SEISMIC WALKDOWN REPORT

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

for the

QUAD CITIES GENERATING STATION UNIT 2
22710 206TH AVENUE NORTH, CORDOVA, ILLINOIS 61242
Renewed Facility Operating License No. DPR-30
NRC Docket No. 50-265
Correspondence No.: RS-12-169

Exelon

Exelon Generation Company, LLC (Exelon)
PO Box 805398
Chicago, IL 60680-5398

Prepared by:
Stevenson & Associates
1661 Feehanville Drive, Suite 150
Mount Prospect, IL 60056

Report Number: 12Q0108.40-R-002, Rev. 3

	Printed Name	Signature	Date
Preparer:	Marlene Delaney	[signature]	10/31/2012
Reviewer:	Tony Perez	[signature]	10/31/2012
Approver:	Tony Perez	[signature]	10/31/2012
Peer Review Team Leader:	Walter Djordjevic	[signature]	10/31/2012
Lead Responsible Engineer:	JULIE A. KIM	[signature]	11/1/2012
Branch Manager:	Douglas F Collins	[signature]	11/2/2012
Senior Manager Design Engineering:	BRIAN STEDMAN	[signature]	11/2/12
Corporate Acceptance:	Jeffrey S. Clark	[signature]	11/2/12

Status: [Y] N U

Seismic Walkdown Checklist (SWC)

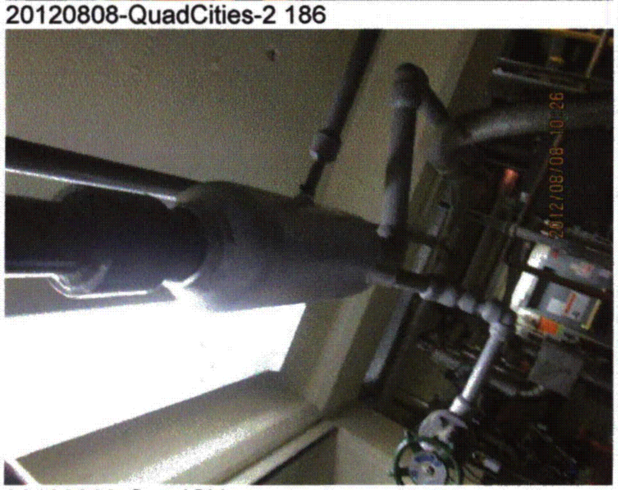
Equipment ID No.: 1/2-4604

Equipment Class: (0) Other

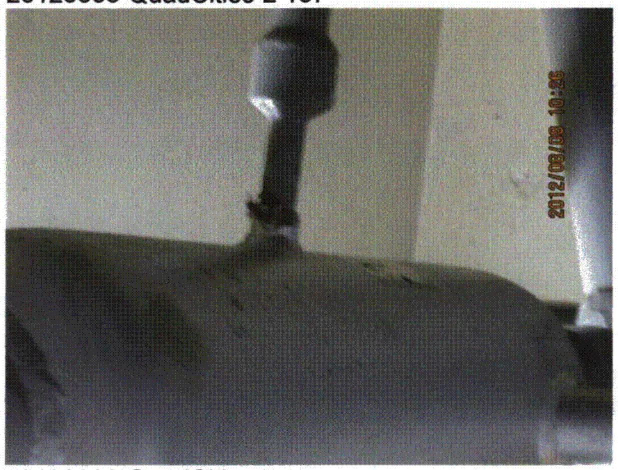
Equipment Description: DRYER, AIR

20120808-QuadCities-2 186

20120808-QuadCities-2 187



20120808-QuadCities-2 188



20120808-QuadCities-2 189

Document Title: SEISMIC WALKDOWN REPORT IN RESPONSE TO THE 50.54(f) INFORMATION REQUEST REGARDING FUKUSHIMA NEAR-TERM TASK FORCE RECOMMENDATION 2.3: SEISMIC for the QUAD CITIES GENERATING STATION UNIT 2

Document Type: Report Report Number: 12Q0108.40-R-001

Project Name: NTTF R2.3 Seismic Walkdowns for Exelon - Quad Cities
Job No.: 12Q0108.40
Client: Exelon.

This document has been prepared in accordance with the S&A Quality Assurance Program Manual, Revision _17_ and project requirements:

Initial Issue (Rev. 0)	
Prepared by: Marlene Delaney	Date: 10/19/2012
Reviewed by: Tony Perez	Date: 10/19/2012
Approved by: Tony Perez	Date: 10/19/2012

Revision Record (see previous revisions for signatures):

Revision No.	Prepared by/ Date	Reviewed by/ Date	Approved by/ Date	Description of Revision
1	M. Delaney 10/24/2012	T. Perez 10/24/2012	T. Perez 10/24/2012	Removed photos. Replaced pages C-532 through C-539 and D-29 through D-33.
2	M. Delaney 10/26/2012	T. Perez 10/26/2012	T. Perez 10/26/2012	Replaced page 2-1.
3	M. Delaney 10/31/2012	T. Perez 10/31/2012	T. Perez 10/31/2012	Replaced pages i through ix, 5-6, 5-7, 7-1, A-23, A-29, A-34, E-2, and F-14.

S&A Stevenson & Associates	DOCUMENT APPROVAL SHEET	CONTRACT NO. 12Q0108

Contents

Appendices

List of Tables

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 Quad Cities Generating Station Unit 2 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/Quad Cities 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 Quad Cities Generating Station site is 0.24g horizontal ground acceleration and 0.16g vertical ground acceleration. (Ref. 2 section 3.7)

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 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 Quad Cities Unit 2, the SWEL is comprised of:

- SWEL 1 resulted with 102 items for walkdown.
- SWEL 2 resulted with no items for walkdown.
- There are no SSCs associated with spent fuel pool rapid drain-down to be 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 Quad Cities Unit 2 were performed during the week of August 6, 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) or designee, and a station Equipment Operator.

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 92 of the 102 components on the SWEL (comprised of SWEL 1 and SWEL 2). Walkdowns for 10 components were deferred due to accessibility issues such as being located in containment or energized equipment. The 10 remaining Unit 2 items will be walked down during a unit outage or another time when the equipment is accessible, as appropriate. Anchorage verification was required for a minimum of 27 components. (Ref. 1) A total of 36 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.

During the seismic walkdowns at Quad Cities Unit 2 eighteen (18) Issue Reports (IRs) were issued for conditions such as open S-hooks and seismic housekeeping issues. Seismic housekeeping conditions were found to be the most common. After evaluation through the CAP, it was determined that none of the conditions identified in the IRs 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 Corrective Action Program (CAP). In lieu of this process, Exelon/Quad Cities utilized the existing processes and procedures (Site CAP Expectations) to identify, evaluate and document conditions identified during the Seismic Walkdowns.

In accordance with Exelon/Quad Cities 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. Tables 5-2 and 5-3 in the report provide the IR, a summary of the condition, and the action completion status.

IPEEE Vulnerabilities

IPEEE vulnerabilities are addressed in Section 7 of this report. No vulnerabilities were identified as a result of the effort that addressed the Individual Plant Examination of External Events (IPEEE). (Ref. 3) However, plant improvements were identified in section 7 of Reference 3. Table G-1 provides the list of plant improvements, the IPEEE proposed resolution, the actual resolution and resolution date. All IPEEE improvement 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, the efforts completed and documented within this report are in accordance with the EPRI guidance document.

Summary

In summary, seismic walkdowns have been completed at the Quad Cities Generating Station Unit 2 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 the Seismic Walkdowns resulted with no adverse anchorage conditions, no adverse seismic spatial interactions, and no other adverse seismic conditions associated with the items on the SWEL. Similarly, the Area Walk-Bys resulted with no adverse seismic conditions associated with other SSCs located in the vicinity of the SWEL item(s).

The Seismic Walkdowns identified several minor issues predominantly pertaining to seismic housekeeping. Other than these minor issues, the Seismic Walkdowns identified no degraded, nonconforming, or unanalyzed conditions 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 10 items deferred due to inaccessibility along with supplemental inspections of 18 electrical cabinets. Area Walk-Bys will be complete, as required, during these follow-on activities.

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 Quad Cities Generating Station Unit 2 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/Quad Cities has utilized this NRC endorsed guidance as the basis for the seismic walkdowns and this report. (Ref. 1)

1.3 PLANT OVERVIEW

Quad Cities Generating Station consists of two operating boiling water reactor (BWR) generating units. The site is located in Rock Island County, Illinois, in parts of sections 7, 8, 17, 18, 19 and 20, Township; 20 North, Range; 2 East. It is on the east bank of the Mississippi River opposite the mouth of the Wapsipinicon River, and about three (3) miles north of Cordova, Illinois. The site is about 20 miles northeast of the Quad Cities (Davenport, Iowa; Rock Island, Moline, and East Moline, Illinois). (Ref. 2 section 2.1.1)

Both units have Mark I containments, are rated for 2957 MWt power (RENEWED FACILITY OPERATING LICENSE NO. DPR-29 (Unit 1) and DPR-30 (Unit 2)), and were originally designed and built by GE as prime contractor for Commonwealth Edison Company. The commercial service dates for Quad Cities Units 1 and 2 were February 18, 1973 and March 10, 1973 respectively. (Ref. 2 section 1.1.1)

1.4 APPROACH

The EPRI Seismic Walkdown Guidance is used for the Quad Cities Generating Station Unit 2 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 completed at the Quad Cities Generating Station Unit 2 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 the Seismic Walkdowns resulted with no adverse anchorage conditions, no adverse seismic spatial interactions, and no other adverse seismic conditions associated with the items on the SWEL. Similarly, the Area Walk-Bys resulted with no adverse seismic conditions associated with other SSCs located in the vicinity of the SWEL item(s).

The Seismic Walkdowns identified several minor issues predominantly pertaining to seismic housekeeping. Other than these minor issues, the Seismic Walkdowns identified no degraded, nonconforming, or unanalyzed conditions 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 10 items deferred due to inaccessibility along with supplemental inspections of 18 electrical cabinets. Area Walk-Bys will be complete, 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 the Quad Cities Generating Station Unit 1 and Unit 2. The safe shutdown earthquake and a summary of the codes, standards, and methods used in the design of Seismic 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 Quad Cities Generating Station site is 0.24g horizontal ground acceleration and 0.16g vertical ground acceleration. (Ref. 2 section 3.7)

2.3 DESIGN OF SEISMIC CATEGORY I SSCS

The input motions used to create the seismic design of Quad Cities are based on the Housner Ground Response Spectrum (GRS) and the south 80 degrees east (S80E) component of the 1957 San Francisco Golden Gate Park earthquake. The Quad Cities drywell was evaluated using the results of the Dresden drywell analysis, which used the north-south component earthquake record of El Centro of May 18, 1940, normalized to 0.10g for Operating Basis Earthquake (OBE (0.2g for Safe Shutdown Earthquake (SSE)). For the seismic analysis of the Seismic Class I structures and development of In-Structure Response Spectra (ISRS), the Housner GRS was used. (Ref. 2 section 3.7)

The Golden Gate earthquake time history was used to verify that when using the time-history method, the maximum OBE loadings did not occur in the valleys of the unsmoothed (Golden Gate) spectrum. The Quad Cities OBE is defined in the horizontal direction by the Housner GRS scaled to 0.12g peak ground acceleration (PGA) and the ISRS developed from the Golden Gate earthquake time history scaled to 0.12g. In addition, the OBE in the vertical direction is constant for all periods with a resulting PGA value of 0.08g. The Quad Cities SSE is defined by multiplying the OBE accelerations by a factor of 2, resulting in horizontal and vertical directions GRS PGA values of 0.24g and 0.16g respectively. (Ref. 2 section 3.7)

The response spectrum method was used to calculate the buildings' responses. For the Reactor Building, the SSE damping values used were 2% damping for steel and 5% damping for concrete. For the Turbine Building, an SSE damping value of 5% was used. The peaks of the time history-derived spectra were broadened by 15%. (Ref. 2 section 3.7)

The governing codes for the design of the structures were American Concrete Institute's ACI-318-63 *for reinforced concrete, and American Institute of Steel Construction (AISC)* Steel Construction Manual, 6th Edition for steel, and American Society of Mechanical

Engineers (ASME) Boiler & Pressure Vessel Code, Section III 1965 for the containment. (Ref. 2 section 3.7)

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 is provided in the following Quad Cities Generating Station UFSAR sections:

- 3.7 Seismic Design
- 3.8 Design of Category I Structures
- 3.9 Mechanical Systems and Components
- 3.10 Seismic Qualification of Seismic Category I Instrumentation and Electrical Equipment

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

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 Walkdown 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
A. Perez	X					
K. Hull	X					
T.K. Ram						X[1]
J. Griffith			X	X		
M. Wodarcyk			X	X		
D. Carter			X	X		
J. Kim (Exelon)			X	X	X	
K. Hall (Exelon)			X			
T. Bacon						X
W. Djordjevic						X[2]
T. Fuhs (Exelon)		X				

Notes:

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

3.3 ADDITIONAL PERSONNEL

In addition to the S&A personnel listed above, Exelon Plant Operations, Tony Fuhs, reviewed the SWEL. Tony Fuhs is the Operation Support Manager at Quad Cities Station, a formerly licensed SRO that has worked at Quad Cities Station for almost 30 years and 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.

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 in 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-1a. Base List 1a - Items Exclusive to Unit 2
- Table B-1b. Base List 1b - Items Common to Units 1 and 2
- Table B-2. SWEL 1

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 for Quad Cities Generating Station Unit 2. (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 the composite Seismic Individual Plant Examination for External Events (IPEEE) Success Path Equipment List (SPEL). (Ref. 3) The IPEEE SPEL was then subjected to the following four 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 IPEEE SPEL was reviewed to determine if it had a defined seismic licensing basis. All items identified as Class I, as defined in Quad Cities UFSAR Chapter 3, 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.

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

   This screen 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 IPEEE SPEL of any Class I Structures, Containment Penetrations, 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 Reference 3, the safety function for each item on the IPEEE SPEL 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 of 'Auxiliary & Support', 'Electrical Systems', or 'Racks & Panels' may be a frontline or support system. Items with a safety function of 'Auxiliary & Support', 'Electrical Systems', or 'Racks & Panels' support at least one of the five safety functions however, the specific safety function(s) is not indicated as identification of the specific safety function(s) supported 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 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 multiple 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 on SWEL 1 includes several 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:

- (11) - Chillers
- (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 on SWEL 1 includes several 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 program 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. 7)

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. (Ref. 2 section 9.1 and Refs. 8, 9, 10, & 11) 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 I (having defined seismic licensing basis) are to be included on SWEL 2 with exception to 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.

The review of design and licensing basis documentation for the SFP revealed no Class I equipment for Quad Cities Generating Station Unit 2. (Ref. 2 section 9.1 and Refs. 8, 9, 10, & 11)

Screen #1 resulted with no items added to SWEL 2. Therefore, Screens #2 and #3 below were not performed. However, Screens #2 and #3 are provided for completeness as they are part of the equipment selection process.

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

   This screen was to consider only those items associated with the SFP that were appropriate for an equipment walkdown process. This screen was not performed as Screen #1 resulted with no items added to SWEL 2.

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

   This screen represents a process that was intended to result in a SWEL 2 that sufficiently represents a broad population of SFP Seismic Category 1 (Class I) equipment and systems to meet the objectives of the NRC 50.54(f) letter. (Ref. 1) The following attributes were to be considered in the development of SWEL 2:

   A. A Variety of Types of Systems

   B. Major New and Replacement Equipment

   C. A Variety of Types of Equipment

   D. A Variety of Environments

   This screen was not performed as Screen #1 resulted with no items added to SWEL 2.

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 I (having defined seismic licensing basis) 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.

   An assessment of the Quad Cities Generating Station Unit 2 spent fuel pools and their cooling systems was performed and found no SFP penetrations below 10 feet above the top of the fuel assemblies. (Ref. 2 section 9.1 and Refs. 8, 9, 10, & 11) As such, and consistent with Reference 1, there is no potential for rapid drain-down and no items were added to SWEL 2.

4.2.3 SWEL 2 – Conclusion

No items were identified to be included in the scope of SWEL 2 for Quad Cities Generating Station Unit 2.

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 week of August 6, 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 as provided in Appendix B of this report. It is noted, as discussed in Section 4 above, there were no items included on SWEL 2 for Quad Cities Unit 2. 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 92 of the 102 items identified on the Quad Cities Unit 2 SWEL. 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 are deferred for the remaining 10 items to a unit outage or appropriate time when the equipment is accessible. These items could not be walked down during the 180-day period following the issuance of the 10CFR50.54(f) letter due to their being inaccessible. Inaccessibility of this equipment was either based on the location of the equipment (environment that posed personnel safety concerns while the unit is operating) or due to the electrical safety hazards posed while the equipment is operating. Appendix E of this report identifies the inaccessible 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 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	102	48	27	36

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 *Issues Identification during Seismic Walkdowns*

Table 5-2 provides a summary of issues identified during the equipment Seismic Walkdowns. The equipment Seismic Walkdowns resulted in a total of eight (8) concerns identified and each of these was entered into the station's CAP. All of the identified concerns were assessed and it was concluded that the condition would not prevent the associated equipment from performing its safety-related function(s). None of the conditions identified by the SWEs during the equipment Seismic Walkdowns were concluded to be 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 26 AWCs were completed for Quad Cities Unit 2. It is noted that additional AWCs will be completed, as required, 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 MA-QC-716-026-1001, Seismic Housekeeping

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 Issue Identification during Area Walk-bys

Table 5-3 provides a summary of issues identified during the Area Walk-bys. Ten (10) issues 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 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

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 record (IR number).

Components identified on Table E-2 may also be identified on Table E-1 as items whose walkdowns have been deferred to an outage.

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. Issues Identified During Seismic Walkdowns

Item ID	Description of Issue	Action Request ID (IR)	Actions Complete Yes/No (See Notes 1 & 2)
2-8801A-AO	Air line for associated solenoid valve 2-8801A-SO is in contact with solid pipe insulation. A drawing review shows that the valve fails closed upon loss of air. Therefore, there is no immediate seismic concern.	1397616	Yes
2-7800-29-1	During the Seismic Walkdowns it was identified that one of the two latches on MCC 29-1 was not secured. The other latch is secured. One of the two door latches was able to be secured properly. The mass of the door is minimal with respect to the capability of the single door latch, and it is reasonable to conclude that the door will remain closed during a seismic event. Further, the door is not made to be bolted shut, nor is it otherwise rigidly fastened to the cubicle. As such, it is not designed to provide significant reinforcement to the cubicle with regard to structural integrity during a seismic event. MCC 29-1 remains fully operable.	1397864	Yes
2-7100-28	No measures in place to prevent trolley on top of Switchgear 28 from impacting trolley rail end stops during seismic event, thereby introducing vibration into Switchgear 28. Trolley movement and impact is judged to be minimal due to cyclic motion of seismic event and relatively small weight of trolley.	1397866	No
2-8300-2	During the Seismic Walkdowns it was identified that there is a minor bend in the bottom of the U2 125V Battery Charger Door. Because the door is latched closed, there is no seismic interaction concern and the charger is capable of performing its design function.	1419533	No
1/2-6601	One of 14 anchors is missing. Per Unit 1 enveloping SQUG anchorage analysis, minimum anchor safety factor for a 14 anchor-configuration is greater than 9. Therefore, a configuration with 1 anchor missing is judged to be acceptable. U1 and U2 EDGs were walked down for extent of condition and were found to have all 14 anchor bolts installed.	1398529	No

Item ID	Description of Issue	Action Request ID (IR)	Actions Complete Yes/No (See Notes 1 & 2)
2-0302-22A	Clearance issue between a portion of the valve actuator for the 2-0302-22A valve and an adjacent lifting lug. There is approximately 1/8th inch clearance between the lug and the valve component. The location of the lug is away from the air input line and any moving parts associated with this valve. A drawing review (M-83, sheet 3) was performed and it was determined that the valve fails closed. If contact is made between the lug and the actuator, and the actuator is damaged, the valve will fail closed per its design. Damage to the actuator will not affect the ability of the valve to fail closed. Because this valve is designed to isolate (fail closed, which is the safe condition), the safety function of the valve will not be prevented.	1400097	No
2212-125	During Fukushima seismic walkdowns, it was discovered that 1 of the 26 sheet metal enclosure screws is missing from the 1/2 EDG Engine Control Rack. The remaining 25 screws are judged adequate to maintain the connection.	1400100	Yes
1/2-5202	Original SQUG Screening Evaluation Work Sheet (SEWS) incorrectly documented anchorage for the U1/2 Diesel Day Tank. SEWS had referenced drawings associated with U1 and U2 Diesel Day Tanks, not U1/2 tank. U1/2 tank saddles are bolted to 18-inch I-beam, as are the U1 and U2 tanks. However, U1/2 I-beam is anchored to floor slab with eight 7/8-inch anchor bolts instead of bolted to embedded beam with steel-to-steel bolts. Per drawings B-203 and B-204, anchors are hooked bolts installed per S&L Std. 1737. Hooked bolts are designed so as to develop the full strength of the anchor bolt. Hooked bolts are the same diameter and of the same number as the U1 and U2 tank steel-to-steel bolts, therefore the seismic qualification of the U1/2 tank anchorage is not impacted by judgment.	1402015	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. Issues Identified During Area Walk-Bys

