidance document. (Ref. 1) These personnel are responsible for:

- Selecting the SSCs that should be placed on the Seismic Walkdown Equipment List (SWEL),
- Performing the Seismic Walkdowns and Area Walk-Bys,
- Performing the seismic licensing basis evaluations, as applicable,
- Identifying the list of plant-specific vulnerabilities identified during the IPEEE program and describing the actions taken to eliminate or reduce them,
- Performing the peer reviews

Selection of SSCs

Selection of SSCs is discussed in Section 4 of this report. The process used to select the items that were included in the overall Seismic Walkdown Equipment List (SWEL) is described in detail in the EPRI guidance document, Section 3: Selection of SSCs. (Ref. 1) The SWEL is comprised of two groups of items, which are described at a high level in the following subsections.

Sample of Required Items for the Five Safety Functions – SWEL 1

Screen #1 narrowed the scope of SSCs in the plant to those that are designed to Seismic Category I requirements because they have a seismic licensing basis.

Screen #2 narrowed the scope of SSCs by selecting only those that do not regularly undergo inspections to confirm that their configuration continues to be consistent with the plant licensing basis.

Screen #3 narrowed the scope of SSCs included on SWEL 1 as only those associated with maintaining the five safety functions. These five safety functions include the four safe shutdown functions (reactor reactivity control, reactor coolant pressure control, reactor coolant inventory control, and decay heat removal, which includes the Ultimate Heat Sink), plus the containment functions.

Screen #4 was a process intended to result in a SWEL 1 that sufficiently represented the broader population of plant equipment and systems needed to meet the objectives of the 50.54(f) letter. The following five sample attributes were used:

- A variety of types of systems
- Major new or replacement equipment
- A variety of types of equipment
- A variety of environments

- Equipment enhanced due to vulnerabilities identified during the IPEEE program

Spent Fuel Pool Related Items – SWEL 2

Screen #1 and Screen #2 were used to narrow the scope of spent fuel pool related SSCs to those that have a seismic licensing basis and those that are appropriate for an equipment walkdown process. Screen #3 was a process intended to result in SWEL 2 that sufficiently represents the broader population of spent fuel pool Seismic Category I equipment and systems to meet the objectives of the 50.54(f) letter, and included the following sample selection attributes:

- A variety of types of systems
- Major new or replacement equipment
- A variety of types of equipment
- A variety of environments

Screen #4 identified items of the spent fuel pool that could potentially cause a rapid drain-down of the pool, even if such items are not Seismic Category I. Rapid drain-down is defined as lowering of the water level to the top of the fuel assemblies within 72 hours after the earthquake. Any items identified as having the potential for rapidly draining the spent fuel pool were to be added to SWEL 2.

For TMI Unit 1, the SWEL is comprised of:

- SWEL 1 resulted with 91 items for walkdown.
- SWEL 2 resulted with 15 items for walkdown.
- Three (3) items associated with spent fuel pool rapid drain-down are included on SWEL 2.

Seismic Walkdowns and Area Walk-Bys

Section 5 , Appendix C, and Appendix D of this report documents the equipment Seismic Walkdowns and the Area Walk-Bys. The online seismic walkdowns for TMI Unit 1 were performed during the weeks of August 13, 2012 and August 24, 2012. During the majority of the walkdown activities, the walkdown team consisted of two (2) Seismic Walkdown Engineers (SWEs), the station Lead Responsible Engineer (LRE), and a station Operations person.

The seismic walkdowns focused on the seismic adequacy of the items on the SWEL. The walkdowns focused on the following:

- Adverse anchorage conditions
- Adverse seismic spatial interactions
- Other adverse seismic conditions (e.g., degradation, configuration, etc.,)

Area Walk-Bys were conducted in each area of the plant that contained an item on the SWEL (generally within 35 feet of the SWEL component). The Area Walk-By was performed to identify potentially adverse seismic conditions associated with other SSCs located in the vicinity of the SWEL item. The key examination factors that were considered in the Area Walk-Bys included the following:

- Anchorage conditions (if visible without opening equipment)
- Significantly degraded equipment in the area
- Potential seismic interaction
- A visual assessment (from the floor) of cable/conduit raceways and HVAC ducting (e.g., condition of supports or fill conditions of cable trays)
- Potential adverse interactions that could cause flooding/spray and fire in the area
- Other housekeeping items, including temporary installations

The seismic walkdown team inspected 91 of the 106 components on the SWEL (comprised of SWEL 1 and SWEL 2), including five (5) components deferred to outage. The five (5) deferred items were inspected the week of August 24, 2012 during the unit outage. Walkdowns for the remaining 15 components were deferred. These components are configured with anchorage that is internal to the component and it was not opened to allow for inspection of the anchorage. Anchorage inspections for these items will be completed at a later time when the equipment is accessible. Anchorage verification was required for a minimum of 40 components. (Ref. 1) A total of 58 anchorage configurations were confirmed to be installed in accordance with the station documentation.

Following the completion of the online seismic walkdowns, the industry was made aware that the NRC staff had clarified a position on opening electrical cabinets to inspect for other adverse seismic conditions. Supplemental inspections of 18 electrical cabinets are planned and will be completed, as required, during a unit outage or another time when the equipment becomes accessible. The list of electrical cabinets along with the milestone completion schedule is provided in Table E-2.

Nineteen (19) Issue Reports (IRs) were initiated for conditions identified during the seismic walkdowns at TMI Unit 1. One (1) condition (IR 1400723) was determined to be a potential adverse seismic condition for which the component (AH-E-18B) was declared inoperable. Further evaluation completed through the Corrective Action Program (CAP) concluded the as-found condition was degraded though capable of withstanding seismic loads and performing its design function(s). Due to the nature of this condition it was concluded the condition was an adverse seismic condition. The condition was addressed via work order (M2310468) to correct the as-found condition to the design configuration.

The remaining eighteen (18) conditions were evaluated through the CAP and it was determined that none of these conditions were adverse seismic conditions.

Seismic Licensing Basis Evaluations

The EPRI guidance document, Section 5: Seismic Licensing Basis Evaluation provides a detailed process to perform and document seismic licensing basis evaluations of SSCs identified when potentially adverse seismic conditions are identified. The process provides a means to identify, evaluate and document how the identified potentially adverse seismic condition meets a station's seismic licensing basis without entering the condition into a station's CAP. In lieu of this process, Exelon/TMI utilized the existing processes and procedures (Site CAP Expectations) to identify, evaluate and document conditions identified during the Seismic Walkdowns.

In accordance with Exelon/TMI processes and procedures, all questionable conditions identified by the SWEs during the walkdowns were entered into the station CAP to be further evaluated and addressed as required. The SWEs provided input to support the identification and evaluation (including seismic licensing basis evaluations, as required) of the potentially adverse seismic conditions entered into the CAP. The station corrective action program is a more robust process than that provided in the EPRI guidance document; in part, ensuring each condition is properly evaluated for conformance with design and licensing bases and corrected as required.

Conditions identified during the walkdowns were documented on the SWCs, AWCs, and entered into the CAP. For those conditions that required, seismic licensing basis evaluations were completed and documented within the IR. Tables 5-2 and 5-3 in the report provide the IR number, a summary of the condition, and the action completion status.

IPEEE Vulnerabilities

IPEEE vulnerabilities are addressed in Section 7 and Appendix G of this report. No vulnerabilities were identified as a result of the effort that addressed the Individual Plant Examination of External Events (IPEEE). (Ref. 7) However, plant improvements were identified in Reference 3 (section 7). Table G-1 provides the list of plant improvements, the IPEEE proposed resolution, the actual resolution and resolution date. All IPEEE plant improvements and associated actions are complete.

Peer Reviews

A peer review team consisting of at least two individuals was assembled and peer reviews were performed in accordance with Section 6: Peer Reviews of the EPRI guidance document. The Peer Review process included the following activities:

- Review of the selection of SSCs included on the SWEL
- Review of a sample of the checklists prepared for the Seismic Walkdowns and Area Walk-Bys
- Review of licensing basis evaluations, as applicable
- Review of the decisions for entering the potentially adverse conditions into the CAP process
- Review of the submittal report
- Provided a summary report of the peer review process in the submittal report

Section 8 of this report contains a summary of the Peer Review. The Peer Review determined that the objectives and requirements of the 50.54(f) letter are met. Further, it was concluded by the peer reviews that the efforts completed and documented within this report are in accordance with the EPRI guidance document.

Summary

In summary, seismic walkdowns have been performed at the Three Mile Island Generating Station Unit 1 in accordance with the NRC endorsed walkdown methodology. All potentially degraded, nonconforming, or unanalyzed conditions identified as a result of the seismic walkdowns have been entered into the corrective action program.

Evaluations of the identified conditions are complete and documented within the CAP. These evaluations determined one (1) condition was an adverse seismic anchorage condition. No adverse seismic spatial interactions and no other adverse seismic conditions associated with SWEL components were identified. The Area Walk-Bys resulted with no adverse seismic conditions associated with other SSCs located in the vicinity of the SWEL item(s).

The one (1) adverse seismic anchorage condition was corrected by work order. No other degraded, nonconforming, or unanalyzed conditions were identified that required either immediate or follow-on action(s). No planned or newly identified protection or mitigation features have resulted from the efforts to address the 50.54(f) letter.

Follow-on activities required to complete the efforts to address Enclosure 3 of the 50.54(f) letter include inspection of 15 items that require internal anchorage inspections along with supplemental inspections of 18 electrical cabinets. Area Walk-Bys will be completed, as required, during these follow-on activities.

To address the items deferred due to inaccessibility and the supplemental inspections of electrical cabinets, follow-on Seismic Walkdowns and Area Walk-Bys were conducted during the fourth quarter of 2013. No degraded, nonconforming, or unanalyzed conditions that required either immediate or follow-on actions were identified.

Annex A to this report provides:

1) Additional information obtained from these follow-on inspections performed on the open items listed on Table E-1 and E-2. (Updated in Tables AE-1 and AE-2.)
2) Status updates on the conditions identified during the previous Walkdowns and Walk-Bys, listed on Table 5-2 and Table 5-3. (Updated in Tables A5-2 and A5-3.)

As of December 31, 2013, all follow-on activities required to complete the efforts to address Enclosure 3 of the 50.54(f) letter are complete and documented in Annex A.

1 Introduction

1.1 PURPOSE

The purpose of this report is to provide information as requested by the Nuclear Regulatory Commission (NRC) in its March 12, 2012 letter issued to all power reactor licensees and holders of construction permits in active or deferred status. (Ref. 5) In particular, this report provides information requested to address Enclosure 3, Recommendation 2.3: Seismic, of the March 12, 2012 letter. (Ref. 5)

1.2 BACKGROUND

Following the accident at the Fukushima Dai-ichi nuclear power plant resulting from the March 11, 2011, Great Tohoku Earthquake and subsequent tsunami, the NRC established the Near Term Task Force (NTTF) in response to Commission direction. The NTTF issued a report - *Recommendations for Enhancing Reactor Safety in the 21st Century: The Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident* - that made a series of recommendations, some of which were to be acted upon "without unnecessary delay." (Ref. 6) On March 12, 2012, the NRC issued a letter to all power reactor licensees in accordance with 10CFR50.54(f). The 50.54(f) letter requests information to assure that certain NTTF recommendations are addressed by all U.S. nuclear power plants. (Ref. 5) The 50.54(f) letter requires, in part, all U.S. nuclear power plants to perform seismic walkdowns to identify and address degraded, non-conforming or unanalyzed conditions and to verify the current plant configuration is within the current seismic licensing basis. This report documents the seismic walkdowns performed at Three Mile Island (TMI) Generating Station Unit 1 in response, in part, to the 50.54(f) letter issued by the NRC.

The Nuclear Energy Institute (NEI), supported by industry personnel, cooperated with the NRC to prepare guidance for conducting seismic walkdowns as required in the 50.54(f) letter, Enclosure 3, Recommendation 2.3: Seismic. (Ref. 5) The guidelines and procedures prepared by NEI and endorsed by the NRC were published through the Electric Power Research Institute (EPRI) as EPRI Technical Report 1025286, *Seismic Walkdown Guidance for Resolution of Fukushima Near-Term Task Force Recommendation 2.3: Seismic,* dated June 2012; henceforth, referred to as the "EPRI guidance document." (Ref. 1) Exelon/TMI has utilized this NRC endorsed guidance as the basis for the seismic walkdowns and this report. (Ref. 1)

1.3 PLANT OVERVIEW

The Three Mile Island Generating Station Unit 1 is a pressurized water reactor type. The station is located on Three Mile Island, which is situated in the Susquehanna River upstream from York Haven Dam, in Londonderry Township of Dauphin County, Pennsylvania, about 2.5 miles north of the southern tip of Dauphin County, where Dauphin is coterminous with York and Lancaster Counties. (Ref. 2 sections 1.1 & 2.1)

Three Mile Island Unit 1 is rated at a licensed power level of 2568 MWt. The nuclear steam supply system (NSSS) was designed and supplied by the Babcock & Wilcox Company. (Ref. 2 sections 1.2 & 1.1) Unit 1 received its original operating license (Renewed License No. DPR-50) on April 19, 1974. (Operating License)

1.4 APPROACH

The EPRI guidance document is used for the Three Mile Island Unit 1 engineering walkdowns and evaluations described in this report. In accordance with Reference 1, the following topics are addressed in the subsequent sections of this report:

- Seismic Licensing Basis
- Personnel Qualifications
- Selection of SSCs
- Seismic Walkdowns and Area Walk-Bys
- Licensing Basis Evaluations
- IPEEE Vulnerabilities Resolution Report
- Peer Review

1.5 CONCLUSION

Seismic walkdowns have been performed at the Three Mile Island Generating Station Unit 1 in accordance with the NRC endorsed walkdown methodology. All potentially degraded, nonconforming, or unanalyzed conditions identified as a result of the seismic walkdowns have been entered into the corrective action program.

Evaluations of the identified conditions are complete and documented within the CAP. These evaluations determined one (1) condition was an adverse seismic anchorage condition. No adverse seismic spatial interactions and no other adverse seismic conditions associated with SWEL components were identified. The Area Walk-Bys resulted with no adverse seismic conditions associated with other SSCs located in the vicinity of the SWEL item(s).

The one (1) adverse seismic anchorage condition was corrected by work order. No other degraded, nonconforming, or unanalyzed conditions were identified that required either immediate or follow-on action(s). No planned or newly identified protection or mitigation features have resulted from the efforts to address the 50.54(f) letter.

Follow-on activities required to complete the efforts to address Enclosure 3 of the 50.54(f) letter include inspection of 15 items that require internal anchorage inspections along with supplemental inspections of 18 electrical cabinets. Area Walk-Bys will be completed, as required, during these follow-on activities.

2 Seismic Licensing Basis

2.1 Overview

This section of the report summarizes the seismic licensing basis for Three Mile Island Unit 1. The safe shutdown earthquake and a summary of the codes, standards, and methods used in the design of Seismic Class I (Category I) SSCs are presented. This section does not establish or change the seismic licensing basis of the facility and is intended to provide a fundamental understanding of the seismic licensing basis of the facility.

2.2 Safe Shutdown Earthquake (SSE)

The safe shutdown earthquake for the Three Mile Island site is 0.12g horizontal ground acceleration and 0.08g vertical ground acceleration. (Ref. 2 section 5.1.2)

2.3 Design of Seismic Category I SSCs

A full description of the Safe Shutdown Earthquake along with the codes, standards, and methods used in the design of the Seismic Class I (Category I) SSCs for meeting the seismic licensing basis requirements are provided throughout the following Three Mile Island Station UFSAR sections:

- 1.3.2 Significant Design Revisions
- 1.6.2.4 Quality Assurance Implementation
- 2.7 Engineering Geology and Foundation Considerations
- 2.8 Seismology
- 3.1.Design Bases
- 3.2.Reactor Design
- 4.1. Reactor Coolant System Design Bases
- 4.2 Reactor Coolant System – System Description and Operation
- 4.3. RCS Structural Design Evaluation
- 5.1 Structural Design Classification
- 5.2 Reactor Building
  - 5.2.3 Structural Design Criteria
  - 5.2.4 Method of Analysis
- 5.3 Isolation System (Reactor Building)

- 5.4 Other Special Structures
  - 5.4.3 Structural Design Criteria
  - 5.4.4 Piping Design Criteria
  - 5.4.5 Method of Analysis
- 6.0 Engineered Safeguards
- 7.0 Instrumentation and Control
- Chapter 8 – Electrical Systems
- Chapter 9 – Auxiliary and Emergency Systems
- Chapter 10 Steam and Power Conversion
- UFSAR Appendix 14A Design Review for Consideration of effects of Piping System Breaks Outside Containment.

UFSAR Chapters 5 and 8 provide detailed discussions of the codes, standards, and methods used in the design of the Seismic Class I (Category I) SSCs for meeting the seismic licensing basis requirements. The remaining sections identified above are identified for reference as they provide system and component specific design features that implement the criteria and methods detailed in UFSAR Chapters 5 and 8.

The UFSAR sections listed above should be referred to for a detailed understanding of the seismic licensing basis.

