C

APPENDIX DATA EVALUATION TABLES

Default Source Characteristics for CEUS SSC Project Study Region

Table C-5.4	Future Earthquake Characteristics

RLME Sources

Table C-6.1.1	Charlevoix RLME
Table C-6.1.2	Charleston RLME
Table C-6.1.3	Cheraw Fault RLME
Table C-6.1.4	Oklahoma Aulacogen RLME
Table C-6.1.5	Reelfoot Rift–New Madrid Fault System RLMEs
Table C-6.1.6	Reelfoot Rift–Eastern Margin Fault RLME
Table C-6.1.7	Reelfoot Rift–Marianna RLME
Table C-6.1.8	Reelfoot Rift–Commerce Fault Zone RLME
Table C-6.1.9	Wabash Valley RLME

Seismotectonic Zones

Table C-7.3.1	St. Lawrence Rift Zone (SLR)
Table C-7.3.2	Great Meteor Hotspot Zone (GMH)
Table C-7.3.3	Northern Appalachian Zone (NAP)
Table C-7.3.4	Paleozoic Extended Crust Zone (PEZ; narrow [N] and wide [W])
Table C-7.3.5	Illinois Basin-Extended Basement Zone (IBEB)
Table C-7.3.6	Reelfoot Rift Zone (RR; including Rough Creek Graben [RR-RCG])
Tables C-7.3.7/7.3.8	Extended Continental Crust Zone–Atlantic Margin (ECC-AM) and Atlantic Highly Extended Crust (AHEX)
Tables C-7.3.9/7.3.10	Extended Continental Crust Zone–Gulf Coast (ECC-GC) and Gulf Coast Highly Extended Crust (GHEX)
[No Table C-7.3.11]	[Oklahoma Aulacogen (OKA); see Table C-6.1.4]
Table C-7.3.12	Midcontinent-Craton Zone (MidC)

Mmax Zones

Criteria for defining the MESE/NMESE boundary for the two-zone alternative are discussed in Section 6.2.2. MESE-N includes ECC-AM, ECC-GC, AHEX, GHEX, RR, SLR, NAP, GMH, and PEZ-N. MESE-W differs from MESE-N in that it adopts the wide alternative geometries (i.e., PEZ-W, RR-RCG, and IBEB). See tables listed above for data pertinent to the definition of the boundaries of the zones and evidence for Mesozoic and younger tectonism. Default future earthquakes rupture parameters (Table 4.1.3-1) are assigned to both the one-zone and two-zone Mmax sources.

Introduction

The Data Evaluation tables were developed to identify the data used, to evaluate the quality of the data, and to specify the degree of reliance on each data set in characterizing seismic sources. Labeling of Data Evaluation tables is keyed to the specific chapter and section where the corresponding source is described. Full citations of references listed in the tables are provided in Chapter 10.

The Data Evaluation tables include the following attributes:

- The first column is a listing of the data, by data type, used in the evaluation for a particular RLME or seismotectonic source. See Appendix A for information regarding the sources for data sets specific to the CEUS SSC Project.
- The second column is an assessment of the quality of the data by the TI Team. This assessment is qualitative and takes into account the resolution, completeness, and distribution of the data relative to the best data of that type currently available. In some cases the assessment of the quality of a particular data set differs somewhat for different seismic sources. This is a reflection of the perceived value of the particular data set toward addressing the SSC characteristics of each seismic source.
- The third column is used for notes about the data quality. This usually includes comments about whether the data have been published in abstract form or full papers and other issues regarding the defensibility of the data.
- The fourth column identifies the particular seismic source to which the data have been applied in the evaluation.
- The fifth and sixth columns provide an assessment of the degree of reliance on the data set for purposes of SSC, and a short description of how the data were relied on. The intent is to assist the reader in understanding how the data set was used and what the evaluation of the degree of reliance was based on.
- The seventh column indicates whether the data exists in GIS format within the project database. If the data are not in GIS format, they will be found in the database in other formats such as a PDF file.

Although many different types of data were considered for the characterization of each seismic source, not all data types were used (e.g., some types of geophysical data or seismological data [such as focal mechanisms] are either not available or have limited usefulness for defining or characterizing a particular seismic source). Therefore, not all of the data types that were considered are listed in the tables. All data that were considered are included in the Data Summary tables (see Appendix D). Additional information on the Data Evaluation tables is provided in Section 4.1.2.2. Finally, please note that magnitudes are reported in the magnitude scale designated in the cited publication.

Table C-5.4 Data Evaluation
Future Earthquake Characteristics

Identified Source
Default for entire CEUS SSC

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Instrumental Seismicity						
Atkinson (2004)	4	Compilation of digital seismograms from 186 earthquakes in southeastern Canada and northeastern United States from 1990 to 2003.	All sources	3	Used for focal depth distribution, but range of magnitudes is only 2.5–5.6, so little constraint on larger magnitudes.	N
CEUS SSC earthquake catalog	5	Comprehensive catalog; includes magnitude conversions and uncertainty assessments.	All sources	2	Provides information on focal depth, but quality varies across region.	Y
Chapman et al. (1997)	5	Eastern Tennessee well-constrained focal mechanism solutions derived using a new velocity model and relocated hypocenters.	All sources	4	Used for assessing sense of slip and focal depths.	N
Dineva et al. (2004)	4	Relocated earthquakes in the 1990–2001 period in the southern Great Lakes and three focal mechanisms.	All sources	2	Used for sense of slip but very few events.	N

Table C-5.4 Data Evaluation
Future Earthquake Characteristics

Identified Source
Default for entire CEUS SSC

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Horton et al 2005)	4	Compilation of better focal mechanisms in Reelfoot, Rough Creek, and Wabash Valley	All sources	3	Used for assessing sense of slip.	N
Kim (2003)	4	Assessment of the June 18, 2002, Caborn, Indiana, earthquake (MW 4.6) using regional and teleseismic waveform data.	All sources	1	Provides information on focal depth and sense of slip in Wabash Valley area; very localized.	N
Kim and Chapman (2005)	4	Detailed study of 2003 event in central Virginia using regional waveforms.	All sources	2	Provides information on depth and sense of slip, but very few events.	N
Mai (2005)	3	Compilation of data related to hypocenter depths in relation to the normalized downdip width of fault rupture for crustal faults.	All sources	3	Used to assess the expected depth distribution of earthquakes as a function of earthquake magnitude.	N
S. Mazzotti (CEUS SSC WS2 presentation)	3	Compilation of focal mechanisms in the St. Lawrence in the Charlevoix area.	All sources	3	Includes events having range of data quality.	N

Table C-5.4 Data Evaluation
Future Earthquake Characteristics

Identified Source
Default for entire CEUS SSC

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Seeber et al. (1998)	3	Local study of Cacoosing Valley earthquakes near Reading, Pennsylvania.	All sources	1	Local study with information on focal depth and sense of slip.	N
Shumway (2008)	5	Special study in New Madrid area with new velocity profile.	All sources	4	High quality focal mechanisms, locations, and focal depths for sense of slip.	N
Sibson (1984)	2	Compilation and physical analysis of earthquake focal depths for larger crustal earthquakes.	All sources	3	Provides a basis for assessing the width of the seismogenic zone using earthquake hypocenters; roughly the 95th percentile cutoff of seismicity.	N
Sibson and Xie (1998)	3	Compilation of fault dips moderate to large (M > 5.5) reverse-slip intracontinental earthquakes with the slip-vector raking 90 ± 30° in the fault plane.	All sources	3	Global compilation used to constrain the dips of reverse faults.	N
Somerville et al. (2001)	3	Compilation of modeling-derived rupture areas and seismic moment for eastern North America earthquakes.	All sources	5	Provides preferred rupture area vs magnitude relationship.	N

Table C-5.4 Data Evaluation
Future Earthquake Characteristics

Identified Source
Default for entire CEUS SSC

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Sykes et al. (2008)	4	High-quality earthquake locations and focal depths in the New York region.	All sources	3	Good quality focal depths for a local region, limited magnitude range.	N
Talwani (CEUS SSC WS2)	3	Compilation of focal mechanisms and focal depths in the Charleston, South Carolina, area.	All sources	3	Variable data quality but good compilation of data for this region.	N
Tanaka (2004)	5	High quality and large numbers of well-determined focal depths for Japanese earthquakes, as well as extensive compilation of thermal measurements.	All sources	5	Provides strong technical basis for the correlation between the maximum crustal thickness and D_{90}, which is the depth above which 90% of the seismicity lies.	N
van Lanen and Mooney (2007)	3	Compilation of earthquake focal depth in eastern North America as a function of moment magnitude.	All sources	3	Good compilation but variable data quality; used for depth as function of magnitude.	N
Regional Stress						
CEUS SSC stress data set	5	Includes additional data points not shown on World Stress Map.	All sources	3	Provides indications of the expected tectonic stress regime and the sense of slip.	Y

Table C-5.4 Data Evaluation
Future Earthquake Characteristics

Identified Source
Default for entire CEUS SSC

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Zoback (1992)	3	Based on focal mechanisms available in late 1980s.	All sources	2	Used to assess the amount of strike-slip versus thrust faulting in the CEUS; also provides indications of orientations of ruptures.	N
Tectonic Strain–Paleoseismicity						
Wesnousky (2008)	4	Compilation of empirical data regarding the seismologic and geologic characteristics of earthquake ruptures.	All sources	3	Used for relationship between fault length-to-width aspect ratio versus magnitude for future ruptures.	N
Geologic Mapping						
Marshak and Paulsen (1997)	3	Maps based on regional-scale extrapolations of local data sets.	All sources	2	Used to confirm the presence of potential northwest-trending future earthquake rupture orientations.	N
Other						
NAGRA (2004)	3	Assessments from expert panel of rupture width as function of magnitude.	All sources	4	Used for characterizing the depth distribution of future earthquake ruptures using the focal depth distribution of observed hypocenters.	N

Table C-5.4 Data Evaluation
Future Earthquake Characteristics

Identified Source
Default for entire CEUS SSC

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Sibson (2007)	3	Assessment of base of seismogenic zone based on physical constraints.	All sources	2	Provides physical basis for estimating depth of seismogenic zone from seismicity; confirms magnitude dependence of focal depths.	N

Table C-6.1.1 Data Evaluation
Charlevoix RLME

Identified Source
Charlevoix RLME within the St. Lawrence Rift Zone

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Instrumental Seismicity						
CEUS SSC earthquake catalog	5	Comprehensive catalog; includes magnitude conversions and uncertainty assessments.	Charlevoix	5	Used to evaluate recurrence parameters.	Y
Lamontagne and Ranalli (1997)	5	Relocated hypocentral depth.	Charlevoix	5	Used to evaluate thickness of seismogenic crust and style of faulting.	Y
Historical Seismicity						
CEUS SSC earthquake catalog	5	Comprehensive catalog; includes magnitude conversions and uncertainty assessments.	Charlevoix	5	Largest historical earthquake in the CEUS SSC earthquake catalog is the 1663 Charlevoix earthquake	Y
Ebel (1996)	3	Determined magnitude from felt effects.	Charlevoix	5	Used to evaluate maximum magnitude.	Y
Ebel (2006b)	3	Determined magnitude from felt effects.	Charlevoix	5	Used to evaluate maximum magnitude.	N

Table C-6.1.1 Data Evaluation
Charlevoix RLME

Identified Source
Charlevoix RLME within the St. Lawrence Rift Zone

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Ebel (2009)	3	Determined magnitude from felt effects and attenuation relationships.	Charlevoix	5	Used to evaluate maximum magnitude.	N
Lamontagne et al. (2008)	4	Earthquake parameters and felt effects for major Canadian earthquakes.	Charlevoix	4	Magnitudes derived from special studies are cited directly in CEUS SSC earthquake catalog.	Y
Magnetic Anomaly						
CEUS SSC magnetic data set	5	High-quality regional data	Charlevoix	1	The Charlevoix zone is not subdivided based on different basement terranes or tectonic features imaged in the magnetic anomaly map.	Y
Gravity Anomaly						
CEUS SSC gravity data set	5	High-quality regional data	Charlevoix	1	The Charlevoix zone is not subdivided based on different basement terranes or tectonic features imaged in the gravity anomaly map.	Y

