WCAP-17688-NP
Revision 0

November 2012

V.C. Summer Unit 1 Seismic Walkdown Inspection Report for Resolution of Fukushima Near-Term Task Force Recommendation 2.3: Seismic

Westinghouse

WCAP-17688-NP
Revision 0

V.C. Summer Unit 1 Seismic Walkdown Inspection Report for Resolution of Fukushima Near-Term Task Force Recommendation 2.3: Seismic

Kendal D. Bishop*
Transient & Design Analysis

Gary L. Douglas*
Risk Applications & Methods II

November 2012

Approved: Michael L. Howard*, Manager
Risk Applications & Methods II

This document may contain South Carolina Electric & Gas Company (SCE&G) Security–Related Information Withhold Under 10 CFR 2.390. SCE&G is responsible for identifying this information.

*Electronically approved records are authenticated in the electronic document management system.

Westinghouse Electric Company LLC
1000 Westinghouse Drive
Cranberry Township, PA 16066, USA

TABLE OF CONTENTS

LIST OF TABLES

EXECUTIVE SUMMARY

On March 11, 2011, the Fukushima Dai-ichi nuclear power plant suffered a devastating accident as a result of the Great Tōhoku Earthquake and subsequent tsunami. In response, the U.S. Nuclear Regulatory Commission (NRC) established the Near Term Task Force (NTTF) to evaluate the catastrophe in Japan and determine what action, if any, was necessary to protect U.S. nuclear power plants. Upon review of the details of the accident at Fukushima Dai-ichi, the NTTF issued a report that made a series of recommendations resulting in the NRC issuing a 50.54(f) letter that requests information from operating power reactor licensees under 10 CFR Part 50. One recommendation in the 50.54(f) letter was contained in Enclosure 3 and is titled Recommendation 2.3: Seismic.

To assist the U.S. nuclear power plants with meeting the request for information, the Nuclear Energy Institute (NEI), through the Electric Power Research Institute (EPRI), developed a guidance document that meets the intent of Enclosure 3 in the NRC 50.54(f) letter. The industry guidance document EPRI Technical Report 1025286, *Seismic Walkdown Guidance for Resolution of Fukushima Near-Term Task Force Recommendation 2.3: Seismic*, dated June 2012, was endorsed by the NRC on May 31, 2012.

Enclosure 3 to the NRC 50.54(f) Letter states the following purposes of the NRC request:

- To gather information with respect to Near-Term Task Force (NTTF) Recommendation 2.3, as amended by staff requirements memorandum (SRM) associated with SECY-11-0124 and SECY-11-0137,
- To request licensees to develop a methodology and acceptance criteria for seismic walkdowns to be endorsed by the NRC staff,
- To request licensees to perform seismic walkdowns using the NRC endorsed walkdown methodology,
- To identify and address degraded, nonconforming, or unanalyzed conditions through the corrective action program, and
- To verify the adequacy of licensee monitoring and maintenance procedures.

The purpose of this report is to document the conformance of South Carolina Electric & Gas Company (SCE&G) to the EPRI Guidance in order to meet the NRC's request for information. The report covers the methods used to develop a representative list of equipment to be walked down, a list of that equipment, methods used during the actual walkdown, observations collected by the walkdown team, and corrective actions taken to address the walkdown team observations. All degraded, non-conforming or unanalyzed conditions are identified and addressed within the corrective action program to ensure compliance with the design basis. The results of the walkdown observations are reported in Section 4. No potentially adverse seismic conditions were identified in Section 4. As a result, no licensing basis evaluations were reported in Section 5.

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
- Licensing Basis Evaluations
- Peer Review
- IPEEE Vulnerabilities Resolution Report

The Seismic Walkdowns identified several minor observations predominantly pertaining to housekeeping. The Seismic Walkdowns identified no degraded, nonconforming, or unanalyzed conditions that have not been resolved. No planned or newly identified protection or mitigation features have resulted from the efforts to address the 50.54(f) letter.

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.
- Participation in daily pre-job walkdown briefings.
- Review of a sample of the checklists prepared for the Seismic Walkdowns and Area Walk-Bys, including an independent seismic walkdown in the field by the peer review team to ensure adherence of the seismic walkdown team evaluations to the Seismic Walkdown Guidance.
- Perform an observation of the seismic walkdown team in the field to ensure their adherence to the Seismic Walkdown Guidance.
- Review of seismic licensing basis evaluations.
- Review of the decisions for entering 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.

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

The conduct of the walkdown team in assessing the current state of safety related equipment and areas, in concert with the site response to identified observations, confirm the adequacy of the VCSNS monitoring and maintenance procedures. In total, this submittal report demonstrates compliance to the requirements of EPRI Technical Report 1025286, and therefore meets the intent of Enclosure 3 to the NRC 50.54(f) letter.

ACKNOWLEDGEMENTS

The authors would like to acknowledge the following individuals for their efforts in supporting the development of this WCAP:

South Carolina Electric & Gas Company:
John Cobb
Mike Fowlkes
Dan Goldston
Jeremy Graham
Leo Kachnik
Dale Krause
Sara Beth Quattlebaum
Eric Rumfelt
Bob Whorton

Stevenson & Associates, Inc.:
Seth Baker
Mark Etre

Westinghouse Electric Company:
Monzer Allam
Leslie Bradshaw
Dan Cope
Marty Schmid
Jim Stanley

ACRONYMS AND ABBREVIATIONS

AC	Alternating Current
ACC	Accumulator System
AH	Air Handler
ASI	Alternating Seal Injection
AWC	Area Walk-By Checklist
BP	Balance of Plant Instrumentation & Controls System
C&D	C&D Technologies, Inc.
CAP	Corrective Action Program
CC	Component Cooling Water System
CCW	Component Cooling Water
CD	Compact Disk
CDF	Core Damage Frequency
CF	Containment Function
CLB	Current Licensing Basis
CR	Condition Report
CREP	Control Room Evacuation Panel
CS	Chemical and Volume Control System
CST	Condensate Storage Tank
DC	Direct Current
DG	Diesel Generator System
DHR	Decay Heat Removal
DP	Differential Pressure
ED	Direct Current Power System
EDG	Emergency Diesel Generator
EF	Emergency Feedwater System
EHA	Equipment has Anchorage
EOP	Emergency Operating Procedure
EPRI	Electric Power Research Institute
EV	Alternating Current Power System
FCV	Feedwater Control Valve
FRV	Feedwater Regulator Valve
FWIV	Feedwater Isolation Valve
GIP	Generic Implementation Procedure
HCLPF	High Confidence of Low Probability of Failure
HR	Hydrogen Removal System
IE	Internal Events
IFV	Flow Control Valve
HVAC	Heating, Ventilation, and Air Conditioning
IPEEE	Individual Plant Examination for External Events
ISLOCA	Intersystem Loss of Coolant Accident
IVA	IPEEE Vulnerability Enhancement
KSF	Key Safety Function
LERF	Large Early Release Frequency
LCV	Level Control Valve
MDEFP	Motor Driven Emergency Feedwater Pump
MDEFW	Motor Driven Emergency Feedwater
MFW	Main Feedwater

MNR	Major New or Replacement Equipment
MRF	Modification Request Form
MS	Main Steam System
NaOH	Sodium Hydroxide
NCN	Non-Conformance Notice
NEI	Nuclear Energy Institute
NNS	Non-Nuclear Safety
NRC	Nuclear Regulatory Commission
NSSS	Nuclear Steam Supply System
NTTF	Near-Term Task Force
OBE	Operating Basis Earthquake
OEM	Original Equipment Manufacturer
ORC	Outside Reactor Containment
PORV	Power-Operated Relief Valve
Pp	Pump
PRA	Probabilistic Risk Assessment
PSE	Plant Support Engineer
RAW	Risk Achievement Worth
RBCU	Reactor Building Cooling Unit System
RC	Reactor Coolant System
RCIC	Reactor Coolant Inventory Control
RCPC	Reactor Coolant Pressure Control
RDD	Rapid Drain-Down
RG	Regulatory Guide
RH	Residual Heat Removal System
RHR	Residual Heat Removal
RMU	Recently Modified or Upgraded
RMWST	Reactor Makeup Water Storage Tank
RPS	Reactor Protection System
RRC	Reactor Reactivity Control
RWST	Refueling Water Storage Tank
S&A	Stevenson & Associates, Inc.
SCE&G	South Carolina Electric & Gas Company
SC-I	Seismic Category I
SFP	Spent Fuel Pool
SG	Steam Generator
SGTR	Steam Generator Tube Rupture
SI	Safety Injection System
SMA	Seismic Margin Assessment
SP	Reactor Building Spray System
SRM	Staff Requirements Memorandum
SSC	Structures, Systems, and Components
SSE	Safe Shutdown Earthquake
SSEL	Safe Shutdown Equipment List
SW	Service Water System
SWC	Seismic Walkdown Checklist
SWE	Seismic Walkdown Engineer
SWEL	Seismic Walkdown Equipment List
SWP	Service Water Pond

SWT	Seismic Walkdown Team
TDEFP	Turbine Driven Emergency Feedwater Pump
UFSAR	Updated Final Safety Analysis Report
VCSNS	Virgil C. Summer Nuclear Station, Unit 1
VCT	Volume Control Tank
Westinghouse	Westinghouse Electric Company LLC
WDO	Walkdown Deferred to Outage
XTF	Transformer
XVC	Check Valve

1 SEISMIC LICENSING BASIS

The seismic licensing basis for Seismic Category I (SC-I) structures, systems, and components (SSCs) at Virgil C. Summer Nuclear Station, Unit 1 (VCSNS) is detailed in the Updated Safety Analysis Report (UFSAR) {Reference 5} Section 3.7, Seismic Design. Section 3.7.1.1, Design Response Spectra, states that the maximum horizontal ground acceleration for the Safe Shutdown Earthquake (SSE) is 0.15g at the competent rock foundation elevation and 0.25g for the soil foundation. Summary seismic design criteria are also found in VCSNS - DBD TOPICAL SEISMIC DESIGN BASIS DOCUMENT {Reference 11} Section 1.3.2.

Other general structures and buildings are designed for Zone 2 of the Uniform Building Code. Site design response spectra for the SSE are provided in UFSAR {Reference 5} Figures 3.7-1 and 3.7-2. The Response Spectra for VCSNS were developed prior to Regulatory Guide (RG) 1.60 {Reference 18} issuance based on previous investigations by Newmark and Blume. The response spectra do not directly conform to RG 1.60 curves but are considered an acceptable alternate; although non-conservative at certain frequencies. Damping used at VCSNS and listed in UFSAR {Reference 5} Table 3.7-1 are more conservative than those listed in RG 1.61{Reference 13}, and are considered an acceptable alternative.

As defined in UFSAR {Reference 5} Section 2.5, the maximum horizontal ground acceleration for the SSE is 0.15g at the competent rock foundation elevation and 0.25g for the soil foundation. For the Operating Basis Earthquake (OBE), the maximum horizontal ground accelerations used are 0.1g (rock) and 0.15g (soil). Through use of attenuation curves, extrapolation of response spectra, and analysis of intensity data, 0.25g is considered a conservative representation of the severity of vibratory ground motion for the SSE. The maximum horizontal ground accelerations for VCSNS are as follows:

SSE	0.15g	at Competent Rock Foundation
	0.25g	at Soil Foundation
OBE	0.10g	at Competent Rock Foundation
	0.15g	at Soil Foundation

SC-I equipment is classified according to Regulatory Guide 1.29 {Reference 12}, Seismic Design Classification, and is discussed in UFSAR {Reference 5} Section 3.2 and summarized in VCSNS – DBD TOPICAL SEISMIC DESIGN BASIS DOCUMENT Section 3.2.1, which states:

SC-I items are defined as those structures, systems, and components which must be designed to withstand a Safe Shutdown Earthquake (SSE) and remain functional.

The relationships between the various classification categories are illustrated in Figure 3.0-1. All structures, systems, and components which are designated as safety related are automatically classified as SC-I. This classification includes all seismic structures, 1E electrical components and circuits, and ANS Safety Class mechanical systems and components. Table 3.2-1 lists the Seismic Category I structures at VCSNS.

Class IE systems and components are defined in IEEE-380-1975 as electrical equipment and systems that are essential to emergency reactor shutdown, containment isolation; reactor core cooling, and containment and reactor heat removal, or are otherwise essential in preventing significant release of radioactive material to the environment. Tables 3.11-0 and 3.11-0a in the FSAR, identify the design drawings which list the Class IE Equipment. Examples of Class IE equipment are the RHR pump motor and the Diesel Generator Control Panel.

Mechanical systems and components are designated as Safety Class I, 2a, 2b, and 3 per ANS N18.2-1973. The breakdown of mechanical systems and components into Safety Classes establishes different levels of analysis required for each Safety Class. Table 3.2-2 lists the design Codes and Standards to be used for components of each Safety Class. A list of major mechanical components by system is provided in Table 3.2-1 of the FSAR which lists their ANS Safety Class and Seismic Classification as well as the Code of Analysis, Code Class, and QA Class for each component.

2 PERSONNEL QUALIFICATIONS

Table 2-1 summarizes the names and corresponding roles of personnel that participated in this effort. Resumes and training records presented in Appendix A provide detail on each person's qualifications for his or her role.

Table 2-1 Summary of Personnel Participation

Personnel	Role						
	Equipment Selection Personnel	Plant Operations Personnel	Seismic Walkdown Engineer	Licensing Basis Reviewer	IPEEE Reviewer	Peer Review Team Leader	Peer Reviewer
Gary L. Douglas (Westinghouse)	X				X		
Kendal D. Bishop (Westinghouse)	X				X		
Dan R. Goldston (SCE&G)	X	X					
Jeremy Graham (SCE&G)(1,2)	X		X	X			
Dale Krause (SCE&G)(2)			X	X			
Mark S. Etre (S&A)			X	X			
Seth W. Baker (S&A)			X	X			
Robert B. Whorton (SCE&G)						X	X
Eric W. Rumfelt (SCE&G)							X

Note:

1. This individual participated in the equipment selection process and accompanied the Seismic Walkdown Team during the at-power and outage walkdowns.
2. These individuals were only responsible for signing the Seismic Walkdown Checklist and associated Area Walk-By Checklist related to component ID ILT 01969.

3 SELECTION OF SSCS

The purpose of this section is to describe the process used to select the structures, systems, and components (SSCs) that were included in the Virgil C. Summer Nuclear Station, Unit 1 (VCSNS) Seismic Walkdown Equipment List (SWEL). The Seismic Walkdown Equipment List is comprised of a sample of Seismic Category I (SC-I) equipment required to meet the objectives of the 10CFR50.54(f) letter {Reference 10}, and was generated based on EPRI 1025286, *Seismic Walkdown Guidance for Resolution of Fukushima Near-Term Task Force Recommendation 2.3: Seismic* {Reference 1}.

The SWEL is comprised of two groups of items:

- SWEL 1 – Items to safely shutdown the reactor and maintain containment integrity.
- SWEL 2 – Items related to the spent fuel pool (SFP).

The SSCs from these two groups were then combined into a single SWEL to be used during the Seismic Walkdowns and Area Walk-Bys.

The following steps, from the integrated project schedule, outline the process used to produce the SWEL:

- Project Kickoff Meeting
- Obtain customer input documentation
  - Retrieve original VCSNS Individual Plant Examination for External Events (IPEEE)
  - Retrieve containment function equipment
  - Retrieve modifications since the IPEEE
  - Retrieve recently modified/upgraded equipment
  - Retrieve SFP equipment (P&IDs, Design Basis Document, and Training Manual)
- Assemble preliminary SWEL 1 Safe Shutdown Equipment List (SSEL) (Base List 1)
  - Perform Screen 1 Seismic Category (non-Seismic Category I SSCs screen out)
  - Perform Screen 2 Regular Inspections (Structure, Piping, Penetrations screen out)
  - Perform Screen 3 Safety Function Support
- Assemble preliminary SWEL 2 SSEL (Base List 2)
  - Perform Screen 1 Seismic Category (non-Seismic Category I SSCs screen out)
  - Perform Screen 2 Appropriate for walkdown
- Site visit to confirm preliminary SSELs
- Finalize SSELs
- Select SWEL 1
  - System variety
  - Equipment type variety
  - Environment variety
  - Risk importance considerations
  - Major new or replacement equipment
  - Recently modified/upgraded (zone of influence effects)
  - IPEEE Seismic Vulnerability findings
- Select SWEL 2
  - System variety
  - Equipment type variety

  - Environment variety
  - Equipment access considerations
  - Major new or replacement equipment
  - Recently modified/upgraded (zone of influence effects)
  - Rapid Drain-Down assessment
- Confirm SWEL (SWEL 1 + SWEL 2) with Seismic Walkdown Engineers (SWEs)
- Obtain VCSNS Operations approval of SWEL
- SWEL Peer Review

3.1 VCSNS OPERATIONS INVOLVEMENT

Per the guidance established in Reference 1, VCSNS Operations personnel participated in the equipment selection process as described below. This participation included:

- Weekly status meetings for review of the SWEL development progress.
- Verification of the SSC data retrieved from the VCSNS IPEEE {Reference 2}, VCSNS Internal Events (IE) Probabilistic Risk Assessment (PRA) model {Reference 3}, and the VCSNS CMMS database.
- Identification of any upgrades, modifications, and replacements of SSCs which were deemed pertinent to the SWEL selection process.
- Categorizing of the SSCs into the Reference 1 guidance equipment classifications (Table B-1 of Reference 1).
- Providing of VCSNS operational experience to the SWEL selection process.
- Peer review and approval of the SSCs selected for the SWEL Walkdowns and Area Walk-Bys.