2.3.1 Summary of Seismic Design

The acceleration response spectra for the design earthquake were partially developed using records from the March 1957 San Francisco earthquake normalized to a basic ground motion of 0.06g. Data from this earthquake were recorded by an instrument located on rock in Golden Gate Park. The instrumented records provide valuable data on the attenuation of a moderate earthquake occurring a short distance from the recording station. These field conditions are considered to best approximate those at the Three Mile Island site. The acceleration response spectra were further developed on the basis of the spectra for the 1940 El Centro earthquake normalized to a basic ground motion of 0.06g. The resultant spectra (Ref. 2 Figure 2.7-1) therefore are controlled in the low frequency region by the El Centro Spectra. (Ref. 2 section 2.7)

2.3.2 Class I Systems and Equipment Design

Components and systems classified as Class I have been designed in accordance with the following criteria:

A. Primary steady state stresses, which included the seismic stress resulting from the design earthquake ground acceleration of 0.06g acting horizontally and 0.04g acting vertically and occurring simultaneously, have been maintained within the allowable working stress limits accepted as good practice and, where applicable, set forth in the appropriate design standards, e.g., ASME Boiler & Pressure Vessel Code and USAS B31.1.0, Code for Pressure Piping. (Ref. 2 section 5.1.2.1.2)

B. Primary steady state stress and corresponding strains, which include the seismic stress resulting from the maximum hypothetical earthquake ground acceleration of 0.12g acting horizontally and 0.08g acting vertically and occurring simultaneously,

have been limited so that the function of the component, system, or structure is not impaired as to prevent a safe and orderly shutdown of the plant. (Ref. 2 section 5.1.2.1.2)

Stresses resulting from the simultaneous occurrence of the maximum earthquake and the loss of coolant accident shall be limited to permit a safe shutdown of the plant. Refer to UFSAR Chapter 4. For piping stress criteria, refer also to UFSAR Section 5.4.4. (Ref. 2 section 5.1.2.1.2)

C. As an alternative to the methodology described in A) and B) above, seismic experience data utilized in accordance with the Seismic Qualification Utilities Group (SQUG) methodology may be used to verify the seismic adequacy of existing, new, modified and replacement items on a case-by-case basis. Such evaluations are performed in a controlled and systematic manner to ensure that the item of equipment is properly represented in the earthquake experience or generic testing classes and that applicable caveats are met. In particular, each new or replacement item must be evaluated for any design changes that could reduce the seismic capacity of the equipment from that reflected in the experience data base, and all such evaluations must be documented in accordance with established procedures. SQUG methodology is applied in accordance with the SQUG Generic Implementation Procedure (UFSAR Reference 66) and implementation of the SQUG methodology is controlled and documented in accordance with the Exelon Nuclear procedure (UFSAR Reference 67). All evaluations performed using the SQUG methodology use as input the amplified response spectra contained in EQE Report 50097-R-001 (UFSAR Reference 68), GPUN Report 990-2362 (UFSAR Reference 69) and EQE Calculation 42105-C-004 (UFSAR Reference 70). The use of the SQUG methodology is limited to the scope of equipment covered by the equipment classes described in the SQUG Generic Implementation Procedure (GIP). The methodology is not used to verify the seismic adequacy of equipment not included within the scope of the equipment classes described in the GIP. (Ref. 2 section 5.1.2.1.2)

In addition to the restrictions, inclusion rules and caveats described in the preceding paragraph and those specified by the GIP, the following restrictions as described in the Exelon Nuclear procedure (UFSAR Reference 67) are applied to use of the SQUG methodology for verification of seismic adequacy of equipment at TMI (Ref. 2 section 5.1.2.1.2):

The SQUG methodology is not utilized to verify seismic adequacy of equipment that is part of the systems described in UFSAR Sections 7.1.1.8, 7.1.3 and 7.3.2 of the TMI FSAR. (Ref. 2 section 5.1.2.1.2)

1. Comparisons of seismic capacity to demand are performed using Method A from Table 4-1 of the SQUG GIP for equipment located in the Intake Screen and Pump House (ISPH). For equipment located in other areas of the plant, Method B is used unless the use of the Method A is justified as part of the evaluation. (Ref. 2 section 5.1.2.1.2)

2. The anchor bolt allowables contained in GIP Appendix C, Section C.2, are used only to verify the adequacy of existing equipment, within the scope of USI A-46, which is known to not contain essential relays and any other existing equipment which does not contain any relays. Anchorage for existing equipment that contains essential relays is designed using the allowables specified in the GIP, reduced by one fourth as required by the GIP. Anchorage for all new equipment

with or without essential relays is designed using allowable capacities specified in TMI-1 procedures and specifications. (Ref. 2 section 5.1.2.1.2)

3. Relay evaluations for new or modified safety related relays are performed based on a comparison of demand to capacity. Reliance on chatter being acceptable or on the ability of operators to take manual action is not used as a basis for seismic qualification of new safety related equipment or modifications to existing safety related equipment. Safety related replacement items are evaluated on the basis of a comparison of capacity to demand or on the basis of equivalency to the existing equipment being replaced. (Ref. 2 section 5.1.2.1.2)

2.3.3 Summary of Codes and Standards

The Class I structures have been designed in accordance with the following Codes, as provided in Reference 2 sections 5.2 and 5.4:

- Regulations for Protection From Fire and Panic Commonwealth of Pennsylvania
- Building Code Requirements for Reinforced Concrete, ACI 318 63
- Specifications for Structural Concrete for Buildings, ACI 301 66 except as modified in the design and quality control of the Reactor Building
- AISC Manual of Steel Construction
- ASME Boiler and Pressure Vessel Code, Section III, Nuclear Vessel; Section VIII, Unfired Pressure Vessels; Section IX, Welding Qualifications (applicable portions pertain to the Reactor Building)

The design of the electrical systems for the Three Mile Island Station Unit 1 is in compliance with the requirements of proposed AEC Criteria 24 "Emergency Power for Protection Systems," and 39 "Emergency Power for Engineered Safety Features," of July 11, 1967 and provides required power sources and equipment to ensure continued operation of essential reactor and station auxiliary equipment under all conditions. The design satisfies the Institute of Electrical and Electronics Engineers (IEEE) Report No. NSG/TCS/SC4 1, "Proposed IEEE Criteria for Class 1E Electrical Systems for Nuclear Power Generating Stations," dated June 1969. (Ref. 2 section 8.1)

3 Personnel Qualifications

3.1 OVERVIEW

This section of the report identifies the personnel that participated in the NTTF 2.3 Seismic Walkdown efforts. A description of the responsibilities of each Seismic Walkdown participant's role(s) is provided in Section 2 of the EPRI guidance document. (Ref. 1) Resumes provided in Appendix A provide detail on each person's qualifications for his or her role.

3.2 PROJECT PERSONNEL

Table 3-1 below summarizes the names and corresponding roles of personnel who participated in the NTTF 2.3 Seismic Walkdown effort.

Table 3-1. Personnel Roles

Name	Equipment Selection Engineer	Plant Operations	Seismic Walkdown Engineer (SWE)	Licensing Basis Reviewer	IPEEE Reviewer	Peer Reviewer
K. Hull	X					
T.K. Ram	X					
A. Perez						X(1)
S. Baker			X	X		
M. Etre			X	X		
J. Lopez-Ferrer (Exelon)			X	X	X	
T. Bacon						X
W. Djordjevic						X(2)
Michael Wynne (Exelon)		X				

Notes:
1. Peer Review Team member for SWEL review only.
2. Peer Review Team Leader.

3.2.1 Stevenson & Associates Personnel

The following provides a synopsis of each individual's background and experiences.

Antonio Perez, P.E.: Mr. Perez is a Senior Engineer III and serves as the General Manager of the S&A Hudson, WI office. He earned his Bachelor of Science degree in

Mechanical Engineering at Michigan Technological University and is a licensed Professional Engineer in the states of Wisconsin and Minnesota. Mr. Perez has over 15 years of experience in project management, project engineering, equipment design, and mechanical systems design and has served in the nuclear power industry for over 11 years. He has extensive experience in Program and Design Engineering and has held positions such as MOV Engineer, Responsible Design Engineer, Design Engineering Supervisor and STA Trainee in the nuclear power industry. Throughout his years serving in the nuclear power industry, Mr. Perez has gained knowledge of plant operations, documentation, and SSCs necessary to capably select a broad distribution of SSCs for the SWEL. In addition, his experiences have provided him with knowledge of IPEEE and USI A-46 programs. Mr. Perez has successfully completed the Near-Term Task Force Recommendation 2.3 – Plant Seismic Walkdowns Training Course.

Kim Hull: Mr. Hull is a Senior Engineer III in the S&A Hudson, WI office. He earned his Master of Science degree in Mechanical Engineering at Michigan State University. Mr. Hull has over 30 years of experience in the nuclear power industry and has held positions such as Shift Technical Advisor, Principal Engineer, Senior Instructor, and Mechanical Design Supervisor. He has an extensive background in all aspects of nuclear power plant modifications with a thorough understanding of configuration control/management along with design and licensing basis of nuclear power plants. Throughout his years serving in the nuclear power industry, Mr. Hull has gained knowledge of plant operations, documentation, and SSCs necessary to capably select a broad distribution of SSCs for the SWEL. In addition, his experiences have provided him with knowledge of IPEEE and USI A-46 programs. Mr. Hull has successfully completed the Near-Term Task Force Recommendation 2.3 – Plant Seismic Walkdowns Training Course.

Tribhawan K. Ram, P.E.: Mr. Ram is a Senior Engineer III in the S&A Phoenix, AZ Office. He has over 28 year experience in the nuclear power industry with expertise in plant systems and design engineering. Currently, Mr. Ram is leading the electrical engineering effort in support of Post-Fukushima Seismic Margin Analysis (SMA) for two Taiwan nuclear stations (PWR and BWR). This effort, in support of the plant Safe Shutdown Equipment List (SSEL), consists of relay list development, relay screening (using GERS, SQURTS or other available testing data), and relay chatter analysis. Mr. Ram was involved in resolving USI A-46 relay outliers for several plants (Dresden, Quad Cities, Millstone, Palisades, and Pilgrim). He evaluated dozens of control circuits for relay chattering issues. To replace outliers, Mr. Ram developed and/or supervised the development of modification packages including: replacement relay selection; relay testing specification preparation; and seismic testing facility visits for relay qualification. As a systems manager, Mr. Ram conducted periodic system walkdowns to discover and then pursue resolutions for any design, maintenance or operational issues with equipment. He has developed test plans for circuit breaker and other electrical equipment replacement, including involvement in test plan execution during refueling outages. Mr. Ram has interfaced, with NRC in their biennial Component Design Basis Inspections (CDBI), and with INPO in their biennial evaluations. Throughout his years serving in the nuclear power industry, Mr. Ram has gained knowledge of plant operations, documentation, and SSCs necessary to capably select a broad distribution of SSCs for the SWEL. In addition, his experiences have provided him with knowledge of IPEEE and USI A-46 programs. Mr. Ram has MS degrees in Nuclear and Electrical Engineering from the University of Cincinnati, and an MBA from Bowling Green State University. He is a licensed Professional Engineer (electrical) in Ohio. Mr. Ram has completed a six month training course in BWR systems.

Mark Etre: Mr. Etre is a Senior Engineer III in the S&A Boston, MA office. He has managed and led seismic walkdowns and analyses of structures and components. Mr. Etre has more than 20 years of seismic experience serving the nuclear industry. Mr. Etre has participated in numerous USI A-46 and IPEEE projects in response to the requirements of Generic Letters 87-02 and 88-20. Mr. Etre has a Master of Science in Structural Engineering from the Worcester Polytechnic Institute. He has received industry training as a Seismic Capability Engineer (EPRI 5-day SQUG training) and has successfully completed the Near-Term Task Force Recommendation 2.3 – Plant Seismic Walkdowns Training Course.

Seth Baker: Mr. Baker is a Senior Engineer I in the S&A Boston, MA office, where he joined in 2008. He has performed seismic and other dynamic evaluations on a variety of nuclear structures including buildings, equipment frames, and cabinets, as well as having designed several structural modifications. He has completed the NTTF Recommendation 2.3 Training Course and has subsequently performed seismic walkdowns on seven US nuclear units. Mr. Baker holds a Master of Science degree in Civil Engineering from Stanford University and a Bachelor of Science degree from the Worcester Polytechnic Institute.

Todd Bacon: Mr. Bacon is a Senior Consultant in the S&A Boston, MA office. He has over 30 years of experience in evaluations of nuclear systems, structures and components, with specialization in the dynamic analysis and design of piping systems, structures and equipment for seismic, other dynamic, fluid, and wind loads. He has managed various ASME Code related tasks for numerous US and international utilities. Mr. Bacon has been involved with the dynamic analyses of systems associated with the Main Steam and other NSSS systems, as well as many other plant systems. In addition, Mr. Bacon has led the analysis and subsequent regulatory response for a number of issues including GL 96-03 and masonry block wall assessments related to IEB 80-11. He is a licensed Professional Engineer (civil) in the states of California, Ohio, and Georgia. Mr. Bacon has successfully completed the Near-Term Task Force Recommendation 2.3 – Plant Seismic Walkdowns Training Course.

Walter Djordjevic, P.E. Mr. Djordjevic is a Senior Consultant and serves as President of S&A with specialization in the dynamic analysis and design of structures and equipment for seismic, blast, fluid, and wind loads. He has managed and led seismic walkdowns and fragility analyses of structures and components for use in probabilistic risk assessments. Mr. Djordjevic has 37 years of seismic experience serving the nuclear industry. Mr. Djordjevic performed and managed more than 20 USI A-46 and IPEEE projects in response to the requirements of Generic Letters 87-02 and 88-20. Mr. Djordjevic has a Master of Science in Structural Engineering from the Massachusetts Institute of Technology. He has received industry training as a Seismic Capability Engineer (EPRI SQUG training), EPRI IPEEE Add-on, Seismic Fragility and Seismic Walkdown Engineer (SWE).

3.2.2 Additional Personnel

Exelon plant Operations, Michael Wynne, reviewed the SWEL. Mr. Wynne was an operator on shift for 25 years in many positions from entry level Non Licensed Operator up to a Shift Manager including time in Operations Training as a Certified SRO instructor for OPS Training. He is currently working as Operations representative, Previous SRO, Supervisor supporting the Fukushima Response project at Three Mile Island Station. He is familiar with all aspects of the station operating procedures.

Various station personnel also provided support to the SWEL preparer in identifying major equipment or system modifications, equipment and systems located in different environments, and equipment and systems that would be accessible for inspection during the plant walkdowns, in accordance with Reference 1.

Exelon Engineering staff member Mr. Juan Lopez performed the IPEEE Vulnerabilities Review based, in part, on the TMI IPEEE submittal along with subsequent correspondence and station records. (Ref. 3) Mr. Lopez is a Structural Engineer in the Exelon Engineering Department. He has worked at TMI since 2009. He has successfully completed the SQUG Walkdown Screening and Seismic Evaluations Training and the Near-Term Task Force Recommendation 2.3 – Plant Seismic Walkdowns Training Course.

4 Selection of SSCs

4.1 OVERVIEW

This section of the report describes the process used to select structures, systems, and components (SSCs) that were included on the Seismic Walkdown Equipment List (SWEL). The actual equipment lists that were developed in this process are found in Appendix B and are as follows:

- Table B-1. Base List 1
- Table B-2. Base List 2
- Table B-3. SWEL 1
- Table B-4. SWEL 2

4.2 SWEL DEVELOPMENT

The selection of SSCs process described in EPRI Technical Report 1025286, *Seismic Walkdown Guidance for Resolution of Fukushima Near-Term Task Force Recommendation 2.3: Seismic*, dated June 2012, was utilized to develop the SWEL list for Three Mile Island Generating Station Unit 1. (Ref. 1)

The SWEL is comprised of two groups of items:

- SWEL 1 is a sample of items to safely shut down the reactor and maintain containment integrity
- SWEL 2 is a list of spent fuel pool related items

4.2.1 SWEL 1 – Sample of Required Items for the Five Safety Functions

The process for selecting a sample of SSCs for shutting down the reactor and maintaining containment integrity began with a review of TMI Unit 1 Individual Plant Examination for External Events (IPEEE), dated December 1994. (Ref. 3) Table 3.1-1, *TMI PRA Comp. List*, and Table 3.1-2, *Additional Components*, of Reference 3 were utilized as the initial list of equipment. The information provided in the Reference 3 tables was supplemented with two Excel Spreadsheets: a) "Q_Class_Components_with_Function.xls" and b) "TMI-1 A-46 SSEL.xls". (Ref. 9 and 10) The three datasets were compiled into a single list of SSCs. The components on this initial list were then subjected to the following four (4) screens to identify the items to be included on the first Seismic Walkdown Equipment List (SWEL 1):

1. **Screen #1 – Seismic Category 1**

   As described in Reference 1, only items that have a defined seismic licensing basis are to be included in SWEL 1. Each item on the initial list was reviewed to determine if it had a defined seismic licensing basis. All items identified as Class I, as defined in the TMI UFSAR Chapter 5, were identified as having a defined

seismic licensing basis. (Ref. 2) Electrical enclosures containing Class I electrical devices were identified as Class I. Class I determination was made through a review of current design and licensing basis documentation.

As a means to expedite this process, the list of SSCs provided in Reference 9 included a QA Class and Seismic Cat. All items with a QA Class of "Q" and Seismic Cat of "W" were considered Class I. QA Class "Q" items are defined as Safety Related Equipment/Component and Seismic Cat "W" items are defined as Seismic Safety Related, Operable During and After SSE.

Screen # 1 reduced the scope of items of the initial list to include only Class I items.

2. **Screen #2 – Equipment or Systems**

This screen further narrowed the scope of items to include only those that do not regularly undergo inspections to confirm that their configuration is consistent with the plant licensing basis. This screen further reduced the components on the list (from Screen #1) of any Seismic Category I (Class I) Structures, Containment Penetrations, Seismic Category I (Class I) Piping Systems, cable/conduit raceways and HVAC ductwork.

3. **Screen #3 – Support for the Five Safety Functions**

This screen narrowed the scope of items included on the SWEL 1 to only those associated with maintaining the following five safety functions:

A. Reactor Reactivity Control (RRC)

B. Reactor Coolant Pressure Control (RCPC)

C. Reactor Coolant Inventory Control (RCIC)

D. Decay Heat Removal (DHR)

E. Containment Function (CF)

The first four functions are associated with bringing the reactor to a safe shutdown condition. The fifth function is associated with maintaining containment integrity.

As described in Appendix E of Reference 1, the safety function for each item on the final SWEL 1 list was identified. It is noted that items on SWEL 1 with a specific safety function(s) are considered frontline systems. Items with a safety function designation of 'Support System HVAC', 'Support System AC Power', 'Support System DC Power', 'Engineered Safety Features Actuation System' (ESFAS) or 'Cooling Water' may be a frontline or support system. Items with a safety function designation of 'Support System HVAC' (SSHVAC), 'Support System AC Power' (SSAC), 'Support System DC Power' (SSDC), 'Engineered Safety Features Actuation System' (ESFAS), 'Support System Compressed Air' (SSCA) or 'Cooling Water' (UHS) support at least one of the five safety functions. However, the specific safety function(s) is not identified as identification of the specific safety function(s) is not required by Reference 1.

The resultant equipment list after Screen #3 is defined in the EPRI guidance document as Base List 1 and is included in Appendix B. (Ref. 1)

4. **Screen #4 – Sample Considerations**

This screen is intended to result in a SWEL 1 that sufficiently represents a broad population of plant Seismic Category 1 (Class I) equipment and systems to meet

the objectives of the NRC 50.54(f) letter. The following attributes were considered in the selection process for items included on SWEL 1:

A. A variety of types of systems

The system is identified for each item on SWEL 1. The equipment included on SWEL 1 is a representative sample of several systems that perform one or more safety functions. Further, the systems represented include both frontline and support systems as listed in Reference 1 Appendix E: Systems to Support Safety Function(s).

B. Major new and replacement equipment

The equipment included on SWEL 1 includes items that have been modified or replaced over the past several years. Each item on SWEL 1 that is new or replaced is identified.

C. A variety of types of equipment

The equipment class is identified for each item on SWEL 1. The equipment included on SWEL 1 is a representative sample from each of the classes of equipment listed in Reference 1 Appendix B: Classes of Equipment. Where appropriate, at least one piece of equipment from each class is included on SWEL 1.

Screening #1, #2, and #3 resulted in no equipment in the following classes:

- (13) Motor Generators
- (19) Temperature Sensors.

D. A variety of environments

The location for each item is identified on SWEL 1. The equipment included on SWEL 1 is a representative sample from a variety of environments (locations) in the station.

E. Equipment enhanced due to vulnerabilities identified during the IPEEE program.

The equipment included on SWEL 1 includes items that were enhanced as a result of the IPEEE program. Each item on SWEL 1 that was enhanced as a result of the IPEEE effort is identified.

F. Contribution to risk

In selecting items for SWEL 1 that met the attributes above, some items with similar attributes were selected based on their higher risk-significance. To determine the relative risk-significance, the Risk Achievement Worth (RAW) and Fussell-Vesely importance for a Loss of Off-Site Power (LOOP) scenario from the internal plant PRA were used. Additionally, the list of risk-significant components for the LOOP PRA were compared with the draft SWEL 1 to confirm that a reasonable sample of risk-significant components (relevant for a seismic event) were included on SWEL 1. (Ref. 8)

4.2.2 SWEL 2 – Spent Fuel Pool Related Items

The process for selecting a sample of SSCs associated with the spent fuel pool (SFP) began with a review of the station design and licensing basis documentation for the

SFP and the interconnecting SFP cooling system. The following four screens narrowed the scope of SSCs to be included on the second Seismic Walkdown Equipment List (SWEL 2):

1. **Screen #1 - Seismic Category 1**

   Only those items identified as Seismic Category 1 (Class I) are to be included on SWEL 2 with exception of the SFP structure. As described in Reference 1, the adequacy of the SFP structure is assessed by analysis as a Seismic Category 1 (Class I) structure. Therefore, the SFP structure is assumed to be seismically adequate for the purposes of this program and is not included in the scope of items included on SWEL 2.