Item ID	Description of Issue	Action Request ID (IR)	Actions Complete Yes/No (See Notes 1 & 2)
AWC-U2-2	During the Seismic Walkdowns, it was identified that a light fixture near MCC 28-1A-1 (RB U2, EL 623, Col line N-8) had an open S-Hook on the North side of the fixture. However, the chain at the other end of the fixture had an S-Hook that was securely clamped shut. Therefore, the fixture would not fall if the open S-Hook were to come loose. Additionally, there is sufficient clearance and other robust barriers (such as piping) that would prevent contact with the MCC should one end of the light fixture become unconnected.	1397870	Yes
AWC-U2-3	During the Seismic Walkdowns, it was identified that the S-Hook used to secure a gas cylinder near the 2-8801A-AO valve is not closed. This item is located RB EL 623, near Col Line L-9. The unclosed S-Hook is a deficient condition; however, the S-Hook is part of a chain assembly that is oriented horizontally and is installed taut such that during a seismic event it cannot become loose. Therefore there is no seismic interaction concern.	1397868	Yes
AWC-U2-8	Light fixture beam clamp oriented incorrectly. Judged to maintain significant margin against falling during a seismic event based on low vertical seismic acceleration for Reactor Building and minimal weight of light fixture.	1398051	Yes
AWC-U2-8	Anchor strap for an instrument air line missing a bolt. Judged to be acceptable since no distortion observed at support and air line spans to adjacent acceptable supports are short.	1398048	Yes
AWC-U2-11	Light fixture beam clamp oriented incorrectly on duct stiffeners above Bus 23. Judged to maintain significant margin against falling during seismic event based on low vertical acceleration values and minimal weight of light fixture.	1398049	Yes
AWC-U2-12	Light fixture behind Bus 2B-1 in the U2 Battery Charger Room is supported by S-Hooks which are not closed. This light fixture is hung from the ceiling. The edge of the light fixture is 5 inches from the wall and 17 inches from Bus 2B-1. The maximum horizontal movement due to pendulum action is limited by the distance it can swing prior to contacting the wall (5 inches). Because the bus is at a distance much greater than 5 inches, the light fixture would not impact the bus, should the S-hooks unlatch during a seismic event.	1398046	Yes

Item ID	Description of Issue	Action Request ID (IR)	Actions Complete Yes/No (See Notes 1 & 2)
AWC-U2-21	Several overhead light fixtures with open S-Hooks. Various mitigating factors (fixtures near robust items, other chains on fixture with closed S-hooks, fixture swing limited by hard targets, minimal fixture weight) prevent harmful interaction with soft targets.	1400098	No
AWC-U2-26	MSA SCBA cases on wall-mounted rack with lip to prevent sliding. Cases not strapped to rack. Per MA-QC-716-026-1001 (Seismic Housekeeping), the critical aspect ratio (height to least width) is 2.5 to 1 for overturning when the object is located on a fixed item. The shelf is considered a fixed item based on the mounting of the shelf to the structure. These cases have an aspect ratio less that 2.5 to 1, therefore overturning is not of concern. Seismic storage of cases as described is adequate.	1398527	Yes
AWC-U2-26	During a walkdown with the resident inspector, it was identified that the recorder and cart for IRM 15 installed under WO 1542900-01 was not adequately located to prevent seismic interaction with the adjacent control panel. The cart would slide on the floor even though the 2 wheels were locked as required by Procedure MA-QC-716-026-1001 for Seismic Housekeeping. The cart did not maintain the 12" separation from the panel as required by Procedure MA-QC-716-026-1001.	1399135	Yes
U2 - General	During the Unit 2 seismic walkdowns, 9 housekeeping issues were found throughout the plant. Per procedure MA-QC-716-026-1001, staged materials near safety-related equipment must adhere to the listed requirements. See IR for specific instances.	1400948	No

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/Quad Cities utilized the existing processes and procedures (Site CAP Expectations) to identify, evaluate and document conditions identified during the Seismic Walkdowns.

In accordance with Exelon/Quad Cities 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. Tables 5-2 and 5-3 in the report provide the IR, 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 Quad Cities and the Staff Evaluation Report of IPEEE submittal of Quad Cities Nuclear Power Station, Units 1 and 2 dated April 26, 2001, an explicit definition of vulnerability was not provided and no vulnerabilities with respect to potential severe accidents related to external events were identified. (Ref. 3 & 4) However, plant improvements and previously identified SQUG outliers were identified in Sections 3 and 7 of Reference 3. Table G-1 in Appendix G lists the plant improvements, the IPEEE/SQUG proposed resolution, the actual resolution and resolution date. All IPEEE improvement actions are complete.

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. Quad Cities Nuclear Power Station Updated Final Safety Analysis Report (UFSAR), Revision 11, October 2011
3. ComEd Letter from R.M. Krich to U.S. Nuclear Regulatory Commission, dated July 29, 1999, Subject: Updated Individual Plant Examination of External Events Report
4. Staff Evaluation Report of Individual Plant Examination of External Events (IPEEE) submittal of Quad Cities Nuclear Power Station, Units 1 and 2 dated April 26, 2001
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 2.3, "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. Internal RM document QC-MISC-12, Rev. 0, Quad Cities Risk Importance Listing to Support Development of the Seismic Walkdown Equipment List (SWEL)
8. Drawing M-80, Rev. AI, Diagram of Fuel Pool Cooling Piping
9. Drawing M-86, Rev. Q, Diagram of Fuel Pool Filter Demineralizer Piping
10. Drawing B-575, Rev. D, Reactor Building Pool Liner Plan
11. Drawing B-579, Rev. D, Reactor Building Pool Sections & Details

A
Project Personnel Resumes and SWE Certificates

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

Stevenson & Associates

Antonio J. Perez, P.E.

SUMMARY
Mr. Perez has over 15 years of experience in project management, project engineering, equipment design, and mechanical systems layout for nuclear and industrial facilities.

EDUCATION
B.S. – Mechanical Engineering
Michigan Technological University, Houghton, MI
Magna cum Laude

LICENSES
Professional Engineer, Wisconsin: September 2002
Minnesota: December 2010

PROFESSIONAL EXPERIENCE
Stevenson & Associates, Green Bay, WI
General Manager October 2010 – Present

- Responsible for interfacing with clients with a focus on continuously improving relationships.
- Responsible for managing staff resources to meet or exceed clients' needs.
- Responsible for recruiting and hiring staff necessary to meet resource requirements while effectively increasing capacity.
- Responsible for providing Engineering Consultation services to clients.

Project Manager March 2007 – October 2010

- Performing Project Management tasks including development of project plans, identification of resource needs, estimating task durations, developing project schedules, and monitoring budgets.
- Lead design team efforts at the Kewaunee Power Station on multiple projects that include two separate Auxiliary Feedwater flow control modifications, Auxiliary Feedwater flow monitoring instrumentation modifications, and Auxiliary Building roof modifications.
- Supported the Calculation Reconstitution and Improvement Project at the Prairie Island Nuclear Generating Plant by mapping calculations associated with the RHR system.

Dominion Energy Kewaunee (formerly Nuclear Management Company 2001 - 2005)
Kewaunee Power Station, Kewaunee, WI
Shift Technical Advisor (trainee) January 2006 – March 2007

- Trainee in a Senior Reactor Operator Certificate training program.

Stevenson & Associates

Antonio J. Perez, P.E.

Engineering Supervisor – ME/CE/SE Design May 2004 – January 2006

- Supervised a staff of 12 to 15 engineers (mechanical, civil, and structural design) who were charged with developing design changes, maintaining design and licensing basis documentation and supporting maintenance.
- Integrated the civil/structural engineering group and the mechanical engineering group into a cohesive unit that resulted in gained efficiency and a net reduction of one full time equivalent engineer.
- Substantially increased the quality of engineering products developed and published by the ME/CE/SE Design Engineering group through coaching and feedback as a result of increased supervisory oversight of engineering products.
- Developed a work management system for the group that provided a means for prioritizing activities, estimating the level of effort, and scheduling of activities. This system allowed for an increased understanding of workload and became an invaluable tool for prioritizing work and managing resources.
- Increased communications within the group by holding daily 15 minute meetings where station messages were delivered and where the group's resources were assessed and redirected as necessary to meet commitments. This resulted in an increase in morale and an increase in commitments met.
- Increased communications with other departments by establishing a central point of contact for the group and by assuring that the ME/CE/SE Design Engineering group was represented at Planning and Scheduling meetings.

Motor Operated Valve Engineer

June 2001 – May 2004

- Established a project plan and led the implementation effort that re-organized the Motor-Operated Valve Program at KPS. This effort consisted of developing a Program Manual, developing controlled calculations, performing Design Basis Reviews, and compiling and/or establishing plant positions on known industry issues. The result of this effort was a reduction of full time equivalent engineers, from 3 to 1, required to maintain the Program.
- Performed and reviewed MOV safety related calculations including Minimum Required Stem Thrust, Weak Link Analysis, and Available Margin.
- Assisted in MOV testing by providing engineering support to maintenance personnel.

DISTRIBUTION PLANNING, INC., Grandville, MI
Systems Mechanical Engineer 2000 – 2001

- Integrated mechanical systems and designed equipment for material handling systems.
- Procured equipment and coordinated delivery schedules with vendors.

Stevenson & Associates

Antonio J. Perez, P.E.

SMS SANDMOLD SYSTEMS, INC., Newaygo, MI
Project Engineer /Manager *1998 – 2000*

- Led multi-discipline project design teams for several projects that ranged in size from a few thousand dollars up to $2.2 million.
- Coordinated efforts with engineering, manufacturing, and installation groups to establish and maintain project schedules that met or exceeded the client's expectations.
- Procured equipment and coordinated delivery schedules with vendors.
- Acted as the company's liaison with clients to work through issues that arose during projects. Provided project status updates to clients and management.
- Designed equipment such as sand storage bins – up to 540-ton live load capacity, bucket elevators, belt conveyors, screw conveyors, and mixers. Most of this equipment was for handling of bulk solids (foundry sand).
- Analyzed and designed structural support members for various types of equipment such as vibratory conveyors, mixers, and conveyors. Designed access structures such as stair towers, service platforms and catwalks.
- Calculated foundation loads and point loads of equipment support points.

LIFT-TECH INTERNATIONAL, Muskegon, MI
Project Engineer 1997 – 1998

- Performed engineering analyses, wrote critiques, and recommended design modifications of structural members for the purpose of upgrading bridge cranes and hoists.
- Implemented engineering design changes to enhance product development.

Certificate of Completion

Tony Perez

Successfully Completed

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

Bruce M. Lory (16 PDH)
Bruce M. Lory – Instructor
NTTF 2.3 Seismic Walkdown Course

Date: 06/26/12

KIM L. HULL

BACKGROUND SUMMARY

Accomplished **Lead Engineer/ Project Manager** with significant experience in commercial nuclear power industry. Demonstrated ability to lead and contribute on cross-functional project teams. Possess strong analytical, problem resolution, collaboration, and communication skills when interacting with diverse audiences including regulatory inspectors, internal inspectors, management, and employees. Respected trainer with ability to develop and present information and measure effectiveness through evaluation techniques. Strengths include:

Project Management	Design Modifications	Plant Operational Support
Procurement	Management/Leadership	Regulatory Compliance
Training/Coaching	Auditing	Inspections

KEY ACCOMPLISHMENTS

- Served as KNPP Lead Engineer/ Project Supervisor for approximately 125 plant design changes.
- Experienced in all aspects of nuclear power plant modification packages including development of calculations, design, engineering, and procurement specifications.
- Thorough understanding of configuration control, management, and preparation of 10CFR50.59 analyses.
- Participated in several regulatory and industry audits, including CDBI and INPO assessments.
- Experienced as a Technical Specialist performing NUPIC Audits.
- Well-developed communication skills for preparing technical presentations including lesson plans, project reports, and meetings in support of regulatory activities and inspections.
- Qualified Shift Technical Advisor for KNPP Operations Group (1980s).

PROFESSIONAL EXPERIENCE

STEVENSON & ASSOCIATES – Project Manager **2010 - Current**
National consulting engineering firm specializing in civil, structural and mechanical engineering for power, industrial and advanced technology facilities.

Project Manager
- Development of plant specific Seismic Walkdown Equipment Lists for multiple Units in response to NRC 50.54(f) requirements 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 2.3, ''Recommendation 2.3: Seismic.''
- Onsite at Kewaunee Power Station Consultant support to resolve Q-list Open Items
- On-site at Kewaunee Power Station Consultant support for Auxiliary Feedwater Flow Control Modification including preparation and review of design documentation.

WISCONSIN PUBLIC SERVICE RESOURCES / Nuclear Management Company
DOMINION ENERGY - Kewaunee, WI **1982 to 2010**

Senior Instructor (Maintenance) (2009 - 2010)
- Developed lesson plans and taught Basic Systems and Continuing Training Topics for Engineering and Technical Support training program.

Engineer III/Principal Engineer (2004 - 2009)
- Responsible for modifications and emergent issues including Steam Exclusion Boundaries, Fuel Transfer Carriage, Frazil Ice development on the KPS Circulating Water Intake, and NRC 96-06 Two Phase flow.
- Member of Dominion Fleet Calculation Quality Review Team and Mentor for Calculation training.
- Outage nightshift Lead Mechanical Design Engineer/Back-up Supervisor.
- KPS Engineering representative on the Independent Review Team developed to address CDBI

inspection findings. Assigned to review all calculations, modification packages, 10CFR 50.59 screenings, evaluations, and procurement packages.
- Technical Instructor for Administrative Process training for new engineers.

Mechanical Design Supervisor (2002 - 2004)
- Supervised nine engineers, analysts, and technicians assigned to the KNPP Mechanical Design Group.
- Provided Mechanical Design Oversight for all vendor activities impacting KNPP Mechanical Design Bases.
- Provided support for emergent plant issues, NRC Inspections, and Physical Change Packages.
- Subject Matter Expert Instructor for 10CFR 50.59 process training for new engineers.

Principal Engineer (Analytical Group SGR Project) (1998 - 2002)
- Contract Manager for Steam Generator Replacement (SGR).
- Responsible for coordination of SGE design, fabrication and installation contracts.
- Provided outage schedule development, coordination, and work process integration between Bechtel and KNPP.
- Coordinated contractor mobilization, badging, and plant specific training.
- Technical Specialist for Quality Assurance audits of vendors.
- SGR Shift Manager for night shift
- Responsible Engineer for SGR related Physical Change Packages.
- Responsible for SGR budget development up to 1998.
- Prepared, reviewed, and awarded Bechtel Installation contract.
- Participated in review and award of Ansaldo Fabrication contract.
- Served on team to review and award Westinghouse Design contract.
- Selected to work at Arkansas Nuclear One for their steam generator installation.

Senior Engineer (Analytical Group) (1994–1998)
- Responsible Engineer for Physical Change Packages.
- Member KNPP Engineering Reorganization Team.
- Recognized Technical Expert for KNPP systems.

Senior Project Supervisor (1992–1994)
- Provided project management and engineering services for KNPP DCR packages.
- Supervisor of KNPP NPM Project Attendants responsible for modification package organization and close out.

Nuclear Services Supervisor (1991–1992)
- Supervised initial Steam Generator replacement project effort.
- Provided specification development for services and major plant components.

Prior to 1992 – Held engineering positions from Associate Engineer to Nuclear Design Engineering Supervisor.

EDUCATION

Masters Program Coursework - Mechanical Engineering; Michigan State University - E. Lansing, MI
B.S. - Mechanical Engineering - Michigan State University - E. Lansing, MI
B.A. - Biology - Albion College - Albion, MI

Certificate of Completion

Kim Hull

Successfully Completed

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

Bruce M. Lory (16 PDH)

Bruce M. Lory - Instructor
NTTF 2.3 Seismic Walkdown Course

Date: 06/26/12

STEVENSON & ASSOCIATES

JAMES D. GRIFFITH

QUALIFICATIONS

Knowledgeable professional with over 23 years of diverse experience in structural engineering. Thorough, results-oriented problem solver with excellent communication skills. Works well independently or as part of a team. Highly skilled in all project phases from design through construction and specializes in field problem resolution.

PROFESSIONAL EXPERIENCE

Project Engineer (Stevenson & Associates, 2000 to present)

Responsible for all aspects of civil structural design. Also provides interface between clients, vendors, constructors and Stevenson & Associates.

Decommissioning Design Engineer (ComEd, 1998 to 2000)

Responsible for structural design work during conversion from generating to storage facility. Gathered design information during conceptual field walkdowns and prepared design calculations and drawings. Provided field support during construction.

- Designed all component supports and concrete foundations for various new indoor equipment.
- Managed construction during installation of new roof-mounted HVAC system.
- Designed structural steel support framing and access gallery for new outdoor cooling towers.

Maintenance Engineer (ComEd, 1995 to 1998)

Responsible for the design of structural repairs to station equipment and facilities. Interfaced with maintenance and construction personnel and performed evaluations of rigging, lead shielding, and scaffolding. Investigated and developed solutions for structural problems in the field and provided field support during installation of modifications.

- Designed and supervised field installation of heavy-duty rigging apparatus for replacement of large overhead crane motor.
- Performed conceptual design and supervised field construction of 60 foot high scaffold work platform for valve replacement.
- Prepared and reviewed calculations to justify structural acceptability of station equipment during successful completion of Seismic Qualification Utility Group (SQUG) evaluation program.
- Acted as engineering liaison to other station departments (Maintenance, Operations, Radiation Protection, etc) to resolve emergent problems regarding:
  - Rigging for lifting various plant equipment
  - Placement and support of temporary lead shielding
  - Storage of equipment in safety related seismic areas of the plant
  - Structural repairs and improvements to plant buildings and equipment

Structural Engineer (Sargent and Lundy, 1983 to 1995)

Responsible for design of structural modifications to various components of power generating facilities. Prepared and reviewed design calculations and drawings

- Designed numerous modifications to existing structural steel framing members and end connections.

- Supported field installation of modifications and provided solutions to problems encountered in the field.
- Designed and monitored field installation of new access galleries for various pieces of equipment.

EDUCATION

B.S., Civil and Environmental Engineering, University of Wisconsin, Madison, Wisconsin

Continuing Education

"Concrete Evaluation and Repair Seminar", Portland Cement Association, Skokie, Illinois, 1996

"STAAD III Program Training", Sargent and Lundy Engineers, Chicago, Illinois, 1995

"Piping Design, Analysis and AUTOPIPE Training"
Vectra Technologies, Inc., Zion, Illinois, 1995

"SQUG Walkdown Screening and Seismic Evaluation Training Course",
Seismic Qualification Utility Group through ComEd, Downers Grove, Illinois, 1994

PROFESSIONAL REGISTRATIONS

Licensed Professional Engineer in State of Wisconsin

Certificate of Completion

Jim Griffith

Successfully Completed

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

Bruce M. Lory (16 PRH)
Bruce M. Lory - Instructor
NTTF 2.3 Seismic Walkdown Course

Date: 06/26/12

SQUG

Certificate of Achievement

This is to Certify that

Jim Griffith

has Completed the SQUG Walkdown Screening
and Seismic Evaluation Training Course

Aug. 2-4 & 10-11, 1994
Date of Course

SQUG Representative

Training Course Administrator

MICHAEL WODARCYK

EMPLOYMENT

Stevenson & Associates, Glenview, Illinois
Staff Engineer June 2011 - present
- Analysis and design of nuclear power plant structures and other assorted structures. On-site engineering at plants during outage maintenance periods.

ESCA Consultants, Urbana, Illinois
Design Engineer September 2010 - June 2011
- Structural design and hydraulic modeling of bridges for the Illinois Department of Transportation, Canadian National Railway, BNSF Railway, and others. Inspection of the production of precast structural elements for CN.

Evans, Mechwart, Hambleton, & Tilton, Columbus, Ohio
Intern May 2007 - August 2007, May 2008 - August 2008
- Assisted in the design and drafting of site, stormwater, and utility plans for various projects using AutoCAD, including the headquarters tower and garage for Grange Insurance in downtown Columbus.

D.E. Huddleston General Contractors, Columbus, Ohio
Laborer May 2006 - August 2006
- Constructed footing foundations and performed other miscellaneous tasks for two elementary schools under construction in the Columbus City Schools district.

EDUCATION

University of Illinois, Urbana-Champaign — Urbana-Champaign, Illinois
Master of Science, Civil Engineering — August 2010
Structural Engineering Concentration
GPA: 3.66 (of 4.0)

University of Notre Dame — Notre Dame, Indiana
Bachelor of Science, Civil Engineering — May 2009
GPA: 3.47 (of 4.0)

- *Undergraduate Research*, January 2009 - August 2009
  Studied the effects that different structural systems have on the harmonic damping of a high-rise structure. Modeled a case study high-rise building using SAP2000.