Table C-6.1.1 Data Evaluation
Charlevoix RLME

Identified Source
Charlevoix RLME within the St. Lawrence Rift Zone

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Seismic Reflection						
Tremblay et al. (2003)	3	Relocates offshore SQUIP data	Charlevoix	2	Images a transition from a half graben to a graben of the St. Lawrence fault within the St. Lawrence estuary.	N
Local Geologic and Tectonic Maps						
Lemieux et al. (2003)	4	Delineates spatial relationship between rift faults and impact crater.	Charlevoix	5	Used for source geometry.	N
Tremblay et al. (2003)	4	Delineates relationship between rift faults and impact crater.	Charlevoix	5	Used for source geometry.	N
Geodetic Strain						
Mazzotti and Adams (2005)	3	Seismic moment rate of 0.1–5.0 1017 Nm/yr for Charlevoix.	Charlevoix	3	Provides a model for localizing earthquakes at Charlevoix	N
Regional Stress						
Baird et al., (2009)	4	Performs 2-D stress modeling of the impact crater and rift faults.	Charlevoix	5	Modeling results confirm source geometry.	N

Table C-6.1.1 Data Evaluation
Charlevoix RLME

Identified Source
Charlevoix RLME within the St. Lawrence Rift Zone

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
CEUS SSC stress data set	4	Provides additional new measurements to World Stress Map.	Charlevoix	1	Data includes thrust mechanisms with minor strike-slip. Orientations vary from E-W to NE-SW.	Y
Heidbach et al. (2008) (World Stress Map)	3	Compilation of worldwide stress data.	Charlevoix	2	Entries for SLR are predominantly thrust mechanisms with some strike-slip. Orientations of maximum horizontal stress vary from E-W to NE-SW.	Y
Focal Mechanisms						
Bent (1992)	3	Analyzed historical waveforms for 1925 earthquake.	Charlevoix	4	Used to characterize future ruptures.	N
Lamontagne (1999)	4	Determined focal mechanisms for Charlevoix earthquakes.	Charlevoix	4	Used to characterize future ruptures.	N
Lamontagne and Ranalli (1997)	4	Well-constrained focal mechanisms within the Charlevoix seismic zone.	Charlevoix	2	Thrust focal mechanisms correspond to larger-magnitude events, whereas smaller-magnitude events display greater variation in nodal planes corresponding to reactivation of fractures.	N
Li et al. (1995)	4	Determined focal mechanisms for two M 4 earthquakes.	Charlevoix	4	Used to characterize future ruptures.	N

Table C-6.1.1 Data Evaluation
Charlevoix RLME

Identified Source
Charlevoix RLME within the St. Lawrence Rift Zone

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Paleoseismicity						
Tuttle and Atkinson (2010)	4	Results of regional paleoliquefaction study in Charlevoix.	Charlevoix	4	Mmax assessment—Evidence for prehistoric earthquakes in Charlevoix area. Suggests stationarity of large-magnitude earthquakes in Charlevoix.	Y
CEUS SSC paleoliquefaction database	5	Compilation (with attributions) of paleoliquefaction observations	Charlevoix	4	Contains data presented in Tuttle and Atkinson (2010).	Y
Dionne (2001)	4	Detailed mapping and dating of Holocene deposits.	Charlevoix	5	Evidence of mid-Holocene sea-level lowstand may result in incompleteness interval.	N
Doig (1990)	3	Documents silt layers in cores attributed to earthquake-induced landslides.	Charlevoix	2	Uncertain magnitude estimates difficult to relate specifically to recurrence.	N
Filion et al. (1991)	3	Provides ages for prehistoric landslides attributed to earthquakes.	Charlevoix	2	Uncertain magnitude estimates difficult to relate specifically to recurrence.	N

Table C-6.1.2 Data Evaluation
Charleston RLME

Identified Sources
Charleston RLME with alternatives: L: Local; R: Regional; N: Narrow

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Instrumental Seismicity						
CEUS SSC earthquake catalog	5	Comprehensive catalog; includes magnitude conversions and uncertainty assessments.	L, R, N	5	Highest concentration of seismicity located in local Charleston area. Possible association of seismicity with offshore Helena Banks fault. Locations of Middleton Place–Summerville and Bowman seismic zones. Magnitudes of the earthquakes in the Adams Run seismic zone (coda magnitudes [M_C] < 2.3) are too small to appear in the CEUS SSC earthquake catalog.	Y
Madabhushi and Talwani (1993)	3	Total of 58 instrumentally recorded earthquakes between 1980 and 1991 with M_D 0.8–3.3 in Charleston area.	L	4	Mapped location of Middleton Place–Summerville seismic zone.	Y
Smith and Talwani (1985)	2	Abstract describing location of Bowman seismic zone and gravity surveys conducted in vicinity of Bowman seismic zone.	N	1	Abstract provides brief description of location of Bowman seismic zone.	Y

Table C-6.1.2 Data Evaluation
Charleston RLME

Identified Sources
Charleston RLME with alternatives: L: Local; R: Regional; N: Narrow

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
South Carolina Seismic Network (2005)	4	Tabulation of microseismicity in Charleston area, recorded between 1974 and 2002.	L, N	4	Includes local Charleston earthquakes with magnitudes smaller than those listed in the CEUS SSC earthquake catalog. Spatially concentrated in 1886 epicentral area.	Y
Tarr et al. (1981)	2	Instrumentally recorded microseismicity in the Charleston area between 1973 and 1979.	L	2	Mapped locations of the Middleton Place–Summerville, Bowman, and Adams Run seismic zones.	N
Tarr and Rhea (1983)	2	Instrumentally recorded microseismicity in the Charleston area between 1973 and 1979.	L	2	Mapped locations of the Middleton Place–Summerville, Bowman, and Adams Run seismic zones.	N
Historical Seismicity						
Bakun and Hopper (2004b)	5	Preferred 1886 magnitude estimate based on assumed location at Middleton Place–Summerville seismic zone.	L, R, N	5	Magnitude of 1886 Charleston earthquake is estimated between M_w 6.4 and 7.2 (at 95% confidence level), with preferred estimate of M_w 6.9.	Y

Table C-6.1.2 Data Evaluation
Charleston RLME

Identified Sources
Charleston RLME with alternatives: L: Local; R: Regional; N: Narrow

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Bollinger (1977)	5	Isoseismal determinations for 1886 earthquake, based on reinterpretation of Dutton's (1889) basic intensity data.	L	5	Maximum epicentral intensity MMI X, with MMI IX in city of Charleston. Isoseismals define roughly coast-parallel elongation. Magnitude of 1886 earthquake estimated at m_b 6.8 to 7.1.	Y
Bollinger (1983)	3	Poorly constrained estimate of seismogenic crustal thickness at Charleston.	L, R, N	3	Estimates 1886 earthquake at m_b 6.7, with rupture length approximately 25 km, width approximately 12 km, average slip 1 m, based on empirical relations. Notes ongoing microseismicity concentrated in 1886 meizoseismal area.	Y
Bollinger (1992)	4	Estimate of seismogenic crustal thickness at Charleston.	L, R, N	4	Seismic source characterization for the Savannah River Site describes input parameters for PSHA, including seismogenic crustal thickness estimates of 14 and 25 km, respectively, for "Local Charleston" and "SC Piedmont and Coastal Plain" seismic sources.	Y

Table C-6.1.2 Data Evaluation
Charleston RLME

Identified Sources
Charleston RLME with alternatives: L: Local; R: Regional; N: Narrow

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Chapman and Talwani (2002)	4	Estimate of seismogenic crustal thickness at Charleston.	L, R, N	4	Seismic source characterization for South Carolina Department of Transportation describes input parameters for PSHA, including seismogenic crustal thickness estimate of 25 km.	N
Dutton (1889)	4	Intensity data and mapping of liquefaction “craterlets” for the 1886 earthquake.	L	2	Intensity data not explicitly used in source characterization, but these data later reinterpreted by Bollinger (1977), Bakun and Hopper (2004b), and others. Descriptions of largest and most spatially concentrated liquefaction “craterlets” near Charleston used, in part, to define epicentral region of 1886 earthquake.	N
Johnston (1996b)	4	Johnston (1996b) magnitude estimate for 1886 earthquake is significantly lower than Johnston et al. (1994) estimate of 7.56 ± 0.35.	L, R, N	5	Magnitude estimate for 1886 Charleston earthquake of M_w 7.3 ± 0.26 based on isoseismal area regression accounting for eastern North America anelastic attenuation.	N
Martin and Clough (1994)	4	Magnitude estimate based on critical reassessment of available data.	L, R, N	4	Magnitude estimate for 1886 Charleston earthquake of M_w 7.0 to 7.5 based on geotechnical assessment of 1886 liquefaction data.	N

Table C-6.1.2 Data Evaluation
Charleston RLME

Identified Sources
Charleston RLME with alternatives: L: Local; R: Regional; N: Narrow

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Silva et al. (2003)	4	Estimate of seismogenic crustal thickness at Charleston.	L, R, N	4	Estimates of seismogenic crustal thickness at Charleston of 16 and 20 km, inferred from contemporary seismicity.	N
Talwani (1982)	3	Early depiction of Woodstock fault, refined and superseded by subsequent publications.	N	2	Relocated seismicity in the 1886 meizoseismal area suggests (1) right-lateral strike-slip events on the NE-striking Woodstock fault; and (2) SW-side-up thrust events on the NW-striking Ashley River fault.	N
Magnetic Anomaly						
CEUS SSC magnetic data set	5	High-quality regional data	R	2	Reviewed in defining the regional source configuration.	Y
Gravity Anomaly						
CEUS SSC gravity data set	5	High-quality regional data	R	2	Reviewed in defining the regional source configuration.	Y
Seismic Reflection						

Table C-6.1.2 Data Evaluation
Charleston RLME

Identified Sources
Charleston RLME with alternatives: L: Local; R: Regional; N: Narrow

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Behrendt et al. (1981)	4	Data suggest onshore faulting but do not provide unambiguous constraints on fault geometry and upward terminations within Coastal Plain sediments.	L, R	4	Subsurface fault mapping in 1886 epicentral area, including the proposed Cooke fault.	N
Behrendt et al. (1983)	4	High-resolution, multichannel seismic-reflection data clearly image the Helena Banks fault. Surveys limited to ~50 km SW and NE offshore of Charleston.	R	4	Mapping and age estimate of offshore Helena Banks fault.	N
Behrendt and Yuan (1987)	4	High-resolution, multichannel seismic-reflection data clearly image the Helena Banks fault. Surveys limited to ~50 km SW and NE offshore of Charleston.	R	4	Mapping and age estimate of offshore Helena Banks fault.	Y

Table C-6.1.2 Data Evaluation
Charleston RLME

Identified Sources
Charleston RLME with alternatives: L: Local; R: Regional; N: Narrow

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Chapman and Beale (2008)	5	"Fault C" clearly imaged in reprocessed seismic reflection line. Orientation, length, and upward termination of fault currently unresolved. Strike and length of "fault C" inferred from alignment of possible faults in adjacent seismic lines. Fault at least as young as Miocene or possibly Pliocene.	L, N	5	"Fault C" postulated to be fault that ruptured in 1886 Charleston earthquake. Location used in defining Local source configuration.	Y
Chapman and Beale (2010)	5	Reprocessed seismic reflection data suggest the 1886 epicentral area lies within a zone of extensive upper crustal faulting, but does not constrain geometry/extent of possible faults.	L, N	5	"Fault C" postulated to be fault that ruptured in 1886 Charleston earthquake. Location used in defining Local source configuration.	Y

Table C-6.1.2 Data Evaluation
Charleston RLME

Identified Sources
Charleston RLME with alternatives: L: Local; R: Regional; N: Narrow

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Hamilton et al. (1983)	4	Data suggest onshore faulting but do not provide unambiguous constraints on fault geometry and upward terminations within Coastal Plain sediments.	L, R	4	Postulated Cooke, Gants, and Drayton faults in Charleston 1886 epicentral area. Strikes, lengths, and ages not well constrained.	N
Marple and Miller (2006)	2	Data suggesting the existence of the proposed Berkeley fault are equivocal. Paper includes useful summary of data used by others to constrain previously proposed faults near Charleston.	L, N	2	Marple and Miller (2006) call into question the existence of the Adams Run fault of Weems and Lewis (2002).	N
Regional Geologic and Tectonic Maps						
Nystrom (1996)	4	Simplified seismic hazard map of South Carolina Coastal plain with minimal documentation.	L, R, N	1	Map roughly outlines those areas of coastal South Carolina most susceptible to liquefaction.	N