A SWEL Development On-Site visit was held on July 16, 2012 and July 17, 2012 to perform the SWEL screening process and reviews necessary to begin selecting components for the SWEL for VCSNS. The following personnel participated in the On-Site visit:

Attendee	Company	Position
Mike Fowlkes	SCE&G	Engineering Manager
Dan Goldston	SCE&G	Operations Support Supervisor
Jeremy Graham	SCE&G	Design Engineer
Bob Whorton	SCE&G	SWEL Peer Review Lead
Monzer Allam	Westinghouse	SWEL Development Data Acquisition Lead
Kendal Bishop	Westinghouse	SWEL Developer
Leslie Bradshaw	Westinghouse	Project Manager
Gary Douglas	Westinghouse	SWEL Development Lead
Marty Schmid	Westinghouse	SWEL Development Data Acquisition Support

The agenda followed during the On-Site visit included:

- Discuss high-level approach to SWEL Development
- Review Base List 1 for accuracy and completeness
- Populate the SWEL 1 Screen 4 Sample selection attributes

- Select the SWEL 1 items
- Review Base List 2 for accuracy and completeness
- Populate the SWEL 2 Screen 3 Sample selection attributes
- Identify the SWEL 2 Screen 4 Rapid Drain-Down (RDD) concern components
- Select the SWEL 2 items
- Identify items for follow-up
- Summary Out-briefing

The completed SWEL was reviewed and signed by VCSNS Operations, and forwarded to the SWEs in advance of the Walkdowns and Area Walk-Bys for review and to begin compilation of the walkdown packages. The completed SWEL was peer reviewed by a team of two peer reviewers: 1 VCSNS Consulting Engineer, and 1 VCSNS PRA Engineer.

3.2 SAMPLE OF REQUIRED ITEMS FOR THE FIVE SAFETY FUNCTIONS

VCNSN was initially classified as a 0.3g focused scope plant in NUREG-1407 {Reference 4}. The methodology chosen for VCSNS was the Seismic Margin Methodology based on EPRI NP-6041-SL {Reference 9} which was the methodology acceptable to the NRC for performing a seismic margin analysis. This methodology was then modified for the VCSNS Seismic IPEEE. The methodology modification included:

1. High Confidence of Low Probability of Failure (HCLPF) calculations were performed only on those components that potentially had a capacity below 0.3g Zero Period Ground Acceleration. This resulted in HCLPF calculations for only a few components.
2. The relay evaluation only included the identification of potentially "low ruggedness" relays.
3. The capacities for reactor internals and soil-related failures were not evaluated for the Seismic Margin Assessment (SMA).

The VCSNS IPEEE SSEL {Reference 2} was used as the starting point for the SSCs for inclusion in Base List 1. Sections 2.1 through 2.5 of Appendix E of the VCSNS IPEEE {Reference 2} provided justification that the five safety functions required as part of the SWEL development process guidance {Reference 1} had been addressed during the development of the VCSNS IPEEE SSEL. A review of the VCSNS Updated Final Safety Analysis (UFSAR) {Reference 5} identified additional SSCs corresponding to the Ultimate Heat Sink at VCSNS which represents additional Decay Heat Removal (DHR) capabilities. The VCSNS IE PRA model {Reference 3} was reviewed to identify additional components not modeled during the original VCSNS IPEEE SSEL development.

The population of the necessary SSC attributes required a query of the VCSNS CMMS database for active Seismic Category I components. This provided such information as the system, type, location, and elevation of the components. This query was also used to verify that the SSCs identified on Base List 1 are active components.

The process for selecting a sample of the SSCs for the SWEL 1 included the following four screens to verify the maintenance of containment integrity and the safe shutdown of the reactor:

- Screen 1 – Seismic Category I

- Screen 2 – Equipment or Systems
- Screen 3 – Support for the Five Safety Functions
- Screen 4 – Sample Considerations

Screen 1 filters out the non-Seismic Category I components since only these items have a defined seismic licensing basis to evaluate against the as-installed configuration. Screen 2 filters out the SSCs which regularly undergo inspections to confirm their configuration continues to be consistent with the established plant licensing basis (i.e., Seismic Category I Structures, Containment Penetrations, Seismic Category I Piping Systems, etc.). Screen 3 filters out the SSCs which do not support any of the five safety functions established in Reference 1 [i.e., Reactor Reactivity Control (RRC), Reactor Coolant Pressure Control (RCPC), Reactor Coolant Inventory Control (RCIC), Decay Heat Removal (DHR); and Containment Function (CF)]. Screen 4 establishes that the developed SWEL sufficiently represents a broad population of plant Seismic Category I equipment, systems, environments, and that any enhancements, replacements, or modifications have been considered during the SSC selection process.

As part of the Reference 1 guidance, the SSCs included on the SWEL 1 needed to represent at least one of the five safety functions. The five safety functions described in the Reference 1 guidance are as follows:

- Reactor Reactivity Control (RRC)
- Reactor Coolant Pressure Control (RCPC)
- Reactor Coolant Inventory Control (RCIC)
- Decay Heat Removal (DHR)
- Containment Function (CF)

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

The following provides an example of the support systems for the five safety functions for VCSNS {Reference 2}. [Note: Many of the systems defined below are considered frontline and/or support for multiple safety functions.]

- Reactor Reactivity Control
  - Reactor Protection System (RPS)
  - Chemical and Volume Control System (CS)
  - Balance of Plant Instrumentation & Controls System (BP)
- Reactor Coolant Pressure Control
  - Reactor Coolant System (RC)
  - Alternating Current Power System (EV)
  - Diesel Generator System (DG)
- Reactor Coolant Inventory Control
  - Residual Heat Removal System (RH)
  - Safety Injection System (SI)
  - Accumulator System (ACC)
  - Component Cooling Water System (CC)
- Decay Heat Removal
  - Emergency Feedwater System (EF)
  - Main Steam System (MS)

  - Direct Current Power System (ED)
  - Service Water System (SW)
- Containment Function
  - Reactor Building Cooling Unit System (RBCU)
  - Reactor Building Spray System (SP)
  - Auxiliary Coolant System (AC)
  - Hydrogen Removal System (HR)

3.2.1 Base List 1

With the established SSC starting list developed based on the VCSNS IPEEE {Reference 1}, UFSAR {Reference 5}, and the VCSNS IE PRA model {Reference 3}, Screens 1 through 3 of the guidance were performed as follows.

Screen 1

Using the SSC list of active Seismic Category I components queried from the VCSNS CMMS database, all components in the starting list were verified as being Seismic Category I components. Those that were not identified in the active Seismic Category I component list were noted and discussed with VCSNS Operations and Engineering personnel during the SWEL Development On-Site visit on July 16, 2012 and July 17, 2012. Those that were identified as not being contained in the active Seismic Category I component list were kept on the starting list, but removed from Base List 1.

Screen 2

The filtering of structures, containment penetrations, piping systems/inline components, and SSCs deemed "children" of larger "parent" components was then performed. The filtered "children" components included those that were mounted on or in the "parent" component. A few examples filtered are as follows:

- Structures/NSSS
  - Reactor Vessel
  - Steam Generators
- Containment Penetrations
  - Fuel Transfer Tube
- Piping Systems/Inline Components
  - Steam Generator Emergency Feedwater Header Discharge Isolation Check Valves
- "Children" SSCs
  - Transformer and Main Incoming Breaker for a 480 Volt Substation Bus

Screen 3

As noted above, the Reference 1 guidance required representation of the five safety functions in the selection of the SWEL 1 SSCs. In addition, the review of the VCSNS UFSAR {Reference 5} identified additional SSCs corresponding to the Ultimate Heat Sink at VCSNS. As part of the SWEL Development On-Site visit between July 16, 2012 and July 17, 2012, VCSNS Operations and Engineering personnel confirmed the system delegation of the five safety functions for VCSNS. These delegations can be seen in the "Screen 3 – Safety Function Support" column of Appendix B. In total 42 systems were represented in Base List 1. These 42 systems represent the frontline and support systems associated with maintaining containment integrity and bringing the reactor to a safe shutdown condition.

The results of Screens 1 through 3 are captured in Appendix B, Base List 1. A total of 937 SSCs were identified.

3.2.2 SWEL 1

Once Base List 1 was established, the SSC selection process entered Screen 4 of the Reference 1 guidance (i.e., Sample Consideration). Screen 4 is intended to result in a SWEL that sufficiently represents a broad spectrum of plant SSCs based on plant systems, equipment types, environments, and component enhancements, upgrades, and replacements. In addition, the development of SWEL 1 needed to take into consideration the components that VCSNS deemed as risk significant to the overall operation of the plant.

During the SWEL Development On-Site visit on July 16, 2012 and July 17, 2012, VCSNS Operations Personnel identified that Train A would be available for inspection the week of July 30, 2012 during the At-power Seismic Walkdowns and Area Walk-Bys. Thus, the components selected for the walkdowns were focused on those which were identified as being part of Train A. Note: For all components selected for the walkdowns, an equivalent Train B component existed, but many were deemed inaccessible.

Screen 4

The process of securing a broad spectrum of plant systems equipment types, and environments was performed during the SWEL Development On-Site visit. Using the established Base List 1, a filter on each plant system was performed and the selection of SSCs was made for each plant system. This filtering process was then repeated for each equipment type and environment defined. Conveniently, the selection of SSCs from the plant system filtering process resulted in a strong representation of each equipment type as well as environment.

3.2.3 IPEEE Identified Outliers/Vulnerabilities

Section 9.0 of the VCSNS IPEEE {Reference 2} identified three outlier concerns during the IPEEE seismic walkdowns. The three outliers are as follows:

- Reactor Coolant Loop 'C' Hot Leg Sample Header Isolation Valve (Component ID XVX09365C) was identified as non-conforming as it was observed as being supported only by its attachment to the Hot Leg Sample line, with an upper lateral support missing. Evidence showed that a U-bolt originally restrained this valve; however, it was not currently installed. The condition was documented in non-conformance notice NCN 4968.

- 17 Electrical panels were identified as having the potential to move out of phase and impact one another, resulting in increased vibration for relays with the potential to cause inadvertent relay actuations or changes of state.

- Neutral Grounding Resistors XCA0015A and XCA0015B were identified as having ceramic feet which experience has shown to be susceptible to damage during earthquakes.

As part of the SWEL 1 development guidance {Reference 1}, the components identified in the three outlier concerns above have been retained as part of the SWEL 1 selected SSC list. For each component, a note was added in the "Addition Notes" column of Appendix B to indicate it was identified as an IPEEE outlier. The associated resolutions are described in footnotes to Appendix B.

In addition to the three outlier concerns noted above, Section 10.0 of the VCSNS IPEEE {Reference 2} performed HCLPF calculations for the Condensate Storage Tank (Component ID XTK0008), the Reactor Makeup Water Storage Tank (Component ID XTK0039), the Refueling Water Storage Tank (Component ID XTK0025), and the Service Water Pond Dams as part of the IPEEE Seismic Margin Assessment (SMA). Due to their need for further analysis during the IPEEE SMA, these three tanks have been retained as part of the SWEL 1 selected SSC list. A note was added in the "Addition Notes" column of Appendix B to indicate them as being analyzed as part of the IPEEE SMA. The associated resolutions are described in footnotes to Appendix B. Due to the Service Water Pond Dams being defined as SC-I structures, they had already been screened from selection to the SWEL 1 list during Screen 2.

3.2.4 Major New/Replacement Equipment

During the SWEL Development On-Site visit on July 16, 2012 and July 17, 2012, VCSNS Operations and Engineering Personnel provided a detailed list of all plant modifications at VCSNS since 1992. While this list extends prior to the completion of the VCSNS IPEEE evaluation, several items on the list were not fully resolved at the time of the VCSNS IPEEE evaluation completion.

From the list, six were selected to be included in the SWEL 1 list as being major new/replacement equipment plant modifications. A short description is provided below with the corresponding selected component IDs involved in the modification.

- Plant Mod 22594: Improve Cooling to the Charging Pumps
  - This modification changed the cooling water supply for the Charging Pump Skid [Charging/Safety Injection Pump A (Component ID XPP0043A)] and the Component Cooling Water Pump Motor [Component Cooling Pump C (Component ID XPP0001C)] from the Chilled Water System to the Component Cooling Water System.
- Plant Mod 50032: Diesel Generator Injector Cooling Water Removal
  - This modification removed the Injector Nozzle Cooling System from the Diesel Generators, which was determined to be unnecessary. Approximately 60 total feet of tubing and piping, along with numerous connections were removed from Diesel Generator Engine A (Component ID XEG0001A-E).
- Plant Mod 50079: RHR Pump Coupling Retrofit
  - This modification involved installing a retrofit coupling to reduce the amount of disassembly that must take place for pump seal maintenance and replacement on Residual Heat Removal Pump A (Component ID XPP0031A). The coupling was installed on the Residual Heat Removal Pump.
- Plant Mod 50466: Diesel Generator Governor Replacement
  - This modification replaced the existing Diesel Generator Governor with a new Diesel Generator Governor. The installation of actuator EGA-50P occurred and the re-attachment

of the fuel rack level arm and jacket water cooling lines on Diesel Generator Engine A (Component ID XEG0001A-E) were completed.

- Plant Mod 50567: Vacuum Relief Valves to the Service Water Discharge Piping from the Reactor Building Cooling Units
  - This modification replaced the Service Water Reactor Building Unit 1A & 2A Return Isolation Valve (Component ID XVG03107A-SW) with a butterfly valve (Component ID XVB03107A-SW). Analysis shows that upon start up after a loss of offsite power a severe water hammer would form on XVG03107A-SW; therefore, the butterfly valve and multiple vacuum relief valves were installed to combat this affect.
- Condition Report CR-05-03329
  - The Emergency Feedwater Turbine Driven Pump (Component ID XPP0008) was observed with incomplete supports. One location was missing a grommet and a Unistrut clamp. The grommet and clamp were replaced making the Emergency Feedwater Turbine Driven Pump as-designed.
- Condition Report CR-06-00190
  - A field walkdown revealed that the Unistrut pipe clamps were missing from the bearing cooling water piping for the Component Cooling Pump C (Component ID XPP0001C). The clamps were replaced making the bearing cooling water piping as-designed.

3.2.5 Recently Modified/Upgraded Equipment

Per the Reference 1 guidance, consultation with VCSNS Operations personnel to identify any SSCs which have been modified or upgraded within approximately the last year was required. Concurrent with the Major New/Replacement Equipment search, identification of any recently modified or upgraded equipment was performed. During the review process, it was identified that there were several modifications in process at VCSNS. As a result, the number of completed modifications/upgrades was a small number and it was decided to encompass an 18 month selection period.

Using the list of plant modifications provided by the VCSNS Operations personnel, three recent plant modifications/upgrades were identified and those components which were affected were selected for the Seismic Walkdowns and Walk-Bys. A short description of the recent plant modification/upgrade is provided below with the corresponding selected walkdown component IDs.

- Plant Mod 50585: Safety Related Chiller Replacement
  - This modification replaced the old chillers with new chillers and associated parts, including HVAC System Mechanical Water Chiller A (Component ID XHX0001A) and HVAC System Mechanical Water Chiller A Control Panel (Component ID XPN7206). The old chillers had long standing issues with not being able to meet availability and reliability requirements.
- Plant Mod 50780: Alternate Seal Injection
  - This modification put in place an Alternate Seal Injection (ASI). The modification provided an alternate means of cooling the Reactor Coolant Pump Seals. The seal water injection line utilizes the Refueling Water Storage Tank (Component ID XTK0025) for the cooling purposes.
- Condition Report CR-11-02166
  - The SG A Wide Range Level DP Transmitter (Component ID ILT00477A) was missing 2 bolts that connect the bracket to the transmitter. The other two existing bolts were loosely

installed on the transmitter. The missing bolts were replaced and the two existing bolts were tightened, returning the SG A Wide Range Level DP Transmitter to as-designed.

3.2.6 Risk Significant Equipment

In order to identify SSCs which have a high contribution to risk, the VCSNS IE PRA model {Reference 3} was used. The associated Risk Achievement Worth (RAW) values for basic events in the IE PRA model were linked to individual SSC component IDs. These RAW values were then analyzed and any value greater than or equal to 2.0 was deemed high risk and considered for SWEL 1 selection. Those with a value less than 2.0 were analyzed on an individual component basis and considered for SWEL 1 selection if deemed pertinent.

The results of Screen 4 are captured in Appendix B, SWEL 1.

3.3 SPENT FUEL POOL RELATED ITEMS

The process for selecting a sample of the SSCs associated with the Spent Fuel Pool (SFP) for the SWEL 2 included the following four screens:

- Screen 1 – Seismic Category I
- Screen 2 – Equipment or Systems
- Screen 3 – Sample Considerations
- Screen 4 – Rapid Drain-Down

As noted above for the SWEL 1 development, Screens 1 through 3 for the SWEL 2 are similar to those of Screens 1, 2, and 4 for SWEL 1, respectively. Screen 4 identifies additional items which could lead to the SFP draining rapidly. Per the guidance in Reference 1, the SSCs considered for Screen 4 are not limited to Seismic Category I items. Rapid Drain-Down is defined as lowering the water level to the top of the fuel assemblies within 72 hours after a seismic event. Reference 1 established an approximate depth of 10 feet above the top of the fuel assemblies as the cutoff for SFP penetrations to be considered for Rapid Drain-Down.

The starting point for the development of SSCs for the SWEL 2 Base List was the VCSNS CMMS database. The resulting Seismic Category I SSC list from the database query noted in the SWEL 1 Development section was filtered to only identify those components which were listed as being part of the Fuel Handling or Spent Fuel Cooling Systems.