- *Big Beam Contest*, August 2008 - February 2009
  Led a team of four students that designed, built, and tested Notre Dame's entry for the Precast/Prestressed Concrete Institute's Big Beam reinforced-concrete beam contest, with all design considerations based upon ACI 318-08 and PCI 6th ed. codes and specifications. This design won 2nd place in the contest's Zone 4 (Midwest).

CERTIFICATIONS

Engineer-in-Training — April 2009
First Aid — August 2008

ORGANIZATIONS

American Concrete Institute
American Society of Civil Engineers

Certificate of Completion

Mike Wodarcyk

Successfully Completed

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

Bruce M. Lory - Instructor
NTTF 2.3 Seismic Walkdown Course

Date: 06/26/12

Stevenson & Associates

DAVID N. CARTER

PROFESSIONAL EXPERIENCE

April, 1998-Present **Wisconsin Electric, Point Beach Nuclear Plant** (On loan from Stevenson & Associates)

Point Beach Nuclear Plant is located in Wisconsin between Milwaukee and Green Bay on Lake Michigan. Worked as Seismic Qualification Engineer responsible for performing seismic evaluations of plant equipment as well as providing input to procurement documents and reviewing seismic qualification reports for new plant equipment. Also worked as Design Engineer preparing and managing various plant modifications. Modifications included reinforcement of RWST anchorage, new HELB barriers and vent paths, new firewall, platform and foundation modifications. The modification preparations included preparing design change documents, 50.59 safety evaluations and calculations as well as assisting in resolution of installation problems.

December, 1997-April, 1998 **Stevenson & Associates**

Stevenson & Associates is a consulting engineering firm. Work includes design and analysis of building structures and components.

April, 1995-December, 1997 **ComEd, Zion Station**

Zion Station is a nuclear power plant that is owned and operated by ComEd, an electric utility serving northern Illinois. Member of design engineering group as a Senior Structural Engineer. Work included the scoping, cost estimating, design and preparation of design documents for various plant modifications. Prepared 50.59 safety evaluations for various plant modifications. Member of the Zion Seismic Review Team that implemented the SQUG program. Performed SQUG walkdowns and assessments. Proposed and implemented upgrades to SQUG outliers. Attended and completed the SQUG SCE Training.

April, 1984-April, 1995 **Sargent & Lundy Engineers**

Sargent & Lundy is a consulting engineering firm that specializes in the design and modification of power plants. Work included the design and analysis of building structures and support components on fossil and nuclear power plants. Assignment highlights include the following:

- Member of modification design project team at Zion Station.
- Member of Zion project team in Sargent and Lundy Chicago office for approximately two years. Worked on various modifications for Zion Station as a Senior Engineer in the Structural Engineering Division. Design activities included preparation, review or approval of design calculations, design documents such as engineering change notices and design criteria documents. Supervised up to four other engineers.
- Member of a design team working on the design of two new nuclear units located in Korea (Yonggwang 3&4). The design was done in the offices of Korea Power Engineering Corporation located in Seoul, Korea. Responsibilities included the design of the structural steel for the turbine building. The assignment involved working with and providing guidance for engineers from the Korean engineering company. The work also involved the preparation of design procedures, procurement specifications, and design calculations as well as the review of design drawings and shop drawings. The length of this assignment was approximately four years.

- Member of a group of engineers that worked on a weld evaluation program at Watts Bar Nuclear Power Station. The assignment included the evaluation of various weld discrepancies on structural steel connections and component supports. This assignment lasted one year.

- Member of various project teams which worked on the design of modifications for fossil and nuclear power plants. Projects include Dresden, Quad Cities, Byron, Braidwood Stations (Commonwealth Edison Co.), and Parish Station (Houston Lighting and Power). Work included the assessment of masonry walls, design of component supports, design of hot air ducts, evaluation of structural steel framing for final loads and preparation of study and design reports. Responsibilities also included the preparation and review of design documents, letters, supervising other engineers, and meeting with clients.

September, 1980-March 1984 **American Bridge Division - United States Steel Corp.**

American Bridge was a consulting engineering firm whose main client was U.S. Steel. They specialized in the design and modification of steel mill buildings. Assignments included the following:

- Design of various modifications to blast furnaces.

- Member of group of engineers whose function was to inspect existing mill buildings, prepare a report of findings and recommend repairs. Included in this assignment was the preparation of design drawings showing the recommended repairs. This assignment lasted approximately one year.

- Loaned to Sargent and Lundy Engineers to assist in the design of component supports and the final load evaluation on Byron Nuclear Power Station. This assignment totaled approximately 16 months.

EDUCATION

Syracuse University, L. C. Smith College of Engineering; Bachelor of Science Degree in Civil Engineering. Graduated Cum Laude.

PROFESSIONAL AFFILIATIONS

Licensed Professional Engineer in State of Minnesota
Licensed Structural Engineer in State of Illinois
Licensed Professional Engineer in State of Wisconsin

Certificate of Completion

Dave Carter

Successfully Completed

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

Bruce M. Lory (16 PDH)
Bruce M. Lory - Instructor
NTTF 2.3 Seismic Walkdown Course

Date: 06/26/12

Exelon.

Julie A. Kim

EXPERIENCE SUMMARY

2011-present Exelon Generation

Julie joined Exelon in 2011. During that year, she worked on projects specific to power plants. Previously, she worked on the design height control valves. She also studied computation fluid dynamics (CFD) during college. Examples of her experience are:

ACCOMPLISHMENT SUMMARY

Product Launch

Worked on a two person team to design, a height control valve that was later tested, released and sold. Also worked with mirror components that were designed for vibration.

Project Lead the Way

An organization that mentors high school kids to design an airplane. Technical aspects of the project included structural mechanics, and the use of FEA and CFD software. The team won the state competition and made it to the semi-finals at National Competition.

Seismic Walkdowns

Organizing SWEL, providing plant drawing, performing plant walkdowns, interfaces with various departments, scheduling dose, writing and tracking issue reports.

Combustible Loading

Verified all materials are accounted for at the time of calculation. Tracked and outlined all changes in fire severity in any fire zone.

Zinc Injection Modifications

Completed design change package for both units for zinc injection skid to change the flow control valve internals. Interfaced with vendor and various departments to complete the reviews.

ASME Presentation

Presented co-authored independent research paper to ASME on CFD. The paper analyzed methods of the aerodynamics of pickup trucks.

Exelon.

EDUCATION

Muskegon Community College, Associates in Arts and Science, 2008
Grand Valley State University, B.S. Mechanical Engineering, 2011

QUALIFICATIONS AND TRAINING

EPRI Seismic Walkdown Engineer (SWE) training, 2012

MEMBERSHIPS

Member, American Society of Mechanical Engineers (ASME)

ELECTRIC POWER RESEARCH INSTITUTE

Certificate of Completion

Julie Kim

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

June 27, 2012
Date

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

Exelon.

Kevin B. Hall, P.E.

EXPERIENCE SUMMARY

2012-present Exelon Generation, Cordova, IL

Kevin joined Exelon in April 2012 as a design engineer.

2001-2012 Stanley Consultants, Muscatine, IA

Kevin began his professional career at Stanley Consultants in Muscatine, IA. His experience includes the structural design of many different types of structures, including buildings in high wind and seismic regions, flood control structures, water and wastewater treatment facilities, and various commercial, industrial and military installations located all over the world.

ACCOMPLISHMENT SUMMARY

Professional Engineer

Earned a professional engineering license in the state of Iowa. License number 17771.

Engineer of Record

Engineer of Record for many flood control structures around New Orleans following hurricane Katrina and the rebuilding effort. Also served as Engineer of Record for various military projects located all over the world.

Seismic Walkdowns

Performed plant walkdowns while interfacing with various departments.

Exelon.

EDUCATION

Bradley University, Peoria, IL – Bachelor of Science in Civil Engineering, May 2001

QUALIFICATIONS AND TRAINING

Professional Engineer in the Branch of Structural Engineering, Iowa Engineering and land Surveying Board, License 17771

EPRI Seismic Walkdown Engineer (SWE) training, 2012

EPRI | ELECTRIC POWER RESEARCH INSTITUTE

Certificate of Completion

Kevin Hall

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

June 27, 2012
Date

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

Tribhawan Ram

EDUCATION:

B.S. - Electrical Engineering, Punjab University, India, 1972
M.S. - Electrical Engineering, University of Cincinnati, 1977
M.S. - Nuclear Engineering, University of Cincinnati, 1982
M.B.A. - Bowling Green State University, 1996

PROFESSIONAL REGISTRATION:

State of Ohio

PROFESSIONAL HISTORY:

Stevenson & Associates, Inc., Senior Engineer, 2011 - present
Public Service Electric & Gas Co., Senior Plant Systems Engineer, Hancock Bridge, NJ, 2007 - 2011
Entergy Corporation, Plymouth, Massachusetts, Senior Design Engineer, 2002-2007
Various Companies, Contract Consulting Project Engineer, 1996 – 2002
Public Service Electric & Gas Co., Senior Staff Engineer, Hancock Bridge, NJ, 1983-1990
Toledo Edison Co., Toledo, Ohio, Senior Assistant Engineer, Associate Engineer, 1978-1983

PROFESSIONAL EXPERIENCE:

- Electrical and Controls Design Engineering
- Plant Systems Engineering
- Transformer and Relay(s) Spec Developer
- Plant Modification Engineering
- Systems and Component Test Engineering
- Factory Testing Witness
- 6 Month BWR Systems Engineering Training
- ETAP Trained
- Arc Flash IEEE 1584 Trained

Mr. Ram has over 28 years of electrical project, design and systems engineering experience in US nuclear plants. As part of the Seismic Margin Analysis (SMA) team, in 2012, Mr. Ram is leading the electrical engineering EPRI methodology effort to perform Post-Fukushima relay list development and evaluation to support Safe Shutdown Equipment List (SSEL), including relay functional screening and chatter analysis, for Taiwan nuclear plants (both PWR and BWR). In this effort, he is preparing the final reports including recommendations to replace any bad actor relays. Mr. Ram is preparing proposals to replace these bad actors including modification package development for field replacement of these relays. He has prepared proposals to lead similar forthcoming relay evaluation efforts for several Westinghouse plants in the USA. Mr. Ram has either prepared or peer reviewed the Seismic Walkdown Equipment Lists (SWEL 1 & 2) for several Exelon Plants.

As a senior plant systems engineer, Mr. Ram has: 1. Developed several test plans for modification packages for the replacement of low and medium voltage circuit breakers (ABB K-Line to Square D Masterpact; GE Magneblast to Wyle Siemens) and for the replacement of the entire Pressurizer Heater Bus switchgear; 2. Personally been involved in execution of these test plans during refueling outages; 3. Witnessed factory testing of Pressurizer Heater Bus Switchgear; 4. Interfaced with NRC in their biennial Component Design Basis Inspections (CDBI); Interfaced with INPO in their biennial evaluations; 5. Developed and executed Performance Centered Maintenance (PCM) strategies for Motor Control Centers (MCCs) and low and medium voltage circuit breakers and switchgear; 6. Developed and executed margin improvement strategies for pressurizer heater busses, for twin units, through obtaining funds and then equipment replacement; 7. Developed refueling outage scoping for low and medium voltage circuit breakers and MCCs through working with outage group, maintenance, operations, and work MGMT; 8. Resolved breaker grease hardening issue for ABB K-Line breakers, over a two year period, through working with maintenance and work MGMT in implementing accelerated overhauls with better grease; 9. Trained operations and engineering personnel in the Engaging People and Behavior Change process, as part of a case study team and; 10. Resolved day to day operations and maintenance issues with systems of responsibility (low and medium voltage systems)

Mr. Ram has regularly participated in the EPRI annual circuit breaker user group conferences; at the 2011 meeting, he made a presentation on circuit breaker as found testing vis-à-vis protection of equipment, cables, and containment penetrations, and selective coordination preservation.

As a Senior Design Engineer, Mr. Ram has: 1. Developed specifications and procured 345/4.16/4.16 kV and 23/4.16/4.16 kV transformers (ranging up to $1.25 million); 2. Prepared a modification package to install the 23 kV/4.16 kV/4.16 kV transformer, including leading the project team to get this transformer successfully installed, tested, and placed in service; 3. Developed ETAP scenarios and performed load flow studies to successfully support the 2006 INPO evaluation; 4. Performed arc flash calculations per IEEE 1584 methodology for 4 kV, 480V Load Centers, and MCCs, enabling a justification of reduced arc flash rated clothing, thereby allowing conversion of OUTAGE PMs into ONLINE PMs and; 5. Performed single point system vulnerability analysis.

As a Consulting Lead Project Engineer, Mr. Ram was heavily involved in resolution of the USI A-46 for several plants. He performed an extensive review of dozens of control circuits for relay chattering issues. To replace bad relay actors, Mr. Ram developed and/or supervised the development of many modification packages including: selection of replacement relays (both protective and auxiliary); preparation of relay testing specification with civil engineering input; working with and visiting seismic testing facilities for relay qualification and; developing pre and post installation instructions including test procedures. He worked closely with teams consisting of maintenance, operations, and work MGMT during the development and implementation of these projects. Besides the A-46 issue, Mr. Ram first developed and then was personally involved in the implementation of modification packages consisting of Cable, Conduit, Circuit Breaker and motor starter (contactor) replacements.

The following provides a list of USI A-46 resolution projects:

Northeast Utilities – Millstone Station
Consumers Power Co. - Palisades Nuclear Station
Boston Edison Co. - Pilgrim Nuclear Power Station
Commonwealth Edison Company- Dresden Station, Quad Cities Station

Walter Djordjevic

EDUCATION:

B.S. - Civil Engineering, University of Wisconsin at Madison, 1974
M.S. - Structural Engineering, Massachusetts Institute of Technology, 1976

PROFESSIONAL REGISTRATION:

State of California, State of Wisconsin, Commonwealth of Massachusetts, State of Michigan, State of Arizona, State of Missouri

PROFESSIONAL HISTORY:

Stevenson & Associates, Inc., President 1996 - present; Vice President and General Manager of the Boston area office, 1983 - 1995
URS/John A. Blume & Associates, Engineers, Boston, Massachusetts, General Manager, 1980 - 1983; San Francisco, California, Supervisory Engineer, 1979 - 1980
Impell Corporation, San Francisco, California, Senior Engineer, 1976 - 1979
Stone & Webster Engineering Corporation, Boston, Massachusetts, Engineer, 1974 - 1976

PROFESSIONAL EXPERIENCE:

- Structural Engineering
- Structural Dynamics
- Seismic Engineering
- Construction
- Vibration Engineering
- Expert Witness
- Committee Chairman

Mr. Djordjevic founded the Stevenson & Associates Boston area office in 1983 and serves as President and General Manager. Mr. Djordjevic is expert in the field of structural engineering – more specifically, in the areas of structural vulnerabilities to the effects of seismic and other extreme loading phenomena. As a structural dynamicist, Mr. Djordjevic also heads the Vibration Engineering Consultants corporate subsidiary of Stevenson & Associates for which he has overseen numerous designs of vibration sensitive microelectronics facilities for such clients as IBM, Intel, Motorola and Toshiba. He has personally been involved in such projects as resolvi ng vibration problems due to construction activities for the Central Artery Project (Big Dig) in Boston for which he was retained by Massport. Finally, Mr. Djordjevic has been personally retained as an Expert Witness a number of times relating to cases involving construction, structural and mechanical issues.

He has performed over a thousand hours of onsite seismic and other natural phenomena (including tornados, hurricanes, fire, and flooding) inspection walkdowns to assess structural soundness and vulnerabilities. He has inspected microelectronics fabrication facilities, power facilities, and hazardous material government and military reservations. He is one of the most experienced seismic walkdown inspection screening and verification engineers having personally participated in seismic walkdowns at over 50 U.S. nuclear units.

In recent years, he has concentrated on screening inspection walkdowns and assessments for resolution of the USI A-46 and seismic IPEEE issues, on numerous facilities. The following provides a partial list of recent projects:

American Electric Power - D.C. Cook Station
Boston Edison Co. - Pilgrim Nuclear Power Station (SPRA)
Commonwealth Edison Company- Braidwood Station [PM], Byron Station[PM], Dresden Station[PM], Quad Cities Station[PM]
Consumers Power Co. - Palisades Nuclear Station[PM]
Entergy - Arkansas Nuclear One
Florida Power & Light - Turkey Point Station
New York Power Authority - James A. Fitzpatrick Nuclear Power Plant
Niagara Mohawk Power Corporation - Nine Mile Point Station [PM]
Northern States Power Co. - Monticello Nuclear Generating Plant
Northern States Power Co. - Prairie Island Nuclear Generating Plant
Omaha Public Power District – Fort Calhoun Station (SPRA)
Public Service Electric & Gas - Salem Nuclear Station
Rochester Gas & Electric - R.E. Ginna Station
Wisconsin Electric - Point Beach Nuclear Station[PM] (SPRA)
Wisconsin Public Service - Kewaunee Nuclear Power Plant[PM] (SPRA)
[PM] Indicates projects where Mr. Djordjevic served as Project Manager
Hanford Reservation
Savannah River Plant Reservation
Rocky Flats Reservation
Tooele US Army Depot
Anniston US Army Reservation
Umatilla US Army Reservation
Newport US Army Reservation
Aberdeen US Army Reservation

He is a member of the IEEE 344 Standards Committee, Chairman of the ASCE Working Group for Seismic Evaluation of Electrical Raceways, and Chairman of the IES Committee for Microelectronics Cleanroom Vibrations

Representative projects include overseeing the SEP shake-table testing of electrical raceways, in-situ testing of control panels and instrumentation racks at various nuclear facilities, equipment anchorage walkdowns and evaluations at various nuclear facilities. He is the principal author of the *CERTIVALVE* software package to evaluate nuclear service valves, and contributing author in the development of the *ANCHOR* and *EDASP* software packages commercially distributed by S&A.

Mr. Djordjevic is expert in the area of seismic fr agility analysis and dynamic qualification of electrical and mechanical equipment. He has participated in and managed over twenty major projects involving the evaluation and qualification of vibration sensitive equipment and seismic hardening of equipment. As demonstrated by his committee work and publications, Mr. Djordjevic has participated in and contributed steadily to the development of equipment qualification and vibration hardening methodology.

PROFESSIONAL GROUPS

Member, Institute of Electrical and Electronics Engineers, Nuclear Power Engineering Committee Working Group SC 2.5 (IEEE-344)

Chairman, American Society of Civil Engineers Nuclear Structures and Materials Committee, Working Group for the Analysis and Design of Electrical Cable Support Systems

Member, American Society of Mechanical Engineers Operation, Application, and Components Committee on Valves, Working Group SC-5

Chairman. Institute of Environmental Sciences, Working Group foe Standardization of Reporting and Measuring Cleanroom Vibrations

PARTIAL LIST OF PUBLICATIONS

1979 ASME PVP Conference, San Francisco, California, "Multi-Degree-of-Freedom Analysis of Power Actuated Valves", Paper No. 79-PVP-106.

1983 ASME PVP Conference, Portland, Oregon, "A Computer Code for Seismic Qualification of Nuclear Service Valves", Paper No. 83-PVP-81.

1983 ASME PVP Conference, Portland, Oregon, "Qualification of Electrical and Mechanical Equipment at Rocky Flats Reservation Using Prototype Analysis".

1984 ANS Conference, "Qualification of Class 1E Devices Using In-Situ Testing and Analysis."

1986 Testing of Lithography Components for Vibration Sensitivity, Microelectronics, Cahners Publishing

1990 Nuclear Power Plant Piping and Equipment Confer ence, "Development of Generic Amplification Factors for Benchboard and Relay Cabinet Assemblies", Paper No. 106, Structures and Components Symposium, held by North Carolina State University

1991 Electric Power Research Institute, "Development of In-Cabinet Response Spectra for Benchboards and Vertical Panels," EPRI Report NP-7146

Certificate of Completion

Walter Djordjevic

Successfully Completed

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

Bruce M. Lory (16 PDH)
Bruce M. Lory - Instructor
NTTF 2.3 Seismic Walkdown Course

Date: 06/26/12

Stevenson & Associates
Engineering Solutions for Nuclear Power

275 Mishawum Road, Suite 200, Woburn, MA 01801
Tel (781) 932-9580 Fax (781) 933-4428
www.vecsa.com

Institute (ACI), and ASME (ANSI) B31.1 and B31.3 codes. He serves on the AREVA College of Experts in the areas of structural and dynamic analysis and is also fluent in using numerous piping and finite element computer programs, as well as in typical frame analysis programs.

Engineering Manager, Civil and Layout Department
AREVA NP Inc.

Mr. Bacon served as an Engineering Manager in the Civil and Layout Department in Charlotte, North Carolina. In this role he was responsible for the efforts involving work on the 3D model for an AREVA US EPR plant being designed for the Calvert Cliffs site in Maryland. His areas of responsibility also included the balance of plant piping system design efforts for the plant. In this role, he was involved with interfaces with numerous groups utilizing the 3D model information, as well as consortium partner Bechtel Power, and AREVA offices throughout the US and Europe who served as subcontractors for various portions of the overall project scope of work. This included coordinating the efforts of approximately fifty individuals for these efforts involving technical resolution of issues, manpower planning, personnel issues, and development of the group.