Table C-6.1.2 Data Evaluation
Charleston RLME

Identified Sources
Charleston RLME with alternatives: L: Local; R: Regional; N: Narrow

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Local Geologic and Tectonic Maps						
Bartholomew and Rich (2007)	2	Authors postulate Dorchester fault in 1886 epicentral area based on indirect evidence.	L	2	Subsurface fault mapping in 1886 epicentral area.	Y
Colquhoun et al. (1983)	3	Data suggesting the existence of proposed Charleston and Garner-Edisto faults are equivocal.	L	3	Early mapping of the proposed Charleston and Garner-Edisto faults based on subsurface stratigraphy and borehole control.	N
Dura-Gomez and Talwani (2009)	4	Article presents minor modifications to previously mapped subsurface faults near Charleston.	L, N	3	Slightly revised mapping of faults in the subsurface near Middleton Place–Summerville seismic zone.	N
Marple and Miller (2006)	4	Data suggesting existence of the proposed Berkeley fault are equivocal. Paper includes useful summary of data used by others to constrain previously proposed faults near Charleston.	L, N	3	Marple and Miller (2006) call into question the existence of the Adams Run fault of Weems and Lewis (2002).	N

Table C-6.1.2 Data Evaluation
Charleston RLME

Identified Sources
Charleston RLME with alternatives: L: Local; R: Regional; N: Narrow

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Marple and Talwani (1993)	4	Early depiction of Zone of River Anomalies and Woodstock fault, refined and superseded by subsequent publications.	L, N	1	Early mapping of Zone of River Anomalies and proposed Woodstock fault. Superseded by subsequent publications.	N
Marple and Talwani (2000)	4	Zone of River Anomalies proposed as tectonic feature, based on equivocal geomorphologic, seismic, and geophysical data. Data suggesting existence of southern segment are more robust than those for central and northern segments.	N	3	Identification of Zone of River Anomalies expands on earlier work (e.g., Marple and Talwani 1993).	Y
McCartan et al. (1984)	4	No faults mapped.	L, R, N	1	Geologic mapping at 1:250,000 scale of greater Charleston area.	N
Talwani and Dura-Gomez (2009)	4	Minor modifications to previously mapped subsurface faults near Charleston.	L, N	3	Subsurface fault mapping in 1886 epicentral area.	Y

Table C-6.1.2 Data Evaluation
Charleston RLME

Identified Sources
Charleston RLME with alternatives: L: Local; R: Regional; N: Narrow

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Talwani and Katuna (2004)	4	Viable alternate explanations (ground-shaking-related) exist for postulated primary surface rupture.	L, N	3	Subsurface fault mapping in 1886 epicentral area. Postulated 1886 coseismic effects and potential surface rupture.	Y
Weems and Lewis (2002)	3	Viable alternate (nontectonic) explanations exist for mapped features, including Adams Run and Charleston faults.	L	4	Subsurface fault mapping in 1886 epicentral area.	Y
Geodetic Strain						
Trenkamp and Talwani (n.d.)	2	Study suffers from admitted monument instability, small number of surveys (three), and short period of GPS measurements (six years).	L, R, N	2	This as-yet-unpublished study presents campaign GPS data from a 20-station grid near Charleston that suggest average shear strain rate (~10^9 to 10^7 rad/yr) that is one to two orders of magnitude higher than the surrounding region. Largest interpreted strains located in Middleton Place–Summerville seismic zone and attributed to local fault intersections.	Y

Table C-6.1.2 Data Evaluation
Charleston RLME

Identified Sources
Charleston RLME with alternatives: L: Local; R: Regional; N: Narrow

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Paleoseismicity						
Amick and Gelinas (1991)	3	Short paper published in *Science* magazine; presents summary of data and interpretations described in more detail in other publications (e.g., Amick, Gelinas, et al., 1990; and Amick, Maurath, and Gelinas, 1990).	L, R, N	5	Largest paleoliquefaction features are at sites near Charleston, suggesting repeated large earthquakes near Charleston. Majority of paleoliquefaction features can be explained by a source near Charleston, but suggest the possibility of a separate (moderate?) source located ~100 km northeast.	N
Amick, Gelinas, et al. (1990)	4	Areas searched in which no features found are identified by 7.5-minute quadrangle only. Detailed reconnaissance maps not available.	L, R, N	5	Paleoliquefaction features found only in coastal Carolinas. Largest paleoliquefaction features are at sites near Charleston, suggesting repeated large earthquakes near Charleston. Return period for large (M ~ 7+) earthquakes near Charleston estimated at 500–600 years.	N

Table C-6.1.2 Data Evaluation
Charleston RLME

Identified Sources
Charleston RLME with alternatives: L: Local; R: Regional; N: Narrow

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Amick, Maurath, and Gelinas (1990)	4	Areas searched in which no features found are identified by 7.5-minute quadrangle only. Detailed reconnaissance maps not available.	L, R, N	5	Paleoliquefaction features found only in coastal Carolinas. Largest paleoliquefaction features are at sites near Charleston, suggesting repeated large earthquakes near Charleston. Return period for large (M ~ 7+) earthquakes near Charleston estimated at 500–600 years.	N
Dutton (1889)	4	Basic intensity data and mapping of liquefaction “craterlets” for the 1886 earthquake.	L, R, N	5	Observed greatest concentration of 1886 liquefaction “craterlets” at and north of Charleston.	N
Hu et al. (2002a)	3	Geotechnical data that form basis of Hu et al.’s (2002b) assessment of paleoearthquake magnitudes.	L, R, N	1	Background geotechnical data used by Hu et al. (2002b) to estimate geotechnical estimates of paleoearthquake magnitudes	N
Hu et al. (2002b)	3	Superseded by Leon et al. (2005) study, which includes two of the same three coauthors.	L, R, N	3	Geotechnical estimates of paleoearthquake magnitudes, based on Talwani and Schaeffer’s (2001) earthquake scenarios.	N

Table C-6.1.2 Data Evaluation
Charleston RLME

Identified Sources
Charleston RLME with alternatives: L: Local; R: Regional; N: Narrow

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Leon (2003)	3	Dissertation, relevant portions of which later published as and superseded by Leon et al. (2005).	L, R, N	3	Geotechnical estimates of paleoearthquake magnitudes. Assumes Talwani and Schaeffer’s (2001) earthquake scenarios.	N
Leon et al. (2005)	4	Geotechnical magnitude estimates for Charleston paleoearthquakes generally lower than previously identified (see Hu et al. 2002b).	L, R, N	4	Geotechnical estimates of paleoearthquake magnitudes. Assumes Talwani and Schaeffer’s (2001) earthquake scenarios.	N
Noller and Forman (1998)	3	Interpreted two or three paleoliquefaction events at Gapway Ditch site, where Amick, Gelinas, et al. (1990); Amick, Maurath, and Gelinas (1990); and Talwani and Schaeffer (2001) interpreted one paleoliquefaction event. No scale provided with exposure log.	L, R, N	3	Timing of paleoliquefaction events used to help constrain return period for large earthquakes at Charleston.	N

Table C-6.1.2 Data Evaluation
Charleston RLME

Identified Sources
Charleston RLME with alternatives: L: Local; R: Regional; N: Narrow

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Obermeier (1996b)	3	General overview of Charleston liquefaction and paleoliquefaction.	L, R, N	4	Large diameters (3+ m) of some prehistoric craters suggest these likely were caused by earthquakes “much stronger than M5 to 5.5.” (p. 350). Sandblow craters that formed roughly 600 and 1,250 yr BP extend along coast at least as far as 1886 features, suggesting that some prehistoric earthquakes likely may have been at least as large as 1886.	Y
Obermeier et al. (1989)	3	Description of liquefaction and paleoliquefaction feature size and spatial concentration are qualitative and not well documented, but taken as evidence for repeated large earthquakes located at or near Charleston.	L, R, N	4	Size and spatial concentration of both 1886 liquefaction and paleoliquefaction features are greatest near Charleston, and decrease with distance up and down the coast, despite similarities in liquefaction susceptibility throughout region. This indicates repeated large earthquakes located at or near Charleston.	N
Olson et al. (2005b)	5	Magnitude-bound relations calibrated for CEUS.	L, R, N	3	Magnitude-bound relations calibrated for CEUS. Used to help constrain source geometries.	N

Table C-6.1.2 Data Evaluation
Charleston RLME

Identified Sources
Charleston RLME with alternatives: L: Local; R: Regional; N: Narrow

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Talwani and Schaeffer (2001)	4	Paleoearthquake scenarios based on 1-sigma radiocarbon age constraints.	L, R, N	5	Tabulation of available paleoliquefaction data for Charleston region. Talwani and Schaeffer's (2001) 1-sigma radiocarbon age data were recalibrated to 2-sigma for use in CEUS SSC Project. Return period for large (M ~ 7+) earthquakes near Charleston estimated at 500–600 years.	N
Talwani et al. (2008)	2	Single undated paleoliquefaction feature does not provide any reliable constraints on timing, magnitude, or location of paleoearthquakes.	L, R, N	2	Paleoearthquake magnitude estimated at ~6.9 (scale unspecified) based on unspecified geotechnical analyses.	N
Weems and Obermeier (1990)	3	Early assessment of paleoliquefaction-based earthquake recurrence at Charleston, refined and superseded by more recent publications.	L, R, N	2	Describe evidence for three, and possibly four, middle to late Holocene earthquakes preserved in the geologic record as paleoliquefaction features, as well as evidence for events as old as 30,000 years.	N

Table C-6.1.3 Data Evaluation
Cheraw Fault RLME

Identified Source
Cheraw fault

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Instrumental Seismicity						
CEUS SSC earthquake catalog	5	Comprehensive catalog; includes magnitude conversions and uncertainty assessments.	Cheraw fault	0	No association of instrumental seismicity with the Cheraw fault.	Y
Historical Seismicity						
CEUS SSC earthquake catalog	5	Comprehensive catalog; includes magnitude conversions and uncertainty assessments.	Cheraw fault	0	No association of historical seismicity with the Cheraw fault.	Y
Magnetic Anomaly						
CEUS SSC magnetic anomaly data set	5	High-quality regional data	Cheraw fault	0	Cheraw fault not expressed as a distinct lineament in the magnetic anomaly map. General NE trend of the fault is subparallel to regional trends to the N and NW of the fault.	Y
Gravity Anomaly						
CEUS SSC gravity anomaly data set	5	High-quality regional data	Cheraw fault	0	Cheraw fault not imaged or apparent in the gravity data.	Y

Table C-6.1.3 Data Evaluation
Cheraw Fault RLME

Identified Source
Cheraw fault

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Regional Geologic and Tectonic Maps						
Scott et al. (1978)	4	Scale 1:250,000	Cheraw fault	0	Map source cited by Crone (1997) for bedrock fault. Not used directly for location of Cheraw RLME source geometry.	N
Sharps (1976)	4	Scale 1:250,000 Cited by Crone, Machette, Bradley, et al. (1997) as original map that identified the Sharps (1976) Cheraw fault.	Cheraw fault	0	Original map source cited by Crone (1997) for bedrock fault. Not used directly for location of Cheraw RLME source geometry.	N
Local Geologic and Tectonic Maps						
Petersen et al. (2008)	4	Source characterization parameters went through USGS community review process.	Cheraw fault	4	All parameters for Cheraw fault retained from 2002; fault modeled using a slip rate of 0.15 mm/yr based on data from last two events and a maximum magnitude of 7.0 ± 0.2 determined from the Wells and Coppersmith (1994) fault length relationship based on all slip types together. Fixed recurrence time of 17,400 years is used with truncated Gutenberg-Richter model from **M** 6.5 to 7.0. This yields a mean recurrence	N