3.3.1 Base List 2

With the established SFP SSC starting list developed based on the VCSNS CMMS database filter of the Fuel Handling or Spent Fuel Cooling Systems, Screens 1 and 2 of the guidance were performed as follows.

Screen 1

The starting list was comprised of only Seismic Category I components based on the filtering of the VCSNS CMMS database for active Seismic Category I components.

Screen 2

The filtering of structures, inline components, inaccessible components (i.e., submerged in the SFP), and components appropriate for walkdown was then performed. Inappropriate components included those identified as having been addressed as part of the SWEL 1 development and non-SFP related components.

The results of Screen 2 are captured in Appendix B, Base List 2.

Rapid Drain-Down

The process of identifying SFP Rapid Drain-Down items involved the review of the following information:

- Seismic Category I SSC list from the CMMS database query
- VCSNS UFSAR Figure 9.1-3 {Reference 5}
- Safe Shutdown Accident Mitigating Flow Diagram {Reference 6}
- Spent Fuel Cooling System Design Basis Document {Reference 7}
- Fuel Handling Building Liner Plate Sections, Details & Elevations {Reference 8}

Per Section 3.5.4 of Reference 7, the top of the SFP fuel assemblies is at an elevation of 436'-8" and no SFP penetration exists below the approximate 10' level above the top of the fuel assemblies Rapid Drain-Down cutoff elevation. As an additional anti-drain down measure, a pair of 1/2" diameter anti-siphoning holes are provided in each of the sixteen 6" cooling water lines entering the SFP and one 1/2" hole in each of the four 2" suction lines from the SFP to the SFP demineralizer pump suction (see note 2 on Figure 9.1-3 of Reference 5).

Per Section 35-35 of Reference 8, the elevation of the SFP gate (Component ID XNF0042) is 437'-9.25" (1'-1.25" above the top of the SFP fuel assemblies). During the VCSNS SWEL visit, it was identified that there are Seismic Category I components mounted to the top of the SFP gate including the SFP gate elastomer inflatable seals air supply check valve. These components are not assigned component identification tags; they are integrated with the SFP gate component identification tag.

The Reference 1 guidance indicates that it is not necessary to include weir gates on SWEL 2, since they are classified as Seismic Category I and are considered part of the SFP structure; therefore the gates screen out from the SWEL.

The normal operating practice for the fuel handling building 125 ton capacity overhead crane (Component ID XCR0003) would be to park the crane in an area outside the perimeter of the SFP when not in use. While parked, the crane is secured to the rails adding additional restraint to falling. Since the time the crane spends over the pool is relatively insignificant, and the crane is parked in a safe portion when not in use, the crane was screened out as not having the potential to fall into the SFP and displace sufficient inventory to introduce a drain down concern.

As a result of the SWEL 2 Screen 4 guidance criteria {Reference 1}, Screen 4 resulted in no potential SFP Rapid Drain-Down concerns. For conservatism, the SFP gate was added to SWEL 2 to evaluate seismic interactions with the gate sealing system.

3.3.2 SWEL 2

Based on Base List 2 the completed SWEL 2 was developed and is provided in Appendix B, SWEL 2. A total of 6 SFP components were selected for the SWEL walkdown. To be thorough in the selection process, at least one component from the 4 represented component classes was selected from Base List 2. This ensured the requirements of the SWEL 2, Screen 3 selection process were met. The 2 remaining components selected were defined as Class "00 – Other". These two components were the SFP gate (Component ID XNF0042) and the SFP Bridge Crane Hoist/Trolley (Component ID XCR0002-CR1).

The four Base List 2 components excluded from the SWEL 2 selected list were removed based on redundancy of equipment (i.e., the equivalent Train A component was selected for walkdown).

3.4 INACCESSIBLE ITEMS

There were no inaccessible items identified. All VCSNC SWEL Seismic Walkdown Checklists and accompanying Area Walk-Bys were performed during the At-Power walkdowns (July 30-August 2, 2012) and the Outage walkdowns (October 21-23, 2012).

4 SEISMIC WALKDOWNS AND AREA WALK-BYS

4.1 BACKGROUND

The approach used to implement the Seismic Walkdowns and Area Walk-Bys was consistent with the EPRI Seismic Walkdown Guidance {Reference 1}. The walkdowns were conducted by the Seismic Walkdown Team (SWT) consisting of the SWEs identified in Section 2.2 of this report. The SWEs utilized engineering judgment based upon experience and training indicated in Section 2.2, supplemented by existing plant documentation and analyses, where applicable, to identify potentially adverse seismic conditions. For items on the SWEL, these potential seismic conditions included any adverse anchorage conditions, adverse seismic spatial interactions, or other adverse seismic conditions. The results of the walkdown and any pertinent observations were documented for each item on the SWEL using the Seismic Walkdown Checklists (SWCs) included in Appendix C. In addition to potentially adverse seismic conditions, other observations described in the SWCs include features that, after discussion between the SWEs, were determined to be adequate.

Area Walk-Bys were conducted by the SWT in each area of the plant that contains an item on the SWEL. The Area Walk-Bys identified potentially adverse seismic conditions associated with other SSCs located in the vicinity of the SWEL item. The area examinations identified any adverse anchorage conditions, significantly degraded equipment in the area, potential seismic interactions, adverse assessments of cable/conduit raceways and HVAC ducting, potential interactions that could cause flooding/spray or fire in the area, and other adverse housekeeping items, including temporary installations. The results of the walk-by and any pertinent observations were documented for each inspected area using Area Walk-By Checklists (AWCs), which are included in Appendix D. Observations described on the AWCs include potentially adverse seismic conditions as well as conditions that were discussed during the walk-by and determined to be adequate at that time.

The SWT was assisted by other individuals present on the walkdown, including members of VCSNS Operations and Engineering. The SWT for VCSNS was led by Mark Etre and Seth Baker of S&A, while Jeremy Graham led the support from VCSNS for walkdowns as well as the interface with plant operators. Other VCSNS and Westinghouse professional staff provided support and guidance and these persons are acknowledged within this report. These accompanying individuals facilitated access to equipment and provided additional information regarding plant procedures and safety related functions of SWEL items and nearby equipment and systems that could cause adverse seismic interaction. Any issue that could not be resolved by consensus of the SWEs during the walkdowns and easily determined to be acceptable was identified as a potentially adverse seismic condition on the SWC or AWC (as applicable). The conditions identified were evaluated with-respect-to the current licensing basis (CLB). These evaluations are listed and described in Section 5.

4.2 PREPARATION FOR SEISMIC WALKDOWNS

In preparation for the Seismic Walkdowns and Area Walk-Bys, the SWT obtained the SWEL and selected 50% (excluding line-mounted equipment) for anchorage configuration verification. A total of 78 components were identified as potentially having anchorage and 45 were chosen to fulfill the 50% anchorage configuration verification requirement.

VCSNS design drawings, seismic qualification calculations, and vendor/supplier documents were reviewed and taken into the field to verify that as-installed configurations were consistent with the CLB established by these documents. The SWT also obtained VCSNS equipment layout drawings to establish a detailed walk down schedule.

There were no masonry walls at VCSNS within the vicinity of any of the equipment to be walked down. A design standard for VCSNS was to not use masonry walls in safety related structures.

Potential flooding/spray interaction hazards due to fire piping were reviewed consistent with {Section 3.1.2 of Reference 5}. Fire-fighting systems are designed to assure that their rupture or inadvertent operation does not significantly impair the safety capability of the safety related structures, systems, and components {Reference 15}. These systems are seismically restrained when located in the near vicinity of safe shutdown equipment {Reference 16}.

Additional documentation obtained and reviewed to supplement the walkdowns included the in-structure floor response spectra for the SSE {Reference 11}, in addition to SSE structural damping criteria per UFSAR Section 3.7.2.2 {Reference 5}.

4.3 WALKDOWN RESULTS

A total of 105 items out of 106 were walked down during the at-power and outage walkdowns. The results of the Seismic Walkdowns for each of the 105 items of equipment are documented on Seismic Walkdown Checklists, attached in Appendix C.

Following the completion of the at-power seismic walkdowns, the industry was made aware that the NRC staff had formulated a position on opening electrical cabinets to inspect for other adverse seismic conditions. A total of 25 electrical cabinets were identified. Supplemental inspections of 20 of the 25 electrical cabinets occurred during the VCSNS outage walkdowns. The corresponding Seismic Walkdown Checklists were updated to document the supplemental inspection results. Supplemental inspections of the remaining 5 electrical cabinets were not performed due to accessibility limitations. Justification for not performing these supplemental inspections has been provided in the corresponding Seismic Walkdown Checklists.

One SWEL item was not walked down during the at-power or outage walkdowns. Component ID ITE01317 (SEAL TABLE TRAIN A CAP TUBE TEMP ELEM) was identified during the outage walkdowns as being located in a "Grave Radiological Danger Area". VCSNS Health Physics personnel identified that the timeframe for which this item would be accessible for inspection would not support the timeframe necessary to complete the requirements of a seismic walkdown, and accessibility at any time during a future VCSNS outage would not support a seismic walkdown. A review of potential replacement components in Base List 1 and 2 resulted in no adequate replacements due to all possible replacements of this equipment type being located in the same high radiation area as Component ID ITE01317. As a result, Component ID ITE01317 has been retained on the SWEL selected list, but will not be inspected.

During the walkdowns a total of 9 observations were identified. None of the observations identified by the SWEs during the equipment walkdowns were determined to be a "Potentially Adverse Seismic Condition" because all observations were entered into the VCSNS CAP and were concluded to be in compliance with the VCSNS seismic licensing basis. Table 4-1 at the end of this section provides a summary of the observations identified during the Seismic Walkdowns.

A total of 53 areas were included in Area Walk-Bys. The results of the Area Walk-Bys are documented on the Area Walk-By Checklists, attached in Appendix D. Table 4-1 at the end of this section provides a summary of the observations identified during the Seismic Area Walk-Bys.

4.3.1 Anchorage Conditions

In all cases, the SWT was able to verify the as-installed anchorage for configuration verification against VCSNS documentation brought into the field (drawings and calculations). No seismic anomalies or issues were identified.

4.3.2 Seismic Spatial Interactions

The SWT noted adequate clearances around safety related equipment and sufficient anchorages of other potential impact hazards, including transient materials.

Observations involving the possibility of insufficient clearances between safety related components included the open door panel on XMC1DA2Z, which has blue painters tape holding the door open, a tool locker in the CREP room and a gap in battery rack XBA1A.

The concern with the open door is that the equipment has relays that may trip in the event that the door impacts the panel. Based on review of a 50.59 screening allowing the doors to be opened, this condition was determined by VCSNS to not present a potentially adverse seismic condition. Plant Support Engineering-Electrical was assigned to review the current practice of opening doors using tape.

The tool locker was identified as being very close to XPN7200A, which if the tool cabinet slides or tips, the relays inside the cabinet may be affected. Condition Report CR-12-03236 was written to address this. This condition was determined by VCSNS to not present a potentially adverse seismic condition.

The gaps in the battery rack are larger than what is currently recommended by the manufacturer. A newer revision of the C&D manual for the LCR-31 battery cells was retrieved from OEM for reference. Review of the manual found that the current guidance is that the end rails should be placed within 1/8" from the end cells, the manual also states not to tighten end rails against the battery cell as it may result in damage to the cell. Condition Report CR-12-03530 was written to address this. Field inspection revealed that the gaps between the end cells and end rails were in general within approximately 1/8". VCSNS electrical maintenance procedure EMP-115.003 "Removal and Re-installation of Battery Cells" was revised to add a requirement that batter cells be installed with a maximum gap of 1/8" between end cells and end rails. This condition was determined by VCSNS to not present a potentially adverse seismic condition.

The SWT inspected overhead piping and distribution systems including cable trays and found them well-anchored and ruggedly supported throughout the unit. Large fire extinguishers on small hooks that could possibly uplift and fall were found throughout the unit, but no extinguishers were within the zone of influence for safety related equipment. Overhead lighting was also noted to be rugged in all areas with sensitive equipment.

Attached lines and piping to SWEL equipment were inspected and concluded to have adequate flexibility.

All scaffolding encountered by the SWT was found to be adequately braced and anchored in addition to having sufficient clearances to safety related equipment.

Several housekeeping observations were discovered throughout the unit; however, none represented potentially adverse seismic conditions that could affect safety related equipment. Table 4-1 of this report includes housekeeping observations that were found in violation of VCSNS housekeeping procedure.

4.3.3 Other Conditions

The SWT identified during the Area Walk-By that the standoff for IPS15403B is not connected to neighboring conduit. Condition Report CR-12-03250 was written to address this. This condition was determined by VCSNS to not present a potentially adverse seismic condition.

In advance of the SWT Area Walk-By, the NRC resident noted 1 fastener missing on XPN0047-DG and XPN5301-DG. Also prior to the Area Walk-By, the NRC resident noted a rolling platform near XMC1DA2Z was not chained to a restraint. These conditions were immediately corrected by VCSNS Operations and CR-12-03249 was written to address these conditions which were determined by VCSNS to not present a potentially adverse seismic condition.

4.3.4 Potential Flooding/Spray Hazards

The SWT was cognizant of potential spray and flooding hazards particularly from threaded fire piping. Overhead fire piping was found to be ruggedly supported at small and regular intervals. No potential seismically induced flooding/spray hazards were noted by the SWT.

4.3.5 Potential Seismically Induced Fire Interactions

No potential seismically induced fire interactions were noted by the SWT.

4.3.6 Non-NTTF 2.3 Related Observations

The SWT and accompanying VCSNS Operations and Engineering staff were also cognizant of observations not pertaining to the seismic qualification of safety related equipment. These were non-seismic observations that were found while performing the walkdowns and walk-bys. Table 4-1 includes the non-NTTF 2.3 related observations and their associated action reports that were generated.

Table 4-1 Summary of Seismic Conditions and Non-NTTF 2.3 Related Observations Identified During Seismic Walkdowns and Area Walk-Bys

Seismic Observations	Degraded	Non-Conforming	Unanalyzed	Action Taken to Address the Condition	Resolution	Current Status	Component
Scaffold/housekeeping issues in RWST pit.	X			CR-12-03221 was issued. Scaffold which could not impact safety related equipment has been re-located within pit. CR-12-03221 Action 1 is still open for Civil Maintenance to re-locate scaffold components in the pit into a shipping container.	Discussed with Operations	Not an immediate concern as determined by VCSNS	XTK0025
Seismic interaction; tool locker in CREP room.	X			CR-12-03236 was issued. WO# 1208668 has been written to anchor locker to floor.	Discussed with Operations	Not an immediate concern as determined by VCSNS	XPN7200A
Gap in battery rack (XBA1A)	X			CR-12-03530 was issued. EMP-115.005 has been updated to match the most recent OEM specifications regarding space between end rail and end cell.	Discussed with Operations	Not an immediate concern as determined by VCSNS due to the fact that field inspection revealed that the gaps between the end cells and end rails were in general within approximately 1/8".	XBA1A

Table 4-1 Summary of Seismic Conditions and Non-NTTF 2.3 Related Observations Identified During Seismic Walkdowns and Area Walk-Bys (cont.)

Seismic Observations	Degraded	Non-Conforming	Unanalyzed	Action Taken to Address the Condition	Resolution	Current Status	Component
NRC resident noted 1 fastener missing on XPN0047-DG and XPN5301-DG. Also noted rolling platform near XMC1DA2Z not chained to restraint.	X			CR-12-03249 was issued. Operation Supervision has completed the condition evaluation. All items identified were corrected by operations the same day as CR initiation.	Discussed with Operations	Not an immediate concern as determined by VCSNS	XPN0047-DG
Standoff for IPS15403B not connected to neighboring conduit. Noted during Area Walk-By.	X			CR-12-03250 was issued. WO# 1208685 has been completed. The work order replaced the 1/4" nut which connected the flexible conduits.	Discussed with Operations	Resolved	IPS15403B
Open door panel on XMC1DA2Z.	X			CR-12-03532. The 50.59 Applicability Determination and Screening allowed the doors to be opened. Evaluation is currently assigned to PSE (Plant Support Engineering)-Electrical to review practice of opening doors with only tape and instead re-consider removing doors if required open in testing configuration.	Discussed with Operations	Not an immediate concern as determined by VCSNS; condition previously evaluated under 50.59 screen is valid	XMC1DA2Z

Table 4-1 Summary of Seismic Conditions and Non-NTTF 2.3 Related Observations Identified During Seismic Walkdowns and Area Walk-Bys (cont.)

Seismic Observations	Degraded	Non-Conforming	Unanalyzed	Action Taken to Address the Condition	Resolution	Current Status	Component
XVG08808A-SI appears to be leaking. Found during Area Walk-By.	X			No Seismic concerns. Operations has been notified (CR-12-04701) and determined that no immediate actions are required. WO# 1211954 was written to repair.	Discussed with Operations	Not an immediate concern as determined by VCSNS.	XTK0028A
A rod type deadweight hanger was found to be unattached to support steel. The hanger rod supports the 3/4" RC line upstream of XVD08030-RC. Found during Area Walk-By.	X			No Seismic Issue, per operations this is not a safety related line. VCSNS is tracking this under CR-12-04706.	Discussed with Operations	Not an immediate concern as determined by VCSNS.	IFT00414
Drawing 1MS-28-028 Sh 2 and 1MS-28-104 show 8 bolts connecting the frame. Only 6 were found in the field.		X		Not a seismic issue, given the number of welds of the frame to the channel and channel to embed plate. VCSNS is tracking this under CR-12-04811	Discussed with Operations	Not an immediate concern as determined by VCSNS.	XPN6020

Table 4-1 Summary of Seismic Conditions and Non-NTTF 2.3 Related Observations Identified During Seismic Walkdowns and Area Walk-Bys (cont.)