   Per the Three Mile Island UFSAR Chapter 5, portions of the SFP system is Class I and screen into the SWEL 2 list. These Class I SSCs include: spent fuel pumps, heat exchangers, all process and instrument piping and valves, etc. (Ref. 2)

   Reference 9 was also utilized to develop the list of components to be included on SWEL 2. Items with a QA Class of "Q" were added for further consideration for inclusion on SWEL 2. QA Class "Q" items are defined as Safety Related Equipment/Component.

2. **Screen #2 – Equipment or Systems**

   This screen considers only those items associated with the SFP that are appropriate for an equipment walkdown process.

3. **Screen #3 – Sample Considerations**

   This screen represents a process that was intended to result in a SWEL 2 that sufficiently represents a population of SFP Seismic Category I (Class I) equipment and systems to meet the objectives of the NRC 50.54(f) letter. The following attributes to be considered in the development of SWEL 2:

   A. A variety of types of systems

      Two systems are identified for the items on SWEL 2. The equipment included on SWEL 2 is a representative sample of the systems associated with the SFP and its cooling system.

   B. Major new and replacement equipment

      No such equipment has been identified.

   C. A variety of types of equipment

      The equipment class is identified for each item on SWEL 2. The equipment included on SWEL 2 is a representative sample from each of the classes of equipment listed in Reference 1 Appendix B: Classes of Equipment. Where appropriate, at least one piece of equipment from each class is included on SWEL 2.

      The classes/types of equipment include; (0) Other (manual valves), (01) Motor Control Centers and Wall-Mounted Contactors, (05) Horizontal Pumps, (21) Tanks and Heat Exchangers, (18) Instrument Racks, and (07) Pneumatic Operated Valves.

D. A variety of environments

The location for each item is identified on SWEL 2. The equipment included on SWEL 2 is a representative sample from a variety of environments (locations) for equipment associated with the SFP and its cooling system. All but one item are in the Fuel Handling Building.

4. Screen #4 – Rapid Drain-Down

This screen identifies items that could allow the spent fuel pool to drain rapidly. Consistent with Reference 1, the scope of items included in this screen is limited to the hydraulic lines connected to the SFP and the equipment connected to those lines. For the purposes of this program it is assumed the SFP gates are installed and the SFP cooling system is in its normal alignment for power operations. The SFP gates are passive devices that are integral to the SFP. As such, they are considered capable of withstanding a design basis earthquake without failure and do not allow for a rapid drain-down of the SFP.

The SSCs identified in this screen are not limited to Seismic Category 1 (Class I) items, but is limited to those items that could allow rapid drain-down of the SFP. Rapid drain-down is defined as lowering of the water level to the top of the fuel assemblies within 72 hours after the earthquake.

Excerpts from the TMI Unit 1 UFSAR 9.4 Description state:

"The most serious failure of the Spent Fuel Cooling System would be complete loss of water from both spent fuel storage pools. To protect against this possibility, the cooling water inlet and outlet connections to spent fuel pool B all enter slightly below, or at, the normal water level in the pool.

Fuel pool A has a drain connection from the spent fuel cooling system extending downward from elevation 330 ft (10 ft above the top of fuel stored in this pool) to 2 inches above the bottom of the pool. This line has a siphon breaker with a normally locked open valve to prevent water from siphoning from the pool below elevation 330 ft in the highly unlikely event that the line should break outside the pool."

The Class I spent fuel cooling system shown in Drawing 302-630 consists of two complete cooling trains. (Ref. 4) With the exception of the A Spent Fuel Pool drain line, the spent fuel system piping arrangement precludes siphoning with connections just below the normal water level.

As stated in the TMI UFSAR, fuel pool A has a drain connection from the spent fuel cooling system extending downward from elevation 330 ft (10 ft above the top of fuel stored in this pool) to 2 inches above the bottom of the pool. Per Reference 4, there is an anti-siphon valve, SF-V-48, in this drain line upstream of the manual isolation valve SF-V-38. Downstream of valve SF-V-38, there are no other valves until manual valve SF-V-37, which isolates the drain from the suction of the Borated Water Recirculation Pump. A Rapid Drain Down transient is possible during the draining of Fuel Pool A. Therefore, manual valves SF-V-37, SF-V-38, and SF-V-48 are included in the SWEL 2 list. Further analysis may determine a failure of the A Fuel Pool drain line is not credible or the flow rate is limited to the extent that any fuel elements in the A Fuel Pool remain appropriately immersed. However, including these components in the seismic walkdown is prudent to ascertain the seismic capacity of this flow path.

5 Seismic Walkdowns and Area Walk-Bys

5.1 Overview

Seismic Walkdowns and Area Walk-Bys were conducted by two (2) person teams of trained Seismic Walkdown Engineers (SWEs), in accordance with the EPRI guidance document during the weeks of August 13, 2012 and August 24, 2012. The Seismic Walkdowns and Area Walk-Bys are discussed in more detail in the following sub-sections.

Consistent with the EPRI guidance document, Section 4: Seismic Walkdowns and Area Walk-Bys, the SWEs used their engineering judgment, based on their experience and training, to identify potentially adverse seismic conditions. Where needed, the engineers were provided the latitude to rely upon new or existing analyses to inform their judgment.

The SWEs conducted the Seismic Walkdowns and Area Walk-Bys together as a team. During the evaluations, the SWEs actively discussed their observations and judgments with each other. The results of the Seismic Walkdowns and Area Walk-Bys reported herein are based on the comprehensive agreement of the SWEs.

5.2 Seismic Walkdowns

The Seismic Walkdowns focused on the seismic adequacy of the items on the SWEL (SWEL 1 and SWEL 2) as provided in Appendix B of this report. The Seismic Walkdowns also evaluated the potential for nearby SSCs to cause adverse seismic interactions with the SWEL items. The Seismic Walkdowns focused on the following adverse seismic conditions associated with the subject item of equipment:

- Adverse anchorage conditions
- Adverse seismic spatial interactions
- Other adverse seismic conditions

The results of the Seismic Walkdowns have been documented on the Seismic Walkdown Checklist (SWC) provided in the EPRI guidance document, Appendix C. Seismic Walkdowns were performed and a SWC completed for 91 of the 106 items identified on the TMI Unit 1 SWEL. This includes five (5) deferred items that were inspected the week of August 24, 2012 during the unit outage. The completed SWCs are provided in Appendix C of this report. Additionally, photos have been included with most SWCs to provide a visual record of the item along with any comments noted on the SWC. Drawings and other plant records are cited in some of the SWCs, but are not included with the SWCs because they are readily retrievable documents through the station's document management system. Information on anchorage that was obtained from the previously performed Seismic Qualification Utility Group (SQUG) walkdowns are included in the SWCs since this information, in part, was used for the anchorage verification.

Seismic Walkdowns for the remaining 15 components were deferred. These components are configured with anchorage that is internal to the component and it was not opened to allow for inspection of the anchorage. Anchorage inspections for these items will be completed at a later time when the equipment is accessible. Appendix E of this report identifies the deferred equipment along with the plan for future Seismic Walkdowns.

The following subsections describe the approach followed by the SWEs to identify potentially adverse anchorage conditions, adverse seismic interactions, and other adverse seismic conditions during the Seismic Walkdowns.

5.2.1 *Adverse Anchorage Conditions*

Guidance for identifying anchorage that could be degraded, non-conforming, or unanalyzed relied on visual inspections of the anchorage and verification of anchorage configuration. Details for these two types of evaluations are provided in the following two subsections.

The evaluation of potentially adverse anchorage conditions described in this subsection applies to the anchorage connections that attach the identified item of equipment to the civil structure on which it is mounted. For example, the welded connections that secure the base of a Motor Control Center (MCC) to the steel embedment in the concrete floor would be evaluated in this subsection. Evaluation of the connections that secure components within the MCC is covered later in the subsection "Other Adverse Seismic Conditions."

Visual Inspections

The purpose of the visual inspections was to identify whether any of the following potentially adverse anchorage conditions were present:

- Bent, broken, missing, or loose hardware
- Corrosion that is more than mild surface oxidation
- Visible cracks in the concrete near the anchors
- Other potentially adverse seismic conditions

Based on the results of the visual inspection, the SWEs judged whether the anchorage was potentially degraded, non-conforming, or unanalyzed. The results of the visual inspection were documented on the SWC, as appropriate. If there was clearly no evidence of degraded, nonconforming, or unanalyzed conditions, then it was indicated on the checklist and a licensing basis evaluation was not necessary. However, if it was not possible to judge whether the anchorage is degraded, nonconforming, or unanalyzed, then the condition was entered into the Corrective Action Program (CAP) as a potentially adverse seismic condition.

5.2.2 *Configuration Verification*

In addition to the visual inspections of the anchorage as described above, the configuration of the installed anchorage was verified to be consistent with existing plant documentation for at least 50% of the items on the SWEL.

Line-mounted equipment (e.g., valves mounted on pipelines without separate anchorage) was not evaluated for anchorage adequacy and was not counted in establishing the 50% sample size.

Examples of documentation that was considered to verify that the anchorage installation configurations are consistent with the plant documentation include the following:

- Design drawings
- Seismic qualification reports of analyses or shake table tests
- IPEEE or USI A-46 program documentation, as applicable

The Table C-1 of Appendix C indicates the anchorage verification status for components as follows:

N/A: components that are line-mounted and/or are not directly anchored (with separate anchorage) to the civil structure and therefore do not count in the anchorage confirmation total

Y: components that are anchored to the civil structure which were confirmed to be consistent with design drawings and/or other plant documentation

N: components that are anchored to the civil structure for which anchorage drawings were not identified and/or retrieved

See Table 5-1 below for the accounting of the 50% anchorage configuration confirmations, and the individual SWC forms in Appendix C for the specific drawings used for each anchorage verification confirmation.

Table 5-1. Anchorage Configuration Confirmation

SWEL	No. of SWEL Items (A)	N/A Items (B)	Required to Confirm? (A-B)/2	Items Confirmed
Total	106	27	40	58

5.2.3 Adverse Seismic Spatial Interactions

An adverse seismic spatial interaction is the physical interaction between the SWEL item and a nearby SSC caused by relative motion between the two during an earthquake. An inspection was performed in the area adjacent to and surrounding the SWEL item to identify any seismic interaction conditions that could adversely affect the capability of that SWEL item to perform its intended safety-related functions.

The three types of seismic spatial interaction effects that were considered are:

- Proximity
- Failure and falling of SSCs (Seismic II over I)
- Flexibility of attached lines and cables

Detailed guidance for evaluating each of these types of seismic spatial interactions is described in the EPRI guidance document, Appendix D: Seismic Spatial Interaction.

The Seismic Walkdown Engineers exercised their judgment to identify seismic interaction hazards. Section 5.2.5 provides a summary of issues identified during the Seismic Walkdowns.

5.2.4 *Other Adverse Seismic Conditions*

In addition to adverse anchorage conditions and adverse seismic interactions, described above, other potentially adverse seismic conditions that could challenge the seismic adequacy of a SWEL item could have been present. Examples of the types of conditions that could pose potentially adverse seismic conditions include the following:

- Degraded conditions
- Loose or missing fasteners that secure internal or external components to equipment
- Large, heavy components mounted on a cabinet that are not typically included by the original equipment manufacturer
- Cabinet doors or panels that are not latched or fastened
- Other adverse conditions

Any identified other adverse seismic conditions are documented on the items' SWC, as applicable.

5.2.5 *Conditions Identification during Seismic Walkdowns*

Table 5-2 provides a summary of conditions identified during the equipment Seismic Walkdowns. The equipment Seismic Walkdowns resulted in a total of eleven (11) conditions identified and each of these was entered into the station's Corrective Action Program (CAP).

One (1) condition (IR 1400723) was determined to be a potential adverse seismic condition for which the component (AH-E-18B) was declared inoperable. Further evaluation completed through the CAP concluded the as-found condition was degraded though capable of withstanding seismic loads and performing its design function(s). Due to the nature of this condition it was concluded the condition was an adverse seismic condition. The condition was addressed via work order (M2310468) to correct the as-found condition to the design configuration.

The remaining ten (10) conditions were assessed and it was concluded that the conditions were not adverse seismic conditions.

5.3 AREA WALK-BYS

The purpose of the Area Walk-Bys is to identify potentially adverse seismic conditions associated with other SSCs located in the vicinity of the SWEL items. Vicinity is generally defined as the room containing the SWEL item. If the room is very large (e.g., Turbine Hall), then the vicinity is identified based on judgment, e.g., on the order of about 35 feet from the SWEL item. This vicinity is described on the Area Walk-By Checklist (AWC), shown in Appendix D of this report. A total of 42 AWCs were

completed for TMI Unit 1. It is noted that additional AWCs will be completed as deferred and supplemental inspections are completed.

The key examination factors that were considered during Area Walk-Bys include the following:

- Anchorage conditions (if visible without opening equipment)
- Significantly degraded equipment in the area
- A visual assessment (from the floor) of cable/conduit raceways and HVAC ducting (e.g., condition of supports or fill conditions of cable trays)
- Potentially adverse seismic interactions including those that could cause flooding, spray, and fires in the area
- Other housekeeping items that could cause adverse seismic interaction (including temporary installations and equipment storage)
- Scaffold construction was inspected to meet Exelon Procedure NES-MS-04.1, Seismic Prequalified Scaffolds
- Seismic housekeeping was examined to meet station procedure AP 1015, Equipment Storage Inside Class I Buildings

The Area Walk-Bys are intended to identify adverse seismic conditions that are readily identified by visual inspection, without necessarily stopping to open cabinets or taking an extended look. Therefore, the Area Walk-By took significantly less time than it took to conduct the Seismic Walkdowns described above for a SWEL item. If a potentially adverse seismic condition was identified during the Area Walk-By, then additional time was taken, as necessary, to evaluate adequately whether there was an adverse condition and to document any findings.

The results of the Area Walk-Bys are documented on the AWCs included in Appendix D of this report. A separate AWC was filled out for each area inspected. A single AWC was completed for areas where more than one SWEL item was located.

Additional details for evaluating the potential for adverse seismic interactions that could cause flooding, spray, or fire in the area are provided in the following two subsections.

Seismically-Induced Flooding/Spray Interactions

Seismically-induced flooding/spray interactions are the effect of possible ruptures of vessels or piping systems that could spray, flood or cascade water into the area where SWEL items are located. This type of seismic interaction was considered during the IPEEE program. Those prior evaluations were considered, as applicable, as information for the Area Walk-Bys.

One area of particular concern to the industry is threaded fire protection piping with long unsupported spans. If adequate seismic supports are present or there are isolation valves near the tanks or charging sources, flooding may not be a concern. Numerous failures have been observed in past earthquakes resulting from sprinkler head impact. Less frequent but commonly observed failures have occurred due to flexible headers and stiff branch pipes, non-ductile mechanical couplings, seismic anchor motion and failed supports.

Examples where seismically-induced flooding/spray interactions could occur include the following:

- Fire protection piping with inadequate clearance around fusible-link sprinkler heads
- Non-ductile mechanical and threaded piping couplings can fail and lead to flooding or spray of equipment
- Long, unsupported spans of threaded fire protection piping
- Flexible headers with stiffly supported branch lines
- Non-Seismic Category I tanks

The SWEs exercised their judgment to identify only those seismically-induced interactions that could lead to flooding or spray.

Seismically-Induced Fire Interactions

Seismically-induced fire interactions can occur when equipment or systems containing hazardous/flammable material fail or rupture. This type of seismic interaction was considered during the IPEEE program. Those prior evaluations were considered, as applicable, as information for the Area Walk-Bys.

Examples where seismically-induced fire interactions could occur include the following:

- Hazardous/flammable material stored in inadequately anchored drums, inadequately anchored shelves, or unlocked cabinets
- Natural gas lines and their attachment to equipment or buildings
- Bottles containing acetylene or similar flammable chemicals
- Hydrogen lines and bottles

Another example where seismically-induced fire interaction could occur is when there is relative motion between a high voltage item of equipment (e.g., 4160 volt transformer) and an adjacent support structure when they have different foundations. This relative motion can cause high voltage busbars, which pass between the two, to short out against the grounded bus duct surrounding the busbars and cause a fire.

The Seismic Walkdown Engineers exercised their judgment to identify only those seismically-induced interactions that could lead to fires.

5.3.1 Conditions Identification during Area Walk-bys

Table 5-3 at the end of this section provides a summary of the conditions identified during the Area Walk-Bys. Eight (8) conditions were identified during the Area Walk-Bys and entered into the station CAP. No potentially adverse seismic conditions were identified that resulted in a seismic licensing basis evaluation. No seismically-induced flooding or spray interactions were identified during the Area Walk-Bys. No seismically-induced fire interactions were identified during the Area Walk-Bys.

5.4 SUPPLEMENTAL INFORMATION ON ELECTRICAL CABINET INSPECTIONS

Following the completion of the online seismic walkdowns, the industry was made aware that the NRC staff had clarified a position on opening electrical cabinets to inspect for other adverse seismic conditions. The purpose for opening these cabinets is to inspect for evidence of:

- internal components not being adequately secured,

- whether fasteners securing adjacent cabinets together are in place, and
- other adverse seismic conditions.

Appendix E of this report includes Table E-2 which identifies components in the specified equipment classes that would be considered as electrical cabinets:

1. Motor Control Centers and Wall-Mounted Contactors
2. Low Voltage Switchgear and Breaker Panels
3. Medium Voltage, Metal-Clad Switchgear
4. Transformers
14. Distribution Panels and Automatic Transfer Switches
16. Battery Chargers and Inverters
20. Instrumentation and Control Panels

Components that are identified on Table E-1 (inaccessible and deferred components) are not listed on Table E-2 to avoid redundancy. Table E-2 indicates internal accessibility of each cabinet. Cabinets that have been identified as requiring these supplemental internal inspections are those with doors or panels with latches or thumbscrews and can be readily opened during normal maintenance activities. Also provided for each cabinet is a proposed milestone schedule for performing these internal inspections and the associated station tracking number (IR number).

The Seismic Walkdown Checklists (SWC) for the components identified in Table E-2 that can be opened for internal inspections will be revised at the time of the supplemental walkdown to indicate the results of these internal inspections.

Table 5-2. Conditions Identified during Seismic Walkdowns

Item ID	Description of Issue	Action Request ID (IR)	Actions Complete Yes/No[1, 2]
SF-V-35	The tightness of one baseplate bolt (out of four) was in question for a wall mounted pipe support above SF-V-35. Bolt appears to be loose.	1401220	Yes
RR-V-6	The handwheel on valve RR-V-6 appears to be slightly bent.	1400293	Yes
NR-V-0001B	The electrical armored cable elbow fitting at the operator motor for NR-V-1B valve is slightly loose.	1402599	Yes
NR-P-0001B	Document inconsistency for NR pumps upper restrains that where no longer installed.	1401674	Yes
IS-480V-ES-SWGR	A single end cover plate fastener (bolt) was discovered to be loose on the 1S-480 Volt Switchgear	1401212	No
IB DG CNPL	No labels were found for DIESEL GEN 1B ENGINE CONT RELAY PANEL and DIESEL GEN 1A ENGINE CONT RELAY PANEL	1400590	Yes
EED-B-1B	The gap between the battery rack end-rails and the Battery No. 33 was not as tight as the others.	1401981	Yes
DH-V-0005B	Boron deposits on the bonnet to valve bolting (carbon steel) with minor corrosion indications. BACC program to investigate if previously identified packing leaks (IR 426184) included the effects on the bolting.	1401947	Yes
DF-P-0001B	The electrical conduit elbow for the DF-P-1B pump is slightly loose.	1400586	Yes
AH-E-18B	Missing bolts on the AH-E-18B fan support frame. No bolts where present at the south side (3 holes) and only two bolts out of three were present at the north side.	1400723	Yes
1B-480-V-ES-SWGR	A screw fastener was discovered missing from the north end cover panel of the Motor Control Center (MCC).	1401217	Yes

Notes:
1) "Yes" indicates that any corrective actions resulting from the issue are complete
2) "No" indicates that any corrective actions resulting from the issue are NOT complete. Actions are tracked by the IR number in the station Corrective Action Program.