In addition to the managerial responsibilities, he was a member of the AREVA College of Experts in the area of mechanics and fluid mechanics. This group was comprised of approximately one percent of the company worldwide which served as the technical leaders for the company, sharing best practices and knowledge throughout the global organization.

In addition to the New Plants activities in the US, Mr. Bacon supported efforts involving current activities for the International Thermonuclear Experimental Reactor (ITER) effort in which AREVA had the responsibility for the Cooling System involving the piping system evaluations and development of Technical Guides and impact to the building resulting from the piping system.

He previously served as an Engineering Manager in the Structural and Engineering Mechanics Group, working on projects involving operating plants. As a Project Engineer and Manager, he helds responsibility for leading project teams in technical areas, as well as in budget and schedule item tracking functions.

Examples of typical projects include the following:

Mixed Oxide (MOX) Fuel Fabrication Facility, Savannah River Site - Conducted third party review of overall project identifying ways to achieve efficiencies and improve production rates for the building design and construction effort. This resulted in numerous recommendations for the site to improve production in the areas of scheduling, group interfacing (engineering disciplines, construction, etc.), procedural development as well as improvements through procedural revisions. This also included performing as the lead engineer on projects for the facility involving development of procedures for field routing of small bore piping systems, as well as conduit runs.

ECCS Debris Blockage Issue, Tokyo Electric Power Company (TEPCO) – Established contact and led proposal efforts to obtain contracts for ECCS suction strainer replacements for first plant performing this

Stevenson & Associates
Engineering Solutions for Nuclear Power

275 Mishawum Road, Suite 200, Woburn, MA 01801
Tel (781) 932-9580 Fax (781) 933-4428
www.vecsa.com

Todd A Bacon

Education

1976 – 1980	University of Illinois – Urbana-Champaign Bachelor of Science – Civil Engineering

Registration / Certification

Professional Engineer: California License No. C-0336104 (Civil), Georgia License. No. 015562, Ohio License No. E-57497

Professional History

2012 – Present	Stevenson & Associates, Charlotte, North Carolina, Senior Consultant and General Manager, Charlotte, NC Office
1980 – 2012	AREVA Inc., Charlotte, NC, Engineering Manager

Professional Experience

Mr. Bacon has thirty years of experience in the design and modification of mechanical and structural systems. His responsibilities as an Engineering Manager have included work from the conceptual design through to the installation support phases of projects. Mr. Bacon has served as Project Engineer and Project Manager for numerous work scope efforts, including coordination of personnel in multiple locations. The efforts have also included significant client and/or regulatory interface, as required. These activities have also included responsibility for budgets, schedules and the technical accuracy of work performed. In addition, he has extensive experience in proposal and report development, as well as personnel training activities.

Mr. Bacon has thirty years of experience in the design and modification of mechanical and structural systems. His responsibilities as an Engineering Manager have included work from the conceptual design through to the installation support phases of projects. Mr. Bacon has served as Project Engineer and Project Manager for numerous work scope efforts, including coordination of personnel in multiple locations. The efforts have also included significant client and/or regulatory interface, as required. These activities have also included responsibility for budgets, schedules and the technical accuracy of work performed. In addition, he has extensive experience in proposal and report development, as well as personnel training activities.

Mr. Bacon's work has involved extensive use of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code, including various piping system related committees. These have included the design group for the HDPE buried pipe group of Section III, and the Flaw Analysis group of Section XI. Other Code experience includes the American Institute of Steel Construction (AISC), American Concrete

Stevenson & Associates
Engineering Solutions for Nuclear Power

275 Mishawum Road, Suite 200, Woburn, MA 01801
Tel (781) 932-9580 Fax (781) 933-4428
www.vecsa.com

scope in Japan. Subsequently won contracts for two additional TEPCO units as well, resulting in $ 8M in revenue for AREVA. This work involved extensive interface and oversight of the strainer hardware vendor during the design, fabrication and construction phases of the projects.

ASME BPVC Work, Various Facilities - Served in positions of increasing responsibility performing and reviewing ASME Boiler and Pressure Vessel Code work in the Structural and Engineering Mechanics Group. Work included Class 1 analyses of flued heads, mechanical equipment evaluations and numerous piping system analyses.

ECCS Debris Blockage Issue, involving numerous US BWR clients - Served in various roles including Project Engineer, Project Manager, and Technical Consultant. Had a significant amount of involvement with this issue including involvement with the BWR Owner's Group for this issue spanning numerous years.

GL 96-06 Operability and Design Basis Resolution, Oconee Nuclear Station, Duke Power - Served as the Project Engineer for the Operability Evaluation for the Oconee Nuclear Station in an effort to show all three units operable under the additional loadings resulting from the USNRC Generic Letter. This assessment included evaluation of the LPSW system, including piping, supports, equipment nozzles, as well as structural platforms and associated components. In addition, operability guidelines were developed for Oconee during this effort.

Reactor Cavity Drain Line Modifications, Palisades Nuclear Power Plant, Consumers Power - Project Manager for the Reactor Cavity Drain Line modifications and letdown piping support modifications at the Palisades Plant. Work scopes included both engineering functions and the generation of modification package paperwork.

NRC Bulletin 79-14 Large-Bore Piping Project Evaluation, D. C. Cook Nuclear Power Plant, Indiana/Michigan Power - Work included serving as Project Engineer to evaluate the adequacy of D.C. Cook's NRC Bulletin 79-14 Large-Bore Piping Project. The work scope involved supervising a project team performing piping and piping support evaluations. Conclusions drawn from this study have enabled the client to realize significant cost savings during recent maintenance outages through discrepancy trending and margin assessment studies.

Reactor Pressure Vessel Bottom Head Drain Line Unplugging Project, Dresden Nuclear Generating Station Units 2 & 3, Commonwealth Edison. Included serving as Project Engineer responsible for unplugging reactor pressure vessel bottom head drain lines for Dresden Units 2 and 3. This project was successfully completed within schedule and budget constraints, and also was part of the Unit 2 critical path outage work.

HPCI System Sparger Modification, Quad Cities Nuclear Generating Station, ComEd - Served as the Structural and Engineering Mechanics Project Engineer and Manager for Quad Cities Unit 1 and 2 high pressure coolant injection (HPCI) system modification, which resulted in the addition of a sparger assembly inside the torus. The project also included the addition of platforms to provide accessibility for personnel performing maintenance activities at both units.

Hardened Wetwell Vent Project Third Party Reviews, Dresden and Quad Cities Nuclear Generating

S&A
Stevenson & Associates
Engineering Solutions for Nuclear Power

275 Mishawum Road, Suite 200, Woburn, MA 01801
Tel (781) 932-9580 Fax (781) 933-4428
www.vecsa.com

Stations, ComEd - Led the third party reviews of the hardened wetwell vent projects for the Dresden and Quad Cities stations. These projects involved the evaluation of existing, as well as new, piping and auxiliary steel. Design codes used for the mechanical work included ASME Section III, Subsections NC, ND, NE and NF, as well as AISC and Uniform Building Code (UBC) standards for the structural evaluations.

Structural Projects, Various Facilities - Past projects have included extensive structural experience, such as the Hope Creek Nuclear Generating Station's drywell inner water seal plate analysis, and also Mark I piping and pipe support evaluations. Previous work also included extensive experience working on various mechanical and structural design projects.

Licensing and Special Projects, Comanche Peak Steam Electric Station, TU Electric - Involved in licensing and special studies projects for the Comanche Peak Station.

SSFI Audit Responses, ComEd - Participated in responding to concerns raised during safety system functional inspection (SSFI) audits.

Project Summary Reports and Operability Guidelines, ComEd and AEPSC - Wrote numerous project summary reports and operability guidelines for Commonwealth Edison (ComEd) and American Electric Power Company (AEPC).

Piping, Piping Support and HVAC Modifications, Various Facilities - Served as Project Engineer for piping, piping support and HVAC modification work for various nuclear plants, including Dresden Units 2 and 3, Quad Cities Units 1 and 2, D. C. Cook Units 1 and 2, and Duane Arnold. Project Engineer responsibilities included coordinating schedule and budget issues, as well as addressing technical questions as they arose.

Control Rod Drive Frame Analysis, Browns Ferry Nuclear Power Plant, Tennessee Valley Authority (TVA) - Involved in the analysis of the control rod drive frames for the Browns Ferry Plant.

Certificate of Completion

Todd Bacon

Successfully Completed

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

(16 PDH)

Bruce M. Lory - Instructor
NTTF 2.3 Seismic Walkdown Course

Date: 06/26/12

B
Equipment Lists

Appendix B contains the equipment lists that were developed during SWEL development. Note that because no SWEL 2 or Rapid Drain-Down items existed for Quad Cities Generating Station Unit 2, there is no Base List 2, SWEL 2, or Rapid Drain-Down Equipment List.

The following contents are found in Appendix B:

Stevenson & Associates

Seismic Walkdown Interim Report, Revision 0

In Response to NTTF Recommendation 2.3: Seismic

Quad Cities Generating Station Unit 2

Tony Perez 7/31/2012

Equipment Selection Preparer date

Kim L. Hull 7/31/2012

Equipment Selection Reviewer date

ANTHONY FUHS 8/1/12

Station Operations Staff Member date

Refer to Attachment 3 for synopsis of Station Operations role and responsibility.

Table B-1a. Base List 1a - Items Exclusive to Unit 2

ID	DESCRIPT	SYSTEM	BUILDING	ELEVATION	LOCATION
125 VDC BATT 2	BATTERY, 125V	125 VDC	TB	628	G-2
125 VDC BUS 2	BUS 2, 125 VDC BATTERY	125 VDC	TB	615	G-1
125 VDC BUS 2A	BUS 2A, 125 VDC BATTERY	125 VDC	TB	615	H-1
125 VDC BUS 2A-1	BUS 2A-1, 125 VDC BATTERY	125 VDC	TB	615	H-1
125 VDC BUS 2B	BUS, TB RES 2B	125 VDC	TB	615	H-1
125 VDC BUS 2B-1	BUS, TB RES 2B-1	125 VDC	TB	615	H-1
2-0203-0001AH25	VALVE, PNUEMATIC - MAIN STEAM INBOARD ISOLATION VALVE	RX	RB	592	
2-0203-0001BH25	VALVE, PNUEMATIC - MAIN STEAM INBOARD ISOLATION VALVE	RX	RB	592	
2-0203-0001CH25	VALVE, PNUEMATIC - MAIN STEAM INBOARD ISOLATION VALVE	RX	RB	592	
2-0203-0001DH25	VALVE, PNUEMATIC - MAIN STEAM INBOARD ISOLATION VALVE	RX	RB	592	
2-0203-0002AH25	VALVE, PNUEMATIC - MAIN MAIN STEAM OUTBOARD ISOLATION VALVE	RX	RB	592	msiv
2-0203-0002BH25	VALVE, PNUEMATIC - MAIN STEAM OUTBOARD ISOLATION VALVE	RX	RB	592	msiv
2-0203-0002CH25	VALVE, PNUEMATIC - MAIN STEAM OUTBOARD ISOLATION VALVE	RX	RB	592	msiv
2-0203-0002DH25	VALVE, PNUEMATIC - MAIN STEAM OUTBOARD ISOLATION VALVE	RX	RB	592	msiv
2-0203-1A	VALVE, MSIV INBOARD	RX	RB	592	AZ005
2-0203-1A-1	SOV, FOR MSIV - SOLENOID 1A INBD MSIV AC	RX	RB	592	AZ005
2-0203-1A-2	SOV, FOR MSIV	RX	RB	592	AZ005
2-0203-1A-AO	VLV, PNEUMATIC	RX	RB	592	AZ005
2-0203-1B	VALVE, MSIV INBOARD	RX	RB	592	AZ010
2-0203-1B-1	SOV, FOR MSIV	RX	RB	592	AZ010
2-0203-1B-2	SOV, FOR MSIV	RX	RB	592	AZ010
2-0203-1B-AO	VLV, PNEUMATIC	RX	RB	592	AZ010
2-0203-1C	VALVE, MSIV INBOARD	RX	RB	592	AZ350
2-0203-1C-1	SOV, FOR MSIV	RX	RB	592	AZ350
2-0203-1C-2	SOV, FOR MSIV	RX	RB	592	AZ350
2-0203-1C-AO	VLV, PNEUMATIC	RX	RB	592	AZ350
2-0203-1D	VALVE, MSIV INBOARD	RX	RB	592	AZ335
2-0203-1D-1	SOV, FOR MSIV	RX	RB	592	AZ335
2-0203-1D-2	SOV, FOR MSIV	RX	RB	592	AZ335

ID	DESCRIPT	SYSTEM	BUILDING	ELEVATION	LOCATION
2-0203-1D-AO	VLV, PNEUMATIC	RX	RB	592	AZ355
2-0203-2A	VALVE, MSIV OUTBOARD	RX	RB	592	G-9
2-0203-2A-1	SOV, FOR MSIV	RX	RB	592	G-9
2-0203-2A-2	SOV, FOR MSIV	RX	RB	592	G-9
2-0203-2A-AO	VLV, PNEUMATIC	RX	RB	591	G-9
2-0203-2B	VALVE, MSIV OUTBOARD	RX	RB	592	G-9
2-0203-2B-1	SOV, FOR MSIV	RX	RB	592	G-9
2-0203-2B-2	SOV, FOR MSIV	RX	RB	592	G-9
2-0203-2B-AO	VLV, PNEUMATIC	RX	RB	591	G-9
2-0203-2C	VALVE, MSIV OUTBOARD	RX	RB	592	G-10
2-0203-2C-1	SOV, FOR MSIV	RX	RB	592	G-10
2-0203-2C-2	SOV, FOR MSIV	RX	RB	592	G-10
2-0203-2D	VALVE, MSIV OUTBOARD	RX	RB	592	G-10
2-0203-2D-1	SOV, FOR MSIV	RX	RB	592	G-10
2-0203-2D-2	SOV, FOR MSIV	RX	RB	592	G-10
2-0203-2D-AO	VLV, PNEUMATIC	RX	RB	591	G-10
2-0203-3A	VALVE, ERV	RX	RB	620	AZ020
2-0203-3B	VALVE, ERV	RX	RB	620	AZ055
2-0203-3C	VALVE, ERV	RX	RB	620	AZ290
2-0203-3D	VALVE, ERV	RX	RB	620	AZ335
2-0203-3E	VALVE, ERV	RX	RB	620	AZ090
2-0203-4A	VALVE, SRV	RX	RB	620	AZ050
2-0203-4B	VALVE, SRV	RX	RB	620	AZ075
2-0203-4C	VALVE, SRV	RX	RB	620	AZ305
2-0203-4D	VALVE, SRV	RX	RB	620	AZ310
2-0203-4E	VALVE, SRV	RX	RB	620	AZ030
2-0203-4F	VALVE, SRV	RX	RB	620	AZ040
2-0203-4G	VALVE, SRV	RX	RB	620	AZ310
2-0203-4H	VALVE, SRV	RX	RB	620	AZ320
2-0220-1-MO	VLV, INBOARD MS DRAIN	RX	RB	592	AZ000
2-0220-2-MO	*U-2 MAIN STM LINE OUTBD DRN VLV (HW)	RX	RB	554	H-8
2-0220-44-AO	VLV, PNEUMATIC, 3/4 - 2A RECIRC LOOP SMPL UPSTREAM SV	RX	RB	620	AZ075
2-0220-45	VALVE, PNUEMATIC - 2A RECIRC LOOP SMPL DOWNSTREAM SV	RX	RB	623	K-17
2-0302-19A	SOV, B/U SCRAM	CRP	RB	595	L-8
2-0302-19B	SOV, B/U SCRAM	CRP	RB	595	L-8
2-0302-20A	SOV, SDV VNT & DRN	CRP	RB	595	L-8
2-0302-20B	SOV, SDV VNT & DRN	CRP	RB	595	L-8
2-0302-21A	VALVE, NO. BNK SDV VNT - 2A SDV INBD VENT VLV	CRP	RB	595	L-7
2-0302-21B	VALVE, NO. BNK SDV VNT - 2A SDV OUTBD VENT VLV	CRP	RB	595	L-7
2-0302-21C	VALVE, SO. BNK SDV VNT - 2B SDV INBD VENT VLV	CRP	RB	595	L-12

ID	DESCRIPT	SYSTEM	BUILDING	ELEVATION	LOCATION
2-0302-21D	VALVE, SO. BNK SDV VNT - 2B SDV OUTBD VENT VLV	CRP	RB	595	L-12
2-0302-22A	VALVE, NO. BNK SDV DRN - 2A SDV 2A INBD DRN VLV	CRP	RB	595	J-7
2-0302-22B	VALVE, NO. BNK SDV DRN - 2A SDV 2A OUTBD DRN VLV	CRP	RB	595	J-7
2-0302-22C	VALVE, SO. BNK SDV DRN - 2B SDV INBD DRN VLV	CRP	RB	595	J-12
2-0302-22D	VALVE, SO. BNK SDV DRN - 2B SDV OUTBD DRN VLV	CRP	RB	595	J-12
2-0305-125-22-27	SCRAM WATER ACCUMULTOR (22-27 F-7 (South))	CRD	RB	595	-
2-0305-125-30-11	SCRAM WATER ACCUMULTOR (30-11 H-3 (South))	CRD	RB	595	-
2-0305-125-38-59	SCRAM WATER ACCUMULTOR (38-59 K-15 (North))	CRD	RB	595	-
2-0305-125-42-27	SCRAM WATER ACCUMULTOR (42-27 L-7 (North))	CRD	RB	595	-
2-0305-126-22-27	CRD SCRAM Inlet Valve (22-27 F-7 (South))	CRD	RB	595	-
2-0305-126-30-11	CRD SCRAM Inlet Valve (30-11 H-3 (South))	CRD	RB	595	-
2-0305-126-38-59	CRD SCRAM Inlet Valve (38-59 K-15 (North))	CRD	RB	595	-
2-0305-126-42-27	CRD SCRAM Inlet Valve (42-27 L-7 (North))	CRD	RB	595	-
2-0305-127-22-27	CRD SCRAM Outlet Valve (22-27 F-7 (South))	CRD	RB	595	-
2-0305-127-30-11	CRD SCRAM Outlet Valve (30-11 H-3 (South))	CRD	RB	595	-
2-0305-127-38-59	CRD SCRAM Outlet Valve (38-59 K-15 (North))	CRD	RB	595	-
2-0305-127-42-27	CRD SCRAM Outlet Valve (42-27 L-7 (North))	CRD	RB	595	-
2-0305-22-27	HCU - (22-27 F-7 (South))	CRD	RB	595	-
2-0305-30-11	HCU - (30-11 H-3 (South))	CRD	RB	595	-
2-0305-38-59	HCU - (38-59 K-15 (North))	CRD	RB	595	-
2-0305-42-27	HCU - (42-27 L-7 (North))	CRD	RB	595	-
2-1001-125A	VALVE, RELIEF - 2A RHR PMP SUCT HDR RV	RH	RB	554	M-8
2-1001-125C	VALVE, RELIEF - 2C RHR PMP SUCT HDR RV	RH	RB	554	M-11
2-1001-145A	HEAT EXCHANGER	RH	RB	554	M-8
2-1001-145B	HEAT EXCHANGER	RH	RB	554	M-8

ID	DESCRIPT	SYSTEM	BUILDING	ELEVATION	LOCATION
2-1001-145C	HEAT EXCHANGER	RH	RB	554	M-12
2-1001-145D	HEAT EXCHANGER	RH	RB	554	M-12
2-1001-165A	VALVE, RELIEF - 2A RHR HX TUBE SIDE RV	RH	RB	554	M-7
2-1001-165B	VALVE, RELIEF - 2B RHR HX TUBE SIDE RV	RH	RB	554	M-12
2-1001-166A	VALVE, RELIEF - 2A RHR HX SHELL SIDE RV	RH	RB	580	M-7
2-1001-166B	VALVE, RELIEF - 2B RHR HX SHELL SIDE RV	RH	RB	554	M-12
2-1001-16A	VALVE, HX 2A BYPASS - 2A RHR HX BYP VLV	RH	RB	554	M-8
2-1001-16B	VALVE, HX 2B BYPASS - 2B RHR HX BYP VLV	RH	RB	554	M-12
2-1001-18A	VALVE, LOOP A MIN FLOW - 2A RHR LOOP MIN FLOW VLV	RH	RB	554	L-8
2-1001-18B	VALVE, LOOP B MIN FLOW - 2B RHR LOOP MIN FLOW VLV	RH	RB	554	L-11
2-1001-19A	VALVE, LOOP A CROSS TIE - 2A RHR HX LOOP XTIE TO 2B RHR LOOP SV	RH	RB	580	M-8
2-1001-19B	VALVE, LOOP CROSS TIE - 2B RHR LOOP XTIE TO 2A RHR LOOP SV	RH	RB	580	M-12
2-1001-22A	VALVE, RELIEF - 2A LPCI LOOP RV	RH	RB	554	L-7
2-1001-22B	VALVE, RELIEF - 2B LPCI LOOP RV	RH	RB	554	L-12
2-1001-23A	VLV, ISOLATION - 2A CONTAINMENT SPRAY LOOP UPSTREAM SV	RH	RB	595	
2-1001-23B	VLV, ISOLATION - 2B CONTAINMENT SPRAY LOOP UPSTREAM SV	RH	RB	623	
2-1001-26A	VLV, ISOLATION - 2A CONTAINMENT SPRAY LOOP DOWNSTREAM SV	RH	RB	595	
2-1001-26B	VLV, ISOLATION - 2B CONTAINMENT SPRAY LOOP DOWNSTREAM SV	RH	RB	623	
2-1001-28A	VALVE, LOOP A LPCI INJ - 2A LPCI LOOP DOWNSTREAM SV	RH	RB	554	J-7
2-1001-28B	VALVE, LOOP B OUTBRD - 2B LPCI/SHUTDOWN CLG LOOP UPSTREAM SV	RH	RB	554	J-12