Table C-6.1.3 Data Evaluation
Cheraw Fault RLME

Identified Source
Cheraw fault

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
					time of 5,000 years for earthquakes with minimum magnitude of 6.5. Fault source parameters (2008 hazard maps) http://gldims.cr.usgs.gov/webapps/cfusion/Sites/c2002_search/search_fault_2002.cfm— Length: 44 km (27.3 mi.) Dip: 60°N Slip rate: 0.15 mm/yr Width: 17 km (10.6 mi.) Characteristic magnitude: 7 (based on Ellsworth (2003) relation. Characteristic rate: 1.15E-04.	
USGS National Hazard Mapping Project	5	Detailed summary of previous mapping and paleoseismic investigations on the Cheraw fault.	Cheraw fault	4	Trace is from 1:24,000-scale mapping (and interpretation of aerial photographs), transferred to a 1:250,000 topographic base (Crone, Machette, Bradley, et al., 1997). Fault source location (total length): 46.24 km (28.73 mi.; measured from Quaternary fault map database).	Y
USGS 10 m DEM	4	Resolution of 10 m data is sufficient to image the Quaternary active trace of the	Cheraw fault	4	Interpretation of 10 m DEM suggests that Cheraw fault may have surface expression beyond the length of fault source as defined in USGS Fault and Fold Database (source length used in	Y

Table C-6.1.3 Data Evaluation
Cheraw Fault RLME

Identified Source
Cheraw fault

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
		Cheraw fault.			the 2008 National Seismic Hazard Mapping Program). A possible lineament (north-facing scarp) extends approximately 16–20 km (10–12.4 mi.) to NE of mapped end of Cheraw fault. A railroad lies adjacent to and just north of the scarp where it is best expressed, suggesting it may be modified or nontectonic in origin. Assuming lineament is tectonic, total length of fault source inferred from DEM is 62–66 km (38.5–41 mi.).	
Regional Stress						
CEUS SSC stress data set	5	Includes additional data points not shown on World Stress Map.	Cheraw fault	0	No new data points in SE Colorado near Cheraw fault.	Y
Heidbach et al. (2008) (World Stress Map)	3	Worldwide compilation of stress data (updated by CEUS SSC data set).	Cheraw fault	1	No nearby measurements to Cheraw fault. Normal sense of displacement on E-NE-trending fault is consistent with regional stress field.	Y
Zoback and Zoback (1991)	4	Comprehensive regional study that discusses stress data and identifies stress domains for the United	Cheraw fault	3	Regional stress data indicate that Cheraw fault is within the transition region between Cordilleran extension (Basin and Range and Rio Grande rift) and CEUS midplate stress (E-NE-directed maximum horizontal	N

Table C-6.1.3 Data Evaluation
Cheraw Fault RLME

Identified Source
Cheraw fault

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
		States.			compressive stress). Normal faulting would be consistent with Cordilleran extension.	
Tectonic Strain—Paleoseismicity						
Crone (1997) Crone, Machette, Bradley, et al. (1997)	5	Detailed paleoseismic trenching and mapping investigation.	Cheraw fault	5	Provides detailed source characterization information: Style of faulting—inferred normal based on trench exposures. Length of fault—approximately 44 km (27.3 mi.) based on mapping and interpretation of aerial photograph. Timing of recent events—~8 ka, 12 ka, and 20–25 ka. Older events must have occurred before about 100 ka. Interpretation of amounts of vertical offset on the Cheraw fault— Most recent event: ~0.5–1.1 m (~1.6–3.6 ft.). Penultimate event: ~1.1–1.6 m (~1.6–5.2 ft.). Oldest event: ~1.5 m (4.9 ft.). Fault behavior—temporal clustering (relatively short time intervals of activity [e.g., 15–20 kyr) separated by long intervals of quiescence [e.g., 100 kyr])	N

Table C-6.1.3 Data Evaluation
Cheraw Fault RLME

Identified Source
Cheraw fault

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
					Avg. recurrence in active period—8 kyr Slip rate—long-term: ≤0.007 mm/yr (8 m [26.2 ft.]/1.2 Ma) Late Pleistocene-Holocene rate—0.14–0.18 mm/yr (determined by dividing the amount of offset [3.6 m, or 11.8 ft.] on oldest faulted deposits in trench by age of the deposits [20–25 ka])	
Dr. A. Crone, USGS, electronic comm., April 21, 2010	4	Reconsideration of trenching data to better constrain uncertainties in number of paleoearthquakes.	Cheraw fault	4	Recurrence—Evaluation of number of paleoearthquakes recorded by stratigraphic and structural features in trench. Evidence for the penultimate event as presented by Crone, Machette, et al. (1997) not as definitive as evidence for earliest and latest events.	N

Table C-6.1.4 Data Evaluation
Oklahoma Aulacogen RLME

Identified Sources
Meers fault RLME with alternatives—localized and random distribution; Oklahoma Aulacogen Zone (OKA)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Instrumental Seismicity						
Luza and Lawson (1993)	4	Data appear robust, but report does not contain comments on how many and which of the reported earthquakes are induced by or related to hydrocarbon exploration.	OKA and Meers fault	3	Reported earthquake depths are used to constrain seismogenic depth and fault depth.	N
Magnetic Anomaly						
CEUS SSC magnetic anomaly data set	4	High-quality regional data	OKA	4	Reviewed in defining geometry of aulacogen source zone. Extent of aulacogen was partially constrained by extent of associated magnetic anomaly.	N
Gravity Anomaly						
CEUS SSC gravity anomaly data set	4	High-quality regional data	OKA	4	Reviewed in defining geometry of aulacogen source zone. Extent of aulacogen was partially constrained by extent of associated gravity anomaly.	N

Table C-6.1.4 Data Evaluation
Oklahoma Aulacogen RLME

Identified Sources
Meers fault RLME with alternatives—localized and random distribution; Oklahoma Aulacogen Zone (OKA)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Seismic Reflection						
Brewer (1982)	3	Presents only two raw reflection lines, which are poorly reproduced. Maps and interpreted cross section are more useful and considered of moderate quality.	OKA	3	Used to help define geometry of aulacogen source zone based on extent of faults within the Arbuckle-Wichita-Amarillo Uplift.	N
Brewer et al. (1983)	3	Presents only one raw reflection line, which is poorly reproduced. Maps and interpreted cross section are more useful and considered of moderate quality.	OKA	3	Used to help defining geometry of aulacogen source zone based on extent of faults associated with the Arbuckle-Wichita-Amarillo Uplift.	N
Good et al. (1983)	4	Presents interpreted COCORP seismic reflection line across the Meers fault and Oklahoma Aulacogen.	OKA and Meers fault	3	Used to help define N-S extent of the aulacogen and to help constrain dip of Meers fault at depth.	N
McConnell (1989)	3	Data considered of moderate quality for defining the dip of the Meers fault at depth.	Meers fault	4	Used to help constrain dip of fault at depth.	N

Table C-6.1.4 Data Evaluation
Oklahoma Aulacogen RLME

Identified Sources
Meers fault RLME with alternatives—localized and random distribution; Oklahoma Aulacogen Zone (OKA)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Miller et al. (1990)	4	Presents shallow (<200 m) interpretations of seismic reflection data across the Meers fault.	Meers fault	4	Used to help constrain shallow dip of fault.	N
Regional Geologic and Tectonic Maps						
Ham et al. (1964)	3	Data considered of moderate quality with respect to accuracy and completeness of identifying faults associated with Arbuckle-Wichita-Amarillo Uplift.	OKA	5	Used to help define geometry of aulacogen source zone based on extent of faults associated with the Arbuckle-Wichita-Amarillo Uplift.	N
Keller and Stephenson (2007)	3	Data considered of moderate quality with respect to outlining extent of the aulacogen based on gravity anomaly data.	OKA	3	Used in defining geometry of aulacogen source zone based on the interpreted extent of aulacogen from gravity data.	N
McConnell (1989)	2	Data considered of moderate to poor quality because no details are given with respect to what data constrains the Meers fault dip.	Meers fault	4	Used to help constrain dip of fault.	N

Table C-6.1.4 Data Evaluation
Oklahoma Aulacogen RLME

Identified Sources
Meers fault RLME with alternatives—localized and random distribution; Oklahoma Aulacogen Zone (OKA)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Texas Bureau of Economic Geology (1997)	3	Data considered of moderate quality with respect to accuracy and completeness of identifying faults associated with Arbuckle-Wichita-Amarillo Uplift.	OKA	5	Used to help define geometry of aulacogen source zone based on extent of faults associated with the Arbuckle-Wichita-Amarillo Uplift.	N
Local Geologic and Tectonic Maps						
Cetin (2003)	2	Proposes a NW extension of Meers fault beyond that previously recognized. Data considered of poor quality because of lack of supporting evidence.	Meers fault	5	Used to define potential NW extension of Meers fault.	N
Ramelli and Slemmons (1986)	5	Data considered of good quality for describing the geomorphic expression of fault trace.	Meers fault	3	Considered in defining extent of the fault and the Quaternary history of the fault.	N
Ramelli and Slemmons (1990)	5	Data considered of good quality with respect to defining extent of fault.	Meers fault	3	Considered in defining extent of fault.	N

Table C-6.1.4 Data Evaluation
Oklahoma Aulacogen RLME

Identified Sources
Meers fault RLME with alternatives—localized and random distribution; Oklahoma Aulacogen Zone (OKA)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Ramelli et al. (1987)	5	Fault trace is digitized in USGS Quaternary Fault and Fold Database; and this USGS version is used to define fault trace. Data considered of good quality.	Meers fault	5	Used to define trace of Holocene active fault.	N
Paleoseismicity						
Crone and Luza (1990)	4	Data considered of moderate quality with respect to defining characteristics of fault rupture (e.g., surface offset, fault dip, horizontal-to-vertical slip ratio).	Meers fault	2	Considered in defining characteristics of fault rupture.	N
Swan et al. (1993)	4	Data considered of good quality with respect to identifying rupture events on the fault and dates constraining timing of those ruptures. Data considered of moderate quality in defining characteristics of those ruptures (e.g., surface offsets).	Meers fault	5	Used to define recurrence rates and earthquake magnitudes from fault slip estimates.	N

Table C-6.1.4 Data Evaluation
Oklahoma Aulacogen RLME

Identified Sources
Meers fault RLME with alternatives—localized and random distribution; Oklahoma Aulacogen Zone (OKA)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Other						
Crone (1994)	5	Data considered of good quality with respect to summarizing and evaluating available data on Meers fault.	Meers fault	3	Considered in evaluating robustness and quality of available data on Meers fault.	N
Wheeler and Crone (2001)	5	Data considered of good quality with respect to analyzing available data concerning Meers fault.	Meers fault	3	Considered in evaluating robustness and quality of available data on Meers fault.	Y

Table C-6.1.5 Data Evaluation
Reelfoot Rift–New Madrid Fault System RLMEs

Identified Sources
New Madrid North (NMN); New Madrid South (NMS); Reelfoot Thrust fault (RFT)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Instrumental Seismicity						
CEUS SSC earthquake catalog	5	Comprehensive catalog; includes magnitude conversions and uncertainty assessments.	NMN, NMS, and RFT	3	Provides constraints on fault location and geometry.	Y
Chiu et al. (1992)	4	Publication discussing results of Portable Array for Numerical Data Acquisition (PANDA) survey. Provides detailed discussion of seismicity in New Madrid seismic zone (NMSZ).	NMN, NMS, RFT	5	Focal depth—Seismic activity in central NMSZ occurs continuously between ~5 and 14 km (3.1 and 8.7 mi.) depth. Seismicity illuminates fault zones. RFT geometry—Two NE-trending vertical segments are concentrated about a plane that dips at ~31°SW; a separate zone to the SE of axial zone defines a plane that dips at ~48°SW; projects to surface near Reelfoot Lake and Lake County uplift.	N
Historical Seismicity						
Dr. William Bakun (USGS, electronic comm., February 3, 2010)	4	Electronic comm. confirming 2004 magnitude estimates based on intensity for 1811-1812 earthquakes.	NMN, NMS, RFT	5	Magnitude of 1811-1812 earthquakes used to constrain Mmax for NMFS RLMEs (see Table 6.1.5-2).	N

Table C-6.1.5 Data Evaluation
Reelfoot Rift–New Madrid Fault System RLMEs

Identified Sources
New Madrid North (NMN); New Madrid South (NMS); Reelfoot Thrust fault (RFT)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Exelon ESP (2004) (includes estimates based on Johnston, 1996b; Hough et al. 2000; Bakun and Hopper, 2004a; pers. comm. from Drs. Johnston, Hough, and Bakun)	3	Compilation and update (2003–2004 time frame) of best estimates of size of 1811-1812 earthquake sequence. NRC reviewed assessment for Early Site Permit Application.	NMN, NMS, and RFT	5	Evaluation of intensity data for the 1811-1812 sequences provides basis for assessing magnitude of these events, which are considered typical of prehistoric events based on similar sizes and distribution of paleoliquefaction features (Tuttle, Schweig, et al., 2002; see Table 6.1.5-2).	N
Hough and Page (2011)	3	Presents magnitude estimates based on assessments by multiple experts.	NMN, NMS, RFT	5	Magnitude of 1811-1812 earthquakes used to constrain Mmax for NMFS RLMEs— Revisions to previous estimates (See Table 6.1.5-2).	N
Dr. Arch Johnston (CERI, pers. comm., February 16, 2010)	2	Telephone conversation—New studies to evaluate size of 1811-1812 earthquakes are being considered but have not yet started.	NMN, NMS, and RFT	4	Estimated sizes of 1811-1812 earthquakes as reported in EGC ESP (2004) study have not been revised.	N
Seismic Reflection						
Interpretation of seismic-reflection data has been integrated with other geologic, geophysical, and seismological data as reported in publications to define the structures within the Reelfoot rift. Specific lines not used directly in this study.						