Table 5-3. Conditions Identified during Area Walk-Bys

Item ID	Description of Issue	Action Request ID (IR)	Actions Complete Yes/No[1, 2]
Area 1: IA-T-0019 Room	Instrumentation tubing support configuration associated with BS-PS-286/933 utilizes unistrut direct attachment supports with a single concrete expansion anchor	1402062	Yes
Area 10: IB-480V-ESV Room	An open conduit cover with 480V wire exiting conduit was observed on top of 1A RADWASTE 480V Motor Control Center (MCC).	1402066	Yes
Area 13: Intermediate Closed Pump Area	The upper wall mounting clamp on instrument line for FW-V-1073 was not attached to the line and the lower clamp was misaligned.	1400290	Yes
Area 15: Shielded Area	Discovered a pair of blue-handled pliers apparently abandoned on the valve to bonnet flange, DH-V-5B. The valve is within a contaminated area.	1401978	Yes
Area 23: Relay Room	Electrical power cord (extension) that came out from the Relay Room Catwalk (near XCR cabinet) and did not seems to have any additional restrain / tie-off.	1401695	Yes
Area 24: 1B Inverter Room	EED-PNL-1J, located in the Control Building B Inverter Room was found to have the door secured in the closed position with two short strips of yellow and black caution tape.	1402668	Yes
Area 39: RB 308 West	An electrical Conduit Cover near MS-PT-1184 was found to be open and held with one bolt out of two. Second bolt was missing.	1404814	No
Area 17: Chiller Room Area 20: ESAS Room Area 23: Relay Room	Light fixtures located at the center and SW side of the ESAS room, at the center and SW side of the chillers room, and near the XCLA cabinet where observed to have open S-Hooks. No seismic interaction concern.	1401692	Yes

Notes:
1) "Yes" indicates that any corrective actions resulting from the issue are complete
2) "No" indicates that any corrective actions resulting from the issue are NOT complete. Actions are tracked by the IR number in the station Corrective Action Program.

6 Licensing Basis Evaluations

The EPRI guidance document, Section 5: Seismic Licensing Basis Evaluation provides a detailed process to perform and document seismic licensing basis evaluations of SSCs identified when potentially adverse seismic conditions are identified. The process provides a means to identify, evaluate and document how the identified potentially adverse seismic condition meets a station's seismic licensing basis without entering the condition into a station's Corrective Action Program (CAP). In lieu of this process, Exelon/TMI utilized the existing processes and procedures (Site CAP Expectations) to identify, evaluate and document conditions identified during the Seismic Walkdowns.

In accordance with Exelon/TMI processes and procedures, all questionable conditions identified by the SWEs during the walkdowns were entered into the station CAP to be further evaluated and addressed as required. The SWEs provided input to support the identification and evaluation (including seismic licensing basis evaluations, as required) of the potentially adverse seismic conditions entered into the CAP. The station corrective action program is a more robust process than that provided in the EPRI guidance document; in part, ensuring each condition is properly evaluated for conformance with design and licensing bases and corrected as required.

Conditions identified during the walkdowns were documented on the SWCs, AWCs, and entered into the CAP. For those conditions that required, seismic licensing basis evaluations were completed and documented within the IR. Tables 5-2 and 5-3 in the report provide the IR number, a summary of the condition, and the action completion status.

7

IPEEE Vulnerabilities Resolution Report

Per the Individual Plant Examination of External Events (IPEEE) Submittal for TMI Unit 1 and the NRC Staff Evaluation Report of the IPEEE, vulnerability was defined as any core damage sequence greater than 1x10-4/yr or any containment bypass or large early containment failure greater than 1x10-6/yr. (Ref. 3 and 7) As a result of the seismic PRA analysis, no vulnerabilities were identified. However, plant improvements were identified in Section 7 of Reference 3. Table G-1 in Appendix G lists the plant improvements, the IPEEE proposed resolution, the actual resolution and resolution date. No open items exist as a result of the seismic portion of the IPEEE program.

8 Peer Review

A peer review team consisting of at least two individuals was assembled and peer reviews were performed in accordance with Section 6: Peer Reviews of the EPRI guidance document. The Peer Review process included the following activities:

- Review of the selection of SSCs included on the SWEL
- Review of a sample of the checklists prepared for the Seismic Walkdowns and Area Walk-Bys
- Review of Licensing basis evaluations, as applicable
- Review of the decisions for entering the potentially adverse conditions into the CAP process
- Review of the submittal report
- Provide a summary report of the peer review process in the submittal report

The peer reviews were performed independently from this report and the summary Peer Review Report is provided in Appendix F of this report.

9 References

Reference drawings related to SWEL items are provided in the Seismic Walkdown Checklists and if applicable, in the Area-Walkdown Checklists.

1 EPRI Technical Report 1025286, Seismic Walkdown Guidance for Resolution of Fukushima Near-Term Task Force Recommendation 2.3: Seismic, dated June 2012.

2 Three Mile Island UFSAR (Current Through Revision 21) dated April 2012

3 TMI Unit 1 Individual Plant Examination for External Events (IPEEE), dated December 1994

4 Three Mile Island Station Drawing 302-630 Rev. 32, Spent Fuel Cooling System

5 NRC (E Leeds and M Johnson) Letter to All Power Reactor Licensees et al., "Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendation 2.1, 2.3, and 9.3, of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident," Enclosure 3, "Recommendation 2.3: Seismic," dated March 12, 2012

6 "Recommendations for Enhancing Reactor Safety in the 21st Century: The Near-term Task Force Review of Insights from the Fukushima Dai-ichi Accident," ADAMS Accession No. ML11186107, July 12, 2011

7 Staff Evaluation Report of Individual Plant Examination of External Events (IPEEE) submittal of Three Mile Island Unit 1 dated July 9, 1999

8 Internal RM Document RM-MISC-018, Rev. 0, Risk Ranking to Support NTTF 2.3 Seismic Walkdowns

9 Three Mile Island Three Mile Island Excel Spreadsheet titled: "Q_Class_Components_with_Function.xls"

10 Three Mile Island Excel Spreadsheet titled: "TMI-1 A-46 SSEL.xls"

Annex A

Updated Transmittal # 1

Contents of Annex A

Appendices

Tables

A1 Introduction

A1.1 PURPOSE

This updated transmittal report is being provided in compliance with the requirements contained in the NRC 50.54(f) letter dated March 12, 2012, Enclosure 3, Recommendation 2.3: Seismic. This new report section, Annex A, contains the results of the follow-on inspections activities that have been completed since the initial NRC Transmittal sent by Exelon for Three Mile Island Generating Station Unit 1, under letter number RS-12-175 / TMI-12-161, on November 19, 2012. Annex A, includes follow-on Seismic Walkdown results associated with NRC Commitments 1 & 2 listed in Enclosure 2 of the above Exelon letter. Additionally, the update includes the current status of the resolution of conditions found during the initial Seismic Walkdowns and Area Walk-Bys as documented in Tables 5-2 and Table 5-3 and updated in Table A5-2 and Table A5-3, respectively.

Commitment 1, for the completion of the fifteen (15) remaining inspection (SWEL) items previously deferred due to inaccessibility listed in Table E-1, has been completed. All fifteen (15) inspection items were completed ahead of the commitment date of T1R21 (Fall 2015) and the results are documented in this update.

Commitment 2, for the completion of the fifteen (15) internal electrical cabinet supplemental inspections out of eighteen (18) items listed in Table E-2, has been completed. Fourteen (14) inspection items with one (1) item deemed inaccessible were completed by the commitment date of T1R20 (Fall 2013) and the results are documented in this update.

The initial NRC Transmittal report documented that one (1) condition identified during the seismic walkdowns, and listed in Table 5-2, remained open. This update documents that this condition is now resolved with all follow-on actions complete.

The initial NRC Transmittal report documented that one (1) condition identified during the area walk-bys, and listed in Table 5-3, remained open. This update documents that the condition is now resolved with all follow-on actions complete.

Commitment No. 21 provided on the NRC Transmittal sent by Exelon for Three Mile Island Generating Station Unit 1, under letter number RS-13-213 / TMI-13-109, on September 16, 2013, for completing the Three Mile Island Generating Station Unit 1 delayed inspections by the commitment date of December 31, 2013, has been completed.

Annex A, includes updates to each report section where the status has changed or new information is available in accordance with Section 8 of EPRI Technical Report 1025286, "Seismic Walkdown Guidance – For Resolution of Fukushima Near Term Task Force Recommendation 2.3 Seismic".

A1.2 BACKGROUND

See Section 1.2, no changes resulted from the follow-on walkdowns.

A1.3 PLANT OVERVIEW

See Section 1.3, no changes resulted from the follow-on walkdowns.

A1.4 APPROACH

See Section 1.4, no changes resulted from the follow-on walkdowns.

A1.5 CONCLUSION

As of November 22, 2013, Seismic Walkdowns have been performed at the Three Island Generation Station Unit 1 on fifteen (15) of the fifteen (15) items deferred due to inaccessibility and on fourteen (14) of the eighteen (18) supplemental inspections of electrical cabinets in accordance with the NRC endorsed walkdown methodology. Area Walk-Bys were also completed, as required, during these follow-on activities. Four (4) of the eighteen (18) supplemental inspections of electrical cabinets were deemed inaccessible and are excluded from the inspection. No potentially degraded, nonconforming, or unanalyzed conditions were identified during these follow-on activities. No planned or newly identified protection or mitigation features have resulted from the efforts to address the 50.54(f) letter.

As of November 12, 2013, nineteen (19) of the nineteen (19) conditions identified during the initial Seismic Walkdowns and Area Walk-bys as documented in the Issue Reports listed in Table 5-2 and Table 5-3 of Enclosure 1 of Exelon Letter to the NRC (RS-12-175) have been corrected. Four (4) additional Issue Reports (IRs) where generated from conditions identified during the follow-on Seismic Walkdowns and Supplemental Internal Cabinet Inspections. The four (4) additional conditions identified have been corrected. The updated completion status for the previous and new IRs are shown in Table A5-2 and Table A5-3 in Section A5.4.1 of this Annex A.

A2 Seismic Licensing Basis

See Section 2, no new licensing basis evaluations resulted from the follow-on walkdowns.

A3 Personnel Qualifications

A3.1 Overview

This section of the report identifies the personnel that participated in the NTTF 2.3 Seismic Walkdown efforts. A description of the responsibilities of each Seismic Walkdown participant's role(s) is provided in Section 2 of the EPRI guidance document. Resumes provided in Appendix A and Appendix AA provides detail on each person's qualifications for his or her role.

A3.2 Project Personnel

Table A3-1 below summarizes the names and corresponding roles of personnel who participated in the NTTF 2.3 Seismic Walkdown effort.

Table A3-1 Personnel Roles

Name	Equipment Selection Engineer	Plant Operations	Seismic Walkdown Engineer (SWE)	Licensing Basis Reviewer	IPEEE Reviewer	Peer Reviewer
K. Hull	X					
T.K. Ram	X					
A. Perez						X(1)
S. Baker			X	X		
M. Etre			X	X		
J. Lopez-Ferrer (Exelon)			X	X	X	
T. Bacon						X
W. Djordjevic						X(2)
Michael Wynne (Exelon)		X				
D. Yerkes (Exelon)			X(5)	X(5)		
D. McGettrick (Exelon)						X(4,5)
P. Mullens (Exelon)						X(3,5)

Notes:
1. Peer Review Team member for SWEL review only.
2. Peer Review Team Leader.
3. Annex A Submittal Peer Review Team member
4. Annex A Peer Review Team Leader.
5. New personnel for Annex A follow-on activities. Resumes provided in Appendix AA.

A3.2.1 Stevenson & Associates Personnel

See Section 3.2.1, no changes resulted from the follow-on walkdowns.

A3.2.2 Additional Personnel

The following additional Exelon personnel participated in the follow-on activities: Dave Yerkes, Dennis McGettrick, and Patrick Mullens. Dave Yerkes is a degreed civil engineer with over four years of performing structural and piping modifications and analyses for US and international nuclear power plants. Dave Yerkes has completed training for the Seismic Qualification Utility Group (SQUG) Walkdown Screening and Seismic Evaluation Training Course and the Near Term Task Force Recommendation 2.3 seismic walkdown training provided by the Electric Power Research Institute (EPRI). Dennis McGettrick is a degree electrical engineer, has over thirty years of nuclear design experience and has been trained in the Verification of the Seismic Adequacy of Power Plant Equipment by the Seismic Experience Data Method. Patrick Mullens is a degreed civil engineer, has nearly three years of nuclear design experience related to civil and structural engineering, and over four years of construction management experience. Refer to sections AA on this Annex A for their experience description and resume.

A4 Selection of SSCs

Refer to Section 4, no changes were made to the SWEL for the follow-on walkdowns and Annex A.

A5 Seismic Walkdowns and Area Walk-bys

A5.1 Overview

Follow-on Seismic Walkdowns and Area Walk-Bys were conducted by a two (2) person team of trained Seismic Walkdown Engineers (SWEs), in accordance with the EPRI guidance document during the fourth quarter of 2012 and fourth quarter of 2013. The Seismic Walkdowns and Area Walk-Bys are discussed in more detail in the following sub-sections.

Consistent with the EPRI guidance document, Section 4: Seismic Walkdowns and Area Walk-Bys, the SWEs used their engineering judgment, based on their experience and training, to identify potentially adverse seismic conditions. Where needed, the engineers were provided the latitude to rely upon new or existing analyses to support their judgment.

The SWEs conducted the Seismic Walkdowns and Area Walk-Bys together as a team. During the evaluations, the SWEs actively discussed their observations and judgments with each other. The results of the Seismic Walkdowns and Area Walk-Bys reported herein are based on the comprehensive agreement of the SWEs.

A5.2 Seismic Walkdowns

These follow-on Seismic Walkdowns focused on the seismic adequacy of the items previously deferred due to inaccessibility as listed on Table E-1 of the initial report. The Seismic Walkdowns also evaluated the potential for nearby SSCs to cause adverse seismic interactions with the SWEL items being inspected. The Seismic Walkdowns focused on the following adverse seismic conditions associated with the subject equipment:

- Adverse anchorage conditions
- Adverse seismic spatial interactions
- Other adverse seismic conditions

The results of the follow-on Seismic Walkdowns were documented in Appendix AC of this Annex A, using the Seismic Walkdown Checklist (SWC) template provided in the EPRI guidance document. Seismic Walkdowns were performed and SWCs were completed for all fifteen (15) deferred items identified on Table E-1 of this report. Additionally, photos have been included with most SWCs to provide a visual record of the item along with any comments noted on the SWC. Drawings and other plant records are cited in some of the SWCs, but are not included with the SWCs because they are readily retrievable documents through the station's document management system.

The following subsections describe the approach followed by the SWEs to identify potentially adverse anchorage conditions, adverse seismic interactions, and other adverse seismic conditions during the Seismic Walkdowns.

A5.2.1 Adverse Anchorage Conditions

See Section 5.2.1, no adverse anchorage conditions were identified during the follow-on walkdowns.

A5.2.2 Configuration Verification

See Section 5.2.2, no additional configuration verification was required for the follow-on walkdowns.

A5.2.3 Adverse Seismic Spatial Interactions

See Section 5.2.3, no adverse seismic spatial interactions were identified during the follow-on walkdowns.

A5.2.4 Other Adverse Seismic Conditions

See Section 5.2.4, no other adverse seismic conditions were identified during the follow-on walkdowns.

A5.2.5 Conditions Identification during Seismic Walkdowns

The follow-on equipment Seismic Walkdowns resulted in a total of two (2) conditions identified and each of these was entered into the station's Corrective Action Program (CAP). These two (2) conditions were assessed and it was concluded that the conditions were not adverse seismic conditions. Corrective actions were completed to address the two (2) conditions.

Per Section 5.2.5 and Table 5-2, during the previous Seismic Walkdowns eleven (11) conditions were identified and entered into the station's Corrective Action Program. Corrective actions were completed to address ten (10) of the eleven (11) initial conditions. Subsequent to the issuance of the last report one (1) additional corrective action was completed to address the remaining condition.

Table A5-2 of this Annex A provides an updated summary of conditions identified during the Seismic Walkdowns and the status of the corrective actions to address these conditions. All Table A5-2 items have been completed.

A5.3 AREA WALK-BYS

The purpose of the Area Walk-Bys is to identify potentially adverse seismic conditions associated with other SSCs located in the vicinity of the SWEL items being inspected. Vicinity is generally defined as the room containing the SWEL item. If the room is very large (e.g., Turbine Hall), then the vicinity is identified based on judgment, e.g., on the order of about 35 feet from the SWEL item. This vicinity is described on the Area Walk-By Checklist (AWC), shown in Appendix D of Enclosure 1 of Exelon Letter to the NRC

(RS-12-175). A total of 42 AWCs were completed for TMI Unit 1 for the initial report. One (1) updated AWC was completed for Three Mile Island Unit 1 as a result of these follow-on walkdowns.

The key examination factors that were considered during Area Walk-Bys include the following:

- Anchorage conditions (if visible without opening equipment)
- Significantly degraded equipment in the area
- A visual assessment (from the floor) of cable/conduit raceways and HVAC ducting (e.g., condition of supports or fill conditions of cable trays)
- Potentially adverse seismic interactions including those that could cause flooding, spray, and fires in the area
- Other housekeeping items that could cause adverse seismic interaction (including temporary installations and equipment storage)
- Scaffold construction was inspected to meet Exelon Procedure NES-MS-04.1, Seismic Prequalified Scaffolds
- Seismic housekeeping was examined to meet station procedure AP 1015, Equipment Storage Inside Class I Buildings

The Area Walk-Bys are intended to identify adverse seismic conditions that are readily identified by visual inspection, without necessarily stopping to open cabinets or taking an extended look. Therefore, the Area Walk-By took significantly less time than it took to conduct the Seismic Walkdowns described above for a SWEL item. If a potentially adverse seismic condition was identified during the Area Walk-By, then additional time was taken, as necessary, to evaluate adequately whether there was an adverse condition and to document any findings.

The results of the follow-on Area Walk-Bys are documented on the AWCs included in Appendix AD of this Annex A. A separate AWC was filled out for each area inspected. A single AWC was completed for areas where more than one SWEL item was located.

Additional details for evaluating the potential for adverse seismic interactions that could cause flooding, spray, or fire in the area are provided in section 5.3.

A5.3.1 Conditions Identification During Area Walk-bys

No conditions were identified during the Area Walk-Bys associated with the follow-on walkdowns.

Per Section 5.3.1 and Table 5-3, during the previous Area Walk-bys eight (8) conditions were identified and entered into the station's Corrective Action Program. Corrective actions were completed to address seven (7) of the eight (8) initial conditions. Subsequent to the issuance of the last report one (1) additional corrective action was completed to address the remaining condition.

