CONTENTS

Abstract ix
Contents xi
List of Figures xxv
List of Tables lxxvii
Executive Summary lxxxv
Participatory Peer Review Panel Final Report Dated October 24, 2011 xcv
Project Acknowledgements ciii
Sponsor's Perspective cv
Abbreviations cix

***1* INTRODUCTION 1-1**
1.1 Background and History 1-1
1.1.1 EPRI-SOG and LLNL Projects 1-2
1.1.2 Development of the SSHAC Process 1-2
1.1.3 Implementation of the SSHAC Methodology 1-3
1.1.4 Regional SSC Model for Nuclear Facilities 1-3
1.1.5 Differences from USGS National Seismic Hazard Mapping Project 1-4
1.2 Purpose of the CEUS SSC Project 1-5
1.2.1 Implementation of SSHAC Level 3 Process 1-6
1.2.2 Goals: Stability and Longevity 1-8
1.2.3 Interface with Ground Motion Models 1-8
1.3 Study Region 1-10
1.4 Products of Project 1-10
1.4.1 Seismic Source Model for Study Region 1-10
1.4.2 Hazard Input Document 1-12
1.4.3 Documentation of Technical Bases for All Assessments 1-12
1.4.4 Other Key Products 1-13
1.4.4.1 Data Evaluation and Data Summary Tables 1-13

1.4.4.2 Database of Geologic, Geophysical, and Seismological Data 1-13
1.4.4.3 Earthquake Catalog with Uniform Moment Magnitudes 1-13
1.4.4.4 Updated Paleoseismicity Data and Guidance 1-14
1.4.4.5 Recommendations for Future Applications of SSC Model 1-14

2 SSHAC LEVEL 3 ASSESSMENT PROCESS AND IMPLEMENTATION 2-1
2.1 Goals and Activities of a SSHAC Assessment Process 2-2
2.1.1 Evaluation 2-4
2.1.2 Integration 2-4
2.2 Roles of CEUS SSC Project Participants 2-5
2.3 CEUS SSC Project Organization 2-7
2.4 Key Tasks and Activities 2-9
2.4.1 Database Development 2-9
2.4.2 Identification of Significant Issues 2-10
2.4.3 Workshop #1—Key Issues and Available Data 2-10
2.4.4 Workshop #2—Alternative Interpretations 2-12
2.4.5 Working Meetings 2-13
2.4.6 SSC Sensitivity Model Development 2-14
2.4.7 Workshop #3—Feedback 2-15
2.4.8 SSC Preliminary Model Development 2-16
2.4.9 Finalization and Review of SSC Draft and Final Model 2-17
2.4.10 Documentation 2-19
2.4.10.1 Development of the Hazard Input Document 2-19
2.4.10.2 Development of Earlier Draft Report 2-19
2.4.10.3 Draft Report Review 2-19
2.4.10.4 Final Report Development 2-20
2.5 Participatory Peer Review Panel 2-20
2.5.1 Roles and Responsibilities 2-20
2.5.2 Reviews and Feedback 2-20
2.5.3 Fulfillment of SSHAC-Prescribed Scope of Review of Both Technical and Process Issues 2-21
2.6 Consistency of CEUS SSC Assessment Process with SSHAC Guidelines 2-22