ID	DESCRIPT	SYSTEM	BUILDING	ELEVATION	LOCATION
2-1001-29A	VALVE, LOOP A LPCI INJ - LPCI OUTBOARD INJECTION TO A RECIRC	RH	RB	554	J-8
2-1001-29B	VALVE, LOOP B INBRD - 2B LPCI/SD CLG LOOP DWNSTRM SVACTUATOR ELEC MOTOR	RH	RB	554	K-11
2-1001-34A	VALVE, TORUS CLG - 2A TORUS SPRAY/CLG SV	RH	RB	554	L-7
2-1001-34B	VALVE, TORUS CLG - 2B TORUS SPRAY/CLG SV	RH	RB	554	L-12
2-1001-36A	VALVE, TORUS CLG - 2A TORUS CLG SV	RH	RB	554	L-8
2-1001-36B	VALVE, TORUS CLG - 2B TORUS CLG SV	RH	RB	554	L-11
2-1001-37A	VLV, ISOLATION - 2A TORUS SPRAY SV	RH	RB	554	
2-1001-37B	VLV, ISOLATION - 2B TORUS SPRAY SV	RH	RB	554	
2-1001-47-MO	VLV, ISOLATION, 20" 900# - RHR SHUTDOWN COOLING OUTBD SUCT ISOL VALVE MO 2-1001-47 MOTOR	RH	RB	615	G-10
2-1001-50-MO	VLV, ISOLATION, 20" 900# - U-2 SHUTDOWN CLG SUCT HDR UPSTREAM SV (HANDWHEEL)	RH	RB	604	AZ002
2-1001-59	VALVE, RELIEF - U-2 HEAD SPRAY HDR RV	RH	RB	591	G-10
2-1001-5A	VALVE, RHR HX 2A DISCH - RHR SW FLOW CONTROL VLV 'A'	RH	RB	554	M-7
2-1001-5B	VALVE, HX DISCH - RHR SERV WTR FROM 2B RHR HX FCV	RH	RB	554	M-12
2-1001-65A	2A RHRSW PUMP	RH	TB	547	C-5
2-1001-65C	2C RHR SERVICE WATER PUMP MOTOR	RH	TB	547	C-7
2-1001-68A	VALVE, CHECK, TESTABLE - 2A LPCI LOOP AO CK VLV	RH	RB	589	AZ090
2-1001-68B	VALVE, CHECK, TESTABLE - 2B LPCI LOOP AO CK VLV	RH	RB	589	AZ270
2-1002A	PUMP, 2A	RH	RB	554	M-8
2-1002A-ROB	HX, PMP SEAL COOLING	RH	RB	554	M-8
2-1002B-ROB	HX, PMP SEAL COOLING	RH	RB	554	M-8
2-1002C	PUMP, 2C	RH	RB	554	M-12
2-1002C-ROB	HX, PMP SEAL COOLING	RH	RB	554	M-12
2-1002D-ROB	HX, PMP SEAL COOLING	RH	RB	554	M-12

ID	DESCRIPT	SYSTEM	BUILDING	ELEVATION	LOCATION
2-1003A	HX, 2A RHR	RH	RB	554	M-8
2-1003B	HX, 2B RHR	RH	RB	554	M-12
2-1006A	SEPARATOR, CYCLONE	RH	RB	554	M-8
2-1006C	SEPARATOR, CYCLONE	RH	RB	554	M-12
2-1201-2	VALVE - U-2 CU SYS UPSTREAM INLET VLV (HW)	RT	RB	623	K-9
2-1201-5	VALVE - U-2 CU SYS DOWNSTREAM INLET VLV	RT	RB	623	K-8
2-1301-16-MO	VLV, ISOLATION, 3 - U-2 MAIN STM TO RCIC UPSTREAM SV	RI	RB	605	AZ350
2-1301-17-MO	U-2 MAIN STM TO RCIC DOWNSTREAM SV	RI	RB	554	H-8
2-1462-A- PS	SWITCH, PRESSURE - 2A CORE SPRAY PMP DSCH PS 2-1462-A SHUTOFF VLV	CS	RB	554	G-7
2-1462-B-PS	SWITCH, PRESSURE - 2B CORE SPRAY PMP DSCH PS 2-1462-B SHUTOFF VLV	CS	RB	554	G-12
2-1601-21-AO	PSS DRYWELL PURGE AIR-OP VALVE 1601-21	PC	RB	554	H-8
2-1601-22-AO	U-2 DW OR TORUS PURGE VLV	PC	RB	554	H-8
2-1601-23-AO	VLV, BUTTERFLY ISO, 18 - PSS DRYWELL VENT TO STANDBY GAS TREATMENT AND RB EXH SYS AO VLV 1	PC	RB	647	L-10
2-1601-24-AO	VLV, BUTTERFLY ISO, 18 - U-2 CNMT RX BLDG EXH VENT VLV	PC	RB	647	L-10
2-1601-55-AO	PSS DRYWELL NITROGEN INERTING AIR OPERATED VALVE 1601-55	PC	RB	554	H-8
2-1601-56-AO	PSS TORUS INERTING AIR-OP VALVE 1601-56	PC	RB	554	J-12
2-1601-57-MO	VLV, IS0, 1", N2 MAKEUP TO CONTAIMENT - U-2 N2 MU TO CNMT DOWNSTREAM SV HANDWHEEL	PC	RB	595	K-12
2-1601-58-AO	VLV, ISO, 1", N2 MAKEUP TO TORUS	PC	RB	595	K-12
2-1601-59-AO	VLV, 1", +1', U-2 N2 MU TO DW	PC	RB	589	K-12
2-1601-60-AO	U-2 TORUS VENT VLV	PC	RB	554	K-7
2-1601-61-AO	U-2 TORUS VENT VLV BYP VLV	PC	RB	554	K-7
2-1601-62-AO	VLV, ISOLATION, 2 - U-2 DW VENT VLV BYP VLV	PC	RB	647	L-10

ID	DESCRIPT	SYSTEM	BUILDING	ELEVATION	LOCATION
2-1601-63-AO	VLV, BUTTERFLY ISO, 6 - U-2 CNMT SBGTS VENT VLV	PC	RB	647	L-10
2-2001-15-AO	VLV, DW EQ. DRAIN SUMP - U-2 DW EQUIP DRN SUMP PMPS UPSTREAM DSCH VLV	RW	RB	554	AZ040
2-2001-16-AO	VLV, DW EQ. DRAIN SUMP - U-2 DW EQUIP DRN SUMP PMPS DOWNSTREAM DSCH VLV	RW	RB	554	AZ042
2-2001-3-AO	VLV, DW FLOOR DRAIN SUMP - U-2 DW FLR DRN SUMP PMP UPSTREAM DSCH VLV	RW	RB	554	AZ182
2-2001-4-AO	VLV, DW FLOOR DRAIN SUMP - U-2 DW FLR DRN SUMP PMP DOWNSTREAM DSCH VLV	RW	RB	554	AZ182
2202-29A	INSTR RACK 2202-29A	RM	RB	554	
2202-29B	INSTR RACK 2202-29B	RM	RB	554	
2202-32	RACK, AUTO BLOWDOWN	RM	RB	623	J-12
2202-5	RACK	RM	RB	623	J-11
2202-59A	RACK	RM	RB	554	M-7
2202-59B	RACK, RHR ROOM INSTR	RM	RB	554	M-13
2202-6	RACK	RM	RB	623	L-11
2202-7	RACK	RM	RB	595	J-8
2202-70A	RACK, ATWS DIV. 1	RM	SB	595	E-26
2202-70B	RACK, ATWS DIV. 2	RM	SB	595	E-25
2202-73A	RACK, ANALOG TRIP	RM	SB	609	F-25
2202-73B	RACK, ANALOG TRIP	RM	SB	609	F-25
2202-75	RACK	RM	RB	554	M-12
2202-76	RACK	RM	RB	554	M-7
2202-8	RACK	RM	RB	595	K-11
2-2301-10-MO	U-2 HPCI PMP UPSTREAM TEST VLV	HP	RB	554	
2-2301-14-MO	U2 HPCI PMP MIN FLOW VLV	HP	RB	554	
2-2301-28-AO	U-2 HPCI STM LINE DRN POT DRN VLV	HP	RB	554	
2-2301-29-AO	U-2 HPCI STM LINE TO CONDENSER UPSTREAM DRN VLV	HP	RB	554	
2-2301-31-AO	U-2 HPCI STM LINE DRN LINE STM TRAP BYP VLV	HP	RB	554	
2-2301-32-SO	U-2 HPCI DRN POT TO GL SEAL CONDENSER SO	HP	RB	554	
2-2301-35-MO	U-2 HPCI PMP DOWNSTREAM TORUS SUCT VLV	HP	RB	554	

ID	DESCRIPT	SYSTEM	BUILDING	ELEVATION	LOCATION
2-2301-36-MO	U-2 HPCI PMP UPSTREAM TORUS SUCT VLV	HP	RB	554	
2-2301-3-MO	U-2 HPCI TURB INLET VLV	HP	RB	554	
2-2301-46-PCV	U-2 HPCI CLG WTR PCV	HP	RB	554	
2-2301-48-MO	U-2 HPCI CLG WTR OUTLET VLV	HP	RB	554	
2-2301-49-MO	U-2 HPCI CLG WTR PMP TEST VLV	HP	RB	554	
2-2301-4-MO	VLV, ISOLATION - U2 MAIN STM TO HPCI UPSTREAM SV (HW)	HP	RB	602	AZ280
2-2301-57	HPCI/ HPCI Turbine Cooling Water Pump	HP	RB	554	
2-2301-5-MO	U2 MAIN STM TO HPCI DOWNSTREAM SV (HW)	HP	RB	554	J-11
2-2301-6-MO	U-2 HPCI PMP CCST SUCT VLV	HP	RB	554	
2-2301-7	VALVE, CHECK - HPCI PUMP TO REACTOR	HP	RB	591	G-16
2-2301-8-MO	U2 HPCI DSCH VLV (HW)	HP	RB	554	H-8
2-2301-9-MO	U-2 HPCI PMP DSCH VLV	HP	RB	554	
2-2302	HPCI/ HPCI Pump	HP	RB	554	
2-2303	TURBINE	HP	RB	554	
2-2304	PUMP U-2 HPCI CONDENSATE	HP	RB	554	
2-2305	CONDENSER GLAND SEAL	HP	RB	554	
2-2306	EXHAUSTER U-2 HPCI GLAND	HP	RB	554	
2-2308	AUXILIARY OIL PUMP (HPCI TURBINE)	HP	RB	554	DRY
2-2310	COOLER U-2 HPCI OIL	HP	RB	554	
2-2317-HO	HPCI TURBINE STOP VLV	HP	RB	554	
2-2319	HOTWELL U-2 HPCI GLAND SEAL CONDENSER	HP	RB	554	
2-2321-HO	U-2 HPCI TURB CV	HP	RB	554	
2-2399-15-PCV	U-2 HPCI GL SEAL CONDENSER COND PMP DSCH PCV	HP	RB	554	
2-2399-40	VALVE, ISOLATION - HPCI TURB EXH LINE VACU BKR INBD ISOL VLV	HP	RB	554	G-11
2-2399-41	VALVE, ISOLATION - HPCI TURB EXH LINE VACU BKR OUTBD ISOL VLV	HP	RB	554	G-11
2251-10	RACK, U-1 DG RELAY & METERING	RM	DG	595	F-23
2251-100	RACK, 1/2 DG CLG AUX FD XFER	RM	TB	547	C-19

ID	DESCRIPT	SYSTEM	BUILDING	ELEVATION	LOCATION
2251-113	RACK, DG ENGINE CONTROL	RM	DG	595	G-23
2251-12	RACK, DG EXCITER	RM	DG	595	G-23
2251-86	RACK	RM	TB	639	H-14
2251-87	RACK	RM	TB	639	H-16
2251-97	RACK, DG AUX FD TRANSFER	RM	DG	595	G-23
2251-98	RACK, DG CWP FEED TRANSFER	RM	DG	595	G-23
2252-10	RACK, DG RELAY & METERING	RM	DG	595	G-3
2252-113	RACK, DG ENGINE CONTROL	RM	DG	595	G-3
2252-12	RACK, DG EXCITER	RM	DG	595	G-3
2252-86	RACK	RM	TB	639	H-10
2252-87	RACK	RM	TB	639	H-12
2252-97	RACK, DG AUX FEED TRANSFER	RM	DG	595	G-3
2252-98	RACK, DG CWP FEED TRANSFER	RM	DG	595	G-3
2-2599-4A-AO	VLV, 1", ACAD VENT TO SBGT - ASSY - 2A ACAD PRESS BLEED INLET VLV	CAD	RB	647	L-10
2-2599-4B-AO	VLV, 1", ACAD VENT TO SBGT - ASSY - 2B ACAD PRESS BLEED INLET VLV	CAD	RB	647	L-10
2-3702-MO	VLV, ISO OUTBOARD 8 - RBCCW SUPPLY TO DW VLV	RCC	RB	554	AZ320
2-3703-MO	VLV, ISO OUTBOARD 8 - RBCCW RETURN FROM DW VLV	RCC	RB	554	AZ310
2-3706-MO	VLV, ISO INBOARD 8 - RBCCW FROM DW UPSTREAM SV	RCC	RB	588	AZ315
2-3903	PUMP, DG COOLING - U2 DIESEL GENERATOR COOLING WATER PUMP	DGW	TB	547	C-5
2-3903A	VLV, ISOLATION, 2A TBCCW HX DISCHARGE	DGW	TB	611	C-10
2-4600A	TANK, AIR RECEIVER - RECEIVER GAS (IDNS PRESSURE VESSEL)	SA	DG	595	G-3
2-4600B	TANK, AIR RECEIVER - RECEIVER GAS (IDNS PRESSURE VESSEL)	SA	DG	595	G-3

ID	DESCRIPT	SYSTEM	BUILDING	ELEVATION	LOCATION
2-4600C	TANK, AIR RECEIVER - RECEIVER GAS (IDNS PRESSURE VESSEL)	SA	DG	595	G-3
2-4600D	TANK, AIR RECEIVER - RECEIVER GAS (IDNS PRESSURE VESSEL)	SA	DG	595	G-3
2-4604	DRYER, AIR	SA	DG	595	G-3
2-4605	TANK, BLOWDOWN	SA	DG	595	G-3
2-4614	LUBRICATOR, AIR LINE	SA	DG	595	G-3
2-4641-42A	SWITCH, PRESS. - DG 2 STARTING AIR PS 2-4641-42A SHUTOFF VLV	SA	DG	595	G-3
2-4641-42B	SWITCH, PRESS. - DG 2 STARTING AIR PS 2-4641-42B SHUTOFF VLV	SA	DG	595	G-3
2-4699-226	VALVE, AIR START RELAY - SERV AIR TO DIESEL AIR START AO	SA	DG	595	G-3
2-4699-306A	VALVE, RELIEF -DG 2 STARTING AIR RECEIVER 2A RV	SA	DG	595	G-3
2-4699-306B	VALVE, RELIEF - DG 2 STARTING AIR RECEIVER 2B RV	SA	DG	595	G-3
2-4699-306C	VALVE, RELIEF - DG 2 STARTING AIR RECEIVER 2C RV	SA	DG	595	G-3
2-4699-306D	VALVE, RELIEF -DG 2 STARTING AIR RECEIVER 2D RV	SA	DG	595	G-3
2-4699-310	SOV, START AIR - DG 2 STARTING AIR SO	SA	DG	595	G-3
2-4720	VLV, ISO IA DRYWLL OTBRD	IA	RB	595	
2-4721	VLV, ISO IA DRYWLL INBRD	IA	RB	595	
250 VDC BATT 2	BATTERY, 250V	250 VDC	TB	628	G-1
250VDC MCC 2	MCC	250 VDC	TB	615	G-2
250VDC MCC 2A	MCC	250 VDC	RB	623	L-11
250VDC MCC 2B	MCC	250VDC	RB	623	M-10
2-5201	TANK, FUEL OIL - U-2 DIESEL FUEL OIL STORAGE TANK	DO	O	595	-
2-5201-RV	VALVE, RELIEF - DIESEL GENERATOR FUEL OIL TRANSFER PUMP DISCHARGE RELIEF VALVE	DO	DG	595	G-3
2-5201-SOV	SOV, DAYTANK FILL - DG 2 DAY TK FILL LINE FROM TRANSFER PMP INLET SO	DO	DG	595	G-3

ID	DESCRIPT	SYSTEM	BUILDING	ELEVATION	LOCATION
2-5202	TANK, FUEL OIL DAY	DO	DG	595	G-3
2-5203	PUMP, FUEL OIL TRANSF	DO	DG	595	G-3
2-5206	FILTER, FUEL OIL	DO	DG	595	G-3
2-5207	STRAINER, FUEL OIL	DO	DG	595	G-3
2-5208	PUMP, FUEL PRIME	DO	DG	595	G-3
2-5209	PUMP, ENG DRVN FUEL	DO	DG	595	G-3
2-5727	FAN, ROOM VENTILAT - DG ROOM VENT FAN	VD	DG	595	G-3
2-5745A	COOLER, CUBICLE - HEAT EXCHANGER CONTACT STEAM-LIQUID	VD	TB	547	C-6
2-5745C	COOLER, CUBICLE - HEAT EXCHANGER CONTACT STEAM-LIQUID	VD	TB	547	C-7
2-5746A	COOLER, CUBICLE - COOLER 2A RHR ROOM	VD	RB	554	M-8
2-5746B	COOLER, CUBICLE - COOLER 2B RHR ROOM	VD	RB	554	M-13
2-5747	COOLER, CUBICLE - HPCI ROOM COOLER	VD	TB	554	G-12
2-5748A	COOLER, CUBICLE - 2A CS PMP RM COOLER	VD	RB	554	G-8
2-5748B	COOLER, CUBICLE - 2B CS/RCIC PMP RM COOLER	VD	RB	554	G-12
2-5749	COOLER, CUBICLE - 2DG CW PMP CUB COOLER	VD	TB	547	C-5
2-5772-89	DAMPER - DG ROOM VENTILATION DAMPER CONTROL	VD	DG	595	G-3
2-6601	DG, UNIT 2	DG	DG	595	G-3
2-6650	PUMP, ENG DRVN SCAVEN	DG	DG	595	G-3
2-6651	PUMP, ENG DRVN MN L &	DG	DG	595	G-3
2-6654	HX, DG LUBE OIL	DG	DG	595	G-3
2-6655	FILTER, LUBE OIL	DG	DG	595	G-3
2-6661A	HX, DG COOLING	DG	DG	595	G-3
2-6661B	HX, DG COOLING	DG	DG	595	G-3
2-6662	TANK, EXPANSION	DG	DG	595	G-3
2-6663	VALVE, TEMP REG - U-2 DG CLG WTR TEMP REG VLV	DG	DG	595	G-3
2-6664	HEATER, IMMERSION	DG	DG	595	G-3
2-6665	MANIFOLD, ENG CLG	DG	DG	595	G-3
2-6666A	PUMP, ENG DRVN CLG	DG	DG	595	G-3
2-6666B	PUMP, ENG DRVN CLG	DG	DG	595	G-3
2-6667	SILENCER, EXHAUST	DG	TB	639	G-2
2-6668	FILTER, INTAKE AIR	DG	TB	615	G-2
2-6703-23	SWGR 23	4160VAC	TB	615	G-4
2-6704-24	SWGR 24	4160VAC	TB	615	H-4
2-6705-23-1	SWGR 23-1	4160VAC	TB	639	H-10