Seismic Observations	Degraded	Non-Conforming	Unanalyzed	Action Taken to Address the Condition	Resolution	Current Status	Component
Non-NTTF 2.3 Related Observations							
NRC identified missing U-bolt on pipe in DG "A" room.	X			CR-12-03261 was issued. WO# 1208696 has been written for maintenance to tighten nut on NNS U-bolt pipe strap.	Discussed with Operations	Not an immediate concern as determined by VCSNS	N/A
NRC inspector noted diesel fuel leak under IPI05419, near "A" DG fuel oil transfer pumps.	X			CR-12-03251 was issued. WO# 1208684 was written. All fittings were removed and cleaned thoroughly. Fitting were supplied with new gasket and re-sealed and verified no leakage.	Discussed with Operations	Not an immediate concern as determined by VCSNS	IPI05419

5 LICENSING BASIS EVALUATIONS

None of the observations identified by the SWEs during the equipment walkdowns were judged to be a "Potentially Adverse Seismic Condition" because all observations were entered into the VCSNS CAP and were concluded to be in compliance with the VCSNS seismic licensing basis. Therefore, no seismic licensing basis evaluations were required.

General methodologies adopted by the Licensing Basis Reviewers (listed in Section 2.3) for addressing the observations noted in Section 4 of this report are summarized in the following subsections.

5.1 EVALUATIONS OF POTENTIALLY ADVERSE ANCHORAGE CONDITIONS

There are no known adverse anchorage conditions.

5.2 EVALUATIONS OF POTENTIALLY ADVERSE SEISMIC SPATIAL INTERACTIONS

No conditions were identified that require license basis evaluations pertaining to adverse interaction issues at VCSNS.

5.3 EVALUATIONS OF OTHER POTENTIALLY ADVERSE CONDITIONS

No conditions were identified that require license basis evaluations pertaining to other adverse interaction issues at VCSNS.

5.4 EVALUATIONS OF POTENTIAL FLOODING/SPRAY HAZARDS

There are no potential flooding and or spray hazards.

5.5 EVALUATIONS OF POTENTIAL SEISMICALLY INDUCED FIRE INTERACTIONS

No potential seismically induced fire interactions were noted by the SWT; therefore, there are no Licensing Basis Evaluations.

6 IPEEE VULNERABILITIES RESOLUTION REPORT

No vulnerabilities were identified in the VCSNS IPEEE {Reference 2}. However, a review of Section 9.0 of the VCSNS IPEEE Report identified three outlier concerns. The three outliers, and their subsequent resolution(s), are as follows:

- Reactor Coolant Loop 'C' Hot Leg Sample Header Isolation Valve (Component ID XVX09365C) was identified as non-conforming as it was observed as being supported only by its attachment to the Hot Leg Sample line, with an upper lateral support missing. Evidence showed that a U-bolt originally restrained this valve; however, was not currently installed. The condition was documented in non-conformance notice NCN 4968.
  - The final disposition of the non-conformance notice was the installation of a temporary U-bolt to provide the primary function of a restraint until the original U-bolt replacement was made.
  - Actions addressing NCN 4968 were completed on January 13, 1995. The U-bolt was replaced per Technical Work Record # 15517, Disposition #1.
  - The missing U-bolt was noted during the IPEEE walkdowns. Prior to the NCN which replaced the U-bolt, ETBT-430 was issued to replace the existing Valcor valve with a Target Rock solenoid valve. Re-design of the valve support was required and was performed by Design Engineering. As a result of the pipe support analysis, drawing's SSH5006A thru SSH5006D were issued to construct the new support. The pipe support drawing does not include the U-bolt, and instead the solenoid valve is anchored to a steel support by two 5/16"-18 bolts.
  - Reactor Coolant Loop 'C' Hot Leg Sample Header Isolation Valve XVX09365C-SS was selected for walkdown to confirm that the plant has maintained the component. No issues were identified with component anchorage or other conditions. The original U-Bolt anchorage was removed by re-design and did not need to be replaced.
- 17 Electrical panels were identified as having the potential to move out of phase and impact one another, resulting in increased vibration for relays with the potential to cause inadvertent relay actuations or changes of state.
  - Plant modifications for 16 of the panels were developed under MRF 22647. The panels were connected to adjacent panels (typically along the top of the panels) using combinations of flat bar stock plate material and/or angle clips and bolts/washers.
  - Actions addressing MRF 22647 were completed on January 13, 1995.
  - The remaining panel, Component ID XPN7218 (Core Sub-Cooling Monitor Panel), was located in the Control Room and was not able to be included in MRF 22647. The panel was subsequently connected to an adjacent panel using steel angles and angle clips bolted through existing panel lifting lug holes.
  - Actions addressing Component ID XPN7218 were completed on October 18, 1996.
  - SWEL Items XPN6001, XPN6020, XPN7001, XPN7010, and XSW0001 were selected for walkdown to confirm that the plant has maintained these panels. No issues were identified with panel anchorage or other conditions for all items.
- Neutral Grounding Resistor cabinets XCA0015A and XCA0015B were identified as having ceramic feet from which experience has shown to be susceptible to damage during earthquakes.
  - A review of the seismic test report for the resistors and a HCLPF calculation resulted in a value of 0.42g which is above the 0.3g Review Level Earthquake.
  - Neutral Grounding Resistor Cabinet XCA0015A, SWEL Item # 83, was selected for walkdown to confirm the plant has maintained the robust design of these cabinets. No issues were identified with cabinet anchorage or other conditions.

In addition to the three outliers, Section 10.0 of the VCSNS IPEEE {Reference 2} performed HCLPF calculations for the Condensate Storage Tank (Component ID XTK0008), the Reactor Makeup Water Storage Tank (Component ID XTK0039), the Refueling Water Storage Tank (Component ID XTK0025), and the Service Water Pond Dams as part of the IPEEE Seismic Margin Assessment (SMA). The HCLPF results are shown in Table 6-1.

Table 6-1 VCSNS IPEEE HCLPF Calculation Results

Component ID	Description	Calculated HCLPF
XTK0008	Condensate Storage Tank	0.49g
XTK0039	Reactor Makeup Water Storage Tank	0.41g
XTK0025	Refueling Water Storage Tank	0.30g
N/A	Service Water Pond Dams	0.22g

The tank HCLPFs showed adequate seismic margin for the 0.3g Review Level Earthquake. Due to their need for further analysis during the IPEEE SMA, the three tanks were selected for walkdown.

The conservative HCLPF estimate for the Service Water Pond Dams showed inadequate seismic margin for the 0.3g Review Level Earthquake. Further studies of the dams are currently on-going at VCSNS. Due to the Service Water Pond Dams being defined as SC-I structures they were not selected for walkdown.

7 PEER REVIEW SUMMARY

The Peer Review Team consists of two individuals as follows:

- Robert B. Whorton (Team Leader, SCE&G)
- Eric W. Rumfelt (SCE&G)

Peer Review activities were performed during each phase of the implementation of the seismic walkdown program in accordance with *EPRI TR-1025286, Seismic Walkdown Guidance For Resolution of Fukushima Near-Term Task Force Recommendation 2.3: Seismic, May 2012 (Reference 1).*

7.1 REVIEW SELECTION OF SSCS INCLUDED ON THE SWEL

On July 16-17, 2012, Robert Whorton participated with a review team of Westinghouse and SCE&G plant engineering and operations personnel in the initial development of the SWEL list. In preparation, Westinghouse prior assembled lists of components for SWEL 1 inputs including:

- IPEEE Safe Shutdown Equipment List (SSEL) SSCs [961]
- Seismic Category I SSCs
- IPEEE vulnerabilities (anomalies, outliers, findings)
- PRA Risk Achievement Worth (RAW) Insights
- Ultimate Heat Sink Components
- Containment Function Components

These inputs resulted in 3028 components which were imported into a spreadsheet. After removing duplicates, the starting list was established as 1932 components.

Robert Whorton provided comments on the initial listings as follows:

1. The initial IPEEE vulnerabilities list identified three (3) outlier concerns which should be included:
   a. Missing U-Bolt on Valve XVX-09365C-SS
   b. 17 Electrical Panels bolted together
   a. Resistors XCA-0015A,B with HCLPF calculation of 0.42g

   Also recommended that the IPEEE vulnerabilities list should also include the three (3) large tanks (CST, RWST, and RMWST) for which HCLPF calculations were made. SWP Dams are excluded (as structures) based on the guidance document for SWEL 1 {Reference 1}.

2. The initial list includes major plant modifications / enhancements for the past ~15 years, i.e., since 1995 (approximate time for conversion of site modifications to MRF Series 50000).

   The team recommended this list be expanded back to June 1992 which was the approximate timeframe for development of the IPEEE SSEL. This is consistent with the industry guidance document {Reference 1} on p. 3-6 for 15 years (i.e., since the completion of the seismic IPEEE evaluations).

From the above assessments, the SWEL review team began screening for SWEL 1 using the following guidance:

- SWEL team to capture at least one (1) component modification in the last 12 months (Reference 1 industry guidance p. 3-7 states within the past year or so). This will evaluate current plant conditions (subsequent to the modification) to validate adequacy of the monitoring and maintenance programs.
- On-line walkdown scheduled for July 30 – August 3, 2012. Operations schedule specifies A-Train maintenance work week.
- Each equipment class (defined in industry guidance Appendix B) reviewed to ensure a consistent understanding of components therein. Equipment Classes 12 & 13 (Air Compressors & Motor Generators) are excluded from the walkdown since there are no SC I components at VCS Unit 1.
- Major Replacement Modifications identified for inclusion in the SWEL 1 baseline list based on the ~15-year timeframe. Westinghouse also obtained an update originating back to June 1992 for further review, including the following major modifications:

22594 – CCW pump and Charging pump[1]	50579 – RB sump[1]
50032	50585 – Chiller A replacement[1,2]
50079	50768 – Accumulator[2]
50466	50780 – AH seal[2]
50567 – SW swap-over[1]	
Notes: 1. A-Train Components 2. Last 12 months or so	

7.1.1 SWEL 1 Selection Results

1. System Review – Selected a minimum of 1 component from each system. Selection also based on prioritization with Risk Achievement Worth (RAW – CDF + LERF).
   a. John Cobb (SCE&G) discussed PRA insights based on the initial assessment by Leo Kachnik (SCE&G) and provided updated RAW assessment for inclusion by Westinghouse.
2. Equipment Classes – Selected a minimum of 1 component from each class (with a target of ~10% from each class). Environmental conditions were considered as part of the selection.
3. Major Modifications – Captured during the system review.
4. IPEEE Vulnerabilities – Captured during the system review.

TARGET SELECTION: 106 Components (all environments) with 6 designated for Outage

7.1.2 SWEL 2 (Part 1) Selection Results (SFP Components)

1. Started with a base list of SC I components (303).
2. Screened (excluded) all but 14 components using the following justifications (which need to be documented in the report):
   a. Addressed by SWEL 1
   b. No control function
   c. Not SFP

d. Pipe support
e. Inaccessible/inside SFP

TARGET SELECTION: SWEL 2 (Part 1) further reduced to 6 Components (8 eliminated with justification of redundancy or structural component)

7.1.3 SWEL 2 (Part 2) Selection Results (SFP Components resulting in Rapid Drain-Down)

Westinghouse reviewed a series of questions which need verification to validate the conclusion that there are no components in this category. Several issues are retained as open items for resolution.

7.1.4 Additional Peer Review

From July 18-20, 2012, Eric Rumfelt subsequently provided an independent review and assessment of the initial SWEL List. To complete this final peer review of the SWEL List development, Eric evaluated the list to ensure that components were appropriately included and to identify any additional components that should be included. This was accomplished by comparing the SWEL to information contained in the Core Damage Frequency and Large Early Release Frequency cutsets, the Emergency Operating Procedures, the different component class types in CMMS, and the five Key Safety Functions identified in the Seismic Walkdown Guidance {Reference 1}.

Eric Rumfelt proposed the following questions which were further evaluated by Dan Goldston:

1. There are no level control valves (LCVs) in the SWEL. Consider adding LCV00115 (from the standpoint that the Key Safety Function of "Inventory Control" is one of the least represented functions.

   Goldston Response: Good point, we could add one or more of the LCV115B, C, D, E valves. But in actuality, is not everything in the Charging/SI pump and RHR pump functional group "inventory control"? The inventory we are controlling is the RCS, not the VCT.

2. The following pumps are not included in the list. Please ensure that an adequate basis exists for their exclusion: XPP0021A (MDEFW Pp), XPP0048 (Chilled Water Pump) and XPP0022A (MFW Pp) [from the standpoint of ability to trip to prevent overcooling...basis may be that the FRV and FWIVs are already represented in the SWEL].

   Goldston Response: XPP022A is not seismic; we did cover the isolation valves. We ensured we had important pumps of each type on the list; we did not record a "basis for exclusion" of any components on SWEL1.

3. From the standpoint of the KSF of "Power Availability," I expected the following to be represented (since these are a true measure of our ability to bring power to the site): XSW1DX (7.2KV Switchgear for XTFs 4/5/5052) and XTF0004 (XTF0005/XTF0031). Please ensure we have a basis for their exclusion.

Goldston Response: These transformers are not Seismic Category I. What good is transformer (1DX) if there are no seismic class power feeds?

4. The Sump Suction Isolation Valve arrangement is somewhat unique (and the valves are prominent in the EOPs and PRA success) but are not on the SWEL. Inclusion of XVG08811A (Containment Sump RHR Pp A Suction Isolation) would ensure this arrangement is inspected and would also enhance the "Inventory Control" KSF.

   Goldston Response: The 8811A/B valves are inside the enclosures. Perhaps 8812A would suffice? I have no objection. We did minimize the time spent in that room as you will pick up some dose.

5. IFV00478 is the lone IFV on the SWEL. From an EOP and PRA standpoint, I expected an Emergency Feedwater FCV would be listed (IFV03531-EF).

   Goldston Response: I would rather see IFV03556 or one of the other TDEFP flow control valves added, than a MDEFP flow control valve. But the flow control function of these is not seismic, so what is the difference between any other AOV that has to be open? I have no objection to adding it.

6. From an EOP and PRA viewpoint, I anticipated a Pressurizer PORV or Spray valve to be included (PCV00444C or 445A) because of the need to depressurize the RCS (SGTR, ISLOCA and others).

   Goldston Response: The PORVs are directly mounted on the NSSS system, and are in a very inhospitable place. I would like to see the team discuss this. I think a spray valve is essentially valueless for the purposes of this walkdown, as its function is not seismic rated (no air).

7. The Inventory Control KSF is not represented in SWEL 2. ILTs 7431/7433 are Seismic Category II. I do not know of any SFP components to represent this KSF. (comment included here only as record of review).

   Goldston Response: Since the level control in the SFP is purely controlled by manual action of manual valves, they screened out.

8. The component type "check valve" is not represented in the list. XVC08926 (Charging/SI Pumps RWST Supply Header Check Valve) would be a good item to represent this class as it is prominent in CDF and LERF cutsets. XVC00971 (EDG Fuel Oil Transfer Pp Discharge) would be another good choice. (Disregard comment; XVCs not included in Appendix B; comment included here only as record of review).

Based on the above communications with Dan Goldston, Westinghouse made the following modifications to the SWEL List which resolved Eric Rumfelt's concerns:

1. XVC08926-SI (CHG/SI PUMPS RFWST SUPPLY HDR CHK VALVE) has been added to the SWEL 1 list based on its risk significance in the PRA model.

2. LCV00115B-CS (CHG PUMP A SUCTION HDR RWST ISOL VALVE) has been added to the SWEL 1 list. NOTE: This valve (along with LCV00115C, D, & E) were on the SWEL 1 Base List already, but were screened out when the SWEL 1 selections were made.

3. XVG08812A-SI (RH PUMP A SUCTION HEADER VALVE) has been added to the SWEL 1 list. NOTE: This valve (along with XVG08811A-SI, XVG08811B-SI, and XVG08812B-SI) were on the SWEL 1 Base List already, but were screened out when the SWEL 1 selections were made.

The checklist {Reference 1 Guidance Document Appendix F} for Peer Review of the SSC Selection (SWEL) is attached to this report.

7.2 WALKDOWN PEER REVIEWS

On the morning of July 26, 2012, Robert Whorton participated in a pre-meeting with the SWEs and plant operational support personnel to review logistics and plan of conduct for the walkdowns which are scheduled for the following weeks: <u>On-Line</u> July 30-August 3, 2012, and <u>Outage</u> October 21-23, 2012.

On the afternoon of July 26, 2012, Robert Whorton participated in a pre-job briefing for conduct of the 2.3 seismic walkdowns. The SWEL list of SSCs were scheduled by day, grouping common locations and operational limitations concerns in order to stream-line the walkdown process. The following activities were reviewed and discussed:

- Critical steps and error precursors.
- Human performance tools.
- Operational and safety considerations.
- Roles and responsibilities.
- SWE planned conduct of the seismic walkdowns and Area Walk-Bys for compliance with TR-1025286, Section 4: Seismic Walkdowns and Area Walk-Bys.
- Establish daily 0700 briefing to review walkdowns planned, lessons learned, and summarize results of completed evaluations.

July 30, 2012 – Robert Whorton participated in the 0700 briefing of the planned walkdowns for Monday. The SWEs discussed the sequence of SWEL SSCs planned throughout the day and identified those SSCs selected for anchorage configuration verifications. Subsequent to this briefing, Robert Whorton met with Eric Rumfelt to provide an update on the seismic walkdown activities planned.

July 31, 2012 – Robert Whorton and Eric Rumfelt participated in the 0700 briefing which provided an overview of SSC walkdowns completed, lessons learned, and plans for Tuesday.