Table A5-3 of this Annex A provides an updated summary of conditions identified during the Area Walk-bys and the status of the corrective actions to address these conditions.

A5.4 SUPPLEMENTAL INFORMATION ON ELECTRICAL CABINET INSPECTIONS

The purpose of the Supplemental Internal Cabinet Inspections is for opening the cabinets listed in Table E-2 of Enclosure 1 of Exelon Letter to the NRC (RS-12-175) as follow-on of the online seismic walkdowns and inspect for evidence of:

- internal components not being adequately secured,
- whether fasteners securing adjacent cabinets together are in place, and
- other adverse seismic conditions.

The results of the Supplemental Internal Cabinet Inspections were documented in Appendix AC of this Annex using the Seismic Walkdown Checklist (SWC) template provided in the EPRI guidance document. Supplemental Internal Inspections were performed and SWCs were completed for fourteen (14) of the eighteen (18) Supplemental Internal Cabinet Inspection listed on Table E-2 of Enclosure 1 of Exelon Letter to the NRC (RS-12-175). The remaining four (4) equipments were excluded from the inspection due to inaccessibility based on the extensive disassembly requirements to perform the internal inspection and the associated safety and operational hazard. No other adverse anchorage conditions were identified for the fourteen (14) equipments inspected and similar results are expected for the excluded four (4) equipment inspections.

A5.4.1 Conditions Identification During the Supplemental Electrical Cabinet Inspections

The follow-on equipment Supplemental Internal Cabinet Inspections resulted in a total of two (2) conditions identified and each of these was entered into the station's Corrective Action Program (CAP). These two (2) conditions were assessed and it was concluded that the conditions were not adverse seismic conditions.

Table A5-2 of this Annex A includes the two (2) conditions identified during the Supplemental Internal Cabinet Inspections and the status of the corrective actions to address these conditions. Both items have been closed.

Table A5-2. Conditions Identified during Seismic Walkdowns

Item ID	Description of Issue	Action Request ID (IR)	Actions Complete Yes/No[1, 2]
SF-V-35	The tightness of one baseplate bolt (out of four) was in question for a wall mounted pipe support above SF-V-35. Bolt appears to be loose.	1401220	Yes
RR-V-6	The handwheel on valve RR-V-6 appears to be slightly bent.	1400293	Yes
NR-V-0001B	The electrical armored cable elbow fitting at the operator motor for NR-V-1B valve is slightly loose.	1402599	Yes
NR-P-0001B	Document inconsistency for NR pumps upper restrains that where no longer installed.	1401674	Yes
IS-480V-ES-SWGR	A single end cover plate fastener (bolt) was discovered to be loose on the 1S-480 Volt Switchgear	1401212	Yes[3]
IB DG CNPL	No labels were found for Diesel Generator 1B Engine Control Relay Panel and Diesel Generator 1A Engine Control Relay Panel	1400590	Yes
EED-B-1B	The gap between the battery rack end-rails and the Battery No. 33 was not as tight as the others.	1401981	Yes
DH-V-0005B	Boron deposits on the bonnet to valve bolting (carbon steel) with minor corrosion indications. BACC program to investigate if previously identified packing leaks (IR 426184) included the effects on the bolting.	1401947	Yes
DF-P-0001B	The electrical conduit elbow for the DF-P-1B pump is slightly loose.	1400586	Yes
AH-E-18B	Missing bolts on the AH-E-18B fan support frame. No bolts where present at the south side (3 holes) and only two bolts out of three were present at the north side.	1400723	Yes
1B-480-V-ES-SWGR	A screw fastener was discovered missing from the north end cover panel of the Motor Control Center (MCC).	1401217	Yes
RR-S-1B	Ground connection on the RR-S-1B Control Panel was observed to be loose	1439557	Yes[3]
EE-INV-1F	Upper right nut for the power terminal board restrain (rear panel) on the 1F Inverter is not fully engage.	1439548	Yes[3]
1B-480V-ES	Bolt found inside the MCC on Southwest Lower Area	1584220	Yes[3]
1T-480V-SHES-SWGR	1T-480V-SHES5-2 Relay had only 2 out of 4 screws installed	1583783	Yes[3]

Notes:
1) "Yes" indicates that any corrective actions resulting from the issue are complete.
2) "No" indicates that any corrective actions resulting from the issue are NOT complete. Actions are tracked by the IR number in the station Corrective Action Program.
3) Action is new or was updated from initial report.

Table A5-3. Conditions Identified during Area Walk-Bys

Item ID	Description of Issue	Action Request ID (IR)	Actions Complete Yes/No[1, 2]
Area 1: IA-T-0019 Room	Instrumentation tubing support configuration associated with BS-PS-286/933 utilizes unistrut direct attachment supports with a single concrete expansion anchor	1402062	Yes
Area 10: IB-480V-ESV Room	An open conduit cover with 480V wire exiting conduit was observed on top of 1A RADWASTE 480V Motor Control Center (MCC).	1402066	Yes
Area 13: Intermediate Closed Pump Area	The upper wall mounting clamp on instrument line for FW-V-1073 was not attached to the line and the lower clamp was misaligned.	1400290	Yes
Area 15: Shielded Area	Discovered a pair of blue-handled pliers apparently abandoned on the valve to bonnet flange, DH-V-5B. The valve is within a contaminated area.	1401978	Yes
Area 23: Relay Room	Electrical power cord (extension) that came out from the Relay Room Catwalk (near XCR cabinet) and did not seems to have any additional restrain / tie-off.	1401695	Yes
Area 24: 1B Inverter Room	EED-PNL-1J, located in the Control Building B Inverter Room was found to have the door secured in the closed position with two short strips of yellow and black caution tape.	1402668	Yes
Area 39: RB 308 West	An electrical Conduit Cover near MS-PT-1184 was found to be open and held with one bolt out of two. Second bolt was missing.	1404814	Yes[3]
Area 17: Chiller Room Area 20: ESAS Room Area 23: Relay Room	Light fixtures located at the center and SW side of the ESAS room, at the center and SW side of the chillers room, and near the XCLA cabinet where observed to have open S-Hooks. No seismic interaction concern.	1401692	Yes

Notes:
1) "Yes" indicates that any corrective actions resulting from the issue are complete.
2) "No" indicates that any corrective actions resulting from the issue are NOT complete. Actions are tracked by the IR number in the station Corrective Action Program.
3) Action is new or was updated from initial report.

A6 Licensing Basis Evaluations

See Section 6, no new licensing basis evaluations were performed as a result of conditions identified during the follow-on Walkdowns or Area walk-Bys.

A7 IPEEE Vulnerabilities Resolution Report

See Section 7, no changes to the IPEEE vulnerabilities resolution were made for this Annex A.

A8 Peer Review

A peer review team consisting of at least two individuals was assembled and peer reviews were performed in accordance with Section 6: Peer Reviews of the EPRI guidance document. The Peer Review process included the following activities:

- Review of the selection of SSCs included on the SWEL, if the SWEL has been revised.
- Review of a sample of the checklists prepared for the Seismic Walkdowns and Area Walk-Bys
- Review of Licensing basis evaluations, as applicable
- Review of the decisions for entering the potentially adverse conditions into the CAP process
- Review of the submittal report
- Provide a summary report of the peer review process in the submittal report

The peer reviews were performed independently from this report and the summary Peer Review Report is provided in Appendix AF of Annex A.

A9 References

See Section 9, no new references were added for Annex A.

AA
Project Personnel Resumes and SWE Certificates

Resumes and certificates (where applicable) for the following people are found in Appendix A:

Resumes and certificates (where applicable) for the following people are found in Appendix AA of this Annex A:

Exelon Generation®

David R. Yerkes, E.I.T.

Background

Mr. Yerkes has nearly six years of experience in Civil and Structural Engineering. He joined Exelon in 2012 where he works as a member of the Engineering Response Team at Three Mile Island in the Design Engineering Department. He has experience working on seismic, rigging, and stress analyses and performing structural inspection of nuclear power plants. Previously, he worked at WorleyParsons preparing civil and structural design analyses and modifications for nuclear power plants including Palo Verde, Crystal River, V.C. Summer, Robinson, Salem, Susquehanna, and the Krsko Nuclear Power Plant in Slovenia. Areas of proficiency include structural analysis, nonlinear analysis of concrete structures, dynamic analysis of structures for seismic and machine vibration loading, seismic qualification of electrical equipment, steel design, aluminum design, connection design, concrete and anchorage design, pipe support design, scaffolding design, and foundation design.

Professional History

Exelon Generation Co., Middletown, P.A., Civil / Structural Engineer, 2012 – Present.

WorleyParsons, Reading, PA / Civil / Structural Engineer, 2008 - 2012

Responsibilities and Accomplishments

TMI AP 1015 Engineering Coordinator responsible for evaluating equipment storage in class I buildings.

Software Quality Assurance Coordinator at WorleyParsons for various computer programs, including GT Strudl, STAAD.Pro, ADINA, and SHAKE used in the preparation of design documents for civil / structural nuclear projects.

Education

Drexel University, Philadelphia, PA, B.S. Architectural Engineering with Structural Concentration, 2008
Drexel University, Philadelphia, PA, B.S. Civil Engineering, 2008

Registration / Professional License

Engineer-in-Training, Pennsylvania, No. ET011532, 2008

Qualification / Training

EPRI Plant Seismic Walkdowns Training, 2012
SQUG Walkdown Screening and Seismic Evaluation Training, 2013

Membership / Affiliations

American Institute of Steel Construction (AISC)

SQUG

Certificate of Achievement

This is to Certify that

David Yerkes

has Completed the SQUG Walkdown Screening and Seismic Evaluation Training Course

March 4 - 8, 2013

Tiverton, Ontario

Paul D. Baughman, ARES Corporation
Instructor, SQUG Subject Matter Expert

Joel Courtney, Bruce Power
Course Administrator, Senior Technical Engineer

EPRI

Certificate of Completion

David Yerkes

Training on Near Term Task Force Recommendation 2.3 - Plant Seismic Walkdowns

July 19, 2012
Date

R.P. Kassawara
Robert K. Kassawara
EPRI Manager,
Structural Reliability & Integrity

Dennis J. McGettrick, P.E.

Background

Mr. McGettrick has nearly forty years of experience in Design Engineering. He joined TMI Engineering in 1974 where he has worked on projects specific to nuclear power plants as a design engineer. He is experience working on the design basis and operability evaluations, seismic evaluations related to design modifications for nuclear power plants.

Professional History

Exelon Generation Co., Middletown, P.A., 1974 – Present.

Three Mile Island Nuclear Station

2011-Present
Sr. Cyber Security Engineer

Provide senior engineer level expertise in the area of Cyber Security. Duties include being the engineering department primary point of contact for Cyber Security issues and the leader of the cyber security peer group. Accountable for the accuracy, completeness, and timeliness of the work ensuring proper configuration management and assuring that standard design criteria, practices and codes are used in preparation of plans and specifications. Position performs advanced engineering problem solving in support of nuclear operations and is responsible for technical decisions associated with cyber security.

2002-2011
Instrumentation and Controls Engineer in the Emergent Response Team

Responsible for supporting Operations and Maintenance in identifying and resolving issues that potentially could impact plant operations. Role involves performance of troubleshooting, development of Engineering Changes packages, and addressing emergent issues. Interface with Procurement Engineering on emergent material issues related to outage and non-outage needs. Support System Engineering with troubleshooting, project scoping for DCSC presentations, and general design engineering.

Served the role of Engineering Duty Manager which required conducting the daily Engineering morning meeting and corporate daily conference call, supervising a multi-disciplined engineering teams, representing Engineering at daily work management meetings, and directing significant portion of emergent plant issues requiring engineering resolution. Supervised Electrical, Mechanical, and Structural engineers that composed Emergent Response organization.

2000 to 2002
I&C Engineer in Plant Engineering

Provided design engineering support to Operations and Maintenance.
Role included development of Configuration Change packages, calculations, supporting System Engineering.

1983 to 2000
Site Liaison Engineer for GPUNC Technical Functions

Provided a site focal point for communications with GPUN headquarters in providing engineering support for plant outages and emergencies. Perform design engineering for plant modifications. During this time also served as chairman of the B&W Owners Group I&C committee and the Instrument Calibration Reduction Working Group.

1980-1983
Design Engineer
Gannet Fleming
Camp Hill, Pa

Provided engineering design, planning, and construction oversight for both public and private projects related to waste and water treatment facilities and transportation, and clients

1974-1979
I&C Engineer in Plant Engineering
TMI Nuclear Station

Preparation, review, and approval of Operating and Maintenance procedures, design of plant modifications, cognizant engineer on various plant systems, and provided system training for operators.

Education

Pennsylvania State University, 1969-1973

Bachelors of Science in Electrical Engineering Technology

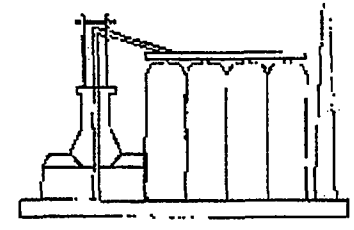
Professional License

Professional Engineer, Commonwealth of Pennsylvania, PE030628E

Qualification / Training

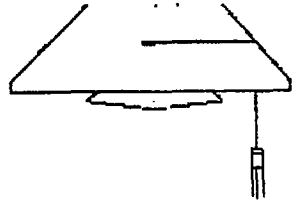
EQE Verification of the Seismic Adequacy of Power Plant Equipment by the Seismic Experience Data Method, 1992

Certification



Dennis McGettrick

has Completed 30 hours of Training in
Procedures for the Verification of the
Seismic Adequacy of Power Plant Equipment
by the Seismic Experience Data Method.



Vice President
EQE Incorporated

Exelon Generation®

Patrick J. Mullens, E.I.T

Background

Mr. Mullens has nearly seven years of experience in Civil and Structural Engineering. He joined Exelon in 2011 where he works on projects specific to nuclear power plants as a design engineer. He is experienced working on the design basis and operability evaluations, seismic and stress analyses, and structural inspection of nuclear power plant structures, systems and components. Previously, he worked as management for construction projects of new and renovated structures.

Professional History

Exelon Generation Co., Middletown, P.A., Civil / Structural Engineer, 2011 – Present.

The Whiting-Turner Contracting Company, Baltimore, MD, Project Manager, 2007-2011

United States Army, Specialist, 2001-2003

Responsibilities and Accomplishments

Lead Responsible Engineer for the Reactor Vessel Internals Support Stand Replacement Modification.

Lead Responsible Engineer for the AH-E-1A Normal Cooling Coils West Bank Replacement Modification.

TMI Structures Monitoring Program manager responsible for performing examinations of Structures, Systems, and Components within the scope of the program and managing, evaluating, and documenting observations from inspections.

TMI Heavy Load Program manager responsible for coordinating, evaluating, and maintaining compliance with the program requirements and commitments.

Engineering Safety Champion representative to observe, enforce, and promote safety program requirements.

Engineering Station Ownership Committee representative to support, review and resolve issue reports in the site Corrective Action Program.

Education

The Pennsylvania State University, B.S. Civil Engineering, 2007

Qualification / Training

Engineer in Training (E.I.T.), October 2006

Membership / Affiliations

North American Young Generation in Nuclear (NA-YGN)

AB

Equipment List

Refer to Section B of Enclosure 1 of Exelon Letter to the NRC (RS-12-175 / TMI-12-161) No changes were made to the equipment list as part of the follow-on actions and Annex A.

AC

Seismic Walkdown Checklists (SWCs)

Table AC-1 provides a description of each item, anchorage verification confirmation, a list of Area Walk-By Checklists associated with each item, comments, and page numbers of each Seismic Walkdown Checklist. All items in Table AC-1 were deferred items listed in Table E-1 of Enclosure 1 of Exelon Letter to the NRC (RS-12-175), and were accessible during the follow-on walkdowns.

Table AC-2 provides a description of each item subject to supplemental internal inspections. All items in Table AC-2 were electrical cabinets subject to Supplemental Internal Inspections as listed in Table E-2 of Enclosure 1 of Exelon Letter to the NRC (RS-12-175), and were accessible without safety and operational hazard.

Table AC-1. Summary of Seismic Walkdown Checklists

ID	Description	Anchorage Configuration Confirmed?	Area Walk-By	Comments	Page
1B DG CNPL	DIESEL GEN 1B - ENGINE CONTROL RELAY PANEL	N	36		AC- 4
1B-480V-ES	480V ENGINEERED SAFEGUARDS MCC 1B	N	18		AC- 7
1B-480V-ESV	1B ENGINEERED SAFEGUARDS VALVES & HEATING CONTROL CENTR	N	10		AC- 11
1B-480V-SHES	480V SCREEN HOUSE ENGINEERED SAFEGUARDS MCC 1B	N	29		AC- 15
1E-4160V-ES	4160V ENGINEERED SAFEGUARDS BUS 1E	N	21		AC- 19
1F-DC	125/250V DC ES DIST PANEL 1F	N	24		AC- 26
1Q-DC	125/250VDC DIST PANEL FOR EDG 1B	N	36		AC- 30
1S-480V-ES SWGR	480V ENGINEERED SAFEGUARDS BUS 1S	N	18		AC- 35
1S-480V-ES XFMR	1S 480V ES SWGR 4160/480V XFMR	N	18		AC- 39
1T-480V-SHES	480V ENGINEERED SAFEGUARDS SCREEN HOUSE BUS 1T	N	29		AC- 43
1T-480V-SHES-XFMR	1T 480V SCREEN HOUSE ES SWGR 4160/480V XFMR	N	29		AC- 47
CC	CONTROL RM CONSOLE CENTER CONTROL PANEL	N	19		AC- 51
DH-T-0001	BWST	N	8		AC- 57
EED-PNL-1B	125/250V DC DIST PANEL 1B	N	24		AC- 62
SF-P-1B-BK	1B ES MCC UNIT 6A	N	20	SWEL 2	AC- 67

Table AC-2. Summary of Seismic Walkdown Checklists for Supplemental Internal Inspections

ID	Description	Anchorage Configuration Confirmed?	Area Walk-By	Comments	Page
1B-480V-ESF	1B-480V-ESF VENT BUILDING MCC	Y	9	Extensive Disassembly is Req.	C- 10
TRB	120V REG AC INSTR. POWER TRB	Y	24		AC- 70
VBD	120V VITAL INST DIST PANEL 1D	Y	24		AC- 73
EED-BC-1B	BATTERY CHARGER 1B	Y	24	Extensive Disassembly is Req.	C- 94
EED-BC-1D	BATTERY CHARGER 1D	Y	24	Extensive Disassembly is Req.	C- 97
EED-BC-1F	BATTERY CHARGER 1F	Y	24	Extensive Disassembly is Req.	C- 100
EE-INV-1B	1B INVERTER	Y	24		AC- 76
EE-INV-1F	1F INVERTER	Y	24		AC- 80
1B	ENGINEERED SAFEGUARDS CABINET 1B	Y	20		AC- 84
3B	ESAS ACTUATION CABINET 3B	Y	20		AC- 87
4B	ESAS ACTUATION CABINET 4B	Y	20		AC- 90
5B	ESAS ACTUATION CABINET 5B	Y	20		AC- 94
BS-PS-0933	RB PRESSURE SWITCH FOR ESAS ACTUATION	Y	13		AC- 97
CRD-CB-1D	CRD CIRCUIT BREAKER 1D	Y	27		AC- 100
EE-PNL-VBB	VBB 120 VAC PANEL	Y	24		AC- 103
HSPS-CH-2	HSPS CHANNEL 2	Y	27		AC- 106
RR-S-1B	RR-S-1B CONTROL PANEL	N	29		AC- 110
XCLA	XCLA RELAY PANEL	Y	23		AC- 113

Status: [Y] N U

Seismic Walkdown Checklist (SWC)

Equipment ID No.: 1B DG CNPL

Equipment Class: (20) Instrumentation and Control Panels and Cabinets

Equipment Description: DIESEL GEN 1B - ENGINE CONTROL RELAY PANEL

Project: TMI SWEL

Location (Bldg, Elev, Room/Area): DG, 305.00 ft, 36

Manufacturer/Model:

Instructions for Completing Checklist

This checklist may be used to document the results of the Seismic Walkdown of an item of equipment on the SWEL. The space below each of the following questions may be used to record the results of judgments and findings. Additional space is provided at the end of this checklist for documenting other comments.