ID	DESCRIPT	SYSTEM	BUILDING	ELEVATION	LOCATION
2-6706-24-1	SWGR 24-1	4160VAC	TB	639	H-12
2-7100	TRANSFORMER T28 4160V-480V	4160VAC	RB	647	H-11
2-7100-28	SWGR 28	480VAC	RB	647	H-11
2-7200-29	SWGR 29	480VAC	RB	647	H-13
2-7800-28-1A	MCC - MCC 28-1A	480 VAC	RB	623	M-8
2-7800-281A1	MCC - MCC 28-1A-1	208 VAC	RB	623	N-8
2-7800-28-1B	MCC - MCC 28-1B	480 VAC	RB	623	N-9
2-7800-28-2	MCC - MCC 28-2	480VAC	TB	615	G-4
2-7800-28295	MCC - MCC 28/29-5	480VAC	RB	595	N-8
2-7800-29-1	MCC - MCC 29-1	480 VAC	RB	623	M-10
2-7800-29-2	MCC - MCC 29-2	480VAC	TB	615	G-3
2-7800-29-4	MCC - MCC 29-4	480 VAC	RB	623	N-10
2-8300-1	CHRGR #2, 125V	DC	TB	615	G-1
2-8300-1A	CHRGR #2A, 125V	DC	TB	615	G-1
2-8350	CHRGR #2, 250V	DC	TB	615	G-1
2-8801A-AO	VLV, PNEUMATIC, 3/4 - CONTAINMENT 2G DW COOLER UPSTREAM AIR SMPL VLV	DAP	RB	623	L-9
2-8801B-AO	VLV, PNEUMATIC, 3/4 - CONTAINMENT 2E DW COOLER UPSTREAM AIR SMPL VLV	DAP	RB	623	L-9
2-8801C-AO	VLV, PNEUMATIC, 3/4 - CONTAINMENT HEAD VENT AIR SMPL VENT	DAP	RB	623	L-9
2-8801D-AO	CONTAINMENT TORUS UPSTREAM AIR SMPL VLV	DAP	RB	554	K-12
2-8802A-AO	VLV, PNEUMATIC, 3/4 - CONTAINMENT 2G DW COOLER DOWNSTREAM AIR SMPL VLV	DAP	RB	623	L-9
2-8802B-AO	VLV, PNEUMATIC, 3/4 - CONTAINMENT 2E DW COOLER DOWNSTREAM AIR SMPL VLV	DAP	RB	623	L-9
2-8802C-AO	VLV, PNEUMATIC, 3/4 - CONTAINMENT HEAD VENT AIR SMPL VLV	DAP	RB	623	L-9
2-8802D-AO	CONTAINMENT TORUS DOWNSTREAM AIR SMPL VLV	DAP	RB	554	K-12
2-8803-AO	CONTAINMENT AIR SMPL UPSTREAM RETURN VLV	DAP	RB	554	H-8
2-8804-AO	CONTAINMENT AIR SMPL DOWNSTREAM RETURN VLV	DAP	RB	554	H-8

ID	DESCRIPT	SYSTEM	BUILDING	ELEVATION	LOCATION
902-2	PANEL	PM	SB	623	-
902-3	PANEL	PM	SB	623	-
902-32	PANEL	PM	SB	595	F-26
902-33	PANEL	PM	SB	595	E-26
902-36	PANEL	PM	SB	623	-
902-39	PANEL	PM	SB	595	E-26
902-46	PANEL	PM	SB	595	F-26
902-47	PANEL	PM	SB	595	E-26
902-48	PANEL	PM	SB	595	E-26
902-5	PANEL	PM	SB	623	-
902-50	PANEL	PM	SB	595	F-27
902-61	PNL, CONTROL	PM	SB	609	CSR
902-62	PNL, CONTROL	PM	SB	609	CSR
902-8	PANEL	PM	SB	623	-
912-8	PANEL	PM	SB	623	
MCC 28-1A-1 TR	TRANSFORMER 28-1A-1	480 VAC	RB	623	M-8
MCC 28-2 TR	TRANSFORMER 28-2	480VAC	TB	615	G-4
MCC 28-3	MCC - MCC 28-3	480VAC	RB	623	N-11
MCC 29-1-1	MCC - MCC 29-1-1	208 VAC	RB	623	N-9
MCC 29-1-1 PNL	MCC DIST PANEL - MCC 29-1-1 PNL	120/208	RB	623	N-9
MCC 29-1-1 TR	TRANSFORMER 29-1-1	480/208	RB	623	N-9
MCC 29-3	MCC 29-3		TB	615	G-13
MCC 29-6	MCC 29-6 - MCC 29-6		RB	623	M-10
MCC 30	MCC	480 VAC	TB	595	H-11
SWGR 29 TR	SWGR 29	480VAC	RB	647	H-13
SWGR 31	SWGR 31	4160VAC	TB	595	H-11

Table B-1b. Base List 1b - Items Common to Units 1 and 2

ID	DESCRIPT	SYSTEM	BUILDING	ELEVATION	LOCATION
1/2-3903	U0 DIESEL GENERATOR COOLING WATER PUMP	DGW	TB	547	D-21
1/2-4600A	RECEIVER GAS (IDNS PRESSURE VESSEL)	SA	DG	595	N-13
1/2-4600B	RECEIVER GAS (IDNS PRESSURE VESSEL)	SA	DG	595	N-13
1/2-4600C	RECEIVER GAS (IDNS PRESSURE VESSEL)	SA	DG	595	N-13
1/2-4600D	RECEIVER GAS (IDNS PRESSURE VESSEL)	SA	DG	595	N-13
1/2-4604	DRYER, AIR	SA	DG	595	N-13
1/2-4605	TANK, BLOWDOWN	SA	DG	595	N-13
1/2-4614	LUBRICATOR, AIR LINE	SA	DG	595	N-13
1/2-4699-226	VALVE, AIR START RELAY DG 1/2 AIR START AO	SA	DG	595	N-13
1/2-4699-306A	VALVE, RELIEF DG 1/2A AIR RCVR TK RELIEF VLV	SA	DG	595	N-13
1/2-4699-306B	VALVE, RELIEFDG 1/2A AIR RCVR TK RELIEF VLV	SA	DG	595	N-13
1/2-4699-306C	VALVE, RELIEF DG 1/2A AIR RCVR TK RELIEF VLV	SA	DG	595	N-13
1/2-4699-306D	VALVE, RELIEF DG 1/2A AIR RCVR TK RELIEF VLV	SA	DG	595	N-13
1/2-4699-310	SOV, START AIR DG 1/2 AIR START SO	SA	DG	595	N-13
1/2-5201	TANK, FUEL OIL EDG FUEL OIL STORAGE TANK	DO	O	595	-
1/2-5201-RV	VALVE, RELIEF DIESEL GENERATOR FUEL OIL TRANSFER PUMP DISCHARGE RELIEF VALVE	DO	DG	595	N-13
1/2-5201-SOV	SOV, DAYTANK FILL DG 1/2 FUEL OIL DAY TK FILL LINE FROM TRANSFER PMP INLET SO	DO	DG	595	N-13
1/2-5202	TANK, FUEL OIL DAY	DO	DG	595	N-13
1/2-5203	FEDG FUEL OIL TRANSFER PUMP	DO	DG	595	N-13
1/2-5206	FILTER, FUEL OIL	DO	DG	595	N-13
1/2-5207	STRAINER, FUEL OIL	DO	DG	595	N-13
1/2-5208	PUMP, FUEL PRIME	DO	DG	595	N-13
1/2-5209	PUMP, ENG DRVN FUEL	DO	DG	595	N-13
1/2-5727	FAN, ROOM VENTILAT EDG ROOM VENT FAN (LARGE FAN)	VP	DG	595	N-13
1/2-5741-319A	VALVE CR HVAC TRN 'B' RCU RHRSW SPLY SV	VP	TB	615	E-23

ID	DESCRIPT	SYSTEM	BUILDING	ELEVATION	LOCATION
1/2-5741-319A	SOV, PILOT - VALVE CR HVAC TRN 'B' RCU RHRSW SPLY SV	VP	TB	615	E-23
1/2-5741-326	SOV SOLENOID AD 1/2-5741-326A,B,C,D,E ISOL DMPRS	VP	SB	623	G-27
1/2-5741-326E	DAMPER +DAMPER CR HVAC RTN AIR DUCT ISOL	VP	SB	623	G-26
1/2-5741-330	SOV SOLENOID CR HVAC TRAIN 'B' AHU ISOL DAMPERS	VP	TB	615	E-24
1/2-5741-330A	DAMPER CR HVAC TRAIN 'B' RTN AIR DUCT ISOL	VP	TB	615	E-24
1/2-5741-330B	DAMPER CR HVAC TRAIN 'B' SPLY AIR DUCT ISOL	VP	TB	615	E-24
1/2-5741-333	VALVE, FLOW CONTRL FLOW CONTROL VALVE TO B CONTROL ROOM HVAC RCU	VP	TB	615	E-24
1/2-5741-341A	VALVE, CONTROL, 1-3/8" CONTROL RM TRAIN B HVAC THERMAL EXPANSION VALVE	VP	TB	615	E-24
1/2-5741-341B	VALVE, CONTROL, 1-3/8" CONTROL RM TRAIN B HVAC THERMAL EXPANSION VALVE	VP	TB	615	E-24
1/2-5741-341C	VALVE, CONTROL, 1-3/8" CONTROL RM TRAIN B HVAC THERMAL EXPANSION VALVE	VP	TB	615	E-24
1/2-5741-341D	VALVE, CONTROL, 1-3/8" CONTROL RM TRAIN B HVAC THERMAL EXPANSION VALVE	VP	TB	615	E-24
1/2-5749	COOLER, CUBICLE 1/2 DG CW PMP CUB COOLER	VP	TB	547	D-21
1/2-5799	COOLER, CUBICLE	VP	TB	595	G-11
1/2-6601	DG, UNIT 1/2	DG	DG	595	N-13
1/2-6650	PUMP, ENG DRVN SCAVEN	DG	DG	595	N-13
1/2-6651	PUMP, ASSY - PUMP DG ENGINE DRIVEN MAIN + PISTON CLG	DG	DG	595	N-13
1/2-6654	HX, DG LUBE OIL	DG	DG	595	N-13
1/2-6655	FILTER, LUBE OIL	DG	DG	595	N-13
1/2-6661A	HX, DG COOLING	DG	DG	595	N-13
1/2-6661B	HX, DG COOLING	DG	DG	595	N-13
1/2-6662	TANK, EXPANSION	DG	DG	595	N-13
1/2-6663	VALVE, TEMP REG	DG	DG	595	N-13
1/2-6664	HEATER, IMMERSION	DG	DG	595	N-13
1/2-6665	MANIFOLD, ENG CLG	DG	DG	595	N-13
1/2-6666A	PUMP, ENG DRVN CLG	DG	DG	595	N-13
1/2-6666B	PUMP, ENG DRVN CLG	DG	DG	595	N-13
1/2-6667	SILENCER, EXHAUST	DG	DG	615	N-12
1/2-6668	FILTER, INTAKE AIR	DG	DG	615	N-12
1/2-8350	CHRGR #1/2, 250V	DC	TB	615	G-24

ID	DESCRIPT	SYSTEM	BUILDING	ELEVATION	LOCATION
1/2-9400-100	AHU FAN MISC/CONTROL RM. AHU/NUS MOD	VC	TB	615	E-24
1/2-9400-102	UNIT REFRIGERATION CONDENSER UNIT COMPRESSOR CRANKCASE HEATER	VC	TB	615	E-24
2212-125	RACK, 1/2 DG ENGINE CONTROL	RM	DG	595	N-13
2212-127	RACK	RM	DG	595	N-13
2212-32	Wall mounted Panel DG	RM	DG	595	N-13
2212-45	RACK	RM	DG	595	N-13
2212-46	RACK, 1/2 DG EXCITER	RM	DG	595	N-13
2212-50	RACK, 1/2 DG AUX CONTROL	RM	DG	595	N-13
912-8	PANEL	PM	SB	623	

Table B-2. SWEL 1

ID	DESCRIPT	CLASS	BUILDING	ELEVATION	LOCATION	SYSTEM	Seismic Cat 1?	Safety Function(s)	New or Replaced Equip?	IPEEE Enhancement ?	Comments
1/2-4604	DRYER, AIR	(00) Other	DG	595	N-13	SA	Y	Auxiliary & Support			
2-0305-22-27	HCU - (22-27 F-7 (South))	(00) Other	RB	595	-	CRD	Y	RRC		Y	
2-0305-30-11	HCU - (30-11 H-3 (South))	(00) Other	RB	595	-	CRD	Y	RRC		Y	
2-0305-38-59	HCU - (38-59 K-15 (North))	(00) Other	RB	595	-	CRD	Y	RRC		Y	
2-0305-42-27	HCU - (42-27 L-7 (North))	(00) Other	RB	595	-	CRD	Y	RRC		Y	
250VDC MCC 2	MCC	(01) Motor Control Centers	TB	615	G-2	250 VDC	Y	Electrical Systems	Y	Y	EC 24260
250VDC MCC 2A	MCC	(01) Motor Control Centers	RB	623	L-11	250 VDC	Y	Electrical Systems		Y	
2-7800-28-1B	MCC - MCC 28-1B	(01) Motor Control Centers	RB	623	N-9	480 VAC	Y	Electrical Systems		Y	
2-7800-28-2	MCC - MCC 28-2	(01) Motor Control Centers	TB	615	G-4	480VAC	Y	Electrical Systems			
2-7800-28295	MCC - MCC 28/29-5	(01) Motor Control Centers	RB	595	N-8	480VAC	Y	Electrical Systems			
2-7800-29-1	MCC - MCC 29-1	(01) Motor Control Centers	RB	623	M-10	480 VAC	Y	Electrical Systems		Y	
2-7100-28	SWGR 28	(02) Low Voltage Switchgear	RB	647	H-11	480VAC	Y	Electrical Systems		Y	
2-6705-23-1	SWGR 23-1	(03) Medium Voltage Switchgear	TB	639	H-10	4160VAC	Y	Electrical Systems	Y	Y	EC 24256
2-7100	TRANSFORMER T28 4160V-480V	(04) Transformers	RB	647	H-11	4160VAC	Y	Electrical Systems		Y	
1/2-5203	FEDG FUEL OIL TRANSFER PUMP	(05) Horizontal Pumps	DG	595	N-13	DO	Y	Auxiliary & Support			PRA: F-V=2.19e-02; RAW=6.51
2-1001-65C	2C RHR SERVICE WATER PUMP MOTOR	(05) Horizontal Pumps	TB	547	C-7	RH	Y	RCIC/DHR			
2-2302	HPCI/ HPCI Pump	(05) Horizontal Pumps	RB	554		HP	Y	RCIC			PRA: F-V=8.66e-03
2-2304	PUMP U-2 HPCI CONDENSATE	(05) Horizontal Pumps	RB	554		HP	Y	RCIC			
2-2308	AUXILIARY OIL PUMP (HPCI TURBINE)	(05) Horizontal Pumps	RB	554	DRY	HP	Y	RCIC			
2-3903	PUMP, DG COOLING - U2 DIESEL GENERATOR COOLING WATER PUMP	(05) Horizontal Pumps	TB	547	C-5	DGW	Y	Auxiliary & Support			PRA: F-V=8.60e-02; RAW=8.28
2-1002A	PUMP, 2A	(06) Vertical Pumps	RB	554	M-8	RH	Y	RCIC/DHR			PRA: F-V=2.82e-02
1/2-4699-226	VALVE, AIR START RELAY DG 1/2 AIR START AO	(07) Fluid-Operated Valves	DG	595	N-13	SA	Y	Auxiliary & Support			
2-0203-0001AH25	VALVE, PNUEMATIC - MAIN STEAM INBOARD ISOLATION VALVE	(07) Fluid-Operated Valves	RB	592		RX	Y	RCPC/CF			
2-0203-3A	VALVE, ERV	(07) Fluid-Operated Valves	RB	620	AZ020	RX	Y	RCPC/CF			
2-0203-4A	VALVE, SRV	(07) Fluid-Operated Valves	RB	620	AZ050	RX	Y	RCPC/CF			
2-0220-45	VALVE, PNUEMATIC - 2A RECIRC LOOP SMPL DOWNSTREAM SV	(07) Fluid-Operated Valves	RB	623	K-17	RX	Y	RCPC/CF		Y	
2-0302-21A	VALVE, NO. BNK SDV VNT - 2A SDV INBD VENT VLV	(07) Fluid-Operated Valves	RB	595	L-7	CRP	Y	RRC			
2-0302-22A	VALVE, NO. BNK SDV DRN - 2A SDV 2A INBD DRN VLV	(07) Fluid-Operated Valves	RB	595	J-7	CRP	Y	RRC			
2-0305-126-22-27	CRD SCRAM Inlet Valve (22-27 F-7 (South))	(07) Fluid-Operated Valves	RB	595	-	CRD	Y	RRC		Y	
2-0305-126-30-11	CRD SCRAM Inlet Valve (30-11 H-3 (South))	(07) Fluid-Operated Valves	RB	595	-	CRD	Y	RRC		Y	
2-0305-126-38-59	CRD SCRAM Inlet Valve (38-59 K-15 (North))	(07) Fluid-Operated Valves	RB	595	-	CRD	Y	RRC		Y	

ID	DESCRIPT	CLASS	BUILDING	ELEVATION	LOCATION	SYSTEM	Seismic Cat 1?	Safety Function(s)	New or Replaced Equip?	IPEEE Enhancement ?	Comments
2-0305-126-42-27	CRD SCRAM Inlet Valve (42-27 L-7 (North))	(07) Fluid-Operated Valves	RB	595	-	CRD	Y	RRC		Y	
2-0305-127-22-27	CRD SCRAM Outlet Valve (22-27 F-7 (South))	(07) Fluid-Operated Valves	RB	595	-	CRD	Y	RRC		Y	
2-0305-127-30-11	CRD SCRAM Outlet Valve (30-11 H-3 (South))	(07) Fluid-Operated Valves	RB	595	-	CRD	Y	RRC		Y	
2-0305-127-38-59	CRD SCRAM Outlet Valve (38-59 K-15 (North))	(07) Fluid-Operated Valves	RB	595	-	CRD	Y	RRC		Y	
2-0305-127-42-27	CRD SCRAM Outlet Valve (42-27 L-7 (North))	(07) Fluid-Operated Valves	RB	595	-	CRD	Y	RRC		Y	
2-1001-165A	VALVE, RELIEF - 2A RHR HX TUBE SIDE RV	(07) Fluid-Operated Valves	RB	554	M-7	RH	Y	RCIC/DHR			
2-1001-166A	VALVE, RELIEF - 2A RHR HX SHELL SIDE RV	(07) Fluid-Operated Valves	RB	580	M-7	RH	Y	RCIC/DHR			
2-1001-22A	VALVE, RELIEF - 2A LPCI LOOP RV	(07) Fluid-Operated Valves	RB	554	L-7	RH	Y	RCIC/DHR			
2-1601-21-AO	PSS DRYWELL PURGE AIR-OP VALVE 1601-21	(07) Fluid-Operated Valves	RB	554	H-8	PC	Y	CF			
2-1601-23-AO	VLV, BUTTERFLY ISO, 18 - PSS DRYWELL VENT TO STANDBY GAS TREATMENT AND RB EXH SYS AO VLV 1	(07) Fluid-Operated Valves	RB	647	L-10	PC	Y	CF			
2-1601-24-AO	VLV, BUTTERFLY ISO, 18 - U-2 CNMT RX BLDG EXH VENT VLV	(07) Fluid-Operated Valves	RB	647	L-10	PC	Y	CF			
2-2001-3-AO	VLV, DW FLOOR DRAIN SUMP - U-2 DW FLR DRN SUMP PMP UPSTREAM DSCH VLV	(07) Fluid-Operated Valves	RB	554	AZ182	RW	Y	CF			
2-2301-29-AO	U-2 HPCI STM LINE TO CONDENSER UPSTREAM DRN VLV	(07) Fluid-Operated Valves	RB	554		HP	Y	RCIC			
2-2301-31-AO	U-2 HPCI STM LINE DRN LINE STM TRAP BYP VLV	(07) Fluid-Operated Valves	RB	554		HP	Y	RCIC			
2-2399-15-PCV	U-2 HPCI GL SEAL CONDENSER COND PMP DSCH PCV	(07) Fluid-Operated Valves	RB	554		HP	Y	RCIC			
2-8801A-AO	VLV, PNEUMATIC, 3/4 - CONTAINMENT 2G DW COOLER UPSTREAM AIR SMPL VLV	(07) Fluid-Operated Valves	RB	623	L-9	DAP	Y	CF			
2-0203-1A-1	SOV, FOR MSIV - SOLENOID 1A INBD MSIV AC	(08) Motor-Operated and Solenoid-Operated Valves	RB	592	AZ005	RX	Y	RCPC/CF			
2-0302-19A	SOV, B/U SCRAM	(08) Motor-Operated and Solenoid-Operated Valves	RB	595	L-8	CRP	Y	RRC			
2-0302-20A	SOV, SDV VNT & DRN	(08) Motor-Operated and Solenoid-Operated Valves	RB	595	L-8	CRP	Y	RRC			
2-1001-16A	VALVE, HX 2A BYPASS - 2A RHR HX BYP VLV	(08) Motor-Operated and Solenoid-Operated Valves	RB	554	M-8	RH	Y	RCIC/DHR			
2-1001-29A	VALVE, LOOP A LPCI INJ - LPCI OUTBOARD INJECTION TO A RECIRC	(08) Motor-Operated and Solenoid-Operated Valves	RB	554	J-8	RH	Y	RCIC/DHR			