Table C-6.1.5 Data Evaluation
Reelfoot Rift–New Madrid Fault System RLMEs

Identified Sources
New Madrid North (NMN); New Madrid South (NMS); Reelfoot Thrust fault (RFT)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Regional Geologic and Tectonic Maps						
Csontos et al. (2008)	3	Structure-contour map of the top of basement showing subbasins and bounding NE- and SE-striking faults. Due to projection of the map showing interpretations of basement faults, the locations are considered approximate.	NMS and RFT	5	Geometry and style of faulting—Interpretation of basement structures and reactivation of faults (e.g., RFT as inverted basement normal fault).	N
Local Geologic and Tectonic Maps						
Cramer (2001)	4	Publication scale map (Figure 3) with registration for digitization.	NMN, NMS, and RFT	2	Used to help constrain locations of alternative segments of the NMFS.	N
Guccione (2005) and Guccione et al. (2005)	4	Includes detailed maps showing offset geomorphic features.	NMS	4	Used to constrain location of Bootheel fault (previously referred to as the Bootheel lineament).	N
Johnston and Schweig (1996)	3	Small-scale line drawings of faults interpreted to be sources of 1811-1812 events.	NMN, NMS, and RFT	4	Interpretation formed the initial starting basis for the delineation of geometries for the New Madrid fault system sources.	Y

Table C-6.1.5 Data Evaluation
Reelfoot Rift–New Madrid Fault System RLMEs

Identified Sources
New Madrid North (NMN); New Madrid South (NMS); Reelfoot Thrust fault (RFT)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Mueller and Pujol (2001)	4	Detailed structure-contour map of fault plane (Figure 3).	RFT	4	Downdip geometry and depth of seismogenic crust—Structure-contour map of Reelfoot blind thrust.	N
Van Arsdale et al. (1999)	4	Publication scale maps—good registration for digitization (Figures 1 and 2).	RFT	5	Used to define the SE segment of the Reelfoot thrust fault.	N
Wheeler et al. (1994)	4	Detailed compilation map, USGS Miscellaneous Investigations Map.	NMS	3	Locations of subsurface faults—Cottonwood Grove fault, Ridgely fault, unnamed fault west of Cottonwood Grove fault.	N
Geodetic Strain						
Calais et al. (2006)	4	Two independent geodetic solutions from close to 300 continuous GPS stations.	NMN, NMS, and RFT	4	Based on observation that there is no detectable residual motion in the NMSZ at the 95% confidence level, some weight is assigned to the model that the NMFS is “out of the cluster.”	N

Table C-6.1.5 Data Evaluation
Reelfoot Rift–New Madrid Fault System RLMEs

Identified Sources
New Madrid North (NMN); New Madrid South (NMS); Reelfoot Thrust fault (RFT)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Calais and Stein (2009)	5	Presents current results (through 2008) of GPS measurements.	NMN, NMS, and RFT	4	Temporal clustering—Conclusion of paper suggests that the recurrence rate estimated from seismicity in NMSZ is consistent with rates suggested by geodetic measurements. This supports “out-of-cluster’” model.	N
Smalley et al. (2005)	4	Provides discussion of possible mechanisms to explain local but not regional geodetic signal.	NMN, NMS, and RFT	3	Temporal clustering issue—Evidence for ongoing strain across RFT and strike-slip fault zone; no apparent far-field signature. Notes that regardless of geodetic results, the challenge remains to reconcile geodetic observations with the detailed geological evidence available for repeated large earthquakes within Central United States, and that the cause of such earthquakes is not well understood.	N
Regional Stress						
Forte et al. (2007)	3	Regional analysis	NMN, NMS, and RFT	1	Provides rationale for concentrating seismic stress in the vicinity of the Reelfoot rift–NMSZ.	N

Table C-6.1.5 Data Evaluation
Reelfoot Rift–New Madrid Fault System RLMEs

Identified Sources
New Madrid North (NMN); New Madrid South (NMS); Reelfoot Thrust fault (RFT)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Grana and Richardson (1996)	4	Regional analysis, models the rift pillow in New Madrid region.	NMN, NMS, and RFT)	3	Temporal clustering—Modeling indicates that stresses from the load of the rift pillow may still be present in the upper crust and may still play a role in present-day deformation. This supports "in-cluster'" model.	N
Li et al. (2009)	3	3-D viscoelasto-plastic finite-element model addresses generic issues of spatiotemporal variations in seismicity in intraplate regions.	NMN, NMS, and RFT	2	Temporal clustering—Supports migration of seismicity within NMSZ (out of cluster model). Model replicates some of the spatiotemporal complexity of clustered, episodic, and migrating intraplate earthquakes. Time-scale-dependent spatiotemporal patterns of intraplate seismicity support the suggestions that seismicity patterns observed from short-term seismic records may not reflect the long-term patterns of intraplate seismicity.	N
Tectonic Strain						

Table C-6.1.5 Data Evaluation
Reelfoot Rift–New Madrid Fault System RLMEs

Identified Sources
New Madrid North (NMN); New Madrid South (NMS); Reelfoot Thrust fault (RFT)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Hildenbrand and Hendricks (1995)	4	Detailed discussion of interpretations of geopotential data sets.	NMS	2	Temporal clustering—Limit of long-term cumulative deformation—NW-trending features related to South-Central magnetic lineament (SCML) and Paducah gravity lineament (PGL) cross Reelfoot graben with no substantial lateral offsets, thus limiting the amount of lateral movement along axial faults of Reelfoot graben since formation of these features.	N
Van Arsdale (2000)	4	Provides evidence for varying slip rate over time.	RFT	2	Temporal clustering—Geologic observations from interpretation of seismic profiles indicate that cumulative post-Late Eocene slip on structures in the NMSZ is low.	N
Focal Mechanisms						
Herrmann and Ammon (1997)	4	Well-constrained focal mechanisms.	NMFS	3	Seismogenic depth—focal mechanisms show depths of up to 16 km (10 mi.) for earthquakes in Reelfoot rift.	N

Table C-6.1.5 Data Evaluation
Reelfoot Rift–New Madrid Fault System RLMEs

Identified Sources
New Madrid North (NMN); New Madrid South (NMS); Reelfoot Thrust fault (RFT)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Shumway (2008)	4	Earthquakes in the NE NMSZ were relocated using a velocity model of Mississippi embayment with appropriate depths to bedrock beneath seismic stations.	NMN	4	NMN long geometry—This shows that this part of the NE NMSZ is influenced by the same fault pattern and stress regime as NMN fault, may be an extension of NMSZ, and therefore may represent alternate locations of January 23, 1812, rupture.	N
Zoback (1992)	4	Well-constrained focal mechanisms.	NMFS	3	Style of faulting in Reelfoot rift—Four focal mechanisms show predominantly strike-slip motion.	N
Paleoseismicity						
CEUS SSC paleoliquefaction database (includes information from Tuttle, 2001; Tuttle, Schweig, et al., 2002, 2006)	5	Comprehensive database, peer-reviewed, includes uncertainties in timing of paleoliquefaction events).	NMN, NMS, and RFT	5	Recurrence—Provides information on “in cluster” recurrence interval for RFT.	Y
Exelon (2004) (includes information from Tuttle, 2001; Tuttle, Schweig, et al., 2002)	4	Comprehensive database; includes published and unpublished data.	NMN, NMS, and RFT	1	Recurrence—Superseded by CEUS SSC paleoliquefaction database.	Y

Table C-6.1.5 Data Evaluation
Reelfoot Rift–New Madrid Fault System RLMEs

Identified Sources
New Madrid North (NMN); New Madrid South (NMS); Reelfoot Thrust fault (RFT)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Holbrook et al. (2006)	4	Detailed analysis of geomorphic indicators of Holocene deformation in NMSZ.	RFT	4	Recurrence—Provides information on “out of cluster” recurrence interval for RFT.	N
Kelson et al. (1996)	5	Detailed and well-documented paleoseismic investigation of surface deformation related to paleoearthquakes on RFT.	RFT	3	Recurrence—Basis for estimating timing and recurrence intervals for RFT. Dates of earthquakes in general agreement with paleoliquefaction data.	N

Table C-6.1.6 Data Evaluation
Reelfoot Rift–Eastern Margin Fault(s) RLMEs

Identified Sources
Reelfoot Rift–Eastern Rift Margin (ERM) RLMEs
Eastern Reelfoot Rift Margin fault north (ERM-N)*; Eastern Reelfoot Rift Margin fault south (ERM-S)*; Eastern Rift Margin fault south–river (fault) picks (ERM-RP); and Eastern Rift Margin south–Crittenden County fault zone (ERM-SCC)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Instrumental Seismicity						
CEUS SSC earthquake catalog	5	Comprehensive catalog; includes magnitude conversions and uncertainty assessments.	ERM-S	1	Reviewed for alignment of microseismicity.	Y
Chiu et al. (1997)	4	Detailed analysis of seismicity along SE margin of Reelfoot rift.	ERM-S	3	Analysis of seismicity suggests there is an active fault source along the SE flank of the Reelfoot rift.	N
Historical Seismicity						
Hough and Martin (2002)	4	Analysis of sparse intensity data for a large aftershock of the 1811 earthquake.	ERM-S	2	Evidence for active fault along ERM—Aftershock of December 1811 NMSZ earthquake (NM1-B)—**M** 6.1 ± 0.2, location of event not well constrained, but probably beyond the southern end of the NMSZ, near Memphis, Tennessee (within the SW one-third to one-half of the band of seismicity identified by Chiu et al. [1997]).	N

Table C-6.1.6 Data Evaluation
Reelfoot Rift–Eastern Margin Fault(s) RLMEs

Identified Sources
Reelfoot Rift—Eastern Rift Margin (ERM) RLMEs
Eastern Reelfoot Rift Margin fault north (ERM-N)*; Eastern Reelfoot Rift Margin fault south (ERM-S)*; Eastern Rift Margin fault south—river (fault) picks (ERM-RP); and Eastern rift margin south—Crittenden County fault zone (ERM-SCC)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Magnetic Anomaly						
CEUS SSC magnetic anomaly data set	5	High-quality regional data.	ERM zones	2	Geometry—The fault zones coincide with the eastern margin of the rift, which is marked by a change from low values (within the graben) to higher magnetic values. Geopotential anomalies, however, provided less resolution than surface data (i.e., surface expression of faulting, topographic lineament, trench exposures) for locating the zone of recent faulting.	Y
Hildenbrand (1982)	4	Analysis based on closely spaced truck-mounted magnetometer survey.	ERM zones	4	Geometry—Width of zone of faulting associated with the rift margin. Eastern Reelfoot rift margin is interpreted to be a 5.5 km (3.4 mi.) wide zone in which magnetic basement has an average dip of 20°NW into the graben.	N