Anchorage

1.	Is anchorage configuration verification required (i.e., is the item one of the 50% of SWEL items requiring such verification)?	No
2.	Is the anchorage free of bent, broken, missing or loose hardware?	Yes
3.	Is the anchorage free of corrosion that is more than mild surface oxidation?	Yes
4.	Is the anchorage free of visible cracks in the concrete near the anchors?	Yes
5.	Is the anchorage configuration consistent with plant documentation? (Note: This question only applies if the item is one of the 50% for which an anchorage configuration verification is required.)	Not Applicable
6.	Based on the above anchorage evaluations, is the anchorage free of potentially adverse seismic conditions?	Yes

Status: [Y] N U

Seismic Walkdown Checklist (SWC)

Equipment ID No.: 1B DG CNPL

Equipment Class: (20) Instrumentation and Control Panels and Cabinets

Equipment Description: DIESEL GEN 1B - ENGINE CONTROL RELAY PANEL

Interaction Effects

7.	Are soft targets free from impact by nearby equipment or structures?	Yes
8.	Are overhead equipment, distribution systems, ceiling tiles and lighting, and masonry block walls not likely to collapse onto the equipment?	Yes
9.	Do attached lines have adequate flexibility to avoid damage?	Yes
10.	Based on the above seismic interaction evaluations, is equipment free of potentially adverse seismic interaction effects?	Yes

Other Adverse Conditions

11.	Have you looked for and found no adverse seismic conditions that could adversely affect the safety functions of the equipment? *Doors were opened and no Other Adverse Conditions were found inside.*	Yes

Comments

Equipment was verified to be in accordance with Seismic Qualification No. SQ-T1-1B-DG-CNPL, Rev 002

External Anchorage verified during on line walk Down and recertified on 12 Nov 2012

Evaluated by: Mark Etre — Date: 11/12/2012

Seth Baker — 11/12/2012

Status: [Y] N U

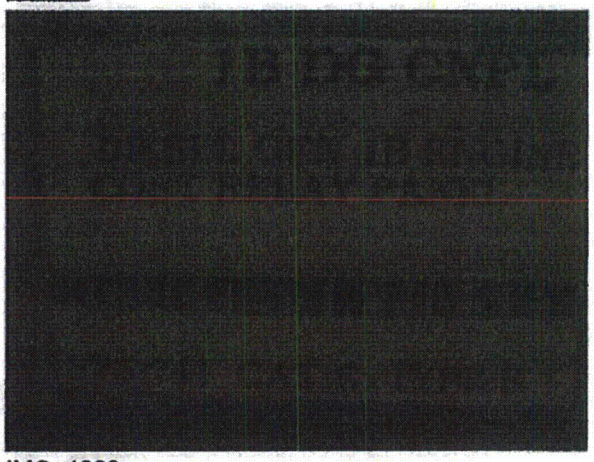
Seismic Walkdown Checklist (SWC)

Equipment ID No.: 1B DG CNPL

Equipment Class: (20) Instrumentation and Control Panels and Cabinets

Equipment Description: DIESEL GEN 1B - ENGINE CONTROL RELAY PANEL

Photos



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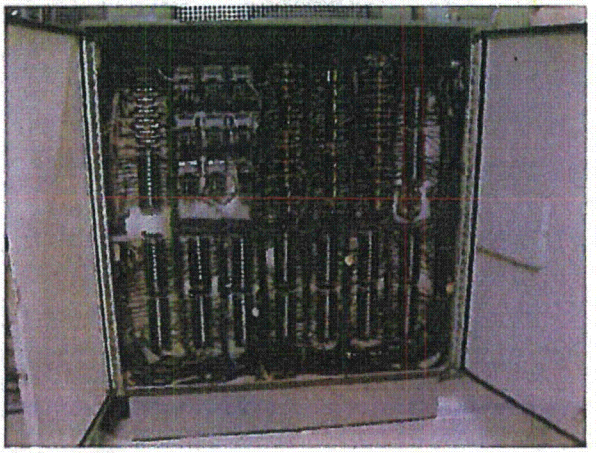

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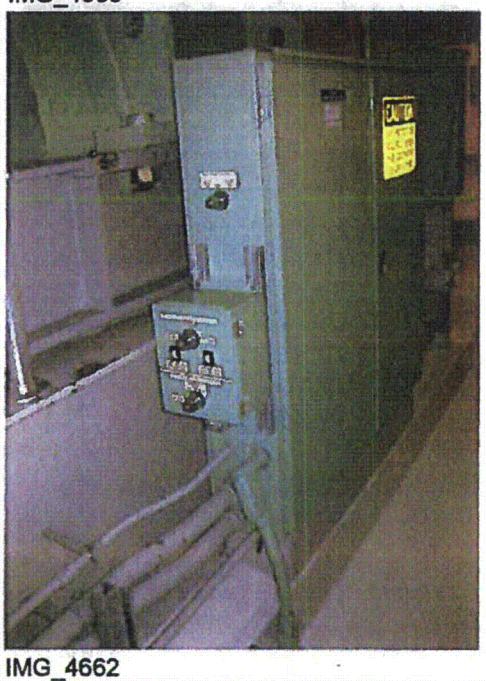

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Seismic Walkdown Checklist (SWC)

Equipment ID No. 1B-480V-ES (EE-MCC-ES-1B) Equip. Class[12] (1) Motor Control Center

Equipment Description 480V Engineed Safeguards MCC 1B

Location: Bldg. CB Floor El. 322 Room, Area 1B

Manufacturer, Model, Etc. (optional but recommended) Imperial Electric Co.

Instructions for Completing Checklist

This checklist may be used to document the results of the Seismic Walkdown of an item of equipment on the SWEL. The space below each of the following questions may be used to record the results of judgments and findings. Additional space is provided at the end of this checklist for documenting other comments.

Anchorage

1. Is the anchorage configuration verification required (i.e., is the item one of the 50% of SWEL items requiring such verification)? Y☐ N☑

2. Is the anchorage free of bent, broken, missing or loose hardware? Y☑ N☐ U☐ N/A☐

3. Is the anchorage free of corrosion that is more than mild surface oxidation? Y☑ N☐ U☐ N/A☐

4. Is the anchorage free of visible cracks in the concrete near the anchors? Y☑ N☐ U☐ N/A☐

5. Is the anchorage configuration consistent with plant documentation? (Note: This question only applies if the item is one of the 50% for which an anchorage configuration verification is required.) Y☐ N☐ U☐ N/A☑

6. Based on the above anchorage evaluations, is the anchorage free of potentially adverse seismic conditions? Y☑ N☐ U☐

[12] Enter the equipment class name from Appendix B: Classes of Equipment.

Seismic Walkdown Checklist (SWC)

Equipment ID No. 1B-480V-ES Equip. Class[12] G) Motor Control Center

Equipment Description 480V Engineered Safeguard MCC 1B

Interaction Effects

7. Are soft targets free from impact by nearby equipment or structures? Y☑ N☐ U☐ N/A☐
   Nearby light fixture will not impact any soft target

8. Are overhead equipment, distribution systems, ceiling tiles and lighting, and masonry block walls not likely to collapse onto the equipment? Y☑ N☐ U☐ N/A☐

9. Do attached lines have adequate flexibility to avoid damage? Y☑ N☐ U☐ N/A☐

10. Based on the above seismic interaction evaluations, is equipment free of potentially adverse seismic interaction effects? Y☑ N☐ U☐

Other Adverse Conditions

11. Have you looked for and found no other seismic conditions that could adversely affect the safety functions of the equipment? Y☑ N☐ U☐
    Loose/Felt bolt found inside MCC. Bolt had no structural function. considered Foreign Material, not operability concern. IR 1584220

Comments (Additional pages may be added as necessary)

① Seismic Qualification performed under SQ-T1-1B-480V-ES Rev.0 for SQUG

② Cable Tray 1025 is rididly attached, still relatively flexible compared to MCC Previously evaluated acceptable.

Evaluated by: Juan A. Lopez / Juan A. Lopez Date: 11/12/2013

David Yerkes / David Yerkes 11/12/2013

Status: [Y] N U

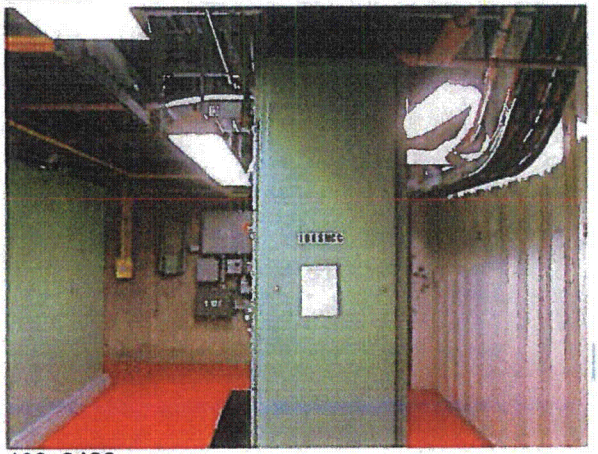
Seismic Walkdown Checklist (SWC)

Equipment ID No.: 1B-480V-ES

Equipment Class: (1) Motor Control Centers

Equipment Description: 480V ENGINEERED SAFEGUARDS MCC 1B

Photos



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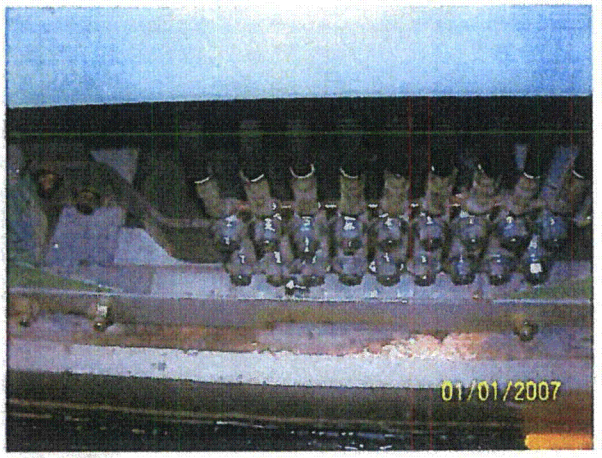


100_3857

Status: [Y] N U

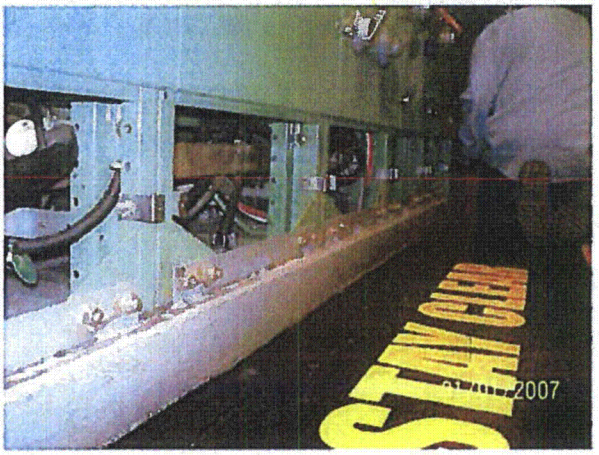
Seismic Walkdown Checklist (SWC)

Equipment ID No.: 1B-480V-ES

Equipment Class: (1) Motor Control Centers

Equipment Description: 480V ENGINEERED SAFEGUARDS MCC 1B

Photos (Continue)



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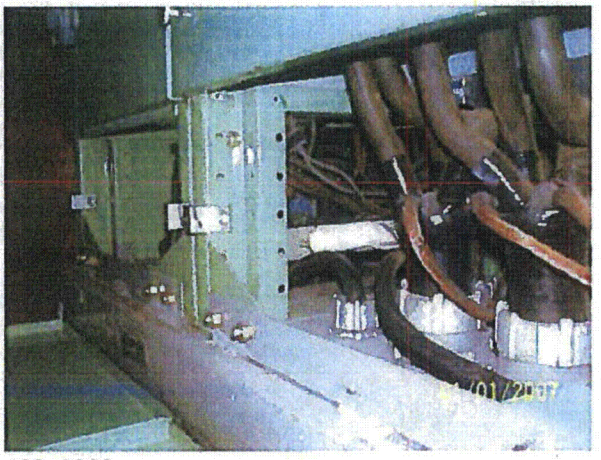

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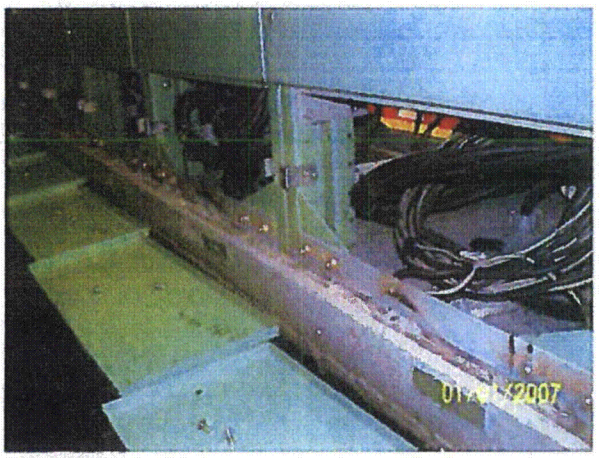

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Seismic Walkdown Checklist (SWC)

Equipment ID No. 1B-480V-ESV (EE-MCC-ESV-1B) Equip. Class[12] (1) Motor Control Centers

Equipment Description 1B Engineered Safeguards Valves & Heating Control Centr.

Location: Bldg. AB Floor El. 305 Room, Area 10

Manufacturer, Model, Etc. (optional but recommended) _____

Instructions for Completing Checklist

This checklist may be used to document the results of the Seismic Walkdown of an item of equipment on the SWEL. The space below each of the following questions may be used to record the results of judgments and findings. Additional space is provided at the end of this checklist for documenting other comments.

Anchorage

1. Is the anchorage configuration verification required (i.e., is the item one of the 50% of SWEL items requiring such verification)? Y☐ N☑

2. Is the anchorage free of bent, broken, missing or loose hardware? Y☑ (SME) N☐ U☑ N/A☐
   one plug weld missing in front right panel. Condition was evaluated acceptable per SQ-T1-1A-480V-ESV (SEWS) for this MCC

3. Is the anchorage free of corrosion that is more than mild surface oxidation? Y☑ N☐ U☐ N/A☐

4. Is the anchorage free of visible cracks in the concrete near the anchors? Y☑ N☐ U☐ N/A☐

5. Is the anchorage configuration consistent with plant documentation? (Note: This question only applies if the item is one of the 50% for which an anchorage configuration verification is required.) Y☐ N☐ U☐ N/A☑

6. Based on the above anchorage evaluations, is the anchorage free of potentially adverse seismic conditions? Y☑ N☐ U☐

[12] Enter the equipment class name from Appendix B: Classes of Equipment.

Seismic Walkdown Checklist (SWC)

Equipment ID No. 1B-480V-ESV Equip. Class[12] C1) Motor Control Center

Equipment Description 1B Engineered Safeguards Valves & Heating Control Centr.

Interaction Effects

7. Are soft targets free from impact by nearby equipment or structures? Y☑ N☐ U☐ N/A☐

8. Are overhead equipment, distribution systems, ceiling tiles and lighting, and masonry block walls not likely to collapse onto the equipment? Y☑ N☐ U☐ N/A☐

9. Do attached lines have adequate flexibility to avoid damage? Y☑ N☐ U☐ N/A☐

10. Based on the above seismic interaction evaluations, is equipment free of potentially adverse seismic interaction effects? Y☑ N☐ U☐

Other Adverse Conditions

11. Have you looked for and found no other seismic conditions that could adversely affect the safety functions of the equipment? Y☑ N☐ U☐

Comments (Additional pages may be added as necessary)

① Seismic Qualification per SQ-T1-1B-480V-ESV Rev 0.
② Anchorage Calculation per SQ-T1-1A-480V-ESV Rev 0. (SCWS)

Evaluated by: Juan A. Lopez / Juan A. Lopez Date: 11/12/13

David Yerkes / David Yerkes 11/12/13

Status: [Y] N U

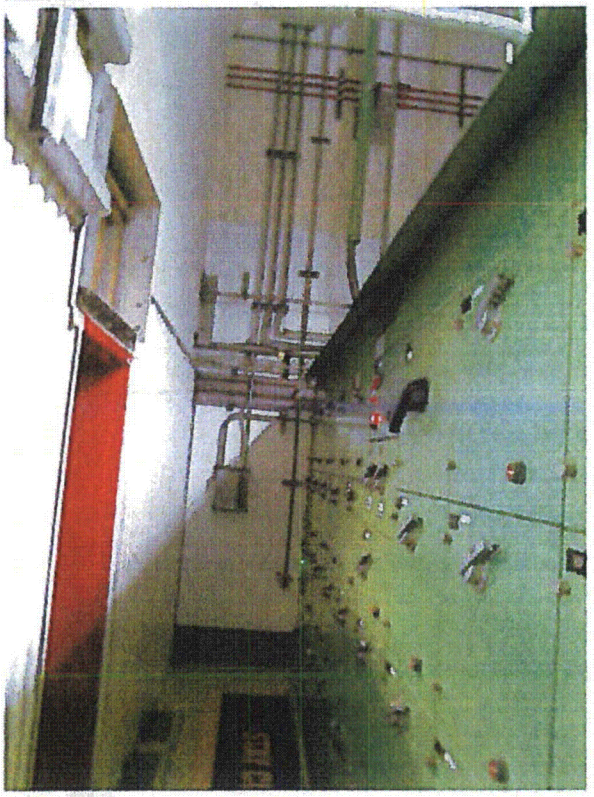
Seismic Walkdown Checklist (SWC)

Equipment ID No.: 1B-480V-ESV

Equipment Class: (1) Motor Control Centers

Equipment Description: 1B ENGINEERED SAFEGUARDS VALVES & HEATING CONTROL CENTR

Photos



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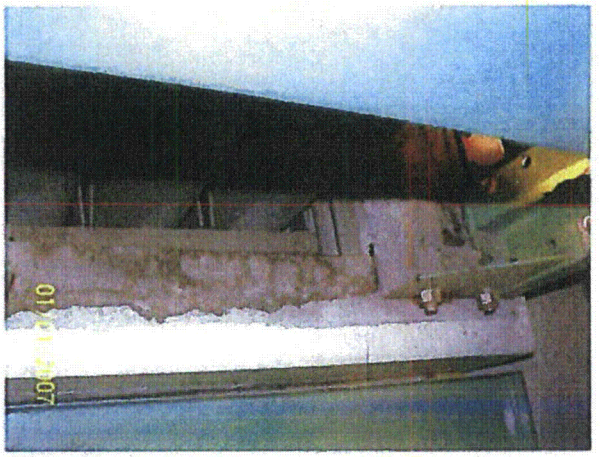