3 EARTHQUAKE CATALOG 3-1
3.1 Goals for the Earthquake Catalog Development 3-1
3.1.1 Completeness 3-1

3.1.2 Uniformity of Catalog Processing 3-2
3.1.3 Catalog Review 3-3
3.2 Catalog Compilation 3-4
3.2.1 Continental-Scale Catalogs 3-5
3.2.2 Regional Catalogs 3-7
3.2.3 Catalogs from Special Studies 3-7
3.2.4 Focal Depth Data 3-8
3.2.5 Nontectonic Events 3-9
3.2.6 Identification of Unique Earthquake Entries 3-9
3.3 Development of a Uniform Moment Magnitude Earthquake Catalog 3-11
3.3.1 Approach for Uniform Magnitude and Unbiased Recurrence Estimation 3-11
3.3.2 Estimation of E[M] for the CEUS SSC Project Catalog 3-19
3.3.2.1 Effect of Magnitude Rounding on Statistical Tests 3-19
3.3.2.2 Moment Magnitude Data 3-20
3.3.2.3 Estimation of E[**M**] from Body-Wave Magnitudes 3-22
3.3.2.4 Estimation of E[**M**] from M_L Magnitudes 3-28
3.3.2.5 Estimation of E[**M**] from M_S Magnitudes 3-29
3.3.2.6 Estimation of E[**M**] from M_C and M_D Magnitudes 3-30
3.3.2.7 Estimation of E[**M**] from the Logarithm of Felt Area 3-32
3.3.2.8 Estimation of E[**M**] from the Maximum Intensity, I_0 3-32
3.3.2.9 Uniform Moment Magnitude Catalog of E[**M**] and *N** Values 3-36
3.4 Identification of Independent Earthquakes 3-37
3.5 Catalog Completeness 3-39

4 **CONCEPTUAL SEISMIC SOURCE CHARACTERIZATION FRAMEWORK 4-1**
4.1 Needs for a Conceptual SSC Framework 4-2
4.1.1 Logic Tree Approach to Representing Alternatives and Assessing Uncertainties 4-2
4.1.1.1 Examples of Logic Trees 4-3
4.1.1.2 Assigning Weights to Logic Tree Branches 4-3
4.1.2 Data Identification and Evaluation 4-5
4.1.2.1 “Generic” Data Identification to Address Indicators of a Seismic Source 4-5
4.1.2.2 Data Evaluation for Particular Seismic Sources: Data Evaluation and Data Summary Tables 4-7
4.1.3 Methodology for Identifying Seismic Sources 4-9

4.1.3.1 Hazard-Informed Approach 4-11
4.1.3.2 Conclusions Regarding the Hazard Significance of Various SSC Issues....4-13
4.1.3.3 Criteria for Defining Seismic Sources 4-14
4.2 Master Logic Tree 4-18
4.2.1 Description of Logic Tree Elements....4-18
4.2.2 RLME Source Logic Tree 4-20
4.2.3 Mmax Zones Logic Tree....4-22
4.2.4 Seismotectonic Zones Branch....4-24

***5* SSC MODEL: OVERVIEW AND METHODOLOGY....5-1**
5.1 Overview of Spatial and Temporal Models....5-1
5.1.1 Spatial Model Considerations....5-1
5.1.2 Considerations Regarding Temporal Models 5-3
5.1.3 Perspective on CEUS SSC Models....5-4
5.2 Maximum Earthquake Magnitude Assessment....5-5
5.2.1 Approaches to Mmax Estimation in the CEUS 5-6
5.2.1.1 Bayesian Mmax Approach....5-8
5.2.1.2 Kijko Approach to Mmax Assessment 5-17
5.2.1.3 Weights for the Alternative Mmax Approaches....5-20
5.2.1.4 Example Mmax Distributions 5-20
5.2.2 Other Mmax Issues 5-21
5.3 Earthquake Recurrence Assessment....5-22
5.3.1 Smoothing to Represent Spatial Stationarity....5-22
5.3.2 Smoothing Approach....5-23
5.3.2.1 Development of Penalized-Likelihood Approach and Formulation 5-23
5.3.2.2 Application of the Model and Specification of Model Parameters....5-36
5.3.2.3 Exploration of Model Results in Parameter Space 5-40
5.3.2.4 Consideration of Constant b-Value Kernel Approaches 5-42
5.3.2.5 Comparison to EPRI-SOG Approach....5-45
5.3.2.6 Assessment of the Lombardi Study 5-46
5.3.3 Estimation of Recurrence for RLME Sources....5-47
5.3.3.1 Estimation of Occurrence Rates for the Poisson Model 5-48
5.3.3.2 Estimation of Occurrence Rates for a Renewal Model 5-51
5.3.3.3 Incorporating Uncertainty in the Input....5-52
5.3.3.4 RLME Magnitude Distribution 5-53