Mark Etre (S&A – SWE Lead) discussed findings from the Monday walkdowns:

- XPP0032A – Spent Fuel Cooling Pump A – Component was not accessible due to operational considerations. Substitute component will be required.

- XPN7200A – Control Room Evacuation Panel (CREP) – Drawings provided in the walkdown package do not reflect connection to an adjacent sub-panel. Condition initially checked as "U" until further evaluation is completed. Additionally, an unrestrained tool cabinet in proximity to the CREP was identified as requiring restraints to prevent movement and/or tip-over under seismic conditions. This condition was reported under CR-12-03236.

- XTK0008 – Condensate Storage Tank (CST) – The CST is stoutly anchored to the concrete ring girder foundation with 80-2.5" diameter cast-in-place anchor bolts. Oxidation is noted on most anchor bolts exposed above the concrete. Condition initially checked as "U" until further evaluation is completed. Also noted 17 linear indications which radiate from anchor bolts through the concrete ring girder. Indications were obviously old and filled with sand.

- XPP0039A – Service Water Pump A – Due to moist and wet environment, oxidation is present on most anchor bolts.

- IPS05843 – HP Turbine Emergency Trip Fluid Header A Pressure Switch – Drawings provided in the walkdown package do not match field conditions. The effective welds appear greater than required, but apparently are on the opposite side. Currently under evaluation.

General conclusions of the SWE walkdown team identified good housekeeping, fire suppressions systems properly stored and anchored, and lighting supports appropriately anchored.

Subsequent to the 0700 briefing, Robert Whorton and Eric Rumfelt entered the plant to visually inspect selected components for validation of conclusions and findings of the SWE walkdown team:

- XPN7200A – Control Room Evacuation Panel (CREP) – The CREP panel is well anchored (welded) to the floor slab and free from any interactions, other than the free-standing tool cabinet as noted by the SWE walkdown. This condition is to be corrected via restraints. Lighting is well secured with protective fall-down cable. Overhead cable trays are structurally anchored and not over-filled. Overhead conduit connections to the CREP are flexible.

- XTK0008 – Condensate Storage Tank (CST) – The uncoated portions of the anchor bolts (below the structural chairs) exhibit oxidation and minor corrosion; however, these conditions are comparable to the conditions observed during IPEEE in the early 1990s. Due to the size of the anchor bolts (2.5" diameter), the oxidation conditions are considered structurally insignificant. Linear indications (cracks) observed radiating from or in the vicinity of the anchor bolts are old and identified in previous IPEEE and Maintenance Rule inspections. The Peer Review Team actually counted 28 such cracks around the perimeter of the CST versus 17 as reported by the SWE walkdown. Recommend a more consistent approach in identifying and reporting cracks, especially for use in documentation for the EPRI NP-6695 baseline review. Issue for discussion during the Wednesday 0700 briefing.

- XPP0039A – Service Water Pump A – A brief inspection confirmed that oxidation and/or corrosion is present on most anchor bolts at the 436' floor slab elevation. The top (cap) nuts also varied in thread engagement; however, all appeared intact for prevention of slippage.

- ILT04418 – Service Water Pond Level Transmitter (A-Train) – Located on the exterior 436' roof slab of the Service Water Intake Structure (tunnel), this component is rigidly mounted with 4 anchor bolts and free from interaction with adjacent SSCs. A portable guard shack in the vicinity is restrained from tip-over. A survey monitoring mast extending from a manhole can only fail downward with no potential impact to this component. There is adequate flexibility in conduit and tube connections.

Subsequent to the in-plant inspections, Robert Whorton reviewed the following SWE walkdown checklists. Documentation on the checklist appeared reasonable and complete. Peer Review Team field observations did not identify conditions beyond that reported by the SWE walkdown team.

1. XES2003A (Service Water Pump A Speed Switch)
2. ILT04418 (Service Water Pond Level Transmitter)
   a. Walkdown checklist noted a black pipe in the adjacent manhole. Suggested adding a note that the black pipe is one of the settlement monitoring masts attached to the SWIS.
3. XTK0008 (Condensate Storage Tank)
   a. Walkdown checklist noted 17 linear indications near anchor bolts versus 28 locations identified by the Peer review Team. Issue for discussion during the Wednesday 0700 briefing.
4. XPN7200A (Control Room Evacuation Panel)

August 1, 2012 – Robert Whorton and Eric Rumfelt participated in the 0700 briefing which provided an overview of SSC walkdowns completed, lessons learned, and plans for Wednesday.

Mark Etre (S&A – SWE Lead) discussed findings from the Tuesday walkdowns:

- All of the large exterior tanks (XTK0025, XTK0039, and XTK0060) exhibited linear indications in the concrete ring foundation in the vicinity of the anchor bolts, similar to those observed at the CST.
- XTK0060 – Sodium Hydroxide Storage Tank – A portable eye-wash tank had fallen-over (apparently from recent heavy rains) and was found lying on conduit adjacent to the tank. This is reported only as a housekeeping issue.
- XTK0025 – Refueling Water Storage Tank – Nearby scaffolding contained stacks of loose walk-boards and there was also a stack of old, molded plywood. Although the plywood is fire-rated, it does degrade over time. CR 12-03221 was written for their removal.
- The following components were identified for modification to the SWEL List:
  - XAH0001A was covered in insulation and replaced by XAH0002.
  - XFN0046A was sealed inside of the unit and will be removed from the list (after approval from the SWEL Developers).
  - XVG00503A was in a very high dose area and was substituted by XVG00503B.
  - XVX09341-SS was approximately 25 ft above the floor elevation and will be removed from the list (after approval from the SWEL Developers).

Robert Whorton discussed the Peer Review Team visit and review of the CST. Specifically, linear indications (old cracks) were observed in the vicinity of approximately 28 anchor bolts versus 17 locations as documented by the SWE team checklist. Mark Etre (SWE Lead) clarified that the walkdown checklist was not necessarily an exact count of linear indications, rather an indication of general structural condition of the concrete ring girder. For the NP-6695 baseline documentation, a more detailed assessment will be conducted in early 2013, specifically documenting each indication by bolt number or azimuth designation.

Subsequent to the 0700 briefing, Robert Whorton reviewed the following SWE walkdown checklists. Documentation on the checklists appeared reasonable and complete, unless otherwise noted.

1. XPP0031A (Residual Heat removal Pump A) – AB374
2. XTF1DA2 (Substation Power Transformer) – IB463
   a. Walkdown checklist incorrectly indicated "N/A" for Questions 2,3,4,6 and should have been checked "YES".
3. XVD06242B-ND (Reactor Building Sump Discharge Header Drain Valve – ORC) – FH412
   a. Walkdown checklist incorrectly indicated "N/A" for Questions 2, 3, and 4 and should have been checked "YES".
4. XAH0012A (Control Room Cooling Unit A) – CB482
5. XSW0001 (Reactor Trip Switchgear) – IB463
6. XTK0060 (Sodium Hydroxide Storage Tank) – AB412 (exterior)
   a. Walkdown checklist indicated minor surface oxidation on anchor bolts, which would be expected for the exterior plant location.
   b. Walkdown checklist also noted the portable eye-wash tank lying near the NaOH Tank as non-significant.
7. XTK0003 (Component Cooling Surge Tank) – AB463
   a. Walkdown checklist noted minor rust stains on the anchorage.
8. Walkdown checklist (interactions) noted piping in the area as non-seismic; however, consistent with the Generic Implementation Procedure (GIP) for piping restrained with double-nutted threads.

For Items 2 and 3 above, Robert Whorton met with the SWE team to ensure that the walkdown checklists correctly identify "adverse anchorage conditions" for checklist Questions 2, 3, 4 and/or 6 as required by the guidance document (TR-1025286). Mark Etre (SWE Lead) acknowledged that anchorage is reviewed for each SWEL component, with only adverse conditions noted on the checklists. He would ensure that each checklist provides the correct response to these questions and/or additional notes for clarification.

Subsequent to the 0700 briefing, Eric Rumfelt reviewed the following SWE walkdown checklists. Documentation on the checklists appeared reasonable and complete, unless otherwise noted in Items 1. and 2. below, which should be addressed in Appendix B.

1. XVC08926-SI (CHG/SI PUMPS RWST SUPPLY HDR) – AB400
   a. The check list places this in the Appendix B Class 21 (Tanks and Heat Exchangers). It would be more appropriate to list it in Class 0 (Other).
2. XPP0031A (RHR PP A) – AB374
   a. The check list places this in Appendix B Class 5 (Horizontal Pumps). It would be more appropriate to list it in Class 6 (Vertical Pumps).
3. XTK0012A (BORIC ACID TANK A) – AB463
4. XVG8812A (RHR PUMP A SUMP SUCTION HDR ISOL) – AB397

August 2, 2012 – Robert Whorton and Eric Rumfelt participated in the 0800 briefing which provided an overview of SSC walkdowns completed, lessons learned, and plans for Thursday.

Mark Etre (S&A – SWE Lead) discussed findings from the Wednesday walkdowns:

- XHX0001A – HVAC System Mechanical Water Chiller A – Several anchor bolts were found without nuts. Review of design packages verified acceptability of the current configuration and numbers of fasteners.
- Walkdowns of the Diesel Generator Building would resume at 12:00pm after the risk significant switchyard work was completed.
- The SWE team expects the walk-down work to be completed on this date.
- Electronic copies of the walkdown and Area Walk-By checklists (with photos) are scheduled for delivery to Westinghouse on 8/10/12. The Peer Review Team requests CDs (or other electronic transfer) of the deliverables for completion of their review.

August 3, 2012 – Robert Whorton and Eric Rumfelt participated in the 0700 briefing which provided an overview of SSC walkdowns completed.

October 21-23 – Robert Whorton and/or Eric Rumfelt participated in the daily briefings. The SWE team outlined walkdown plans for reviewing the remaining 26 components scheduled for the outage, including anchorage inspections, some of which would require work orders for access. A sample of the completed walkdown and walk-by checklists was reviewed as part of the final report submittal.

October 22 – Robert Whorton accompanied the SWE Team in the field to observe their evaluation and documentation of the following electrical cabinets (Control Building Relay Room, Elevation 436') for anchorage and spatial interaction with the cabinet doors opened. Operations limited these inspections to not breaking a vertical plane inside the cabinet. This overview concluded that the SWE Team performed a thorough inspection to validate adequate anchorage conditions and to ensure that there were no spatial interaction issues within the cabinets.

- XPN6001 - 7 of 8 anchor bolts were visible and intact. One (1) anchor bolt was not visible from any direction due to numerous coiled cables in the base of the cabinet over the bolt location. This anchorage condition was deemed acceptable, even if the non-visible anchor bolt was missing.
- XPN7226A - All 4 anchor bolts were verified intact. Additionally, there are 4 internal welds and 4 external welds to floor base plates for redundancy.
- XPN6020 - The cabinet lower base is welded to the floor base plates. The base of the cabinet is then bolted to the lower base with 8 bolts, noting that 2 bolts are missing; however, there are additional welds at each of these connections. The SWE Team documented this anchorage condition as acceptable.
- XPN7001 - All 8 anchor bolts were verified intact.
- XPN7010 - All 8 anchor bolts were verified intact.

7.3 REVIEW THE LICENSING BASIS EVALUATIONS

None of the anomalies or issues identified by the SWEs during the equipment walkdowns were judged to be a "Potentially Adverse Seismic Conditions" because in all cases it was concluded that it was not credible for the anomaly or issue to prevent the equipment from performing its safety related function during or after a seismic event. The peer review team concurs that no seismic licensing basis evaluations were required.

7.4 REVIEW DECISIONS FOR ENTERING POTENTIALLY ADVERSE CONDITIONS INTO THE CAP

There were no "Potentially Adverse Seismic Conditions" identified during the walkdowns. CRs were appropriately initiated for other non-potentially adverse conditions, such as housekeeping and spatial interaction, as described in Table 4-1.

7.5 REVIEW SUBMITTAL REPORT

The Peer Review Team reviewed draft sections of the submittal report as they were initially developed and provided comments in September 2012. The final draft report was reviewed and comments were provided in November 2012.

The Peer review Team concludes that the objectives and requirements of the 50.54(f) letter are met, with conclusions and results of the seismic walkdowns documented in the submittal report, Section 7.

7.6 SUMMARIZE RESULTS OF THE PEER REVIEW PROCESS IN THE SUBMITTAL REPORT

The Checklist for Peer review of SSC Selection can be found in Appendix E.

7.7 PEER REVIEW SIGNOFF

7.7.1 Peer Review Signoff Summary

The submittal report was reviewed to determine whether the objectives and requirements of the 50.54(f) letter have been met. Section 7 represents the peer review summary report. The Peer Review Checklists are provided in Appendix E. The peer review team concluded that the objectives and requirements of the 50.54(f) letter have been met.

Peer Review Approval	Eric W Rumfelt (signature)	11/9/12	RB Whorton (signature)	11-8-12
	Eric W. Rumfelt	Date	Robert B. Whorton	Date

8 REFERENCES

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

2. Virgil C. Summer Nuclear Station Engineering Services Technical Report TR00310-001, "Individual Plant Examination for External Events," December 1998.

3. Virgil C. Summer Unit 1 Internal Events PRA Model Revision 6e.

4. NUREG-1407, "Procedural and Submittal Guidance for the Individual Plant Examination of External Events (IPEEE) for Severe Accident Vulnerabilities," June 1991.

5. Virgil C. Summer Nuclear Station, Updated Final Safety Analysis Report, dated May 2012.

6. Virgil C. Summer Nuclear Station Dwg. D-307-651, Rev. 11, "Safe Shutdown Accident Mitigating Flow Diagram Spent Fuel Pool," September 2011.

7. Virgil C. Summer Nuclear Station Spent Fuel Cooling System (SF) Design Basis Document, Rev. 7, April 2010.

8. Virgil C. Summer Nuclear Station Dwg. E-515-104, Rev. 5, "Fuel Handling Building Liner Plate Sections, Details & Elevations," October 1984.

9. EPRI NP-6041-SL, Rev. 1, "A Methodology for Assessment of Nuclear Power Plant Seismic Margin (Revision 1)," August 1991.

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

11. VC Summer Seismic Design Basis Document, Rev. 0, dated February 1993.

12. Regulatory Guide 1.29. Rev. 2, Seismic Design Classification, For Comment February 1976.

13. Regulatory Guide 1.61, Rev. 0, Damping Values For Seismic Design Of Nuclear Power Plants, October 1973.

14. Not Used.

15. Technical Requirements Package TRP-2, Rev. 8, Letter change D, "Fire Protection," April 2011.

16. TR05610-001, Rev. 2, "Pipe Support Design Criteria For Non-Safety Class Piping Over Essential Safe Shutdown Equipment," January 2000.

17. Not Used.

18. Regulatory Guide 1.60, Rev. 1, "Design Response Spectra for Seismic Design of Nuclear Power Plants," December 1973.

19. Seismic Qualification Utility Group (SQUG), Rev. 3A, "Generic Implementation Procedure (GIP) for Seismic Verification of Nuclear Plant Equipment," December 2001.

APPENDIX A
PROJECT PERSONNEL RESUMES AND SWE CERTIFICATES

CONTENTS OF APPENDIX A

GARY L. DOUGLAS

Principal Engineer, Risk Applications & Methods
Westinghouse Nuclear Services Division

Education:

B.S. Oceanography	U.S. Naval Academy
Nuclear Power Program	United States Navy
M.Eng. Materials Science	Cornell University

Summary:

Mr. Douglas is a Principal Engineer in the Risk Applications and Methods Group of the Systems & Risk Applications Engineering Department of Westinghouse's Nuclear Services Division. He has 14 years of experience with PWR design, including qualifications in the Navy Nuclear Power Program. He has safety analysis experience in the Nuclear Power and Aerospace Industries. He worked as an engineer for 9 years at South Texas Project Electric Generating Station, with emphasis on root cause analysis, reliability engineering, systems engineering and PRA applications analysis. He worked as an engineer for 10 years at Hamilton Sundstrand, with emphasis on root cause analysis, FMEA, and safety hazards analysis of jet engine controls and space & submarine life support systems.

Specifically, Mr. Douglas's prior engineering experience as an engineer in the Navy Nuclear Power Program and at South Texas Project Electric Generating Station has afforded him plant-wide hands-on experience with all safety and non-safety related equipment comprising military and commercial nuclear steam supply systems.

Mr. Douglas is presently involved in PSA applications activities for several plant sites, with emphasis on External Events and Internal Flooding PRA Modeling. He recently completed a site visit to Fort Calhoun Station for the purpose of performing verification walkdowns of systems supporting the station's PRA model.

Some of the recognitions Mr. Douglas has achieved over his career include the following: Distinguished Midshipman Award, 1983; Advanced Root Cause Analysis Certified, 1996; INPO Recognition as South Texas Project Plant Doctor, 1997; AS9100 Certified Quality Engineer, 2005; NASA Environmental Controls & Life Support Systems Award, 2011 (for contributions to the Oxygen Generation System aboard the International Space Station).

EPRI | ELECTRIC POWER RESEARCH INSTITUTE

Certificate of Completion

Gary Douglas

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

July 11, 2012
Date

Robert K. Kassawara
EPRI Manager,
Structural Reliability & Integrity

DOCUMENTATION OF TRAINING

Print Name: Gary Douglas **Project:** EPRI Seismic Walkdown Tasks

Signature: [signature] **Date:** July 24, 2012

My signature/electronic signature indicates that I have completed the training program covering the items listed below.