Table C-6.1.6 Data Evaluation
Reelfoot Rift–Eastern Margin Fault(s) RLMEs

Identified Sources
Reelfoot Rift–Eastern Rift Margin (ERM) RLMEs
Eastern Reelfoot Rift Margin fault north (ERM-N)*; Eastern Reelfoot Rift Margin fault south (ERM-S)*; Eastern Rift Margin fault south–river (fault) picks (ERM-RP); and Eastern Rift Margin south–Crittenden County fault zone (ERM-SCC)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Gravity Anomaly						
CEUS SSC gravity anomaly data set	5	High-quality regional data.	ERM RLMEs	0	Gravity anomaly data did not provide good resolution for delimiting the boundaries of the fault zone.	Y
Seismic Reflection						
Cox et al. (2006)	4	Published interpretations of high-resolution S-wave seismic profile (selected portions of uninterpreted profiles provided).	ERM-N and ERM-S	5	Geometry—Seismic profiles (shallow S-wave, electrical profiles) collected at paleoseismic sites are used to identify faults.	N
Luzietti et al. (1992)	4	Interpretation of good-quality high-resolution (Mini-Sosie) seismic data that show stratigraphy down to 1.2 km (0.7 mi.); (selected portions of uninterpreted profiles provided).	ERM-SCC	5	Geometry and activity of fault source—Evidence for reactivation of the Crittenden County fault zone in Pleistocene to possibly Holocene time.	N

Table C-6.1.6 Data Evaluation
Reelfoot Rift–Eastern Margin Fault(s) RLMEs

Identified Sources
Reelfoot Rift—Eastern Rift Margin (ERM) RLMEs
Eastern Reelfoot Rift Margin fault north (ERM-N)*; Eastern Reelfoot Rift Margin fault south (ERM-S)*; Eastern Rift Margin fault south—river (fault) picks (ERM-RP); and Eastern rift margin south—Crittenden County fault zone (ERM-SCC)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Beatrice Magnani (CERI) unpublished data Magnani et al. (2009)	3	Preliminary results of location of fault picks provided as PDF.	ERM-RP	4	Geometry and activity—This data provided the basis for the location of the alternative segment defined by seismic data (ERM-RP). Connection of the three localities along the river seismic survey where recent faulting was observed suggest that there may be an alternative, more northerly trending fault along SE margin of rift zone.	N
Odum et al. (2010)	4	Reinterpretation of a seismic-reflection profile across the scarp at Meeman-Shelby Forest State Park 25 km north of Memphis, Tennessee.	ERM-S	2	Figures 1 and 7 show revised orientation of Meeman-Shelby fault (MSF) and relationship to Joiner Ridge. This alternative geometry for the MSF is not modeled directly as part of the RLME due to lack of information regarding timing and recent activity on the MSF. Geometry—Figure 3 is used to define the limits of the zones associated with the eastern Reelfoot rift margin.	N

Table C-6.1.6 Data Evaluation
Reelfoot Rift–Eastern Margin Fault(s) RLMEs

Identified Sources
Reelfoot Rift–Eastern Rift Margin (ERM) RLMEs
Eastern Reelfoot Rift Margin fault north (ERM-N)*; Eastern Reelfoot Rift Margin fault south (ERM-S)*; Eastern Rift Margin fault south–river (fault) picks (ERM-RP); and Eastern Rift Margin south–Crittenden County fault zone (ERM-SCC)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Parrish and Van Arsdale (2004)	4	Published interpretations of seismic profile (selected portions of uninterpreted profiles provided).	ERM-S	3	Geometry—Interpretation of major basement faults and Tertiary faults along southeastern margin of Reelfoot rift—used in conjunction with paleoseismic investigations to identify location of fault source.	N
Williams et al. (2001)	4	Published interpretations of a seismic-reflection profile across the scarp at the Meeman-Shelby Forest State Park 25 km north of Memphis, Tennessee. Revised interpretation provided in Odum et al. (2010).	ERM-S	2	Geometry—Meeman-Shelby fault (MSF) pick lies ~5 km (3 mi.) east of the magnetically defined southeastern margin of the Reelfoot rift. Is similar to the Crittenden County fault zone (CCFZ) in seismic profiles (up to the west). Seismic data suggest that the ERM-S may subparallel the CCFZ. Possible continuation of fault on a N33°E trend based on similar structure observed in a proprietary industry seismic line 33 km (20.5 mi.) to the northeast.	N

Table C-6.1.6 Data Evaluation
Reelfoot Rift–Eastern Margin Fault(s) RLMEs

Identified Sources
Reelfoot Rift—Eastern Rift Margin (ERM) RLMEs
Eastern Reelfoot Rift Margin fault north (ERM-N)*; Eastern Reelfoot Rift Margin fault south (ERM-S)*; Eastern Rift Margin fault south—river (fault) picks (ERM-RP); and Eastern rift margin south—Crittenden County fault zone (ERM-SCC)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Local Geologic and Tectonic Maps						
Cox et al. (2006)	4	Provides detailed maps of paleoseismic localities.	ERM-S and ERM-N	5	Geometry—Figures 1, 4, and 8 show locations of seismic lines and trenches used to constrain location of fault source. Used to locate detailed paleoseismic investigation sites and ERM-S and ERM-N fault source.	N
Crone (1992)	4	Peer-reviewed publication.	CCFZ	4	Geometry—Figure 2 used to locate the CCFZ.	N
Regional Stress						
CEUS SSC stress data set	5	Most comprehensive data set available for CEUS.	ERM-S and ERM-N	2	Style of faulting—Right-lateral slip on eastern margin fault sources is consistent with stress indicators that show general E-W trend to the maximum horizontal compression axis.	Y

Table C-6.1.6 Data Evaluation
Reelfoot Rift–Eastern Margin Fault(s) RLMEs

Identified Sources
Reelfoot Rift–Eastern Rift Margin (ERM) RLMEs
Eastern Reelfoot Rift Margin fault north (ERM-N)*; Eastern Reelfoot Rift Margin fault south (ERM-S)*; Eastern Rift Margin fault south–river (fault) picks (ERM-RP); and Eastern Rift Margin south–Crittenden County fault zone (ERM-SCC)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Tectonic Strain						
Cox et al. (2001a)	3	Summary of paleoseismic investigations and overall structural model for active faults along the SE margin of the Reelfoot rift. Trench log details not sufficient to evaluate postulated offset channel.	ERM-S and ERM-N	4	Geometry—Total length of Eastern Rift Margin faults: 150 km (93.2 mi.). Activity—Topographic expression—Linear topographic scarp.	N
Focal Mechanisms						
Chiu et al. (1997)	4	Provides detailed analysis of focal mechanisms.	ERM-S	4	Style of faulting—The style of faulting along the southeast margin of the Reelfoot rift inferred from analysis of is complex with the dominant pattern being right-lateral strike-slip with reverse movement. Seismogenic crustal thickness—Nine out of 10 well-constrained focal depths are ≤17.3 km. One deeper earthquake is at 22.8 km.	N

Table C-6.1.6 Data Evaluation
Reelfoot Rift–Eastern Margin Fault(s) RLMEs

Identified Sources
Reelfoot Rift—Eastern Rift Margin (ERM) RLMEs
Eastern Reelfoot Rift Margin fault north (ERM-N)*; Eastern Reelfoot Rift Margin fault south (ERM-S)*; Eastern Rift Margin fault south—river (fault) picks (ERM-RP); and Eastern rift margin south—Crittenden County fault zone (ERM-SCC)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Paleoseismicity						
CEUS SSC paleoliquefaction database	5	Most comprehensive database of paleoliquefaction for CEUS.	ERM-S and ERM-N	4	Constraints on estimated size of prehistoric earthquake—Evaluation of potential 80 km (50 mi.) rupture at ~2,500 yr BP. There are no known paleoliquefaction features of this age observed in rivers in western Tennessee. Location and age of paleoliquefaction in western Kentucky that could possibly be associated with a rupture on the ERM-N: 11,300 yr BP ± 200 yr.	Y

Table C-6.1.6 Data Evaluation
Reelfoot Rift–Eastern Margin Fault(s) RLMEs

Identified Sources
Reelfoot Rift–Eastern Rift Margin (ERM) RLMEs
Eastern Reelfoot Rift Margin fault north (ERM-N)*; Eastern Reelfoot Rift Margin fault south (ERM-S)*; Eastern Rift Margin fault south–river (fault) picks (ERM-RP); and Eastern Rift Margin south–Crittenden County fault zone (ERM-SCC)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Cox, Van Arsdale, and Larsen (2002)	3	NEHRP report—Interpretation of trenching and boring data with some constraints on timing from radiocarbon dates. Trench log details not sufficient to evaluate postulated offset channel.	ERM-S and ERM-N	4	Recurrence and style of faulting—Used to evaluate timing of events, recurrence intervals, slip rate, and components of slip (H and V). Confirms that the SE Reelfoot rift margin is a fault zone with multiple high-angle faults and associated folding based on shallow seismic profiles and paleoseismological investigations. Stratigraphic and structural relationships in trench exposure at a site near Porter Gap are interpreted to show 8–15 m (26.2–49.2 ft.) of right-lateral offset of a late Wisconsinan paleo-channel (~20 ka)., suggesting average slip rate of between 0.85 and 0.37 mm/year. Evidence for an earthquake ca. 2,500–2,000 yr BP on SE Reelfoot rift margin that ruptured ≥ 80 km from Shelby County (15–25 km [9.3–15.5 mi.] north of Memphis metropolitan area) to Porter Gap (just south of intersection with the RF).	N

Table C-6.1.6 Data Evaluation
Reelfoot Rift–Eastern Margin Fault(s) RLMEs

Identified Sources
Reelfoot Rift—Eastern Rift Margin (ERM) RLMEs
Eastern Reelfoot Rift Margin fault north (ERM-N)*; Eastern Reelfoot Rift Margin fault south (ERM-S)*; Eastern Rift Margin fault south—river (fault) picks (ERM-RP); and Eastern rift margin south—Crittenden County fault zone (ERM-SCC)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Cox et al. (2006)	3	Interpretation of trenching and boring data with some constraints on timing from radiocarbon dates. Trench log details not sufficient to evaluate postulated offset channel.	ERM-S and ERM-N	5	Recurrence and style of faulting—Used to evaluate timing of events, recurrence intervals, slip rate, and components of slip (H and V). Age constraints from paleoseismic investigations at Shelby County and at Porter Gap site are consistent with an earthquake ca. 2,500–2,000 years ago (most recent event) that ruptured ≥80 km (50 mi.). Late Wisconsinan and Holocene faulting along the SE rift margin fault system observed adjacent to hanging wall of Reelfoot thrust, but only Wisconsinan faulting is noted adjacent to footwall of the thrust. It is hypothesized that the NE segment of the SE rift margin turned off in Holocene when Reelfoot stepover thrust turned on.	N

Table C-6.1.6 Data Evaluation
Reelfoot Rift–Eastern Margin Fault(s) RLMEs

Identified Sources
Reelfoot Rift–Eastern Rift Margin (ERM) RLMEs
Eastern Reelfoot Rift Margin fault north (ERM-N)*; Eastern Reelfoot Rift Margin fault south (ERM-S)*; Eastern Rift Margin fault south–river (fault) picks (ERM-RP); and Eastern Rift Margin south–Crittenden County fault zone (ERM-SCC)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Tuttle et al. (2006)	4	Detailed discussion of paleoliquefaction features near Marianna, Arkansas.	ERM-S	2	Timing and recurrence of large-magnitude earthquakes—Based on radiocarbon dating liquefaction features at the Daytona Beach and St. Francis sites near Marianna, Arkansas, formed about 3500 BC and 4800 BC (5,000 and 7,000 years ago), respectively. Marianna sand blows are similar in size to NMSZ. Several faults in Marianna area (including eastern Reelfoot rift margin [ERRM], White River fault zone [WRFZ], and Big Creek fault zone [BCFZ]) are thought to be active based on apparent influence on local topography and hydrography. ERRM appears to be most likely source of very large earthquakes during the middle Holocene. (See also Section 6.1.7, Marianna [MAR] RLME.)	Y

* ERM-N and ERM-S are included in the Big Creek fault as defined by Fisk (1944).