5.4 Assessment of Future Earthquake Characteristics 5-54
5.4.1 Tectonic Stress Regime 5-55
5.4.2 Sense of Slip/Style of Faulting 5-55
5.4.3 Strike and Dip of Ruptures 5-55
5.4.4 Seismogenic Crustal Thickness 5-56
5.4.5 Fault Rupture Area 5-57
5.4.6 Rupture Length-to-Width Aspect Ratio 5-57
5.4.7 Relationship of Rupture to Source Zone Boundaries 5-58
5.5 Predicted Seismic Moment Rate 5-58

6 SSC MODEL: RLME SOURCES AND MMAX ZONES BRANCH 6-1
6.1 RLME Sources 6-1
6.1.1 Charlevoix 6-3
6.1.1.1 Evidence for Temporal Clustering 6-4
6.1.1.2 Localizing Tectonic Features 6-4
6.1.1.3 Geometry and Style of Faulting 6-5
6.1.1.4 RLME Magnitude 6-7
6.1.1.5 RLME Recurrence 6-8
6.1.2 Charleston 6-10
6.1.2.1 Evidence for Temporal Clustering 6-11
6.1.2.2 Localizing Feature 6-12
6.1.2.3 Geometry and Style of Faulting 6-12
6.1.2.4 RLME Magnitude 6-15
6.1.2.5 RLME Recurrence 6-17
6.1.3 Cheraw Fault 6-22
6.1.3.1 Evidence for Temporal Clustering 6-23
6.1.3.2 Geometry and Style of Faulting 6-24
6.1.3.3 RLME Magnitude 6-25
6.1.3.4 RLME Recurrence 6-26
6.1.4 Meers Fault 6-28
6.1.4.1 Evidence for Temporal Clustering 6-29
6.1.4.2 Localizing Feature 6-29
6.1.4.3 Geometry and Style of Faulting 6-30
6.1.4.4 RLME Magnitude 6-31
6.1.4.5 RLME Recurrence 6-34

6.1.5 Reelfoot Rift–New Madrid Fault System 6-35
6.1.5.1 Evidence for Temporal Clustering 6-40
6.1.5.2 Geometry and Style of Faulting 6-42
6.1.5.3 RLME Magnitude 6-44
6.1.5.4 RLME Recurrence 6-47
6.1.6 Reelfoot Rift—Eastern Rift Margin Fault 6-50
6.1.6.1 Evidence for Temporal Clustering 6-53
6.1.6.2 Geometry and Style of Faulting 6-53
6.1.6.3 RLME Magnitude 6-54
6.1.6.4 RLME Recurrence 6-56
6.1.7 Reelfoot Rift—Marianna 6-57
6.1.7.1 Evidence for Temporal Clustering 6-58
6.1.7.2 Geometry and Style of Faulting 6-59
6.1.7.3 RLME Magnitude 6-60
6.1.7.4 RLME Recurrence 6-61
6.1.8 Reelfoot Rift—Commerce Fault Zone 6-62
6.1.8.1 Evidence for Temporal Clustering 6-63
6.1.8.2 Geometry and Style of Faulting 6-64
6.1.8.3 RLME Magnitude 6-65
6.1.8.4 RLME Recurrence 6-66
6.1.9 Wabash Valley 6-68
6.1.9.1 Evidence for Temporal Clustering 6-69
6.1.9.2 Geometry and Style of Faulting 6-69
6.1.9.3 RLME Magnitude 6-72
6.1.9.4 RLME Recurrence 6-73
6.2 Mmax Distributed Seismicity Source Zones 6-74
6.2.1 Definition of Mmax Zones 6-74
6.2.2 Criteria for Defining the MESE/NMESE Boundary 6-75
6.3 Maximum Magnitude Distributions for Mmax Distributed Seismicity Sources 6-76
6.3.1 Maximum Observed Earthquake Magnitude 6-76
6.3.2 Mmax Distributions 6-77
6.4 Recurrence Parameters 6-78
6.4.1 Rate and b-Value Maps for Single Zone and Two Zones 6-78
6.4.2 Comparison of Recurrence Parameters to Catalog 6-79