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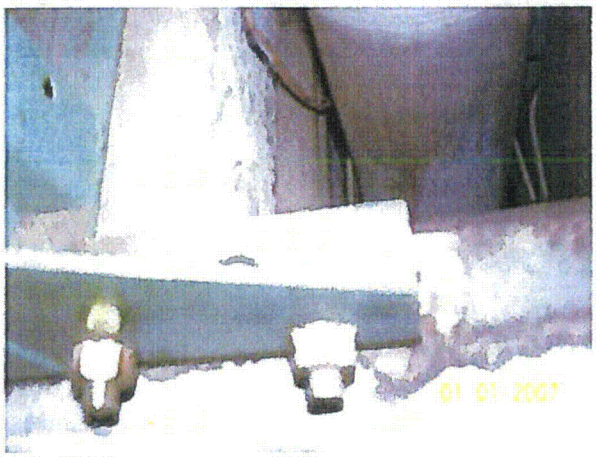

100_3916

Status: [Y] N U

Seismic Walkdown Checklist (SWC)

Equipment ID No.: 1B-480V-ESV

Equipment Class: (1) Motor Control Centers

Equipment Description: 1B ENGINEERED SAFEGUARDS VALVES & HEATING CONTROL CENTR

Photos (Continue)

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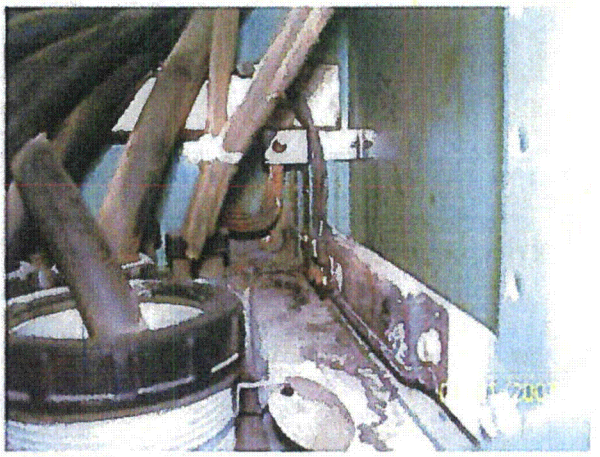

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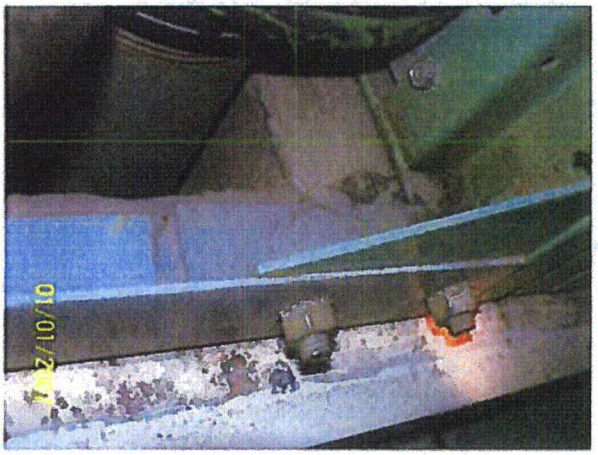

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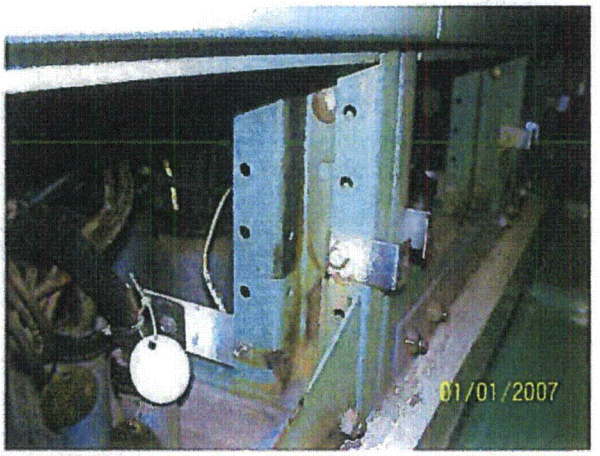


100_3932

Seismic Walkdown Checklist (SWC)

Equipment ID No. 1B-480V-SHES (EE-MCC-SH-1B) Equip. Class[12] (1) Motor Control Centers

Equipment Description 480V Screen House Engineered Safeguards Mcc 1B

Location: Bldg. IPH Floor El. 308' Room, Area 29

Manufacturer, Model, Etc. (optional but recommended) ITE CIRCUIT Breaker LTD / 9600

Instructions for Completing Checklist

This checklist may be used to document the results of the Seismic Walkdown of an item of equipment on the SWEL. The space below each of the following questions may be used to record the results of judgments and findings. Additional space is provided at the end of this checklist for documenting other comments.

Anchorage

1. Is the anchorage configuration verification required (i.e., is the item one of the 50% of SWEL items requiring such verification)? Y☐ N☑

2. Is the anchorage free of bent, broken, missing or loose hardware? Y☑ N☐ U☐ N/A☐
   Filled welds at both side are acceptable

3. Is the anchorage free of corrosion that is more than mild surface oxidation? Y☑ N☐ U☐ N/A☐

4. Is the anchorage free of visible cracks in the concrete near the anchors? Y☑ N☐ U☐ N/A☑
   No anchors, no cracks near embeded angles

5. Is the anchorage configuration consistent with plant documentation? (Note: This question only applies if the item is one of the 50% for which an anchorage configuration verification is required.) Y☐ N☐ U☐ N/A☑

6. Based on the above anchorage evaluations, is the anchorage free of potentially adverse seismic conditions? Y☑ N☐ U☐

[12] Enter the equipment class name from Appendix B: Classes of Equipment.

Seismic Walkdown Checklist (SWC)

Equipment ID No. 1B-480V-SHES Equip. Class[12] C17 Motor Control Center

Equipment Description 480V Screen House Engineered Safeguard Mcc 1B

Interaction Effects

7. Are soft targets free from impact by nearby equipment or structures? Y☑ N☐ U☐ N/A☐
   Spaces are installed

8. Are overhead equipment, distribution systems, ceiling tiles and lighting, and masonry block walls not likely to collapse onto the equipment? Y☑ N☐ U☐ N/A☐

9. Do attached lines have adequate flexibility to avoid damage? Y☑ N☐ U☐ N/A☐
   some rigid conduit adequate per comment ①

10. Based on the above seismic interaction evaluations, is equipment free of potentially adverse seismic interaction effects? Y☑ N☐ U☐

Other Adverse Conditions

11. Have you looked for and found no other seismic conditions that could adversely affect the safety functions of the equipment? Y☑ N☐ U☐

Comments (Additional pages may be added as necessary)

① Seismic Qualification performed under SQ-T1-1B-480V-SHES Rev. 2 (SQUG)

Evaluated by: Juan A. Lopez / Juan A. Lopez Date: 11/11/13

David Yerkes / David Yerkes 11/11/13

Status: [Y] N U

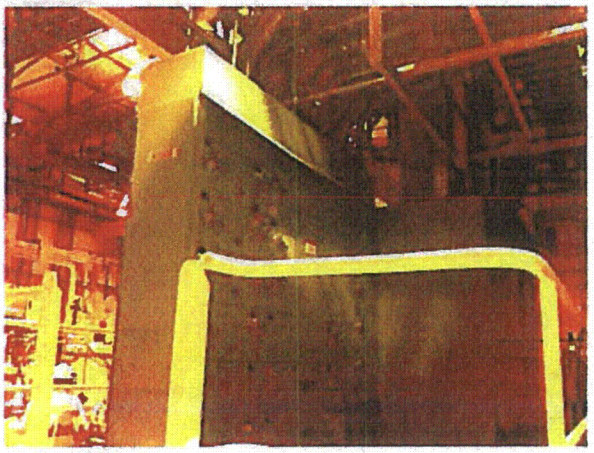
Seismic Walkdown Checklist (SWC)

Equipment ID No.: 1B-480V-SHES

Equipment Class: (1) Motor Control Centers

Equipment Description: 480V SCREEN HOUSE ENGINEERED SAFEGUARDS MCC 1B

Photos



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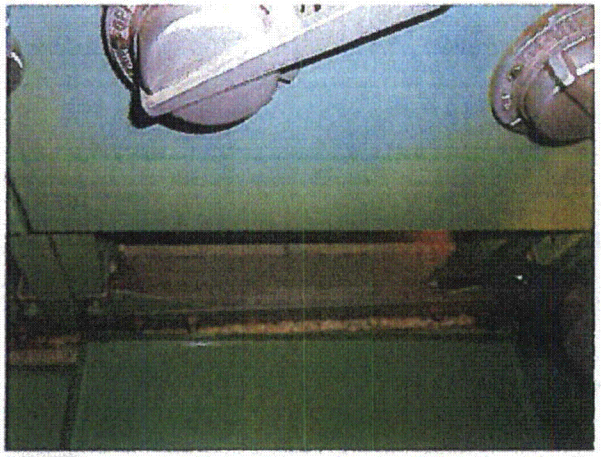

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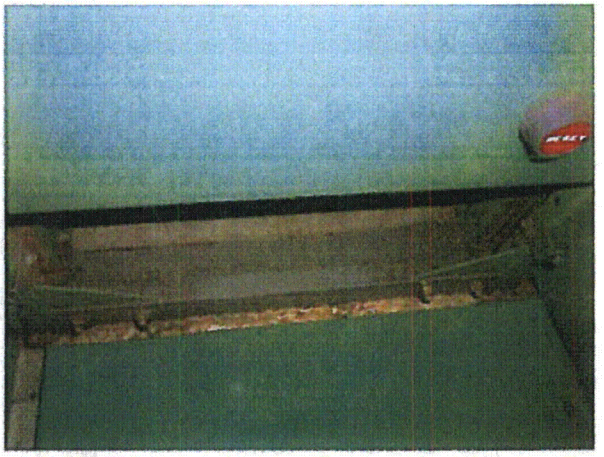

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Status: [Y] N U

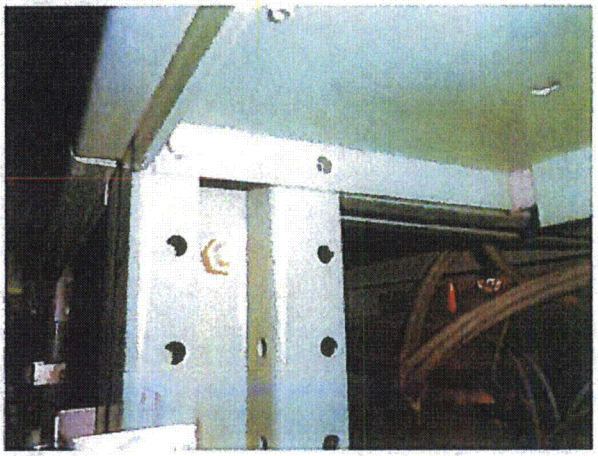
Seismic Walkdown Checklist (SWC)

Equipment ID No.: 1B-480V-SHES

Equipment Class: (1) Motor Control Centers

Equipment Description: 480V SCREEN HOUSE ENGINEERED SAFEGUARDS MCC 1B

Photos (Continue)



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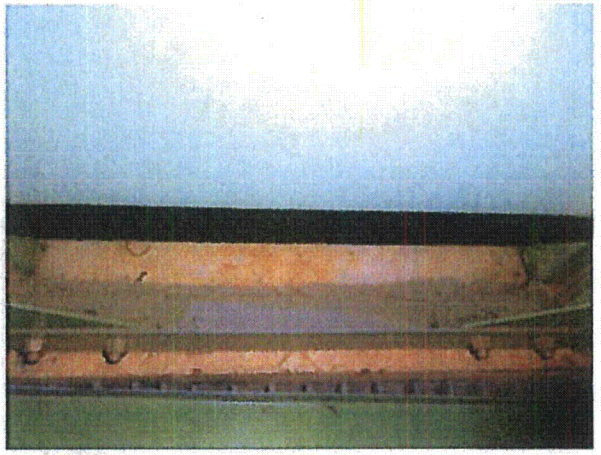

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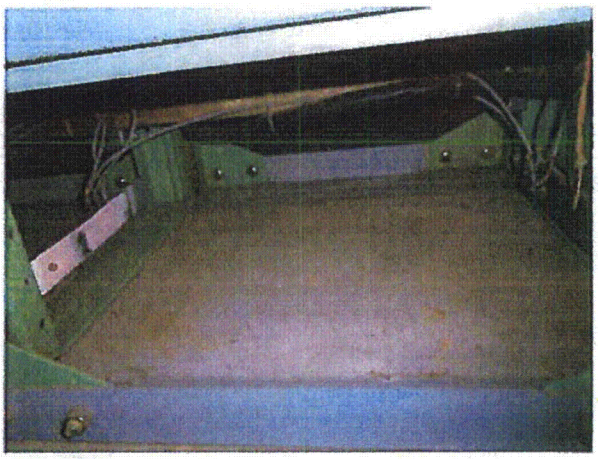

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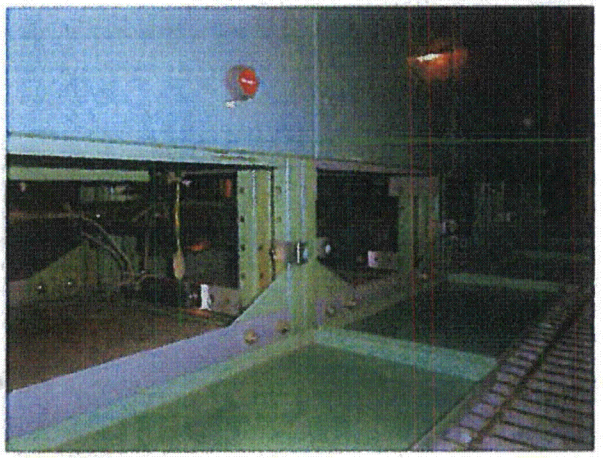


100_0575

Status: [Y] N U

Seismic Walkdown Checklist (SWC)

Equipment ID No.: 1E-4160V-ES

Equipment Class: (3) Medium Voltage Switchgear

Equipment Description: 4160V ENGINEERED SAFEGUARDS BUS 1E

Project: TMI SWEL

Location (Bldg, Elev, Room/Area): CB, 338.50 ft, 21

Manufacturer/Model:

Instructions for Completing Checklist

This checklist may be used to document the results of the Seismic Walkdown of an item of equipment on the SWEL. The space below each of the following questions may be used to record the results of judgments and findings. Additional space is provided at the end of this checklist for documenting other comments.

Anchorage

1.	Is anchorage configuration verification required (i.e., is the item one of the 50% of SWEL items requiring such verification)?	No
2.	Is the anchorage free of bent, broken, missing or loose hardware?	Yes
3.	Is the anchorage free of corrosion that is more than mild surface oxidation?	Yes
4.	Is the anchorage free of visible cracks in the concrete near the anchors?	Yes
5.	Is the anchorage configuration consistent with plant documentation? (Note: This question only applies if the item is one of the 50% for which an anchorage configuration verification is required.)	Not Applicable
6.	Based on the above anchorage evaluations, is the anchorage free of potentially adverse seismic conditions?	Yes

Status: [Y] N U

Seismic Walkdown Checklist (SWC)

Equipment ID No.: 1E-4160V-ES

Equipment Class: (3) Medium Voltage Switchgear

Equipment Description: 4160V ENGINEERED SAFEGUARDS BUS 1E

Interaction Effects

7.	Are soft targets free from impact by nearby equipment or structures?	Yes
8.	Are overhead equipment, distribution systems, ceiling tiles and lighting, and masonry block walls not likely to collapse onto the equipment?	Yes
9.	Do attached lines have adequate flexibility to avoid damage?	Yes
10.	Based on the above seismic interaction evaluations, is equipment free of potentially adverse seismic interaction effects?	Yes

Other Adverse Conditions

11.	Have you looked for and found no adverse seismic conditions that could adversely affect the safety functions of the equipment? *Performed internal inspection and did not find any Other Adverse Conditions. Partial Inspection was performed by opening two cubicles. The other Cubicles would not be opened by Operations due to the fact that they were energized. Internals and anchorage at the back of the cabinet was inspected through grating. There were no issues found in the areas. Therefore, the intent of no other adverse conditions is met.*	Yes

Comments

Equipment was verified to be in accordance with Seismic Qualification No. SQ-T1-1E-4160V-ES, Rev 001

Evaluated by: Mark Etre Date: 11/12/2012

Seth Baker 11/12/2012

Status: [Y] N U

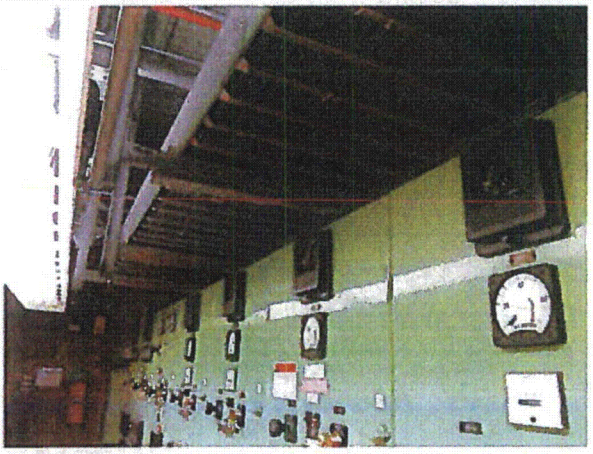
Seismic Walkdown Checklist (SWC)

Equipment ID No.: 1E-4160V-ES

Equipment Class: (3) Medium Voltage Switchgear

Equipment Description: 4160V ENGINEERED SAFEGUARDS BUS 1E

Photos



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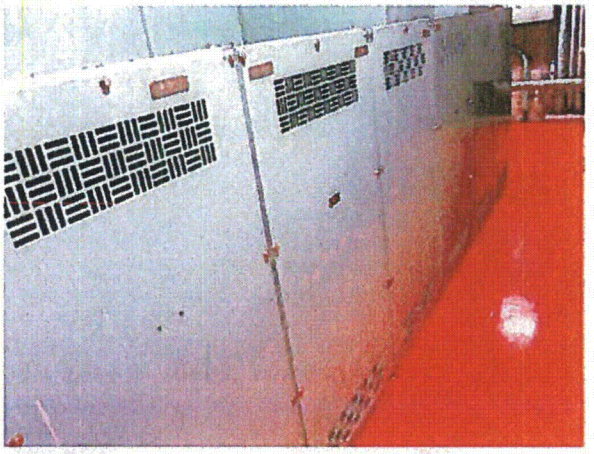

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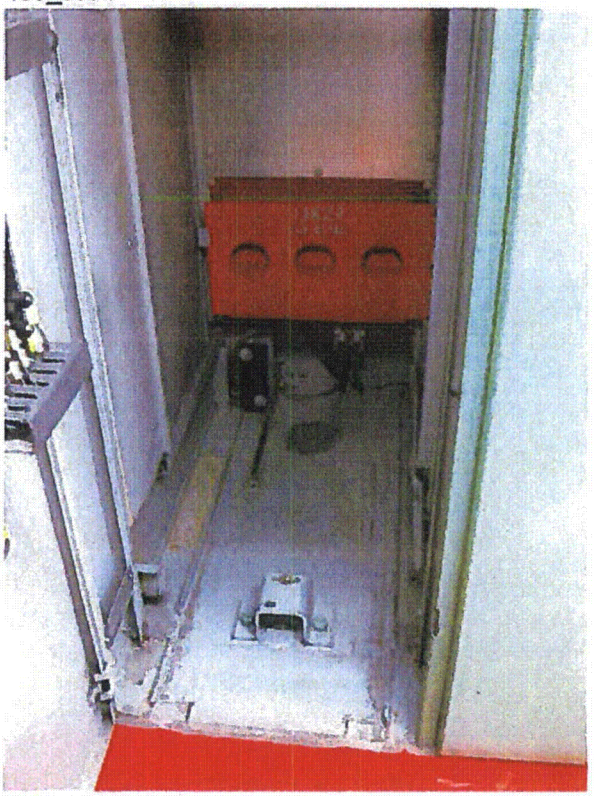