Table C-6.1.7 Data Evaluation
Reelfoot Rift–Marianna RLME

Identified Source
Marianna zone (MAR)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Instrumental Seismicity						
CEUS SSC earthquake catalog	5	Comprehensive catalog; includes magnitude conversions and uncertainty assessments.	MAR	1	Reviewed for alignment of microseismicity, seismicity scattered.	Y
Magnetic Anomaly						
CEUS SSC magnetic anomaly data set	5	High-quality regional data.	MAR	0	Location of RLME source is not based on magnetic anomaly map.	Y
Gravity Anomaly						
CEUS SSC gravity anomaly data set	5	High-quality regional data.	MAR	0	Location of RLME source is not based on gravity anomaly map.	Y
Local Geologic and Tectonic Maps						
Csontos et al. (2008)	3	Due to projection of the map showing interpretations of basement faults, the locations are considered approximate.	MAR	2	Potential fault sources for Marianna paleoliquefaction features. Considered in evaluation of the orientation and style of faulting.	N

Table C-6.1.7 Data Evaluation
Reelfoot Rift–Marianna RLME

Identified Source
Marianna zone (MAR)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Fisk (1944)	3	Due to the small scale and methodology used in mapping, the fault locations are considered approximate.	MAR	3	Location of faults with possible geomorphic expression of Quaternary faulting—Potential fault sources for Marianna paleoliquefaction features (e.g., White River fault zone, Big Creek fault zone) considered in evaluation of the orientation and style of faulting.	N
Schumm and Spitz (1996)	4	Detailed analysis and discussion of geomorphic evidence (anomalies in channel morphology) for neotectonic deformation on regional and fault-specific basis.	MAR	3	Location and activity of potential fault sources—White River fault zone, Big Creek fault zone. Considered in evaluation of the orientation and style of faulting.	N
Spitz and Schumm (1997)	4	Detailed analysis and discussion of geomorphic evidence (anomalies in channel morphology) for neotectonic deformation on regional and fault-specific basis.	MAR	3	Location and activity of potential fault sources—White River fault zone, Big Creek fault zone, eastern Reelfoot rift margin. Activity—Geomorphic evidence for Quaternary tectonic deformation in vicinity of Marianna. Style of faulting—White River fault zone is left-lateral strike-slip fault.	N

Table C-6.1.7 Data Evaluation
Reelfoot Rift–Marianna RLME

Identified Source
Marianna zone (MAR)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Regional Stress						
CEUS SSC stress data set	5	Most comprehensive data set available for CEUS.	MAR	2	Right-lateral slip on NE-trending fault and left-lateral slip on NW-trending sources is consistent with stress indicators that show general E-W trend to the maximum horizontal compression axis.	Y
Tectonic Strain						
Al-Qadhi (2010)	2	Unpublished Ph.D. dissertation.	MAR	3	Local source of large-magnitude earthquakes—Provides additional information on total length of the Marianna lineament based on geophysical (GPR) survey data.	Y
Al-Shukri et al. (2009)	4	NEHRP report—Provides good illustrations and discussion of results of high-resolution ground-penetrating radar (GPR) and resistivity profiles and three-dimensional surveys that were conducted to define the morphology and assist in the	MAR	4	Local source of large-magnitude earthquakes—Marianna lineament identified from geophysical surveys, possible fault in trench exhibits similar orientation. Recurrence—Provides constraints on the timing of paleoliquefaction features.	Y

Table C-6.1.7 Data Evaluation
Reelfoot Rift–Marianna RLME

Identified Source
Marianna zone (MAR)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
		interpretation of the origin of large earthquake-induced liquefaction features.				
Paleoseismicity						
CEUS SSC paleoliquefaction database (includes results from Al Shukri et al., 2005; Tuttle et al., 2006; Al Shukri et al., 2009)	5	Most comprehensive database of paleoliquefaction for CEUS.	MAR	4	Used to identify locations and ages of paleoliquefaction features in the Marianna region. 4.8 ka, 5.5 ka, 6.8 ka, 9.9 ka, something older (9.9–38 ka?).	Y
Al-Qadhi (2010)	2	Unpublished dissertation.	MAR	3	Local source of large-magnitude earthquakes—Used to constrain total length of the Daytona Beach lineament. GPR surveys used to identify additional paleoliquefaction features along the trend of the lineament.	Y

Table C-6.1.7 Data Evaluation
Reelfoot Rift–Marianna RLME

Identified Source
Marianna zone (MAR)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Tuttle et al. (2006)	4	Provides detailed discussion of studies to evaluate paleoliquefaction features near Marianna, Arkansas.	ERM-S MAR	3	Timing and recurrence of large-magnitude earthquakes— Based on radiocarbon dating liquefaction features at the Daytona Beach and St. Francis sites near Marianna, Arkansas, formed about 3500 BC and 4800 BC (5,000 and 7,000 years ago), respectively. Marianna sand blows are similar in size to NMSZ. Several faults in Marianna area (including the eastern Reelfoot rift margin [ERRM], the White River fault zone [WRFZ], and Big Creek fault zone [BCFZ]) are thought to be active based on apparent influence on local topography and hydrography. ERRM appears to be most likely source of very large earthquakes during the middle Holocene.	N

Table C-6.1.8 Data Evaluation
Reelfoot Rift–Commerce Fault Zone RLME

Identified Source
Commerce fault zone (CFZ)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Instrumental Seismicity						
CEUS SSC earthquake catalog	5	Comprehensive catalog; includes magnitude conversions and uncertainty assessments.	CFZ	1	Spatial association of seismicity—Some association of seismicity along Commerce geophysical lineament. Recurrence—Not used to estimate recurrence. Recurrence is based on paleoseismic evidence.	Y
Harrison and Schultz (1994)	2	Publication discussing association of seismicity; includes summary of other publications.	CFZ	1	Support for localized source—Shows 12 earthquakes near proposed trace of Commerce geophysical lineament (CGL) and suggests these earthquakes can be attributed to movement along structures associated with CGL.	N
Langenheim and Hildenbrand (1997)	4	Good maps and tabulated data on $m_b > 3$ earthquakes along or near CGL.	CFZ	2	Evidence for localized source of seismicity—Postulates an association of seismicity with Commerce geophysical lineament (CGL). The diversity of associated focal mechanisms and the variety of surface structural features along length of CGL, however, obscures its relation to release of present-day strain.	N

Table C-6.1.8 Data Evaluation
Reelfoot Rift–Commerce Fault Zone RLME

Identified Source
Commerce fault zone (CFZ)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Magnetic Anomaly						
CEUS SSC magnetic anomaly data set	5	High-quality regional data.	CFZ	2	Commerce fault zone source generally coincident with magnetic anomaly. Anomaly extends beyond region where paleoseismic studies document repeated late Pleistocene surface faulting.	Y
Langenheim and Hildenbrand (1997)	4	Detailed evaluation of geopotential anomalies.	CFZ	3	Quaternary active faulting appears to be localized along Commerce geophysical lineament, a magnetic and gravity anomaly. Modeling indicates that source of magnetic and gravity anomalies is probably a mafic dike swarm. However, paleoseismic studies and high-resolution seismic profiles are used to define the location of CFZ.	N
Gravity Anomaly						
CEUS SSC gravity anomaly data set	5	High-quality regional data.	CFZ	1	Commerce geophysical lineament is defined in part by gravity anomaly as described in literature. CFZ RLME zone, however, is not well defined by the regional gravity data.	Y

Table C-6.1.8 Data Evaluation
Reelfoot Rift–Commerce Fault Zone RLME

Identified Source
Commerce fault zone (CFZ)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Langenheim and Hildenbrand (1997)	4	Detailed evaluation of geopotential anomalies.	CFZ	2	Quaternary active faulting appears to be localized along Commerce geophysical lineament, a gravity and magnetic anomaly. However, paleoseismic studies and high-resolution seismic profiles are used to define location of active traces of the CFZ.	N
Seismic Reflection						
Palmer, Hoffman, et al. (1997) Palmer, Shoemaker, et al. (1997)	4	Published interpretations of shallow high-resolution seismic-reflection profiles (selected portions of uninterpreted profiles provided).	CFZ	4	Location and style of faulting—The CFZ striking N50°E overlies a major regional basement geophysical lineament and is present on two shallow seismic-reflection lines at southern margin of the escarpment. Fault is favorably oriented to be reactivated as right-lateral strike-slip fault.	N
Stephenson et al. (1999)	4	Published interpretations of high-resolution seismic-reflection profiles (selected portions of uninterpreted profiles provided).	CFZ	4	Location and style of faulting (Quilin site, Idalia Hills, and Benton Hills sites)—Interpretation of post-Cretaceous faulting extending into the Quaternary. Used in conjunction with paleoseismic investigations to identify location of fault source and to evaluate style of faulting and amount of reverse displacement.	N

Table C-6.1.8 Data Evaluation
Reelfoot Rift–Commerce Fault Zone RLME

Identified Source
Commerce fault zone (CFZ)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Regional Stress						
CEUS SSC stress database	4	Provides additional new measurements to World Stress Map.	CFZ	2	A and B quality directions of maximum horizontal stress based on focal mechanisms show E-W to WNW trends in vicinity of Commerce fault.	Y
Focal Mechanisms						
Herrmann and Ammon (1997)	4	Presents results based on combination of traditional regional seismic network observations with direct seismogram modeling to improve estimates of small earthquake faulting geometry, depth, and size.	CFZ	3	Style of faulting—Focal mechanism analysis of a **M** 3.85 earthquake (February 5, 1994) along the northward-projected trend of CFZ shows motion was primarily right-lateral strike-slip along a N-NE azimuth.	N
Langenheim and Hildenbrand (1997)	4	Tabulation of data for $m_b >$ 3 earthquakes along CGL.	CFZ	3	Focal mechanism and location of the earthquake near Thebes Gap are consistent with movement along nearly vertical NE-trending Commerce fault in the present regional stress field. However, focal mechanisms of other earthquakes shown by Harrison and Schultz (1994) near CGL are mixed, ranging from thrust to normal fault solutions. Focal mechanisms of two events that predate establishment of a comprehensive seismic network in the	N

Table C-6.1.8 Data Evaluation
Reelfoot Rift–Commerce Fault Zone RLME

Identified Source
Commerce fault zone (CFZ)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
					Midcontinent may be suspect.	
Shumway (2008)	4	Detailed analysis of seismicity data using recent velocity model.	CFZ	4	Depth of seismogenic crust—well-located earthquakes to depths between 13 and 15 km (8 and 9 mi.). Focal mechanisms—Half of the well-constrained earthquakes have a NE-trending nodal plane with strike-slip component (comparable to previous studies by Chiu et al., 1992).	N
Paleoseismicity						
Baldwin et al. (2006)	4	Detailed discussion of paleoseismic investigations.	CFZ	5	Character of deformation zone—Seismic-reflection data image a 0.5 km (0.3 mi.) wide zone of NE-striking, near-vertical faults that offset Tertiary and Quaternary reflectors and coincide with near-surface deformation. The regional NE strike of fault zone, as well as presence of near-vertical faults and complex flower-like structures, and preferential alignment with contemporary central U.S. stress regime, indicates that the fault zone likely accommodates right-lateral transpressive deformation. Recurrence—Stratigraphic and structural relationships in trenches	N

Table C-6.1.8 Data Evaluation
Reelfoot Rift–Commerce Fault Zone RLME

Identified Source
Commerce fault zone (CFZ)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
					provide evidence for at least two late Quaternary faulting events on Idalia Hill fault zone overlying Commerce section of Commerce geophysical lineament. The penultimate event occurred in late Pleistocene (before 23.6–18.9 ka). The most recent event occurred in late Pleistocene to early Holocene (18.5–7.6 ka). Events overlap in age, with two prehistoric events interpreted by Vaughn (1994) that occurred 23–17 ka and 13.4–9 ka, and one event recognized by Harrison et al. (1995) that occurred 35–25 ka. Length of documented Quaternary faulting along CGL: 75 km (45 mi.).	
Baldwin et al. (2008)	4	Well-illustrated NEHRP report; comprehensive discussion of evidence for timing of recent deformation.	CFZ	4	Location and geometry of Penitentiary fault—Evidence for linking observed Pleistocene-Holocene deformation with previously mapped faults overlying the Commerce geophysical lineament. The fault is accommodating dextral transpression. Timing and amount of displacement—Faults project upsection into the latest Pleistocene Henry Formation (older than ~25 ka) and possibly Holocene Cahokia Formation. Vertical offset of	N