7 SSC MODEL: SEISMOTECTONIC ZONES BRANCH 7-1
7.1 Approaches and Data Used to Define Seismotectonic Zones 7-1
7.2 RLME Sources in the Seismotectonic Zones Branch 7-4
7.3 Seismotectonic Source Zones 7-4
7.3.1 St. Lawrence Rift Zone (SLR) 7-4
7.3.1.1 Background 7-5
7.3.1.2 Basis for Defining Seismotectonic Zone 7-11
7.3.1.3 Basis for Zone Geometry 7-12
7.3.1.4 Basis for Zone Mmax 7-12
7.3.1.5 Future Earthquake Characteristics 7-13
7.3.2 Great Meteor Hotspot Zone (GMH) 7-15
7.3.2.1 Background 7-16
7.3.2.2 Basis for Defining Seismotectonic Zone 7-18
7.3.2.3 Basis for Zone Geometry 7-19
7.3.2.4 Basis for Zone Mmax 7-19
7.3.2.5 Future Earthquake Characteristics 7-20
7.3.3 Northern Appalachian Zone (NAP) 7-21
7.3.3.1 Background 7-21
7.3.3.2 Basis for Defining Seismotectonic Zone 7-23
7.3.3.3 Basis for Zone Geometry 7-24
7.3.3.4 Basis for Zone Mmax 7-24
7.3.3.5 Future Earthquake Characteristics 7-25
7.3.4 Paleozoic Extended Crust (PEZ) 7-25
7.3.4.1 Background 7-26
7.3.4.2 Basis for Defining Seismotectonic Zone 7-32
7.3.4.3 Basis for Zone Geometry 7-33
7.3.4.4 Basis for Zone Mmax 7-34
7.3.4.5 Future Earthquake Characteristics 7-36
7.3.5 Ilinois Basin Extended Basement Zone (IBEB) 7-37
7.3.5.1 Background 7-38
7.3.5.2 Basis for Defining Seismotectonic Zone 7-38
7.3.5.3 Basis for Zone Geometry 7-40
7.3.5.4 Basis for Zone Mmax 7-41
7.3.5.5 Future Earthquake Characteristics 7-41
7.3.6 Reelfoot Rift Zone (RR) 7-42