ID	DESCRIPT	CLASS	BUILDING	ELEVATION	LOCATION	SYSTEM	Seismic Cat 1?	Safety Function(s)	New or Replaced Equip?	IPEEE Enhancement ?	Comments
2-1001-34A	VALVE, TORUS CLG - 2A TORUS SPRAY/CLG SV	(08) Motor-Operated and Solenoid-Operated Valves	RB	554	L-7	RH	Y	RCIC/DHR			
2-1201-2	VALVE - U-2 CU SYS UPSTREAM INLET VLV (HW)	(08) Motor-Operated and Solenoid-Operated Valves	RB	623	K-9	RT	Y	CF			
2-1201-5	VALVE - U-2 CU SYS DOWNSTREAM INLET VLV	(08) Motor-Operated and Solenoid-Operated Valves	RB	623	K-8	RT	Y	CF			
2-1301-16-MO	VLV, ISOLATION, 3 - U-2 MAIN STM TO RCIC UPSTREAM SV	(08) Motor-Operated and Solenoid-Operated Valves	RB	605	AZ350	RI	Y	RCIC/DHR			
2-1301-17-MO	U-2 MAIN STM TO RCIC DOWNSTREAM SV	(08) Motor-Operated and Solenoid-Operated Valves	RB	554	H-8	RI	Y	RCIC/DHR	Y		
2-1601-57-MO	VLV, IS0, 1", N2 MAKEUP TO CONTAIMENT - U-2 N2 MU TO CNMT DOWNSTREAM SV HANDWHEEL	(08) Motor-Operated and Solenoid-Operated Valves	RB	595	K-12	PC	Y	CF			
2-2301-14-MO	U2 HPCI PMP MIN FLOW VLV	(08) Motor-Operated and Solenoid-Operated Valves	RB	554		HP	Y	RCIC			
2-2301-35-MO	U-2 HPCI PMP DOWNSTREAM TORUS SUCT VLV	(08) Motor-Operated and Solenoid-Operated Valves	RB	554		HP	Y	RCIC			
2-2301-3-MO	U-2 HPCI TURB INLET VLV	(08) Motor-Operated and Solenoid-Operated Valves	RB	554		HP	Y	RCIC			
2-2301-49-MO	U-2 HPCI CLG WTR PMP TEST VLV	(08) Motor-Operated and Solenoid-Operated Valves	RB	554		HP	Y	RCIC			
2-2301-6-MO	U-2 HPCI PMP CCST SUCT VLV	(08) Motor-Operated and Solenoid-Operated Valves	RB	554		HP	Y	RCIC			
2-2301-8-MO	U2 HPCI DSCH VLV (HW)	(08) Motor-Operated and Solenoid-Operated Valves	RB	554	H-8	HP	Y	RCIC			
1/2-5727	FAN, ROOM VENTILAT EDG ROOM VENT FAN (LARGE FAN)	(09) Fans	DG	595	N-13	VP	Y	Auxiliary & Support		Y	PRA: F-V=6.04e-02
2-5745A	COOLER, CUBICLE - HEAT EXCHANGER CONTACT STEAM-LIQUID	(10) Air Handlers	TB	547	C-6	VD	Y	Auxiliary & Support		Y	
2-5747	COOLER, CUBICLE - HPCI ROOM COOLER	(10) Air Handlers	TB	554	G-12	VD	Y	Auxiliary & Support	Y	Y	EC 24120
2-5748A	COOLER, CUBICLE - 2A CS PMP RM COOLER	(10) Air Handlers	RB	554	G-8	VD	Y	Auxiliary & Support	Y	Y	EC 24248
2-5749	COOLER, CUBICLE - 2DG CW PMP CUB COOLER	(10) Air Handlers	TB	547	C-5	VD	Y	Auxiliary & Support		Y	
1/2-4600A	RECEIVER GAS (IDNS PRESSURE VESSEL)	(12) Air Compressors	DG	595	N-13	SA	Y	Auxiliary & Support			
902-61	PNL, CONTROL	(14) Distribution Panels	SB	609	CSR	PM	Y	Racks & Panels			
902-62	PNL, CONTROL	(14) Distribution Panels	SB	609	CSR	PM	Y	Racks & Panels			
125 VDC BATT 2	BATTERY, 125V	(15) Batteries on Racks	TB	628	G-2	125 VDC	Y	Electrical Systems		Y	
250 VDC BATT 2	BATTERY, 250V	(15) Batteries on Racks	TB	628	G-1	250 VDC	Y	Electrical Systems		Y	
2-8300-2	CHRGR #2, 125V	(16) Battery Chargers and Inverters	TB	615	G-1	DC	Y	Electrical Systems		Y	
2-8350	CHRGR #2, 250V	(16) Battery Chargers and Inverters	TB	615	G-1	DC	Y	Electrical Systems		Y	

ID	DESCRIPT	CLASS	BUILDING	ELEVATION	LOCATION	SYSTEM	Seismic Cat 1?	Safety Function(s)	New or Replaced Equip?	IPEEE Enhancement ?	Comments
1/2-6601	DG, UNIT 1/2	(17) Engine-Generators	DG	595	N-13	DG	Y	Auxiliary & Support	Y		EC 24448 PRA: F-V=3.65e-01; RAW=9.91
2202-29A	INSTR RACK 2202-29A	(18) Instruments on Racks	RB	554		RM	Y	Racks & Panels			
2202-32	RACK, AUTO BLOWDOWN	(18) Instruments on Racks	RB	623	J-12	RM	Y	Racks & Panels	Y	Y	EC 24113
2202-59A	RACK	(18) Instruments on Racks	RB	554	M-7	RM	Y	Racks & Panels			
2202-7	RACK	(18) Instruments on Racks	RB	595	J-8	RM	Y	Racks & Panels			
2202-73A	RACK, ANALOG TRIP	(18) Instruments on Racks	SB	609	F-25	RM	Y	Racks & Panels			
2202-8	RACK	(18) Instruments on Racks	RB	595	K-11	RM	Y	Racks & Panels			
2212-125	RACK, 1/2 DG ENGINE CONTROL	(18) Instruments on Racks	DG	595	N-13	RM	Y	Racks & Panels			
2212-32	Wall mounted Panel DG	(18) Instruments on Racks	DG	595	N-13	RM	Y	Auxiliary & Support		Y	
2252-86	RACK	(18) Instruments on Racks	TB	639	H-10	RM	Y	Racks & Panels			
2252-87	RACK	(18) Instruments on Racks	TB	639	H-12	RM	Y	Racks & Panels			
902-3	PANEL	(20) Instrumentation and Control Panels and Cabinets	SB	623	-	PM	Y	Racks & Panels			
902-33	PANEL	(20) Instrumentation and Control Panels and Cabinets	SB	595	E-26	PM	Y	Racks & Panels		Y	
902-39	PANEL	(20) Instrumentation and Control Panels and Cabinets	SB	595	E-26	PM	Y	Racks & Panels		Y	
902-5	PANEL	(20) Instrumentation and Control Panels and Cabinets	SB	623	-	PM	Y	Racks & Panels			
1/2-4605	TANK, BLOWDOWN	*(21) Tanks and Heat Exchangers*	DG	595	N-13	SA	Y	*Auxiliary & Support*			
1/2-5202	TANK, FUEL OIL DAY	(21) Tanks and Heat Exchangers	DG	595	N-13	DO	Y	Auxiliary & Support			
1/2-6654	HX, DG LUBE OIL	(21) Tanks and Heat Exchangers	DG	595	N-13	DG	Y	Auxiliary & Support			
1/2-6661A	HX, DG COOLING	(21) Tanks and Heat Exchangers	DG	595	N-13	DG	Y	Auxiliary & Support			
2-0305-125-22-27	SCRAM WATER ACCUMULTOR (22-27 F-7 (South))	(21) Tanks and Heat Exchangers	RB	595	-	CRD	Y	RRC		Y	
2-0305-125-30-11	SCRAM WATER ACCUMULTOR (30-11 H-3 (South))	(21) Tanks and Heat Exchangers	RB	595	-	CRD	Y	RRC		Y	
2-0305-125-38-59	SCRAM WATER ACCUMULTOR (38-59 K-15 (North))	(21) Tanks and Heat Exchangers	RB	595	-	CRD	Y	RRC		Y	
2-0305-125-42-27	SCRAM WATER ACCUMULTOR (42-27 L-7 (North))	(21) Tanks and Heat Exchangers	RB	595	-	CRD	Y	RRC		Y	
2-1001-145A	HEAT EXCHANGER	(21) Tanks and Heat Exchangers	RB	554	M-8	RH	Y	RCIC/DHR			
2-1003A	HX, 2A RHR	(21) Tanks and Heat Exchangers	RB	554	M-8	RH	Y	RCIC/DHR		Y	
2-2310	COOLER U-2 HPCI OIL	(21) Tanks and Heat Exchangers	RB	554		HP	Y	RCIC			

C Seismic Walkdown Checklists (SWCs)

Table C-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.

Table C-1. Summary of Seismic Walkdown Checklists

COMPONENT ID	DESCRIPTION	Anchorage Configuration Confirmed?	AWC-U2-xx	PAGE
1/2-4600A	RECEIVER GAS (IDNS PRESSURE VESSEL)	N	18	C - 6
1/2-4604	DRYER, AIR	N/A	18	C - 13
1/2-4605	TANK, BLOWDOWN	Y	18	C - 19
1/2-4699-226	VALVE, AIR START RELAY DG 1/2 AIR START AO	N/A	18	C - 27
1/2-5202	TANK, FUEL OIL DAY	Y	17	C - 34
1/2-5203	FEDG FUEL OIL TRANSFER PUMP	Y	18	C - 44
1/2-5727	FAN, ROOM VENTILAT EDG ROOM VENT FAN (LARGE FAN)	Y	18	C - 50
1/2-6601	DG, UNIT 1/2	Y	18	C - 59
1/2-6654	HX, DG LUBE OIL	N	18	C - 70
1/2-6661A	HX, DG COOLING	N	18	C - 77
125 VDC BATT 2	BATTERY, 125V	Y	13	C - 83
2-0203-0001AH25	VALVE, PNUEMATIC - MAIN STEAM INBOARD ISOLATION VALVE	N/A	OUTAGE	
2-0203-1A-1	SOV, FOR MSIV - SOLENOID 1A INBD MSIV AC	N/A	OUTAGE	
2-0203-3A	VALVE, ERV	N/A	OUTAGE	
2-0203-4A	VALVE, SRV	N/A	OUTAGE	
2-0220-45	VALVE, PNUEMATIC - 2A RECIRC LOOP SMPL DOWNSTREAM SV	N/A	OUTAGE	
2-0302-19A	SOV, B/U SCRAM	N/A	7	C - 91
2-0302-20A	SOV, SDV VNT & DRN	N/A	7	C - 98
2-0302-21A	VALVE, NO. BNK SDV VNT - 2A SDV INBD VENT VLV	N/A	7	C - 101
2-0302-22A	VALVE, NO. BNK SDV DRN - 2A SDV 2A INBD DRN VLV	N/A	25	C - 107
2-0305-125-22-27	SCRAM WATER ACCUMULTOR (22-27 F-7 (South))	N/A	8	C - 113
2-0305-125-30-11	SCRAM WATER ACCUMULTOR (30-11 H-3 (South))	N/A	8	C - 115
2-0305-125-38-59	SCRAM WATER ACCUMULTOR (38-59 K-15 (North))	N/A	7	C - 117
2-0305-125-42-27	SCRAM WATER ACCUMULTOR (42-27 L-7 (North))	N/A	7	C - 119
2-0305-126-22-27	CRD SCRAM Inlet Valve (22-27 F-7 (South))	N/A	8	C - 121
2-0305-126-30-11	CRD SCRAM Inlet Valve (30-11 H-3 (South))	N/A	8	C - 123
2-0305-126-38-59	CRD SCRAM Inlet Valve (38-59 K-15 (North))	N/A	7	C - 125
2-0305-126-42-27	CRD SCRAM Inlet Valve (42-27 L-7 (North))	N/A	7	C - 127

COMPONENT ID	DESCRIPTION	Anchorage Configuration Confirmed?	AWC-U2-xx	PAGE
2-0305-127-22-27	CRD SCRAM Outlet Valve (22-27 F-7 (South))	N/A	8	C - 129
2-0305-127-30-11	CRD SCRAM Outlet Valve (30-11 H-3 (South))	N/A	8	C - 131
2-0305-127-38-59	CRD SCRAM Outlet Valve (38-59 K-15 (North))	N/A	7	C - 133
2-0305-127-42-27	CRD SCRAM Outlet Valve (42-27 L-7 (North))	N/A	7	C - 135
2-0305-22-27	HCU - (22-27 F-7 (South))	Y	8	C - 137
2-0305-30-11	HCU - (30-11 H-3 (South))	Y	8	C - 145
2-0305-38-59	HCU - (38-59 K-15 (North))	Y	7	C - 150
2-0305-42-27	HCU - (42-27 L-7 (North))	Y	7	C - 158
2-1001-145A	HEAT EXCHANGER	N	23	C - 166
2-1001-165A	VALVE, RELIEF - 2A RHR HX TUBE SIDE RV	N/A	23	C - 169
2-1001-166A	VALVE, RELIEF - 2A RHR HX SHELL SIDE RV	N/A	24	C - 175
2-1001-16A	VALVE, HX 2A BYPASS - 2A RHR HX BYP VLV	N/A	23	C - 181
2-1001-22A	VALVE, RELIEF - 2A LPCI LOOP RV	N/A	25	C - 188
2-1001-29A	VALVE, LOOP A LPCI INJ - LPCI OUTBOARD INJECTION TO A RECIRC	N/A	25	C - 193
2-1001-34A	VALVE, TORUS CLG - 2A TORUS SPRAY/CLG SV	N/A	25	C - 197
2-1001-65C	2C RHR SERVICE WATER PUMP MOTOR	Y	19	C - 203
2-1002A	PUMP, 2A	Y	23	C - 214
2-1003A	HX, 2A RHR	Y	24	C - 217
2-1201-2	VALVE - U-2 CU SYS UPSTREAM INLET VLV (HW)	N/A	OUTAGE	
2-1201-5	VALVE - U-2 CU SYS DOWNSTREAM INLET VLV	N/A	OUTAGE	
2-1301-16-MO	VLV, ISOLATION, 3 - U-2 MAIN STM TO RCIC UPSTREAM SV	N/A	OUTAGE	
2-1301-17-MO	U-2 MAIN STM TO RCIC DOWNSTREAM SV	N/A	OUTAGE	
2-1601-21-AO	PSS DRYWELL PURGE AIR-OP VALVE 1601-21	N/A	25	C - 228
2-1601-23-AO	VLV, BUTTERFLY ISO, 18 - PSS DRYWELL VENT TO STANDBY GAS TREATMENT AND RB EXH SYS AO VLV 1	N/A	16	C - 234
2-1601-24-AO	VLV, BUTTERFLY ISO, 18 - U-2 CNMT RX BLDG EXH VENT VLV	N/A	16	C - 237
2-1601-57-MO	VLV, IS0, 1", N2 MAKEUP TO CONTAIMENT - U-2 N2 MU TO CNMT DOWNSTREAM SV HANDWHEEL	N/A	8	C - 249
2-2001-3-AO	VLV, DW FLOOR DRAIN SUMP - U-2 DW FLR DRN SUMP PMP UPSTREAM DSCH VLV	N/A	25	C - 255
2202-29A	INSTR RACK 2202-29A	Y	21	C - 260
2202-32	RACK, AUTO BLOWDOWN	Y	5	C - 268
2202-59A	RACK	Y	23	C - 276

COMPONENT ID	DESCRIPTION	Anchorage Configuration Confirmed?	AWC-U2-xx	PAGE
2202-7	RACK	Y	7	C - 287
2202-73A	RACK, ANALOG TRIP	Y	15	C - 295
2202-8	RACK	Y	8	C - 303
2212-125	RACK, 1/2 DG ENGINE CONTROL	N	18	C - 312
2212-32	Wall-mounted Panel DG	Y	18	C - 319
2-2301-14-MO	U2 HPCI PMP MIN FLOW VLV	N/A	21	C - 326
2-2301-29-AO	U-2 HPCI STM LINE TO CONDENSER UPSTREAM DRN VLV	N/A	21	C - 334
2-2301-31-AO	U-2 HPCI STM LINE DRN LINE STM TRAP BYP VLV	N/A	21	C - 342
2-2301-35-MO	U-2 HPCI PMP DOWNSTREAM TORUS SUCT VLV	N/A	21	C - 349
2-2301-3-MO	U-2 HPCI TURB INLET VLV	N/A	21	C - 355
2-2301-49-MO	U-2 HPCI CLG WTR PMP TEST VLV	N/A	21	C - 361
2-2301-6-MO	U-2 HPCI PMP CCST SUCT VLV	N/A	21	C - 367
2-2301-8-MO	U2 HPCI DSCH VLV (HW)	N/A	OUTAGE	
2-2302	HPCI/ HPCI Pump	Y	21	C - 375
2-2304	PUMP U-2 HPCI CONDENSATE	N	21	C - 385
2-2308	AUXILIARY OIL PUMP (HPCI TURBINE)	N	21	C - 393
2-2310	COOLER U-2 HPCI OIL	N	21	C - 399
2-2399-15-PCV	U-2 HPCI GL SEAL CONDENSER COND PMP DSCH PCV	N/A	21	C - 405
2252-86	RACK	Y	9	C - 410
2252-87	RACK	Y	10	C - 416
2-3903	PUMP, DG COOLING - U2 DIESEL GENERATOR COOLING WATER PUMP	Y	20	C - 423
250 VDC BATT 2	BATTERY, 250V	Y	13	C - 427
250VDC MCC 2	MCC	N	12	C - 434
250VDC MCC 2A	MCC	Y	4	C - 441
2-5745A	COOLER, CUBICLE - HEAT EXCHANGER CONTACT STEAM-LIQUID	N	20	C - 448
2-5747	COOLER, CUBICLE - HPCI ROOM COOLER	Y	21	C - 455
2-5748A	COOLER, CUBICLE - 2A CS PMP RM COOLER	Y	22	C - 468
2-5749	COOLER, CUBICLE - 2DG CW PMP CUB COOLER	N	20	C - 475
2-6705-23-1	SWGR 23-1	N	9	C - 483
2-7100	TRANSFORMER T28 4160V-480V	N	1	C - 492
2-7100-28	SWGR 28	Y	1	C - 500
2-7800-28-1B	MCC - MCC 28-1B	N	2	C - 513
2-7800-28-2	MCC - MCC 28-2	N	11	C - 524
2-7800-28295	MCC - MCC 28/29-5	N	6	C - 532
2-7800-29-1	MCC - MCC 29-1	N	2	C - 540
2-8300-2	CHRGR #2, 125V	Y	12	C - 547

COMPONENT ID	DESCRIPTION	Anchorage Configuration Confirmed?	AWC-U2-xx	PAGE
2-8350	CHRGR #2, 250V	N	12	C - 557
2-8801A-AO	VLV, PNEUMATIC, 3/4 - CONTAINMENT 2G DW COOLER UPSTREAM AIR SMPL VLV	N/A	3	C - 564
902-3	PANEL	Y	26	C - 574
902-33	PANEL	Y	14	C - 577
902-39	PANEL	Y	14	C - 584
902-5	PANEL	Y	26	C - 592
902-61	PNL, CONTROL	Y	15	C - 595
902-62	PNL, CONTROL	Y	15	C - 600

Status: [Y] N U

Seismic Walkdown Checklist (SWC)

Equipment ID No.: 1/2-4600A

Equipment Class: (12) Air Compressors

Equipment Description: RECEIVER GAS (IDNS PRESSURE VESSEL)

Project: Quad Cities 2 SWEL

Location (Bldg, Elev, Room/Area): DG, 595.00 ft, ALL

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

   Base of tank bolted to compressor skid with 4 bolts. Skid mounted to floor with 10 anchors (5 per side).

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

   Minor surface corrosion judged to be acceptable.

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

   Minor shrinkage cracks in floor judged to be acceptable.

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.: 1/2-4600A

Equipment Class: (12) Air Compressors

Equipment Description: RECEIVER GAS (IDNS PRESSURE VESSEL)

Interaction Effects

7. Are soft targets free from impact by nearby equipment or structures? Yes

Clearance to adjacent tanks judged to be acceptable.

8. Are overhead equipment, distribution systems, ceiling tiles and lighting, and masonry block walls not likely to collapse onto the equipment? Yes
Overhead light fixtures judged to be acceptable.