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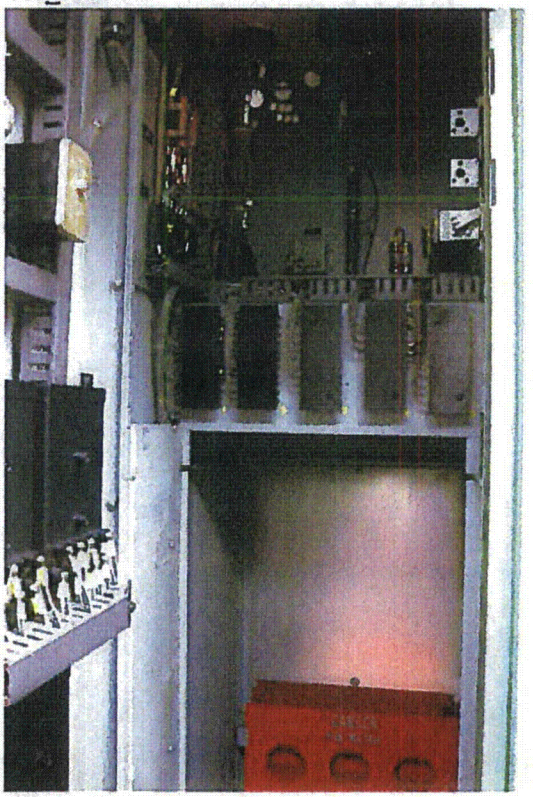


IMG_4601

Status: [Y] N U

Seismic Walkdown Checklist (SWC)

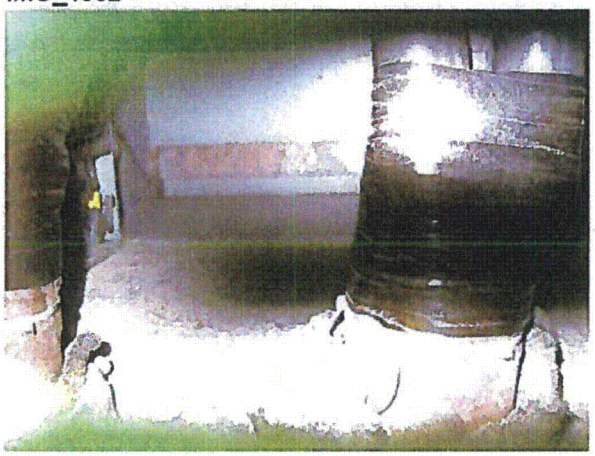
Equipment ID No.: 1E-4160V-ES

Equipment Class: (3) Medium Voltage Switchgear

Equipment Description: 4160V ENGINEERED SAFEGUARDS BUS 1E

IMG_4602

IMG_4603



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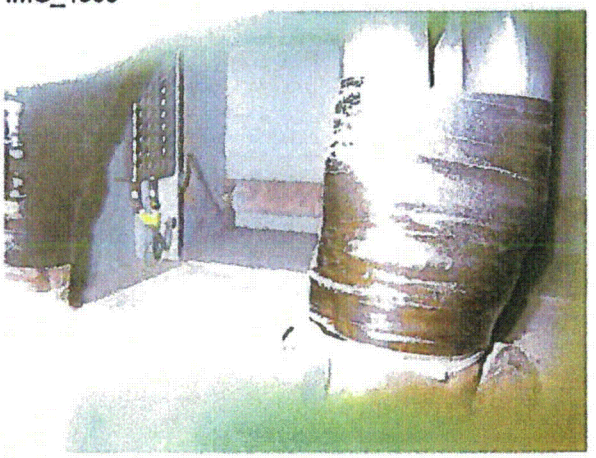


IMG_4607

Status: [Y] N U

Seismic Walkdown Checklist (SWC)

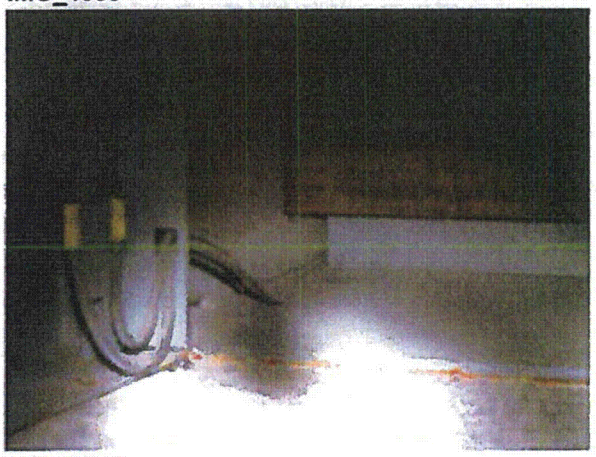
Equipment ID No.: 1E-4160V-ES

Equipment Class: (3) Medium Voltage Switchgear

Equipment Description: 4160V ENGINEERED SAFEGUARDS BUS 1E

IMG_4608

IMG_4612



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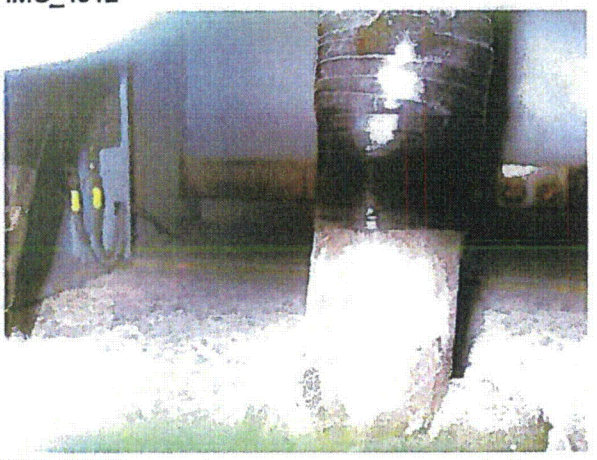


IMG_4619

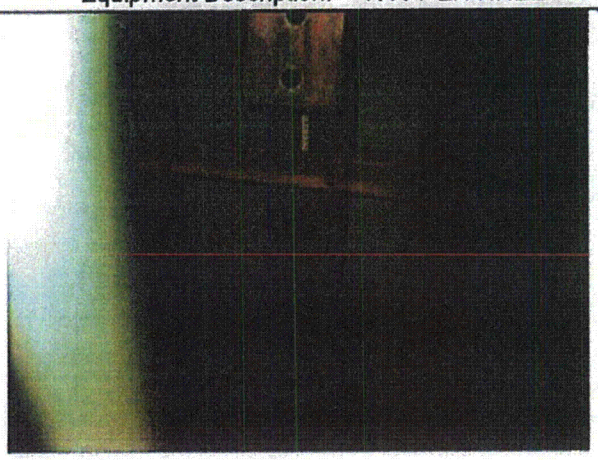
Status: [Y] N U

Seismic Walkdown Checklist (SWC)

Equipment ID No.: 1E-4160V-ES

Equipment Class: (3) Medium Voltage Switchgear

Equipment Description: 4160V ENGINEERED SAFEGUARDS BUS 1E



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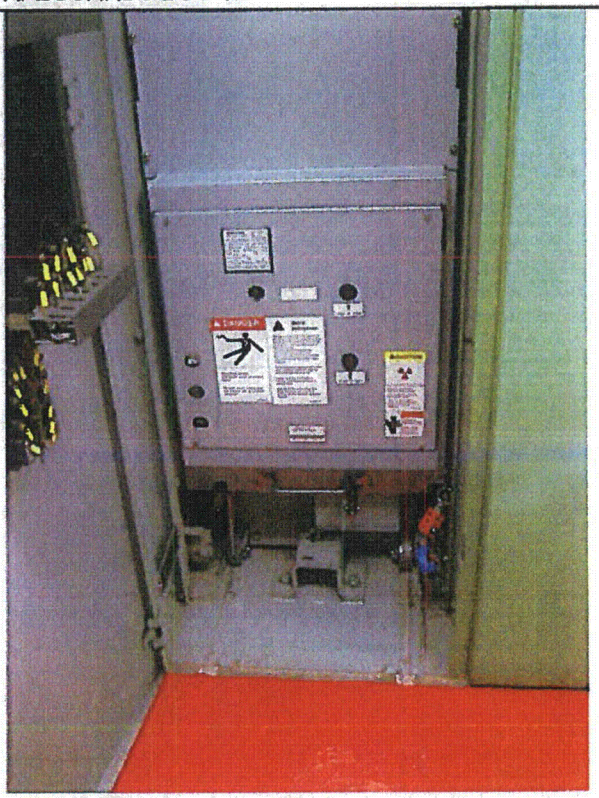


IMG_4622

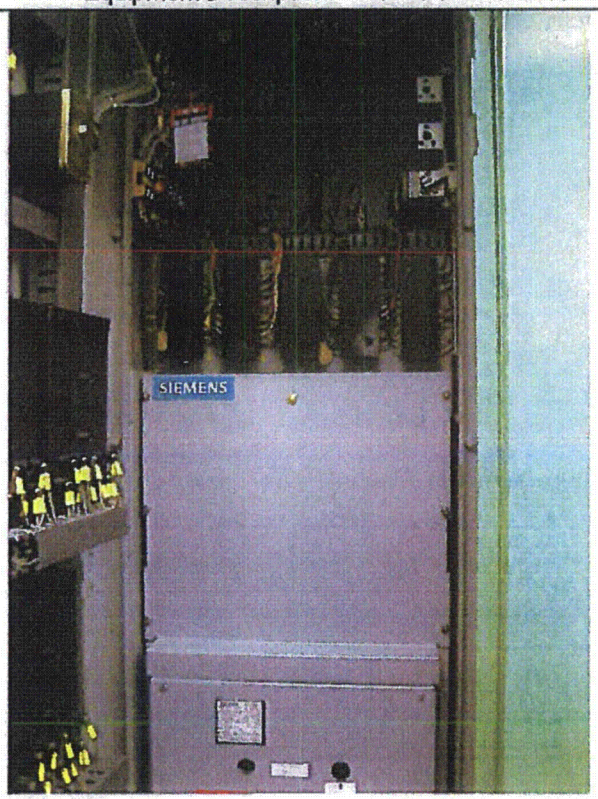
Status: [Y] N U

Seismic Walkdown Checklist (SWC)

Equipment ID No.: 1E-4160V-ES

Equipment Class: (3) Medium Voltage Switchgear

Equipment Description: 4160V ENGINEERED SAFEGUARDS BUS 1E



IMG_4623

Status: [Y] N U

Seismic Walkdown Checklist (SWC)

Equipment ID No.: 1F-DC

Equipment Class: (14) Distribution Panels

Equipment Description: 125/250V DC ES DIST PANEL 1F

Project: TMI SWEL

Location (Bldg, Elev, Room/Area): CB, 322.00 ft, 24

Manufacturer/Model:

Instructions for Completing Checklist

This checklist may be used to document the results of the Seismic Walkdown of an item of equipment on the SWEL. The space below each of the following questions may be used to record the results of judgments and findings. Additional space is provided at the end of this checklist for documenting other comments.

Anchorage

1. Is anchorage configuration verification required (i.e., is the item one of the 50% of SWEL items requiring such verification)? — No

2. Is the anchorage free of bent, broken, missing or loose hardware? — Yes

   Kick plates were removed and welds were inspected.

3. Is the anchorage free of corrosion that is more than mild surface oxidation? — Yes

4. Is the anchorage free of visible cracks in the concrete near the anchors? — Yes

5. Is the anchorage configuration consistent with plant documentation? (Note: This question only applies if the item is one of the 50% for which an anchorage configuration verification is required.) — Not Applicable

6. Based on the above anchorage evaluations, is the anchorage free of potentially adverse seismic conditions? — Yes

Status: [Y] N U

Seismic Walkdown Checklist (SWC)

Equipment ID No.: 1F-DC

Equipment Class: (14) Distribution Panels

Equipment Description: 125/250V DC ES DIST PANEL 1F

Interaction Effects

7.	Are soft targets free from impact by nearby equipment or structures?	Yes
8.	Are overhead equipment, distribution systems, ceiling tiles and lighting, and masonry block walls not likely to collapse onto the equipment?	Yes
9.	Do attached lines have adequate flexibility to avoid damage?	Yes
10.	Based on the above seismic interaction evaluations, is equipment free of potentially adverse seismic interaction effects?	Yes

Other Adverse Conditions

11.	Have you looked for and found no adverse seismic conditions that could adversely affect the safety functions of the equipment? *Cabinet doors and kick plates were opened and no Other Adverse Conditions were found inside.*	Yes

Comments

Rear & Front external anchorage welded to embedded Chanel

Panel 1J adjacent to 1F-DC has taped door due to broken latch. No sensitive equipment, therefore OK.

Equipment was verified to be in accordance with Seismic Qualification No. SQ-T1-1F-DC, Rev 000

Evaluated by: Mark Etre Date: 11/13/2012

Seth Baker 11/13/2012

Status: [Y] N U

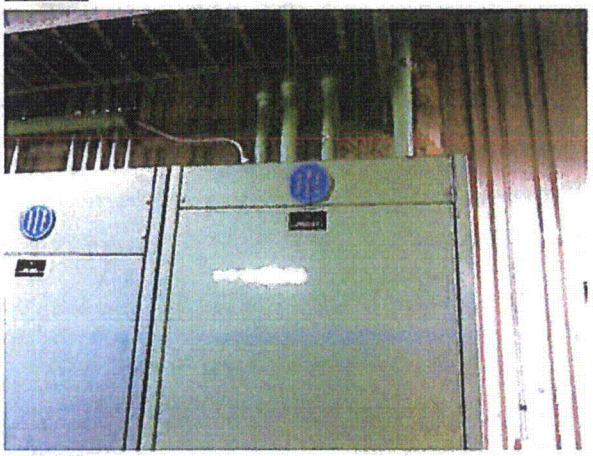
Seismic Walkdown Checklist (SWC)

Equipment ID No.: 1F-DC

Equipment Class: (14) Distribution Panels

Equipment Description: 125/250V DC ES DIST PANEL 1F

Photos



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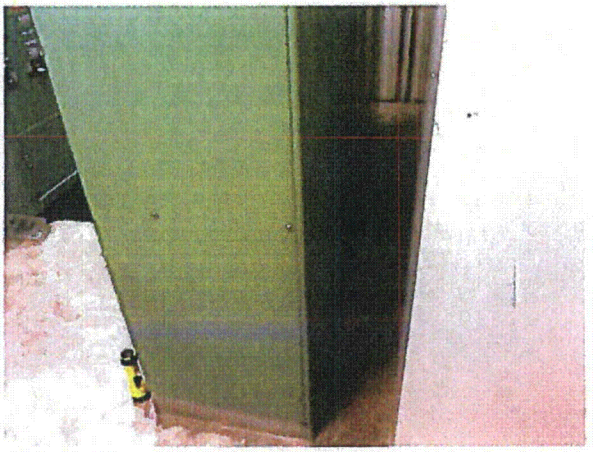

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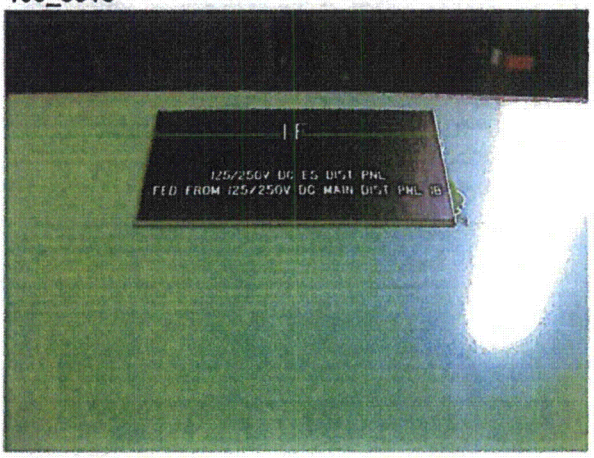


IMG_4641

IMG_4642

Status: [Y] N U

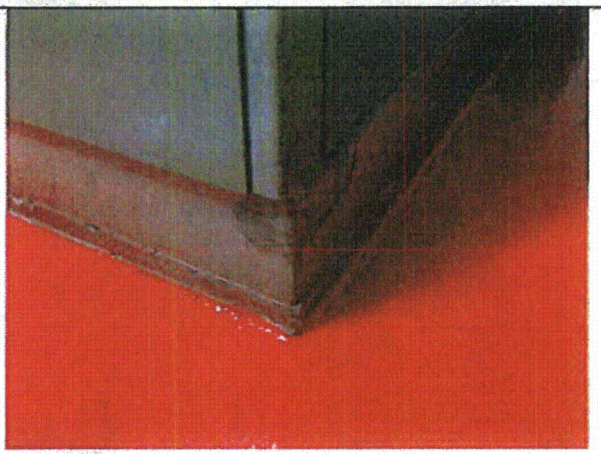
Seismic Walkdown Checklist (SWC)

Equipment ID No.: 1F-DC

Equipment Class: (14) Distribution Panels

Equipment Description: 125/250V DC ES DIST PANEL 1F

IMG_4643



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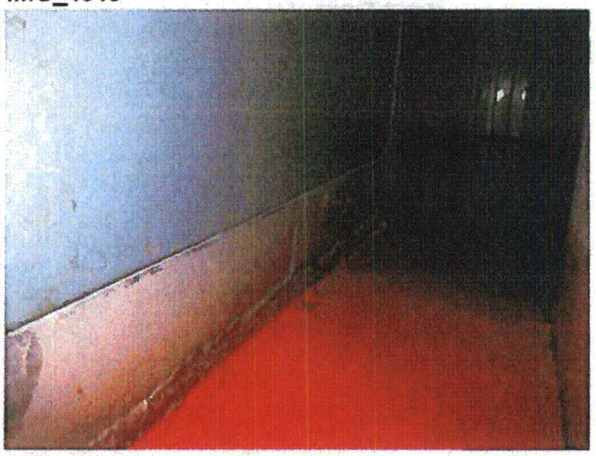

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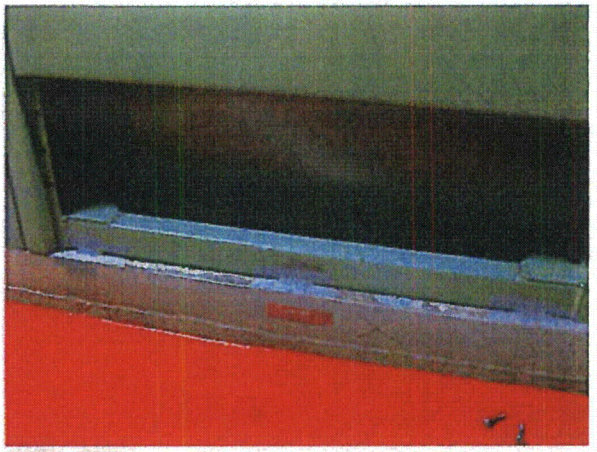

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