7.3.6.1 Background 7-42
7.3.6.2 Basis for Defining Seismotectonic Zone 7-46
7.3.6.3 Basis for Zone Geometry 7-46
7.3.6.4 Basis for Zone Mmax 7-47
7.3.6.5 Future Earthquake Characteristics 7-48
7.3.7 Extended Continental Crust–Atlantic Margin Zone (ECC-AM) 7-48
7.3.7.1 Background 7-49
7.3.7.2 Basis for Defining Seismotectonic Zone 7-53
7.3.7.3 Basis for Geometry 7-54
7.3.7.4 Basis for Mmax 7-54
7.3.7.5 Future Earthquake Characteristics 7-55
7.3.8 Atlantic Highly Extended Crust Zone (AHEX) 7-55
7.3.8.1 Basis for Defining Seismotectonic Zone 7-56
7.3.8.2 Basis for Geometry 7-57
7.3.8.3 Basis for Mmax 7-57
7.3.8.4 Future Earthquake Characteristics 7-57
7.3.9 Extended Continental Crust–Gulf Coast Zone (ECC-GC) 7-58
7.3.9.1 Basis for Defining Seismotectonic Zone 7-58
7.3.9.2 Basis for Zone Geometry 7-59
7.3.9.3 Basis for Zone Mmax 7-62
7.3.9.4 Future Earthquake Characteristics 7-63
7.3.9.5 Possible Paleoliquefaction Features in Arkansas, Louisiana, and Mississippi 7-64
7.3.10 Gulf Coast Highly Extended Crust Zone (GHEX) 7-65
7.3.10.1 Basis for Defining Seismotectonic Zone 7-66
7.3.10.2 Basis for Zone Geometry 7-66
7.3.10.3 Basis for Zone Mmax 7-66
7.3.10.4 Future Earthquake Characteristics 7-67
7.3.11 Oklahoma Aulacogen Zone (OKA) 7-68
7.3.11.1 Basis for Defining Seismotectonic Zone 7-69
7.3.11.2 Basis for Zone Geometry 7-69
7.3.11.3 Basis for Zone Mmax 7-70
7.3.11.4 Future Earthquake Characteristics 7-70
7.3.12 Midcontinent-Craton Zone (MidC) 7-70
7.3.12.1 Background 7-71

7.3.12.2 Basis for Defining Seismotectonic Zone 7-76
7.3.12.3 Basis for Zone Geometry 7-77
7.3.12.4 Basis for Zone Mmax 7-77
7.3.12.5 Future Earthquake Characteristics 7-77
7.4 Maximum Magnitude Distributions for Seismotectonic Distributed Seismicity Sources 7-78
7.4.1 Maximum Observed Earthquake Magnitude 7-78
7.4.2 Mmax Distributions 7-79
7.5 Recurrence Parameters 7-80
7.5.1 Rate and b-Value Maps for Single Zone and Two Zones 7-80
7.5.2 Comparison of Recurrence Parameters to Catalog 7-80

_8_ DEMONSTRATION HAZARD CALCULATIONS 8-1
8.1 Background on Demonstration Hazard Calculations 8-1
8.2 Demonstration Hazard Calculations 8-2
8.2.1 Central Illinois Site 8-4
8.2.2 Chattanooga Site 8-5
8.2.3 Houston Site 8-6
8.2.4 Jackson Site 8-7
8.2.5 Manchester Site 8-9
8.2.6 Savannah Site 8-9
8.2.7 Topeka Site 8-10

_9_ USE OF THE CEUS SSC MODEL IN PSHA 9-1
9.1 Overview 9-1
9.2 Hazard Input Document (HID) 9-2
9.3 Implementation Instructions 9-2
9.3.1 Simplifications to Seismic Sources 9-2
9.3.1.1 Charleston RLME 9-3
9.3.1.2 Charlevoix RLME 9-3
9.3.1.3 Cheraw RLME 9-4
9.3.1.4 Commerce Fault Zone RLME 9-5
9.3.1.5 Eastern Rift Margin North RLME 9-5
9.3.1.6 Eastern Rift Margin South RLME 9-5
9.3.1.7 Marianna RLME 9-6
9.3.1.8 Meers RLME 9-6

9.3.1.9 New Madrid Fault System RLME 9-7
9.3.1.10 Wabash Valley RLME 9-7
9.3.1.11 Background Sources 9-8
9.3.2 Accessing the SSC Model and Components from the Website 9-8
9.3.3 Accessing Project Databases 9-9
9.3.4 Use of SSC Model with Site-Specific Refinements 9-10
9.4 Hazard Significance 9-10
9.4.1 Data Available to Evaluate the Precision of Seismic Hazard Estimates 9-10
9.4.2 Observed Imprecision in Seismic Hazard Estimates 9-11
9.4.2.1 Area Seismic Sources 9-11
9.4.2.2 RLME Seismic Sources 9-12
9.4.2.3 Ground Motion Equations 9-15
9.4.2.4 Site Response 9-19
9.4.3 Conclusions on the Precision in Seismic Hazard Estimates 9-19