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? Yes

Comments

Seismic Walkdown Team: J. Griffith & M. Wodarcyk - 8/8/2012

Evaluated by: James Griffith Date: 10/4/2012

Michael Wodarcyk 10/4/2012

Status: [Y] N U

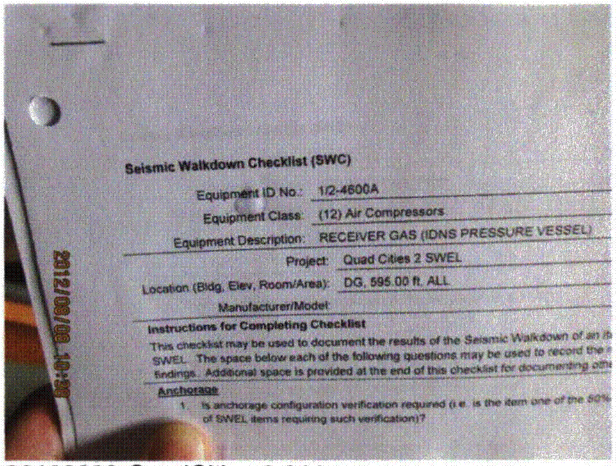
Seismic Walkdown Checklist (SWC)

Equipment ID No.: 1/2-4600A

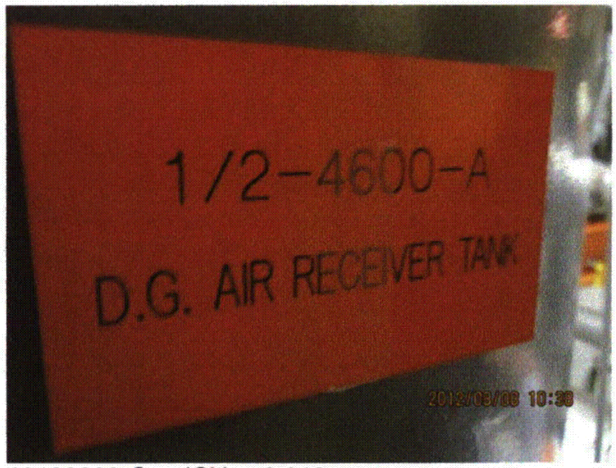
Equipment Class: (12) Air Compressors

Equipment Description: RECEIVER GAS (IDNS PRESSURE VESSEL)

Photos



20120808-QuadCities-2 211



20120808-QuadCities-2 212

20120808-QuadCities-2 213

20120808-QuadCities-2 214

Status: [Y] N U

Seismic Walkdown Checklist (SWC)

Equipment ID No.: 1/2-4600A

Equipment Class: (12) Air Compressors

Equipment Description: RECEIVER GAS (IDNS PRESSURE VESSEL)

20120808-QuadCities-2 215

20120808-QuadCities-2 216

20120808-QuadCities-2 217

20120808-QuadCities-2 218

Status: [Y] N U

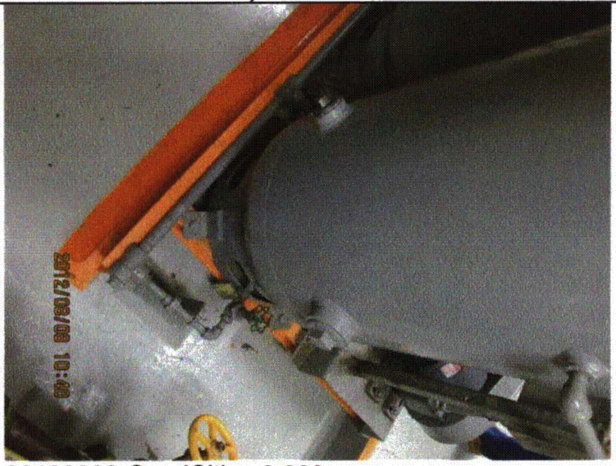
Seismic Walkdown Checklist (SWC)

Equipment ID No.: 1/2-4600A

Equipment Class: (12) Air Compressors

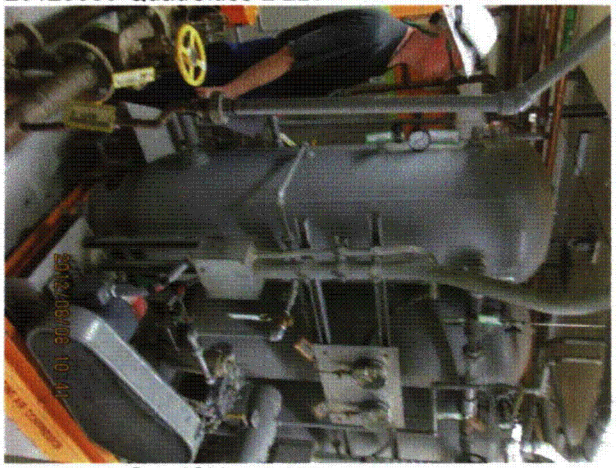
Equipment Description: RECEIVER GAS (IDNS PRESSURE VESSEL)

20120808-QuadCities-2 219



20120808-QuadCities-2 220

20120808-QuadCities-2 221



20120808-QuadCities-2 222

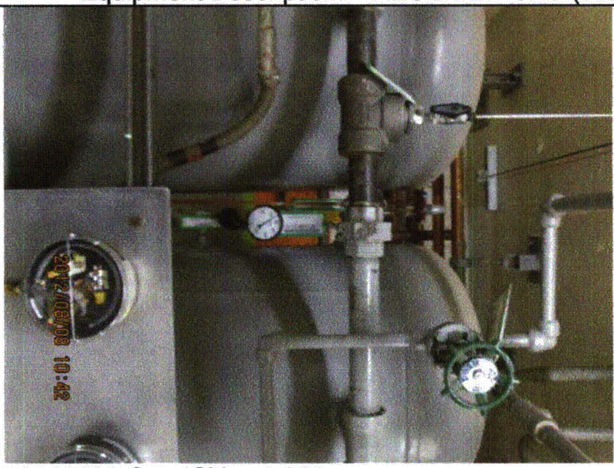
Status: [Y] N U

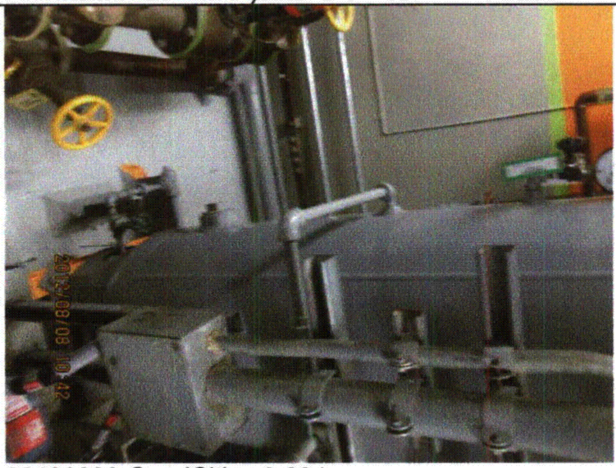
Seismic Walkdown Checklist (SWC)

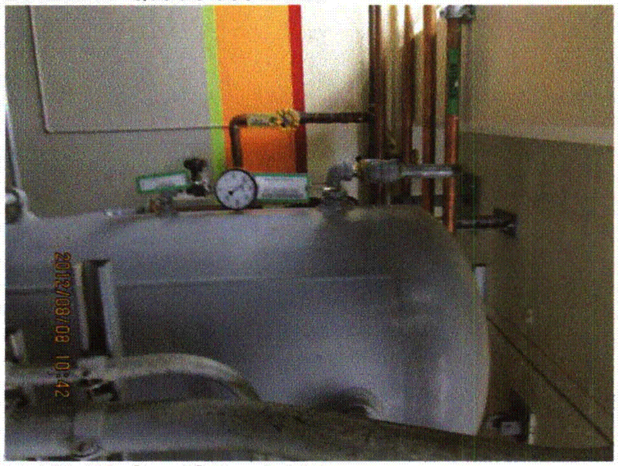
Equipment ID No.: 1/2-4600A

Equipment Class: (12) Air Compressors

Equipment Description: RECEIVER GAS (IDNS PRESSURE VESSEL)


20120808-QuadCities-2 223


20120808-QuadCities-2 224


20120808-QuadCities-2 225


20120808-QuadCities-2 226

Status: [Y] N U

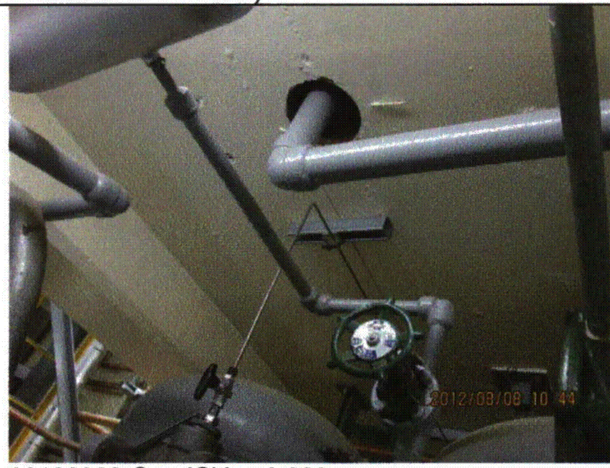
Seismic Walkdown Checklist (SWC)

Equipment ID No.: 1/2-4600A

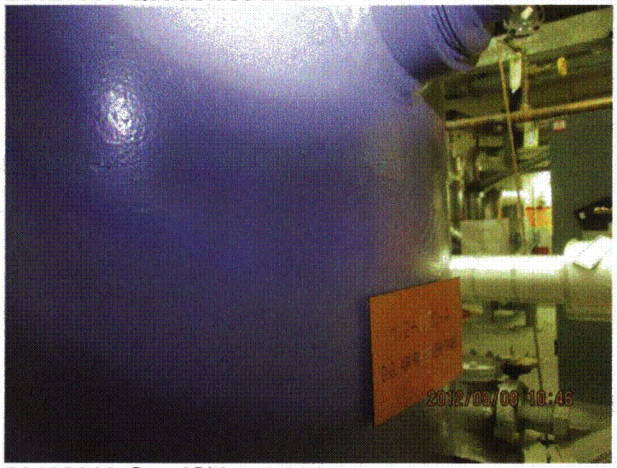
Equipment Class: (12) Air Compressors

Equipment Description: RECEIVER GAS (IDNS PRESSURE VESSEL)

20120808-QuadCities-2 227



20120808-QuadCities-2 228



20120808-QuadCities-2 229

Status: [Y] N U

Seismic Walkdown Checklist (SWC)

Equipment ID No.: 1/2-4604

Equipment Class: (0) Other

Equipment Description: DRYER, AIR

Project: Quad Cities 2 SWEL

Location (Bldg, Elev, Room/Area): DG, 595.00 ft, ALL

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? — Not Applicable

3. Is the anchorage free of corrosion that is more than mild surface oxidation? — Not Applicable

4. Is the anchorage free of visible cracks in the concrete near the anchors? — Not Applicable

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

   In-line air dryer with screwed fitting at each end mounted in pipe.

Status: [Y] N U

Seismic Walkdown Checklist (SWC)

Equipment ID No.: 1/2-4604

Equipment Class: (0) Other

Equipment Description: DRYER, AIR

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
   Overhead light fixtures judged to be acceptable.

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? — Yes

Comments

Seismic Walkdown Team: J. Griffith & M. Wodarcyk - 8/8/2012

Evaluated by: James Griffith — Date: 10/4/2012

Michael Wodarcyk — 10/4/2012

Status: [Y] N U

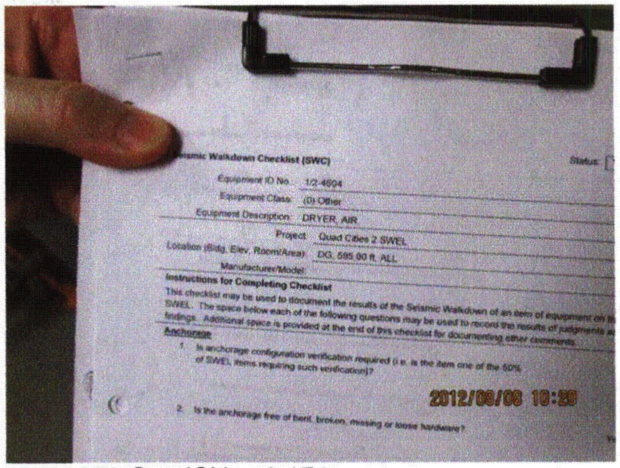
Seismic Walkdown Checklist (SWC)

Equipment ID No.: 1/2-4604

Equipment Class: (0) Other

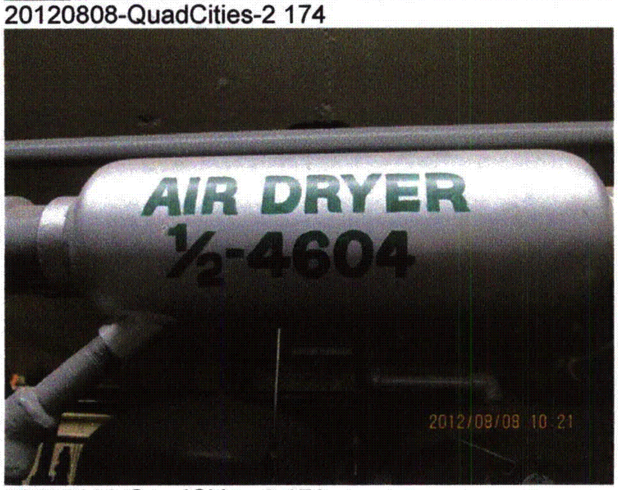
Equipment Description: DRYER, AIR

Photos

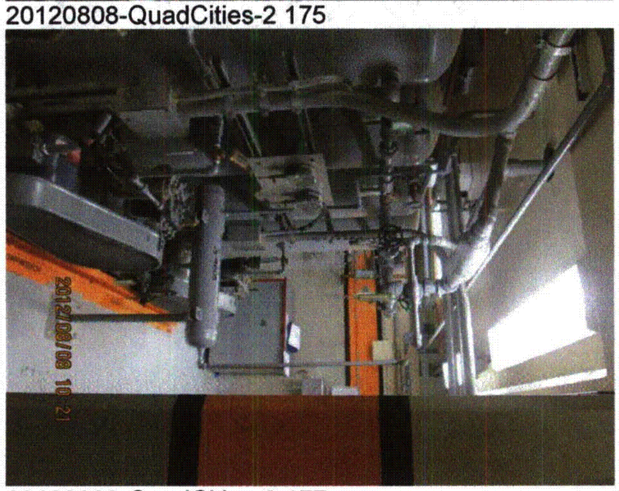


20120808-QuadCities-2 174

20120808-QuadCities-2 175



20120808-QuadCities-2 176



20120808-QuadCities-2 177

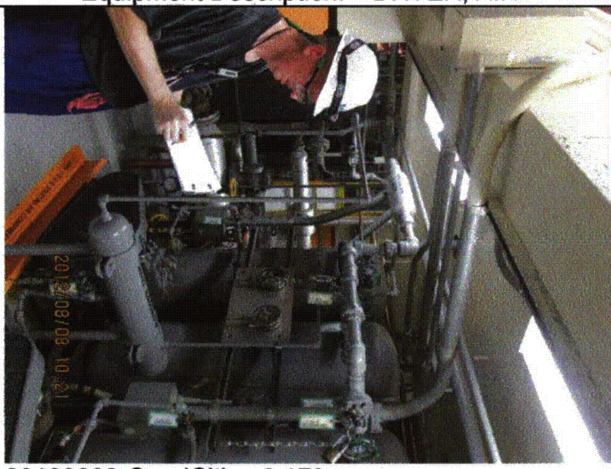
Status: [Y] N U

Seismic Walkdown Checklist (SWC)

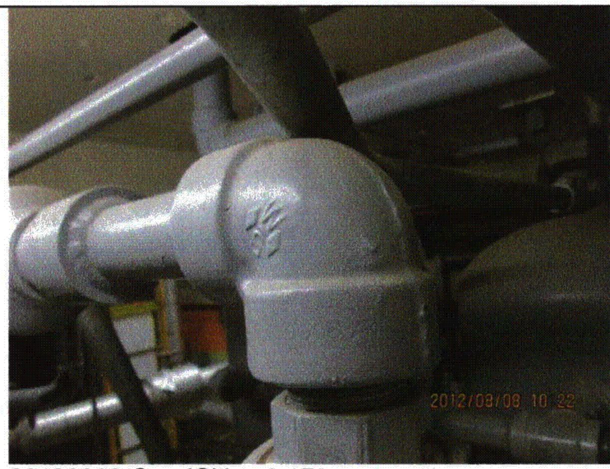
Equipment ID No.: 1/2-4604

Equipment Class: (0) Other

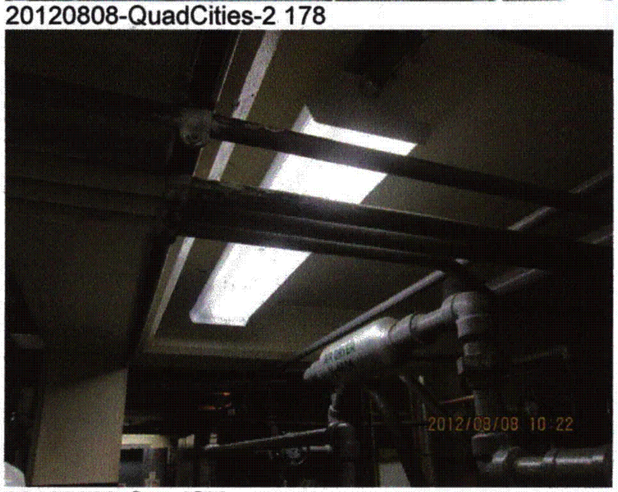
Equipment Description: DRYER, AIR



20120808-QuadCities-2 178



20120808-QuadCities-2 179



20120808-QuadCities-2 180

20120808-QuadCities-2 181

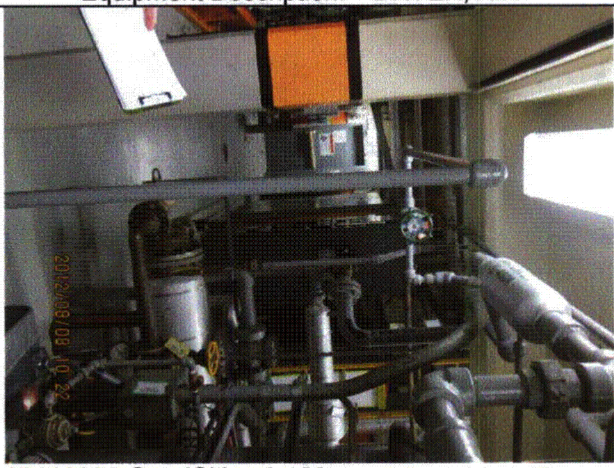
Status: [Y] N U

Seismic Walkdown Checklist (SWC)

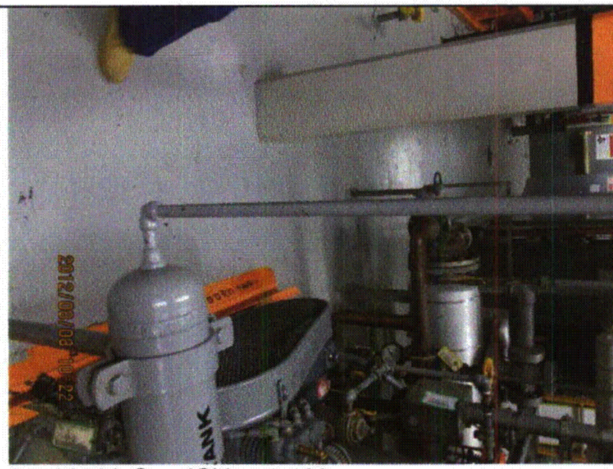
Equipment ID No.: 1/2-4604

Equipment Class: (0) Other

Equipment Description: DRYER, AIR

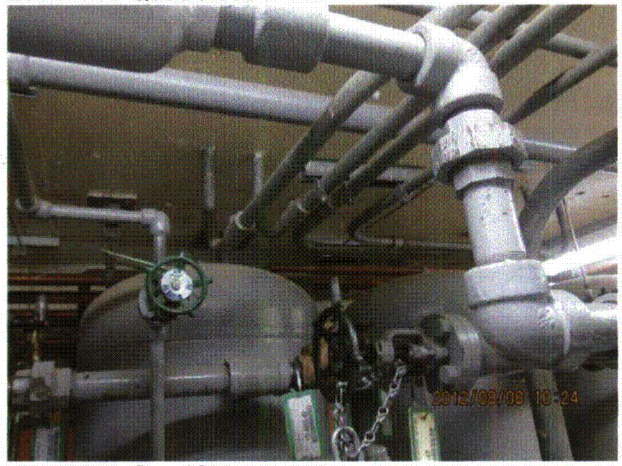


20120808-QuadCities-2 182



20120808-QuadCities-2 183

20120808-QuadCities-2 184



20120808-QuadCities-2 185