Training Method:

1. Read Online or Hardcopy
2. Centra/Webinar Session (Live Online or Playback)
3. CD-ROM, Web, etc.
4. External Instructor Led Class or Seminar
5. DVD, VHS, Audio Tape

Title/Subject	Training Date(s)	Total Hours	Training Method (1-5)
1-EPRI 2.3 Seismic Training	July 10-11	16	4
2-TR-1025286 - EPRI 2.3 walkdown guidance	July 6	2	1
3-PA-RMSC-732 - Task 1 - EPRI webinar on Recommendation 2.3	July 24	.5	1
4-NRC TI 2515-188.Seismic Walkdowns	July 12	1	1
16-Seismic Walkdown Checklist (SWC)-20120620	July 6	.5	1
17-Area Walk-By Checklist (AWC)-20120620	July 6	.5	1
18-Peer Review Checklist for SWEL-20120620	July 6	.5	1

Return Completed Form To: douglagl@westinghouse.com

KENDAL D. BISHOP

Senior Engineer, Risk Applications & Methods
Westinghouse Nuclear Services Division

Education:

B.S. Nuclear Engineering	University of Missouri-Rolla
M.S. Industrial Engineering	Kansas State University

Summary:

Mr. Bishop is a Senior Engineer in the Risk Applications and Methods Group of the Systems & Risk Applications Engineering Department of Westinghouse's Nuclear Services Division. He has 4 years of experience with Westinghouse in the areas of Design Analysis, Transient Analysis, and Probabilistic Risk Assessment.

Since 2011 Mr. Bishop has developed several database systems for Combustion Engineering designed plants to allow for the maintenance of Uncertainties, Configuration changes, and Assumptions contained with the individual plant internal events PRA model. In addition, he has worked on PRA applications analyses for various Combustion Engineering designed plants.

From 2008 to 2011 Mr. Bishop worked as an Operations Analyst for Westinghouse. His responsibilities included the development and performance of design analysis transients and simulator benchmarking for the Combustion Engineering nuclear fleet. In addition, he was responsible for the upgrading of the Combustion Engineering Nuclear Transient Simulation Software to have the capability to model the Westinghouse ***AP1000®*** plant design.

DOCUMENTATION OF TRAINING

Print Name: Kendal Bishop **Project:** EPRI Seismic Walkdown Tasks

Signature: Kendal Bishop **Date:** 07/24/2012

My signature/electronic signature indicates that I have completed the training program covering the items listed below.

Training Method:

1. Read Online or Hardcopy
2. Centra/Webinar Session (Live Online or Playback)
3. CD-ROM, Web, etc.
4. External Instructor Led Class or Seminar
5. DVD, VHS, Audio Tape

Title/Subject	Training Date(s)	Total Hours	Training Method (1-5)
EPRI 2.3 Seismic Training	07/23/12	1.5	1
TR-1025286 - EPRI 2.3 walkdown guidance	07/02/12	2	1
PA-RMSC-732 - Task 1 - EPRI webinar on Recommendation 2.3	07/24/12	1	1
NRC TI 2515-188.Seismic Walkdowns	07/24/12	1	1
16-Seismic Walkdown Checklist (SWC)-20120620	07/24/12	0.5	1
17-Area Walk-By Checklist (AWC)-20120620	07/24/12	0.5	1
18-Peer Review Checklist for SWEL-20120620	07/24/12	0.5	1

Return Completed Form To: douglagl@westinghouse.com

Mark S. Etre

EDUCATION:

MBA, Rensselaer Polytechnic Institute - Hartford Graduate Center, Hartford, CT
MS, Mechanical Engineering, Rensselaer Polytechnic Institute - Hartford Graduate Center, Hartford, CT
BS, Civil Engineering – Worcester Polytechnic Institute, Worcester, MA

PROFESSIONAL HISTORY:

Stevenson & Associates, Inc., Woburn Massachusetts, Project Manager, 2009 - Present.
Pratt & Whitney Power Systems, East Hartford, CT, Project Manager, 2000 - 2009.
Northeast Utilities, Millstone, Waterford, CT, Engineering Supervisor, 1981 - 2000.
Pratt & Whitney Aircraft, East Hartford, CT, Analytical Engineer, 1978 - 1981.

PROFESSIONAL EXPERIENCE:

Mr. Etre is a result oriented Manager with extensive experience working on the design basis reconstruction, evaluation and construction of nuclear power plants and assessment of components. Significant accomplishments in the areas of licensing; engineering reviews, welding evaluations, quality program evaluation and implementation, project coordination, and ASME interpretation and training. He has testified as a witness before regulatory groups on topics such as design basis criteria, engineering analysis, fabrication techniques, material and welding applications, material control, and construction practices. Known for and have demonstrated skills and capabilities in:

Managing Resources	Safety Analysis
Erosion-corrosion criteria	Project Management
ASME Section III, IX, XI, B31.1	NRC GL 89-13
High Energy Line Break	Seismic Assessments

RESPONSIBILITIES AND ACCOMPLISHMENTS

Stevenson & Associates, Woburn, MA

Director of Projects **2009 - Present**

Advises leadership and/or office managers at the highest levels about the project portfolio, status and resource planning for delivering strategic business Initiatives. Plans, directs, and ensures the successful management of designed business solutions utilizing the complete resources of the staff and assigned project management teams. Provides technical assistance in identifying, evaluating and developing methods and procedures that are efficient, effective and meet good business practice. Maintains communication with upper management both within and across organizations to ensure smooth running of all projects undertaken by team. Responsible for leading in a mature and organization-focused manner, providing help where necessary to project a professional image. Has expert experience in Project/Program Management and able to lead in the coaching and mentoring of team members to help them achieve individual expectations and deliverables. Assesses resource loads and makes appropriate individual assignments.

Pratt & Whitney Power Systems, Windsor, CT

Project Manager **2000 - 2009**

Mark S. Etre S&A

Responsible for the organization of proposal teams and the Project management function of a $56 million power plant. Coordinated the priorities of management and personnel to ensure goals.

Ensured customer satisfaction while maintaining high quality and controlling costs.
Managed the Engineering function of the design, analysis and manufacturing of rotating and static structures.
Demonstrated versatility, coordinated diverse activities, i.e., proposals, projects on through to job implementation. Routinely oversee multiple proposals and projects.
Created and negotiated realistic proposals and schedules that satisfied customer requirements and resulted in accurate outcomes on time and within financial targets.

Northeast Utilities, Millstone, Waterford, CT

Manager, Engineering Backlog **1999 - 2000**
Responsible for the Design Basis Reconstruction.

Managed turnaround of the Design Basis Reconstruction that resulted in a 30% increase in production.
Implemented a process to prioritize projects and other initiatives, which resulted in a 90% reduction in our design and calculations basis backlog while ensuring the documentation was current.
Created and negotiated realistic budgets and schedules, which satisfied NRC regulatory requirements and resulted in on-time completion within budget constraints.
Maintained a bottom line focus in scheduling and budgeting that allowed for the completion of backlog ahead of schedule.
Eliminated projects that had limited added value to the bottom-line performance.

Engineering Supervisor ***1992 - 1999***
Managed the Mechanical/Civil engineering function at Millstone Unit 3 with a professional staff of 15. Coordinated the priorities of management and personnel to ensure goals.

Ensured customer satisfaction while maintaining high quality and controlling costs.
Demonstrated versatility, coordinated diverse activities, i.e., construction, purchasing on through to job completion. Routinely oversaw multiple projects.
Managed the implementation of NRC GL 89-13, Erosion-corrosion assessments, Reg Guide 1.97 and USI A-46.

Senior Engineer ***1981 - 1992***
Various engineering assignments designed to enhance performance throughout manufacturing and power generation facilities.

Demonstrated track record for translating technical knowledge and leadership to bottom line results.
Reviewed and approved engineering documents such as calculations, specifications and drawings for adherence to regulatory and code requirements. This included design, analysis, fabrication, and erection of pressure vessels and piping components at several nuclear power plants.

Pratt & Whitney, East Hartford, CT ***1978 - 1981***

Analytical Engineer
Responsible for evaluation and improving jet engine designs.

Performed Critical Speed and Forced Response Analysis.
Conducted test demonstrations to ensure design compliance.

Mark S. Etre S&4

EPRI

Certificate of Achievement

This is to Certify that

Mark S. Etre

has Completed the EPRI Add-On Seismic IPEEE Training Course

Held November 2nd through 4th, 1992

David A. Freed, MPR Associates
Training Coordinator

Robert P. Kassawara, EPRI
Program Manager

Certificate of Completion

Mark Etre

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

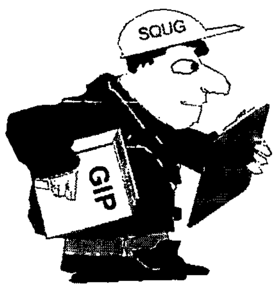
SQUG

Certificate of Achievement

This is to Certify that

Mark S. Etre

has Completed the SQUG Walkdown Screening
and Seismic Evaluation Training Course
Held August 5-10, 1992



David A. Freed, MPR Assocaites, Inc.
SQUG Training Coordinator

R.P. Kassawara

Robert P. Kassawara, EPRI
SQUG Program Manager

SETH BAKER

275 Mishawum Rd Suite 200 Woburn, MA 01801
sbaker@vecsa.com 781-932-9580 ext 105

EDUCATION

2012	**Stanford University**, MS, Civil/Structural Engineering
2008	**Worcester Polytechnic Institute**, BS, Civil Engineering

PROFESSIONAL HISTORY

6/12 – pres	**Stevenson & Associates**, Senior Engineer I	Woburn, MA
5/08 - 6/10	**Stevenson & Associates**, Staff Engineer	Woburn, MA

Focus on structural engineering analysis & design, finite element analysis, structural mechanics evaluations, seismic qualification

PROFESSIONAL PROJECTS

Evaluation of underground utilities at the Cooper Nuclear Station for large overburden loads associated with the hauling of spent fuel casks to the independent spent fuel storage facility.

Evaluated concrete structures for the Salt Water Processing Facility at the Savannah River nuclear plant.

Performed a detailed seismic analysis of the service water building at the Ginna nuclear station. Development of GTSTRUDL 3D model and dynamic response analysis. Was also responsible for load and stress analysis of the steel structural members and connections.

Analyzed the washdown area for larger fuel casks at Cooper nuclear station. This work lead to design retrofits to locally strengthen the supporting floor beams and additionally brace the spent fuel cask.

Review and evaluation of seismic and tornado vulnerabilities associated with maintaining the component cooling water systems within the Turbine Building at Prairie Island nuclear plant.

Participated in on-site staff augmentation at Point Beach nuclear station for duration of 1.5 months. Authored a report that that analyzed and articulated the design of a flood relief louver system in the circulating water pump house.

Evaluating repair options for a personnel hatch containment penetration at Brunswick nuclear station. Design will involve placing a 10' concentric sleeve within the existing penetration sleeve. Extensive ASME work was performed.

PROFESSIONAL PROJECTS (cont.)

Seismic evaluation and redesign of equipment frames for Shaw/Areva Mixed Oxide facility using GTSTRUDL model.

Main Steam Line inspections at Cooper nuclear station to determine locations for additional dampers.

Design of equipment support frames to resist blast load at Palo Verde nuclear station

MISC.

SOFTWARE	GTSTRUDL, ETABS, ANSYS, MATLAB, AutoCAD, MathCAD, Revit Architecure
CODES	AISC 6th, 7th, 9th, 13th Editions, IBC

Certificate of Completion

Seth Baker

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

ROBERT B. WHORTON, P. E.

EDUCATION:

B. S. Engineering (Civil – Structural) – University of South Carolina, 1970

REGISTRATION:

Professional Engineer – South Carolina, No. 06157, February 20, 1976

Professional History:

South Carolina Electric & Gas Company, Virgil C. Summer Nuclear Station, Consulting Engineer, 2008-12

South Carolina Electric & Gas Company, Virgil C. Summer Nuclear Station, Senior Engineer, 1981-2008

South Carolina Electric & Gas Company, Virgil C. Summer Nuclear Station, Engineer, 1971-81

PROFESSIONAL EXPERIENCE:

Mr. Whorton has served as Lead Engineer for South Carolina Electric & Gas Company (SCE&G) on a variety of projects involving civil, structural, seismic, design, siting and licensing issues for the Virgil C. Summer Nuclear Station (VCSNS) Unit 1 since its initial siting, design and construction. He has been responsible for the coordination and review of all civil/structural/seismic design inputs for VCSNS Unit 1 and provided engineering support in these areas during the construction and operation phases of the project. He was involved in the preparation and review of the civil/structural/seismological sections of the VCSNS Unit 1 Preliminary Safety Analysis Report (PSAR) and Final Safety Analysis Report (FSAR), and instrumental in the construction and operating license hearings for resolution of seismic and structural issues. He has served as Senior Engineer for the review of all civil/structural/seismic issues affecting VCSNS Unit 1 since its commercial operation in 1984. In this capacity he has coordinated and developed several Design Basis Documents (DBDs) as follows: Reactor Building Structure, Nuclear Safety-Related Structures, and Seismic Topical DBDs. Mr. Whorton has also been responsible for the consolidation of the civil/structural design calculations for VCSNS Unit 1 and has been involved in the review and development of the Seismic Equipment Qualification Files.

Since 1971, Mr. Whorton has worked with numerous Universities in the further understanding of the seismicity effects in the Eastern U. S. and South Carolina. He maintained a close working relationship with the University of South Carolina and The Citadel in the evaluation of seismicity in South Carolina, including Charleston and the VCSNS site area. Mr. Whorton is credited with the investigation and documentation of several of the earliest know earthquakes in the Charleston area, including discovery of documentation leading to the first reported earthquake in the U. S. in 1698.

Mr. Whorton has obtained a wealth of earthquake engineering experience over the past 40 years while working on resolution of seismic issues affecting the VCSNS site. These areas include: PSAR/FSAR development, coordination of seismologists and geologists in the initial design review of VCSNS Unit 1, coordination of seismologists and geologists in the resolution of faults discovered at VCSNS Unit 1, coordination of a large team of prominent seismologists and earthquake engineers during the ACRS and ASLB Operating License hearings for VCSNS Unit 1 on the resolution of Reservoir Induced Seismicity and other structural issues, coordination of a Seismic Confirmatory Program for resolution of ACRS and ASLB license confirmatory items, and coordination of the Seismic IPEEE Program.

Since 1983, Mr. Whorton has been an active participant in numerous industry committees involved in the oversight of seismic issues affecting nuclear power plants. These committees include: Seismicity Owners Group (SOG) Steering Committee for Resolution of the Charleston Earthquake Issue, SOG Hazards Evaluation Committee, AIF Seismic Design Basis Sub-Committee, NUMARC Seismic Issues Working Group, NEI Seismic Ad Hoc Advisory Committee, EPRI Seismic Design and Qualification Committee, EPRI Structural Reliability and Integrity Committee, NEI Seismic Issues Task Force (including the Fukushima seismic oversight working group), Participatory Peer Review Panel for the EPRI 04/06 ground motion attenuation model update, and SMiRT 2013 Seismic Advisory Committee.. As a member of these committees, Mr. Whorton has been instrumentally involved in the development and review of numerous industry reports, participated in interactive meetings with ACRS and NRC, and worked with many prominent earthquake engineering experts in the establishment of industry positions on regulatory matters. Significant issues for which Mr. Whorton has been an industry leader include: the Charleston Earthquake hazards resolution, development of the OBE Exceedance Criteria, requirements for plant seismic instrumentation, and justification for reduction in Seismic IPEEE programs.

Mr. Whorton has also served on several State of South Carolina Committees related to seismic hazards, including: South Carolina Seismic Safety Consortium, South Carolina Technology Transfer and Development Council, and the Governor's Nuclear Waste Consultation Committee on the High-Level Nuclear Waste Repository Program. In 1995 Mr. Whorton was invited by the International Atomic Energy Agency (IAEA) to participate in a meeting in Vienna, Austria to present the U. S. perspectives on requirements for seismic design and instrumentation for Eastern European Reactors. In 1996 and 1997, IAEA invited Mr. Whorton to participate with a team of experts on three missions to the Armenia Nuclear Power Plant (Metsmor). During these missions, Mr. Whorton was involved in upgrade of seismic design response spectra for the plant, installation of upgraded seismic instrumentation, and training of plant personnel.

Also during the 1990s, Mr. Whorton developed the VCSNS Unit 1 civil and structural inspection programs required to support the Maintenance Rule and Containment Inspection Program in accordance with ASME III (IWE/IWL). From 2000 – 2004, Mr. Whorton was the structural lead for License Renewal of VCSNS Unit 1 which incorporated and imposed these structural inspection programs for aging management.

In 2005, Mr. Whorton was selected as a member of the initial team for the VCSNS Units 2/3 project. In this capacity he was involved with the initial siting and layout for the two new Westinghouse AP1000 units, including initial geological investigations. Mr. Whorton coordinated review and development of Section 2.5 of the FSAR for the COL application, the Unit 2/3 site geotechnical investigations, along with coordination of the Seismic Technical Advisory Group (TAG) which consisted of prominent industry experts for endorsement of the FSAR Section 2.5. Mr. Whorton also coordinated a working group of utilities who were in parallel submitting applications for the AP1000 design to ensure consistency among applications.

For VCSNS Units 2/3, Mr. Whorton has coordinated the geologic mapping program, including inspections by NRC and RII. In addition, he also has oversight responsibilities for the overall civil and structural design. Since 2009, Mr. Whorton has also participated in an industry oversight and review group for the AP1000 enhanced shield building design for AIA considerations. Since the March 11, 2011, Honshu, Japan Earthquake, Mr. Whorton has been an active member of the Nuclear Energy Institute seismic task force in developing industry responses to address NRC requests for information. In addition to this capacity, Mr. Whorton is also a member of the EPRI Participatory Peer Review Panel evaluating updates to the current ground motion attenuation models for the Central and Eastern United States.