***10* REFERENCES 10-1**

***11* GLOSSARY OF KEY TERMS 11-1**

***A* DESCRIPTION OF THE CEUS SSC PROJECT DATABASE A-1**
A.1 Data Sources A-2
A.2 Project Database Design and Management A-3
A.3 Workflow and Data Assessment A-3
A.3.1 Workflow A-3
A.3.2 Digital Data A-4
A.3.3 Nondigital Data A-4
A.4 Use of Project Database in Model Development A-5
A.5 Metadata A-5
A.6 Database Delivery Format A-6

***B* EARTHQUAKE CATALOG DATABASE B-1**
B.1 CEUS SSC Uniform Moment Magnitude Earthquake Catalog B-1
B.2 Moment Magnitude Data B-2
B.3 Approximate Moment Magnitude Data B-3
B.4 CEUS SSC Project Data B-3

_C_ DATA EVALUATION TABLES C-1

Introduction C-2

_D_ DATA SUMMARY TABLES D-1

Introduction D-2

_E_ CEUS PALEOLIQUEFACTION DATABASE, UNCERTAINTIES ASSOCIATED WITH PALEOLIQUEFACTION DATA, AND GUIDANCE FOR SEISMIC SOURCE CHARACTERIZATION ..... E-i

E.1 Development of the Paleoliquefaction Database E-1

E.1.1 Database Structure E-1

E.1.2 Regional Data Sets E-4

E.2 Uncertainties Associated with Paleoliquefaction Data E-24

E.2.1 Collection of Paleoliquefaction Data E-24

E.2.2 Uncertainties Related to Interpretation of Paleoliquefaction Data E-35

E.2.3 Recommendations for Future Research E-43

E.3 Guidance for the Use of Paleoliquefaction Data in Seismic Source Characterization E-44

E.4 Glossary E-46

E.5 References E-49

E.5.1 References Cited in Paleoliquefaction Database E-49

E.5.2 References Cited in Appendix E E-54

_F_ WORKSHOP SUMMARIES F-1

WORKSHOP 1: KEY ISSUES AND AVAILABLE DATA

DAY 1–TUESDAY, JULY 22, 2008 ..... F-1

DAY 2–WEDNESDAY, JULY 23, 2008 ..... F-10

REFERENCES F-17

WORKSHOP 2: ALTERNATIVE INTERPRETATIONS

DAY 1–WEDNESDAY, FEBRUARY 18, 2009 ..... F18

DAY 2–THURSDAY, FEBRUARY 19, 2009 ..... F-24

DAY 3–FRIDAY, FEBRUARY 20, 2009 ..... F-29

REFERENCES F-34

WORKSHOP 3: FEEDBACK

DAY 1–TUESDAY, AUGUST 25, 2009 ..... F-42

DAY 2–WEDNESDAY, AUGUST 26, 2009 ..... F-49

_G_ BIOGRAPHIES OF PROJECT TEAM G-1
EPRI MANAGEMENT G-2
PROJECT MANAGER G-2
TI TEAM G-3
TECHNICAL SUPPORT G-7
DATABASE MANAGER G-9
PARTICIPATORY PEER REVIEW PANEL G-9
SPONSOR REVIEWERS G-14