PUBLICATIONS:

1. Somerville, M. R.; Redpath, B. B.; Whorton, R. B.; and Williams, D., "Experimental Investigation of Relative Foundation and Free-Field Response", 1984.

2. Whorton, R. B., et. al., "Earthquake Hazards, Risk and Mitigation in South Carolina and the Southeastern United States", Section 2 co-author, South Carolina Seismic safety Consortium, August 1986.

3. Whorton, R. B., "High Frequency, High Amplitude and Low Energy earthquake Study at V. C. Summer Nuclear Station", *Nuclear Engineering and Design (North Holland, Amsterdam)*, 1988.

4. O'Hara, T.; Reed, J. W.; and Whorton, R. B., "Justification for Reduction in IPEEE Program Based on Revised LLNL Seismic Hazard Results", NEI White Paper, April 1994.

5. Whorton, R. B., "Implementation of OBE Exceedance Criteria at Virgil C. Summer Nuclear Station", 5th Symposium on Current Issues Related to Nuclear Power Plant Structures, Equipment and Piping, Orlando, Florida, December 1994.

AFFILIATIONS:

Earthquake Engineering Research Institute (EERI), Member Since 1981

EPRI
Electric Power
Research Institute

Certificate of Achievement

This is to Certify that

Robert B. Whorton

has Completed the
Seismic IPE Add-On Training Course
Held June 8-10, 1993

David A. Freed, MPR Associates
SQUG Training Coordinator

Robert P. Kassawara, EPRI
SQUG Program Manager

SQUG

Certificate of Achievement

This is to Certify that

Robert B. Whorton

has Completed the SQUG Walkdown Screening
and Seismic Evaluation Training Course
Held May 3–7, 1993

Neil P. Smith, Commonwealth Edison
SQUG Chairman

David A. Freed, MPR Associates
SQUG Training Coordinator

Robert P. Kassawara, EPRI
SQUG Program Manager

SQUG

Certificate of Achievement

This is to Certify that

Bob Whorton

has Completed the

SQUG Equipment Selection Training Course

Held August 25–27, 1992

Paul W. Hayes, MPR Associates

Richard G. Starck II, MPR Associates

SQUG

Certificate of Achievement

This is to Certify that

Bob Whorton

has Completed the

SQUG Relay Evaluation Training Course

Held August 25-27, 1992

Jess O. Betlack, MPR Associates

Eric W. Rumfelt

Personal:

Address: 1221 Park Drive
Newberry, SC 29108
(803) 276-1616

Date of Birth: May 21, 1965

Education:

Bachelor of Science in Nuclear Engineering
North Carolina State University
May 1988
Graduated Cum Laude

Certification:

Senior Reactor Operator Certification
Virgil C. Summer Nuclear Station
November 1995

Work History:

All of the work history below is with South Carolina Electric and Gas Company (a subsidiary of SCANA Corporation) as assigned to the Virgil C. Summer Nuclear Station.

6-88 to 7-89: SCANA Professional Development Program (Learned the roles of various departments within SCE&G and SCANA .)

7-89 to 10-91: Nuclear Licensing Engineer (Responsible for ensuring technical correctness of and management of licensing submittals to the NRC and other regulatory agencies.)

10-91 to 9-93: Quality Assurance Engineer (Responsible for ensuring plant modifications and repairs met industry, regulatory, and plant requirements.)

09-93 to 10-01: Independent Safety Engineering Group (ISEG) (Responsible for maintaining oversite of all plant activities from a nuclear safety perspective. Ensured refueling outage schedules/work met the requirements for defense-in-depth, in addition to existing Technical Specification requirements.)

10-01 to 11-04: Probabilistic Risk Assessment Engineer (Responsible for evaluating risk impact of changing plant configurations using PRA model. Responsible for maintaining risk model.)

11-04 to 01-08: Nuclear Operations (Shift Engineer/Shift Technical Advisor) (Responsible for coordinating activities between Maintenance and Operations on day shift. Additionally responsible as Maintenance Supervisor on night shift and weekends. This position also fills the role of Core Expertise during the first hour of any events requiring entry into the Emergency Plan, monitors critical safety functions and advises the Shift Supervisor and Control Room Supervisor during any events/transients.)

01-08 to 02-11: Probabilistic Risk Assessment Engineer (Responsible for evaluating risk impact of changing plant configurations using PRA model. Responsible for maintaining risk model.) VCSNS PRA Engineer responsible for overseeing development of Fire PRA and NFPA 805 transition.

02-11 to 08-12: Nuclear Licensing Supervisor (Responsible for coordinating review and approval of VCSNS Licensing documents and assignment of Nuclear Licensing tasks, both in the Regulatory Compliance and Licensing areas.)

08-12 to present: Probabilistic Risk Assessment Engineer (Responsible for evaluating risk impact of changing plant configurations using PRA model. Responsible for maintaining risk model.)

DAN R. GOLDSTON

Operations Support Supervisor
South Carolina Electric & Gas Company, Virgil C. Summer Nuclear Station

Education:

B.S. Nuclear Technology	University of Maryland

Professional History:

South Carolina Electric & Gas Company, Virgil C. Summer, Operations Support Supervisor

South Carolina Electric & Gas Company, Virgil C. Summer, Senior Reactor Operator

South Carolina Electric & Gas Company, Virgil C. Summer, Shift Supervisor (Shift Manager)

United States Navy, RC Division Leading Petty Officer

Summary:

During his 32 years with the Virgil C. Summer Nuclear Station (VCSNS), Mr. Goldston has maintained an active Senior Reactor Operator license for the past 30 years. In addition, he has most recently been tasked with VCSNS's National Fire Protection Agency 805 Operations input and is currently tasked to support the VCSNS Fukushima and FLEX responses with Operations input.

Previous assignments have included the initial set up of the VCSNS Work Control Centers and Work Week Managers, as well as, the initial set up of the Testing Unit. He is a member of the Pressurized Water Reactor Owners Group core team for the Nuclear Regulatory Committee's B5B Order regarding Station Blackout and Advanced Accident Mitigation.

Jeremy R. Graham

VC Summer - SCE&G
P.O. Box 88, Mail Code 805
Jenkinsville, SC 29065

Phone (Work): 803-345-4391
Cell: 803-271-1755
E-mail: jeremy.graham@scana.com

Education

CLEMSON UNIVERSITY
Clemson, South Carolina
B.S. in Civil Engineering, May 2008

Work Experience

April 2012 - Present
VC Summer Nuclear Station, SCE&G - Jenkinsville, SC
Design Engineering - Engineer

* Developed site amplification document for new GMRS calculation.
* Site Engineering lead for response to NTTF 50.54(f) Recommendation 2.1/2.3 (Seismic and Flooding)

June 2008 - April 2012
VC Summer Nuclear Station, SCE&G - Jenkinsville, SC
Plant Support Engineering - Engineer

* Civil/Structural Systems Engineer, Fuel/Material Handling Systems Engineer
* Project Lead for Containment Guard Pipe Remediation and Amertap Projects.
* Supported Emergent Plant Issues (Steam Barrier Issues, Amertap Repairs, RB Coating Issues, etc)
* Completed ESP Orientation Training (Spring 2009).

May 2007 - May 2008
Clemson University Wind Load Test Facility - Clemson, SC
Student Assistant/Technician

* Performed deflection and failure test on various connections to determine maximum capacity and failure modes. Data was taken on various types of welds, rivets, and bolted connections under different loading patterns to determine failure modes.

Licenses and Certificates

* Successfully Completed Fundamentals of Engineering (EIT) Exam in October 2007.
* Completed Engineering Services Personnel, ESPOT-101 Training in April 2009.
* Completed EPRI Seismic Walkdown Training Course (July 2012).

Computer Skills

Microsoft Office (excel), MathCAD, AutoCAD, SAP2000(structural analysis), MASTAN (matrix analysis software).

Technical Skills

10CFR50.65 Qualified, 10CFR50.59 Qualified SAP-107 AD and 50.59 Screen Qualified.

Certificate of Completion

Jeremy Graham

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

July 19, 2012
Date

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

DALE D. KRAUSE, PE
7 Kings Creek Court
Irmo, SC 29063
(803) 407-3184

BACKGROUND SUMMARY

More than 35 years of experience in engineering supervision, consulting, and hands-on engineering and design for nuclear power plants and related facilities. Responsibilities included Senior Engineer and Principal Civil Engineer, Project Engineer, Engineering Consultant, Lead Structural Engineer, and Structural Engineer.

EXPERIENCE

Experience with South Carolina Electric and Gas Company working at Virgil C. Summer Nuclear Station since 1995.

2007-Present **Senior Engineer and Principal Civil Engineer.** Responsible for ensuring the plant license basis is maintained for all civil and structural related design. Review and provide guidance and input to for all changes to the plant. Responsible Engineer for ASME Section XI IWE/IWL Containment Inspection Program including the Prestress Tendon System. Responsible for Safety Related Service Water Pond Dams and Structures Inspections, Containment Coatings Program, Cut Rebar Program, Main Control Board Cumulative Effects, Structures inspection program. Lead Engineer for Ground Water Monitoring Technical Report. Lead Interface Engineer for major structure modifications to install new Main Generator Breaker. Perform Equipment Seismic Qualification evaluations. Provide training to new engineers on civil and structural topics.

2005-2007 **Responsible Engineer and Project Lead** for replacement of existing RHR and Spray Sump Strainers in the Reactor Building in response to GI-191. Wrote procurement technical specifications, performed bid evaluations, interfaced with vendor AECL during design, fabrication and installation of complex project to meet space limitations within the Reactor Building.

2003-2005 **Responsible Engineer and Project Lead** for major security modifications including safeguards modifications. Coordinate design and perform Owners review of all engineering work related to modifications to many buildings and installation of Vehicle Barrier system. Performed design changes to support field installations.

2000 **Principal Civil Engineer (Acting)** Perform all Principal Civil Engineer functions including review and approval of calculations, PERG meetings for review and classification of changes to the plant, cumulative effect reviews, design input interface reviews, change package reviews and other procedural responsibilities.

1999-2003 **Responsible Engineer and Project Lead** Spent Fuel Pool Reracking Project. Performed Vendor interface and internal coordination for a project feasibility study by the vendor Holtec International. Provide preliminary and conceptual design documentation including scope, schedule, and manhour estimates. Primary responsibility to generate the specification and purchasing documentation to procure services to rerack the Spent Fuel Pool. Coordinated all technical inputs for License Amendment that reduced in core hold time during refueling as well as replacement of racks with high density racks. Lead Engineer for removal of existing fuel storage racks and replacement with new racks.

2000 **Responsible Engineer** Reactor Building Tendon Surveillance. Coordinated and reviewed the revisions to the governing technical documents STP-160.001 and SP-228 for the tendon surveillance. Lead the Pre-implementation Meeting with the sole source vendor and internal parties. Furnish procurement document input.

Dale D. Krause, PE (continued)

1999 **ESPPOT Training** Successfully completed 14 weeks of full time comprehensive training on Reactor Theory, Plant Systems and Procedures.

1998-1999 **Responsible Engineer** Performed as-built and closeout functions for ECRs for the Installation of the Reactor Building Fall Arrest System and for the Installation of the Industrial Cooling Towers including generating vendor manuals, redlining drawings, and all package closeout documentation. Provided design modification to weld the Fuel Transfer Cart Assembly into a single unit to address problem found during the RF outage that delayed refueling.

Contract Engineer Performed verification for update of piping analysis and pipe support calculations for numerous MRFs for snubber reduction.

1997-1998 **Contract Engineer** Lead Engineer to coordinate the as-built effort for MRF 90105 Turbine Building Closed Cycle Cooling Tower with Parsons Power Corp. Performed all required work to close the package including review of DBDs, generate new vendor manuals, and other required activities.

1997 **Contract Engineer** Revised the tendon surveillance governing documents STP-160.001 and SP-228 for new requirements in 10CFR50.55a. Wrote 50.59 evaluation for the changes including writing the FSAR change notice, and proposed Technical Specification changes. Wrote responses to NRC requests for additional information on the report for the Tendon Surveillance performed in 1996. Performed new regression analyses for projecting group tendon force. Updated tendon database.

1996 **Engineer** member of team responsible to review the FSAR for discrepancies. Review and closeout MRF packages.

1995 **Consultant** to South Carolina Electric and Gas Company for condition surveillance requirements for prestressed tendon system in Reactor Building. Revised detailed inspection procedures and provided calculations for predicted tendon liftoff forces.

Experience with Gilbert/Commonwealth since 1969.

1994-95 **Structural Engineering Consultant**

- Performed analyses of building floor systems for new heavy loadings at the Oyster Creek Power Station for General Public Utilities.
- Performed constructability review for a new Federal Prison facility at Edgefield, South Carolina for the Federal Bureau of Prisons.
- Performed evaluations and dynamic analyses of existing buildings and designed new barriers for five nuclear plants to provide protection against a design basis terrorist event involving use of a vehicle and explosives (USNRC Regulatory Guide 5.68 "Protection Against Malevolent Use of Vehicles at Nuclear Power Plants").
- Performed design modifications to overhead crane walkway/handrail arrangement in compliance with OSHA for V.C.Summer Station.
- Co-Authored Publication as a Consultant to Westinghouse for "Aging Management Evaluation for Pressurized Water Reactor Containment Structure." WCAP-14756-A.

Dale D. Krause, PE (continued)

1991-94 **Senior Project Civil/Structural Engineer** - Martin Marietta Energy Systems, Oak Ridge National Laboratory. Advanced Neutron Source Project. Responsible for plant layout, civil, structural, and geotechnical engineering for the conceptual design of the Advanced Neutron Source Project. Integrated facility design included numerous buildings to house and to support operation of a new 339 MW research reactor. Responsible for coordinating architectural design subcontractor. Scope included the design, system descriptions, cost estimate, Safety Analysis Report, risk assessments and value engineering. Responsible for planning and control of manhours and schedule.

1991 **Structural Engineer** South Carolina Electric and Gas Company, V.C.Summer Station. Performed calculations for the restressing of the vertical post-tensioned tendon group in the Reactor Building. Provided engineering evaluation of tendon surveillance test results.

1987-91 **Project Structural Engineer** - Department of Energy, Oak Ridge National Laboratory, Liquid Radwaste Collection System Upgrade Project at Bethel Valley. Performed all structural engineering work for new buildings including transported waste receiving facility and two monitoring and control stations as well as modifications to existing laboratory buildings. Wrote overhead crane specifications, including CMAA, AISE, and OSHA considerations. Reviewed vendor submittals including crane test procedures and maintenance manuals.

1986 **Structural Task Engineer** – South Carolina Electric and Gas Company, V.C.Summer Station. Performed structural calculations for predicted forces in the Reactor Building tendons using new wire relaxation results from testing. Interface on the surveillance test including providing engineering evaluation of test results. Wrote PTR for procurement of spare tendon and anchorages.

1986 **Structural Consultant** – TERA Corporation, Comanche Peak Nuclear Station. Performed independent third party review of structural design calculations for the Reactor Building.

1985-86 **Project Engineer Structures** - Subcontract with Westinghouse for the Peoples Republic of China. Developed design criteria documents, engineering schedule, and conceptual design for two-unit (1000 MW) power plant project.

1985 **Structural Consultant** - KOPEC, South Korea. Consulted on the structural arrangement and design of a reference nuclear power plant.

1984 **Lead Engineer** - Rochester Gas & Electric Company, R. E. Ginna Station. Performed analyses of masonry structures for increased seismic loads.

1982-83 **Project Structural Engineer** - Commonwealth Edison Company, Zion Power Station. Performed structural engineering and design for installation of a new liquid radwaste processing system into the existing Auxiliary Building. Selected and designed new jib cranes.

Project Structural Engineer. Responsible for technical and administration coordination of civil, architecture, plant layout, and structural for the design of onsite low level waste storage facilities. Performed structural engineering, design, and wrote specifications including remotely operated overhead cranes for the following:

- Philadelphia Electric Company, Peach Bottom Power Station
- General Public Utilities, Oyster Creek Power Station and Three Mile Island Power Station
- Generic Onsite Storage Facility Design

Dale D. Krause, PE (continued)

Project Engineer Virginia Electric Power Company, Surry Station. Performed technical and administrative supervision of geotechnical, civil, plant layout, and structural engineering/drafting for the preliminary design and licensing report for an Independent Wet Pool Spent Fuel Storage Facility.

Project Structural Engineer Department of Energy. Responsible for preliminary design and preparation of licensing documents for a Radwaste Incineration Facility.

1981 **Task Coordinating Engineer** General Public Utilities, Three Mile Island Unit 1. Responsible for interdiscipline coordination of Post-Accident Shielding modifications and design for the Auxiliary Building. Responsible for design and installation of environmental barrier separating the fuel handling areas of Units 1 and 2. Responsible for design and specifications for the backfit of a new radwaste treatment system into the Unit 1 Auxiliary Building.

1979-80 **Project Engineer Structures** General Public Utilities, Three Mile Island Unit 2. Responsible for coordination of civil, architect, and structural for preliminary design and Technical Evaluation Report for and Evaporator/Crystallizer Facility for TMI 2 recovery effort. Coordination and client interface for design and construction of the Solid Waste staging Facility for TMI 2 recovery.

1979 **Structural Engineer** Potomac Electric Power Company, Chalk Point Fossil Power Station. Responsible for structural design for backfit of the uninterruptible power equipment room, new computer room, and cable spreading room.

1977-79 **Project Structural Engineer** Gilbert/Commonwealth, Reference Nuclear Plant. Responsible for preliminary designs and input to the Safety Analysis Report that was submitted to NRC. Assisted Project manager with progress reports, budget and manhour estimates for the team.

1972-78 **Structural Engineer** - South Carolina Electric & Gas Company, V.C. Summer Power Station, Unit 1 (900 MW). Performed bid evaluations, vendor and field liaison for contracts for stainless steel liners, Reactor Building liner, penetration sleeves, and personnel airlocks; structural design of fuel handling building; reinforced concrete and structural steel design. Design verification of Reactor Building interior concrete structures. Wrote FSAR and DBD sections for the liners and airlocks.

1969-74 **Structural Engineer** - Metropolitan Edison Company, Three Mile Island Power Station (871 MW). Responsible for vendor liaison for post-tensioned structures; field liaison for the installation of tendon system and extensive concrete repair work on Reactor Building ring girder. Wrote procedures and coordinated field pressure testing of Reactor Building. Performed seismic analyses for the Reactor, Auxiliary, Fuel Handling, Intermediate, and Intake Buildings. Coordinated seismic qualification of electrical equipment. Performed reinforced concrete and structural steel design including overhead crane supports, cable tray, and conduit supports.

EDUCATION

"Training on Near Term Task Force Recommendation 2.3 - Plant Seismic Walkdowns" Duke Energy July 18-19, 2012.
ESPPOT Reactor Theory and Plant Systems, V.C.Summer Station (14 weeks)
M.B.A. Program, Temple University, Philadelphia, PA (12 credits)
B.S., Civil Engineering, Lehigh University, Bethlehem, PA
B.A., Biology, Lehigh University, Bethlehem, PA
Additional Courses:
Structural Dynamics (2 week course), UCLA
Seismic Analysis and Design, University of Wisconsin

Dale D. Krause, PE (continued)

PROFESSIONAL SOCIETIES

Life Member of American Society of Civil Engineers

REGISTRATION

Professional Engineer: Pennsylvania (1973), New Jersey (1983)

EPRI | ELECTRIC POWER RESEARCH INSTITUTE

Certificate of Completion

Dale Krause

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

July 19, 2012
Date

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

APPENDIX B
EQUIPMENT LISTS

Westinghouse

Seismic Walkdown Equipment List, Revision 3
In Response to NTTF Recommendation 2.3: Seismic

Virgil C. Summer Nuclear Station

GARY DOUGLAS [signature] 10/10/12
Equipment Selection Personnel Lead — date

KENDAL BISHOP [signature] 10/10/2012
Equipment Selection Personnel — date

DAN GOLDSTON [signature] 10/10/2012
Station Operations — date

VCSNS Seismic Walkdown Equipment List October 10, 2012

Revision History

Revision 0 of this document provides the Seismic Walkdown Equipment List (SWEL) developed prior to the Virgil C. Summer Nuclear Station (VCSNS) At-Power Seismic Walkdowns performed between Monday, July 30th, 2012 and Thursday, August 2nd, 2012. The SWEL contained a total of 115 components (109 SWEL 1 & 6 SWEL 2).

Revision 1 of this document updates the VCSNS SWEL based on modifications required during the At-Power Seismic Walkdowns performed between Monday, July 30th, 2012 and Thursday, August 2nd, 2012. As a result of these modifications, the SWEL contained a total of 112 components (106 SWEL 1 & 6 SWEL 2).

A review of the Revision 1 modifications verified that the requirements of Screen #4 – *Sample Considerations* of the EPRI Technical Report 1025286, Seismic Walkdown Guidance for Resolution of Fukushima Near-Term Task Force Recommendation 2.3: Seismic, dated June 2012 {Reference 1}, are maintained. These modifications include the following:

Component ID Affected	Resolution	Justification
XPP0039A (Item # 31)	Added note to state that only the portion of the pump at or above Elevation 436 ft will be assessed.	The portion of the component below Elevation 436 ft is submerged and inaccessible.
XAH0001A (Item # 70)	Replaced with Component ID XAH0002.	XAH0001A was deemed inaccessible (covered in insulation). The replacement component is the equivalent on a different train.
XFN0046A (Item # 68)	Removed from the SWEL selected walkdown components.	XFN0046A was deemed inaccessible (sealed inside unit which would require additional work to access).
XVB03116A-SW (Item # 49)	Replaced with XVB03116C-SW.	XVB03116A-SW was deemed inaccessible (Room containing the component had a few inches of water due to rainfall. The room with the replaced component was dry.) The replacement component is the equivalent on a different train.
XVG00503A-BD (Item # 41)	Replaced with XVG00503B-BD.	XVG00503A-BD was deemed inaccessible (Dose rates around the "A" train component were approximately four times greater than that of the "B" train. Input from VCSNS Health Physics personnel preferred the walkdown of the "B" train rather than the "A" train for this component.) The replacement component is the equivalent on a different train.
XVX09341-SS (Item # 62)	Removed from the SWEL selected walkdown components.	XVX09341-SS was deemed inaccessible (approximately 25ft off the floor elevation).
XFN0032A (Item # 67)	Removed from the SWEL selected walkdown components.	XFN0032A was deemed inaccessible (inside a pressure boundary which would require additional work to access).
XPP0031A (Item # 27)	Updated Classification from "05 - Horizontal Pumps" to "06 - Vertical Pumps".	Change was verified by Dan Goldston (SCANA) on 8/2/2012 via email.

Revision 2 of this document updated the VCSNS SWEL based on modifications required prior to the VCSNS Outage Seismic Walkdowns scheduled to be performed between Saturday, October 20th, 2012 and Monday, October 29th, 2012. As a result of these modifications, the SWEL contained a total of 110 components (104 SWEL 1 & 6 SWEL 2).

A review of the Revision 2 modifications verified that the requirements of Screen #4 – *Sample Considerations* of the EPRI Technical Report 1025286, Seismic Walkdown Guidance for Resolution of Fukushima Near-Term Task Force Recommendation 2.3: Seismic, dated June 2012 {Reference 1}, are maintained. These modifications include the following:

Component ID Affected	Resolution	Justification
XFL0154 (Item # 10)	Removed from the SWEL selected walkdown components.	XFL0154 was deemed inaccessible (located approximately 25 feet above the floor elevation which would require the SWEs to scale several ladders to access).
XAA0001A (Item # 73)	Removed from the SWEL selected walkdown components.	XAA0001A was deemed inaccessible (located approximately 25 feet above the floor elevation which would require the SWEs to scale several ladders to access).

Revision 3 of this document updates the VCSNS SWEL based on inaccessibility of internal anchorage noted during the review of components deferred to the outage walkdowns. As a result of these modifications, the SWEL contained a total of 106 components (100 SWEL 1 & 6 SWEL 2).

A review of the Revision 3 modifications verified that the requirements of Screen #4 – *Sample Considerations* of the EPRI Technical Report 1025286, Seismic Walkdown Guidance for Resolution of Fukushima Near-Term Task Force Recommendation 2.3: Seismic, dated June 2012 {Reference 1}, are maintained. These modifications include the following:

Component ID Affected	Resolution	Justification
XTF1DA2 (Item # 23)	Removed from the SWEL selected walkdown components.	XTF1DA2 was deemed inaccessible (anchorage is located internally and would require extensive disassembly to inspect anchorages).
XPP0001C (Item # 30)	Updated Classification from "06 - Vertical Pumps" to "05 - Horizontal Pumps".	Change was identified by Jeremy Graham (SCANA) on 9/13/2012 via email.
XPN5293 (Item # 81)	Removed from the SWEL selected walkdown components.	XPN5293 was deemed inaccessible (anchorage is located internally and would require extensive disassembly to inspect anchorages).
XPN5253 (Item # 89)	Removed from the SWEL selected walkdown components.	XPN5253 was deemed inaccessible (anchorage is located internally and would require significant scaffolding to access and inspect anchorages).

Component ID Affected	Resolution	Justification
XPN5503 (Item # 90)	Removed from the SWEL selected walkdown components.	XPN5503 was deemed inaccessible (anchorage is located internally and would require extensive disassembly to inspect anchorages).
XNF0042 (SWEL 2 Item # 3)	Updated "Associated with Rapid Draindown" from "Y" to "N".	The Reference 1 guidance documents that weir gates are classified as Seismic Category I and are considered part of the Spent Fuel Pool structure; justifying their removal from SWEL 2 consideration. XNF0042 was removed as a Rapid Draindown concern, but was kept on the SWEL 2 list to evaluate seismic interactions with the gate sealing system.

Seismic Walkdown Equipment List (SWEL)

A listing of structures, systems, and components (SSCs) that will be viewed during the walkdown, the Seismic Walkdown Equipment List (SWEL), has been prepared in advance of the walkdown effort.

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 {Reference 1}, was utilized to develop the SWEL for Virgil C. Summer Nuclear Station (VCSNS).

The SWEL is comprised of two groups of items:

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

VCSNS Operations and Engineering Staff Members participated in the selection of SSCs compiling the SWEL and provided direct input to the Equipment Selection Personnel during the SWEL development process. This input included:

- Verification of the equipment information retrieved from the VCSNS IPEEE documentation, the VCSNS Internal Events PRA Model, and the VCSNS CMMS database.
- Discussions with the Equipment Selection Personnel to identify upgrades, modifications, and replacements of equipment which might be pertinent to the selection of the SWEL.
- Input into the selection of the SWEL using operational experience relevant to systems, equipment classifications, and environmental considerations.
- Approval of the components selected for the SWEL.

The process detailed in Reference 1 for the Selection of SSCs to produce the SWEL was discussed with the VCSNS Operations and Engineering Staff Members during the site visit to confirm the SSEL on July 16, 2012. In addition to the VCSNS Operations and Engineering Staff Members, one member of the Peer Review Team participated in the discussion during the site visit to confirm the SSEL on July 16, 2012. The details describing the process for Selection of SSCs to produce the SWEL are provided in the Selection of SSCs section of the Submittal Report.

References

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

[redacted]

[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]	[redacted]	[redacted]	[redacted]

[redacted]

[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]

[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

SWEL 1

The following abbreviations are used in the Additional Notes column of SWEL1:

- MNR – Major New or Replacement Equipment
- RMU – Recently Modified or Upgraded
- IVA – IPEEE Vulnerability Enhancement
- WDO – Walkdown Deferred to Outage
- EHA – Equipment has Anchorage

The equipment classes used in the CLASS column are as follows:

- (00) – Other
- (01) – Motor Control Centers & Wall-Mounted Contactors
- (02) – Low Voltage Switchgear & Breaker Panels
- (03) – Medium Voltage, Metal-Clad Switchgear
- (04) – Transformers
- (05) – Horizontal Pumps
- (06) – Vertical Pumps
- (07) – Fluid-Operated Valves(1)
- (08) – Motor-Operated & Solenoid-Operated Valves
- (09) – Fans
- (10) – Air Handlers
- (11) – Chillers
- (14) – Distribution Panels & Automatic Transfer Switches
- (15) – Battery Racks
- (16) – Battery Chargers & Inverters
- (17) – Engine Generators
- (18) – Instrument Racks
- (19) – Temperature Sensors
- (20) – Instrumentation & Control Panels
- (21) – Tanks & Heat Exchangers

Note:

1. Table B-1 of EPRI Report 1025286 {Reference 1} documents Equipment Class 7 as "Pneumatic-Operated Valves". However, the classification in Reference 1 states that the classes are based on the GIP {Reference 19}. The GIP Equipment Class 7 is defined as "Fluid-Operated Valves". The GIP Equipment Class 7 has been used herein.

[redacted]

[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

[redacted]

[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

[redacted]

Sensitive Information Withhold from Public Disclosure Under 10 CFR 2.390

[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	

[redacted]

[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

[redacted]

[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

[redacted]

[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

[redacted]

[redacted]

[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

APPENDIX C
SEISMIC WALKDOWN CHECKLISTS

CONTENTS OF APPENDIX C

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]	[redacted]	
[redacted]	[redacted]	
[redacted]	[redacted]	
[redacted]	[redacted]	
[redacted]	[redacted]	
[redacted]		
[redacted]		
[redacted]		
[redacted]		
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]	[redacted]	
[redacted]	[redacted]	
[redacted]	[redacted]	

[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]		[redacted]

[redacted]	[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]	[redacted]	[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
		[redacted]		[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
		[redacted]		[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]	[redacted]	
[redacted]	[redacted]	
[redacted]	[redacted]	
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]		
[redacted]	[redacted]	[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

IMG_4347

[redacted]

[redacted]

[redacted]

IMG 4350

[redacted]

[redacted]

[redacted]

[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

Photos

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

412-510

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted]
[redacted] [redacted]
[redacted] [redacted]

[redacted]
[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]
[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]	[redacted]	
[redacted]	[redacted]	
[redacted]	[redacted]	

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

IMG_3935

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
		[redacted]		[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	

[redacted]

[redacted]

- [redacted] [redacted]
- [redacted] [redacted]
- [redacted] [redacted]
- [redacted] [redacted]
- [redacted] [redacted]
- [redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

Photos

[redacted]

APPENDIX D
AREA WALK-BY CHECKLISTS

CONTENTS OF APPENDIX D

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]		
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]		
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]		
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]		
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted] [redacted]

Comments

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted]

[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
		[redacted]		[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]		
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]		
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted]

IMG_3484

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]		
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted]

[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]	[redacted]
[redacted]	
[redacted]	[redacted]
[redacted] [redacted]	[redacted]
[redacted] [redacted]	[redacted]
[redacted] [redacted]	[redacted]
[redacted] [redacted]	[redacted]
[redacted] [redacted]	[redacted]
[redacted] [redacted]	[redacted]
[redacted] [redacted]	[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted] [redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted] [redacted] [redacted] [redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

APPENDIX E
PEER REVIEW CHECKLIST

Virgil C. Summer **Unit 1** **Peer Review Checklist for SWEL**

Instructions for Completing Checklist

This peer review checklist may be used to document the review of the Seismic Walkdown Equipment List (SWEL). The space below each question in this checklist should be used to describe any findings identified during the peer review process and how the SWEL may have changed to address those findings. Additional space is provided at the end of this checklist for documenting other comments.

1. Were the five safety functions adequately represented in the SWEL 1 selection? Y☒ N☐

   The five safety functions (for SWEL 1 Screen #3) were inherently captured in the baseline list using the IPEEE SSEL and components from PRA insights. Ultimate Heat Sink and Containment Function components also considered the five safety functions.

2. Does SWEL 1 include an appropriate representation of items having the following sample selection attributes:

   a. Various types of systems? Y☒ N☐

      From the baseline list, components were grouped by system, with each system validated for frontline and support functions. The VCS operations representative verified completeness of the systems list.

   b. Major new and replacement equipment? Y☒ N☐

      The VCS operations representative reviewed the total listing of plant modifications since 1995 and designated those modifications which should be considered as major new and replacement. A subsequent listing of modifications (dating back to June 1992) was similarly reviewed. Major plant modifications for consideration in SWEL 1 were designated for further review to ensure that all components are captured in the screening process.

   c. Various types of equipment? Y☒ N☐

      Each equipment class (from guidance document Appendix B) was reviewed to ensure common understanding of content. During the SWEL 1 selection, baseline components were grouped by equipment class to target ~10% of the population (with a minimum of 1 component from each class). Equipment classes 12 & 13 are excluded from the walkdown since there are no SC I components in these classes at VCS.

   d. Various environments? Y☒ N☐

      During the equipment class selection, environmental conditions were discussed to ensure that components in hot, humid, and/or wet conditions are included in SWEL 1.

Virgil C. Summer **Unit 1 Peer Review Checklist for SWEL**

e. Equipment enhanced based on the findings of the IPEEE (or equivalent) program? Y☒ N☐

The IPEEE study from 1993 was reviewed and all plant enhancement were captured. The peer review also recommended the following: (1) IPEEE vulnerabilities list should include the three (3) large tanks (CST, RWST, and RMWST) for which HCLPF calculations were made. SWP Dams are excluded (as structures) based on the guidance document for SWEL 1 (Screen #2 – p. 3-2). (2) List should be expanded back to June 1992 which was the approximate timeframe for completion of the IPEEE SSEL. This is consistent with the industry guidance document on p. 3-6 for 15 years (i.e., since the completion of the seismic IPEEE evaluations).

f. Were risk insights considered in the development of SWEL 1? Y☒ N☐

Westinghouse obtained an initial RAW listing of PRA insights from SCE&G which was used to select higher risk components in the SWEL 1 screening. Further clarifications were obtained from the PRA analysts which are being re-evaluated to ensure consistency with the SWEL 1 components selected.

3. For SWEL 2:

a. Were spent fuel pool related items considered, and if applicable included in SWEL 2? Y☒ N☐

A baseline listing of all SFP related SC I components was generated for review in the SWEL 2 selection process.

b. Was an appropriate justification documented for spent fuel pool related items not included in SWEL 2? Y☒ N☐

From the baseline listing, individual components were excluded based on a series of justifications (i.e., addressed in SWEL 1, no control functions, not SFP, pipe support, inaccessible/inside SFP, redundancy, and structural component) which will be documented in the final report.

4. Provide any other comments related to the peer review of the SWELs.

The SWEL selection process was performed in accordance with the industry Seismic Walkdown Guidance Document (EPRI TR-1025286), using a 30+ year experienced VCS plant operations representative (Dan Goldston). The Westinghouse process of capturing the various component baseline inputs in a spreadsheet format proved very effective in each screening step.

5. Have all peer review comments been adequately addressed in the final SWEL? Y☒ N☐

Peer Reviewer #1: *R. B. Whorton* RB Whorton Date: 11-6-12

Peer Reviewer #2: *E. Rumfelt* Eric W Rumfelt Date: 11/9/12