_H_ CEUS SSC MODEL HAZARD INPUT DOCUMENT (HID) H-1
H.1 Introduction H-1
H.2 Seismic Source Model Structure and Master Logic Tree H-1
H.3 Mmax Zones Distributed Seismicity Sources H-2
H.3.1 Division of Study Region H-2
H.3.2 Location of Boundary of Mesozoic Extension H-2
H.3.3 Magnitude Interval Weights for Fitting Earthquake Occurrence Parameters H-2
H.3.4 Mmax Zones H-2
H.3.5 Seismogenic Crustal Thickness H-2
H.3.6 Future Earthquake Rupture Characteristics H-3
H.3.7 Assessment of Seismicity Rates H-3
H.3.8 Degree of Smoothing Applied in Defining Spatial Smoothing of Seismicity Rates H-3
H.3.9 Uncertainty in Earthquake Recurrence Rates H-3
H.3.10 Uncertainty in Maximum Magnitude H-4
H.4 Seismotectonic Zones H-4
H.4.1 Alternative Zonation Models H-4
H.4.2 Magnitude Interval Weights for Fitting Earthquake Occurrence Parameters H-4
H.4.3 Seismotectonic Zones H-5
H.4.4 Seismogenic Crustal Thickness H-5
H.4.5 Future Earthquake Rupture Characteristics H-5
H.4.6 Assessment of Seismicity Rates H-5
H.4.7 Degree of Smoothing Applied in Defining Spatial Smoothing of Seismicity Rates H-5
H.4.8 Uncertainty in Earthquake Recurrence Rates H-5
H.4.9 Uncertainty in Maximum Magnitude H-6
H.5 RLME Sources H-6

H.5.1 Charlevoix RLME Seismic Source Model H-6
H.5.2 Charleston RLME Seismic Source Model H-7
H.5.3 Cheraw RLME Seismic Source Model H-9
H.5.4 Meers RLME Seismic Source Model H-11
H.5.5 New Madrid Fault System RLME Seismic Source Model H-12
H.5.6 Eastern Rift Margin Fault RLME Seismic Source Model H-14
H.5.7 Marianna Zone RLME Seismic Source Model H-15
H.5.8 Commerce Fault RLME Seismic Source Model H-16
H.5.9 Wabash Valley RLME Seismic Source Model H-18

_I_ PPRP REVIEW COMMENTS I-1
CORRESPONDENCE—CONTENTS I-3
Participatory Peer Review Panel (PPRP) Letters I-3
Technical Integration (TI) Team and Project Manager (PM) Response to PPRP Letters I-4

_J_ MAGNITUDE-RECURRENCE MAPS FOR ALL REALIZATIONS AND ALL SOURCE-ZONE CONFIGURATIONS J-1

_K_ SCR DATABASE USED TO DEVELOP MMAX PRIOR DISTRIBUTIONS K-1
K.1 SCR Earthquake Catalog K-1
K.2 SCR Crustal Domains K-3

_L_ QUALITY ASSURANCE L-1
L.1 BACKGROUND L-1
L.2 CEUS SSC PROJECT L-2
L.2.1 Introduction L-2
L.3 BEST BUSINESS PRACTICES L-3
L.3.1 General L-3
L.4 CEUS SSC EARTHQUAKE CATALOG DEVELOPMENT L-3
L.4.1 External Review of Earthquake Catalog L-3
L.4.2 Simulation Testing L-4
L.4.3 Checks for Consistency in Magnitude Conversion from Intensity L-4
L.4.4 Use of Verified Computer Programs L-4
L.5 RECURRENCE ANALYSIS AND SPATIAL SMOOTHING L-4
L.5.1 Introduction L-4
L.5.2 Recurrence Comparisons at the Source-Zone Level L-5

L.5.3 Recurrence Comparisons for Portions of a Source Zone L-5
L.5.4 Examination of Recurrence Maps L-5
L.5.5 Test with a Synthetic Catalog Homogeneous Seismicity L-5
L.5.6 Test for the Adequacy of Eight Maps to Represent Epistemic Uncertainty L-6
L.6 HAZARD CALCULATION SOFTWARE L-6
L.6.1 Introduction L-6
L.6.2 Test for the Treatment of Variable b L-6
L.6.3 Test for the Treatment of Dipping Ruptures Within a Source Zone L-6
L.6.4 Tests for Treatment of Epistemic Uncertainty from Sources that Make Small Contribution to Hazard L-6