Table C-6.1.8 Data Evaluation
Reelfoot Rift–Commerce Fault Zone RLME

Identified Source
Commerce fault zone (CFZ)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
					reflectors 2–6 m (6.5–20 ft.).	
CEUS SSC paleoliquefaction database	5	Comprehensive database; peer-reviewed; includes uncertainties in timing of paleo-liquefaction events).	CFZ	5	Recurrence—Provides preferred ages for paleoliquefaction features in vicinity of CFZ.	Y
Harrison et al. (1999)	4	Interpretation of high-resolution seismic profile data and paleoseismic trenching investigations (on secondary structures).	CFZ-	5	Style of faulting—The overall style of neotectonic deformation is interpreted as right-lateral strike-slip faulting. Recurrence—Documents evidence for four episodes of Quaternary faulting on secondary structures in hills west of assumed primary fault along range front: one in late- to post-Sangamon, pre- to early Roxana time (~60–50 ka); one in syn- or post-Roxana, pre-Peoria time (~35–25 ka); and two in Holocene time (middle to late Holocene, and possibly during 1811-1812 earthquake sequence).	N
Harrison et al. (2002)	4	USGS Miscellaneous Investigations publication; mapping supplemented by dates.	CFZ	4	Timing of recent earthquakes—At least two events may have occurred in the latest Holocene (just after 2-sigma calibrated calendar ages of 3747–3369 BC and AD 968–639).	N

Table C-6.1.8 Data Evaluation
Reelfoot Rift–Commerce Fault Zone RLME

Identified Source
Commerce fault zone (CFZ)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Palmer, Hoffman, et al. (1997) Palmer, Shoemaker, et al. (1997)	4	Publications with high-resolution seismic data images; numerous post-Cretaceous faults and folds; discusses neotectonic significance.	CFZ	4	Style of faulting—English Hills. Evidence for deep-seated tectonic fault. Style of faulting—Faults are interpreted as flower structures with N-NE-striking, vertically dipping, right-lateral oblique-slip faults. Amount of displacement—Near-vertical displacements with maximum offsets on the order of 15 m (50 ft.).	N
Vaughn (1994)	2	NEHRP report—Relatively few liquefaction features studied and dated in area; often significant uncertainties in age estimates.	CFZ	5	Paleoliquefaction results to evaluate timing of events. Preferred ages in CEUS SSC database based on communications between author and Dr. M. Tuttle.	Y

Table C-6.1.9 Data Evaluation
Wabash Valley RLME

Identified Source
Wabash Valley (WV) RLME

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Instrumental Seismicity						
CEUS SSC earthquake catalog	5	Comprehensive catalog; includes magnitude conversions and uncertainty assessments.	WV	0	Not used to evaluate recurrence parameters for RLME. Magnitudes smaller than the RLME are included in Illinois Basin Extended Basement or Mmax zone.	Y
Hamburger et al. (2008)	3	Abstract	WV	4	Evidence for reactivation of structures in present stress regime—04:30 CDT, April 18, 2008, M 5.4 earthquake.	Y
Withers et al. (2009)	3	Abstract; preliminary analysis.	WV	4	Evidence for reactivation of structures in the present stress regime—April 18, 2008, M_w 5.2 (M_w 5.4 GCMT [http://www.global cmt.org]) Mt. Carmel, Illinois, earthquake—Largest event in 20 years in Wabash Valley seismic zone (WVSZ).	Y

Table C-6.1.9 Data Evaluation
Wabash Valley RLME

Identified Source
Wabash Valley (WV) RLME

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Yang et al. (2009)	3	Abstract; preliminary analysis.	WV	5	Analysis of aftershocks using sliding-window cross-correlation technique and double-difference relocation algorithm give a best-fit plane having a nearly E-W trend with orientation of 248 and dip angle of 81. Fault is nearly vertical down to ~20 km (12.5 mi.). Provides constraints on seismogenic width.	N
Historical Seismicity						
McBride et al. (2007)	5	Integrated assessment based on seismicity, borehole, geophysical, and industry seismic profile data analysis.	WV	5	Discusses possible association of recent earthquakes (April 3, 1974, m_b = 4.7; June 10, 1987, m_b = 5.2; and November 9, 1968, m_b = 5.5 events) with three distinct upper-crust sources. Provides detailed discussion of parameters (magnitude, depth, focal mechanism) for each event.	Y

Table C-6.1.9 Data Evaluation
Wabash Valley RLME

Identified Source
Wabash Valley (WV) RLME

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Magnetic Anomaly						
CEUS SSC magnetic anomaly data set	5	High-quality regional data.	WV	1	Boundaries of WV RLME not uniquely defined by magnetic anomaly map.	Y
Gravity Anomaly						
CEUS SSC gravity anomaly data set	5	High-quality regional data.	WV	1	Boundaries of WV RLME not uniquely defined by gravity anomaly map.	Y
Seismic Reflection						
McBride, Hildenbrand, et al. (2002)	5	Provides simplified line drawings and interpretations of four reprocessed migrated seismic profiles. Also provides excerpts of reprocessed seismic-reflection profiles. Includes detailed geologic discussion based on integrated review of seismic, and geopotential data.	WV	3	Used to define style of faulting and possible source structures within the source zone.	N

Table C-6.1.9 Data Evaluation
Wabash Valley RLME

Identified Source
Wabash Valley (WV) RLME

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
McBride et al. (2007)	4	Builds on McBride, Hildenbrand, et al. (2002) and provides additional interpretations of seismic-reflection data. Presents both raw (selected excerpts) and interpreted sections.	WV	3	Used to define style of faulting and possible source structures within the source zone.	N
Regional Geologic and Tectonic Maps						
Nelson (1995)	5	Digital file of Illinois structural trends map.	WV	3	Constraint on boundary of source zone—Used to identify major structural trends (Wabash Valley fault system [WVFS], La Salle anticlinal belt).	Y
Local Geologic and Tectonic Maps						
Sexton et al. (1986)	3	Small-scale publication figure.	WV	3	Used to define style of faulting and possible source structures within the source zone—Map of individual faults within the WVFS that extend to basement.	Y
Wheeler et al. (1997)	3	Compilation map (scale 1:250,000).	WV	2	Constraint on boundary of source zone—Identifies areas of possible neotectonic deformation.	N

Table C-6.1.9 Data Evaluation
Wabash Valley RLME

Identified Source
Wabash Valley (WV) RLME

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Geodetic Strain						
Hamburger et al. (2002)	1	Only one year of data.	WV	1	Generally consistent with focal mechanism data from historical events.	N
Hamburger et al. (2009)	3	Abstract	WV	1	GPS data for WVSZ indicate systematic northwestward motion of about 0.5–0.7 mm/yr with respect to Stable North American Reference Frame. Results suggest that elevated seismicity and strain in WVSZ could result from aseismic slip triggered by viscous relaxation in the lower crust long after New Madrid earthquake.	N
Regional Stress						
CEUS SSC stress data set	5	Includes two additional new stress measurements based on focal mechanisms.	WV	2	East trend consistent with previous measurements shown on World Stress Map.	Y
Heidbach et al. (2008) (World Stress Map)	3	Worldwide compilation of stress data.	WV	2	Three events used by World Stress Map, while tectonically and spatially distinct, represent	N

Table C-6.1.9 Data Evaluation
Wabash Valley RLME

Identified Source
Wabash Valley (WV) RLME

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
					contemporary maximum horizontal compressive stress that trends just north of east in southern Illinois and Indiana (McBride et al., 2007).	
Tectonic Strain						
Fraser et al. (1997)	2	Geomorphic analysis. Indirect evidence for neotectonic deformation. Apparent deformation could result from other nontectonic fluvial channel processes.	WV	3	Constraints on boundary of zone—Used as one potential indicator of a more localized region of deformation in vicinity of Vincennes.	Y
Wheeler and Cramer (2002)	4	Systematic evaluation of potential source zone for two largest paleoearthquakes in WVSZ.	WV	4	Constraints on boundary of zone—The Tri-State source zone defined by Wheeler and Cramer and used by USGS to define an Mmax source region for WVSZ is captured by using a leaky boundary for ruptures originating in the WV RLME.	Y
Counts et al. (2008, 2009a, 2009b) Van Arsdale et al.	4	Paleoseismic studies (trenching, paleoliquefaction, and geomorphic analyses) provide good indication of	WV	4	Constraints on boundary of zone—Quaternary activity on faults within WVFS used as an indicator of a more localized region of deformation in vicinity	Y

Table C-6.1.9 Data Evaluation
Wabash Valley RLME

Identified Source
Wabash Valley (WV) RLME

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
(2009) Woolery (2005)		Quaternary deformation on faults within the WVFS.			of Vincennes.	
Focal Mechanisms						
Hamburger et al. (2002, 2008) Larson (2002) Larson et al. (2009) McBride, Hildenbrand, et al. (2002) McBride et al. (2007) Withers et al. (2009) Yang et al. (2009)	4	Well-constrained focal mechanisms for several recent moderate-sized (M 4–5.4) earthquakes in Wabash Valley region of southern Illinois and Indiana.	WV	5	Style of deformation—Focal mechanisms indicate ongoing deformation along reactivated Precambrian and Paleozoic basement structures. Analyses indicate three seismotectonic environments in upper crust: strike-slip (E-NE and NE trends) and reverse fault.	N
Paleoseismicity						
CEUS SSC paleoliquefaction database	5	Comprehensive database; peer-reviewed; includes uncertainties in timing of paleo-liquefaction events).	WV	4	Recurrence—Provides constraints on timing of Vincennes and Skelton paleoearthquakes	Y

Table C-6.1.9 Data Evaluation
Wabash Valley RLME

Identified Source
Wabash Valley (WV) RLME

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
[various studies by numerous researchers; see Table 6.1.9-1]	4–5	One of the best paleoliquefaction data sets available for a region in the CEUS. Back-calculations using site-specific field observations and seismological observations have been put into a probabilistic framework.	WV	5	Recurrence and magnitude—Paleoliquefaction data provide a basis for identifying as many as eight prehistoric earthquakes in the region. The proximities of the two largest prehistoric events—the Vincennes (~6,100 yr BP) and the Skelton earthquakes (~12,000 yr BP)—are used to characterize recurrence of RLMEs. Detailed analyses of Vincennes earthquake (~6,100 BP) provide a reasonable constraint on size and location of this event.	Y

Table C-7.3.1 Data Evaluation
St. Lawrence Rift Zone

Identified Source
St. Lawrence Rift (SLR)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Instrumental Seismicity						
CEUS SSC earthquake catalog	5	Comprehensive catalog; includes magnitude conversions and uncertainty assessments.	SLR	5	Used to evaluate recurrence parameters.	Y
Lamontagne and Ranalli (1997)	5	Relocated hypocentral depth.	SLR	5	Used to evaluate thickness of seismogenic crust and style of faulting.	Y
Historical Seismicity						
CEUS SSC earthquake catalog	5	Comprehensive catalog; includes magnitude conversions and uncertainty assessments.	SLR	5	The prior distribution for Mmax is modified by the largest observed historical earthquake taken from the CEUS SSC earthquake catalog.	Y
Lamontagne et al. (2008)	4	Earthquake parameters and felt effects for major Canadian earthquakes.	SLR	4	Magnitudes derived from special studies are cited directly in CEUS SSC earthquake catalog.	Y

Table C-7.3.1 Data Evaluation
St. Lawrence Rift Zone

Identified Source
St. Lawrence Rift (SLR)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Magnetic Anomaly						
CEUS SSC magnetic anomaly data set	5	High-quality regional data.	SLR	2	St. Lawrence rift zone is not subdivided based on different basement terranes or tectonic features imaged in the magnetic anomaly map. Magnetic anomalies to the west reflect Grenville basement as opposed to rift faulting. Data does not assist in delineating eastern boundary.	Y
Gravity Anomaly						
CEUS SSC gravity data set	5	High-quality regional data.	SLR	0	The St. Lawrence rift zone generally encompasses a region of low-amplitude gravity anomalies. The boundaries were not drawn based on this data set.	Y
Seismic Reflection						
Tremblay et al. (2003)	3	Relocates offshore SQUIP data.	SLR	2	Images a transition from a half graben to a graben of the St. Lawrence fault within the St. Lawrence estuary.	N

Table C-7.3.1 Data Evaluation
St. Lawrence Rift Zone

Identified Source
St. Lawrence Rift (SLR)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Geophysical Anomalies						
Li et al. (2003)	3	Determined velocity structure from inversion of Rayleigh waves.	SLR	3	Deep crustal velocity anomalies beneath the Adirondacks are attributed to the Cretaceous Great Meteor hotspot.	N
Local Geologic and Tectonic Maps						
Garrity and Soller (2009) (Database of the Geologic Map of North America)	5	1:5,000,000-scale geologic map in GIS format compiled from various national maps.	SLR	4	Boundary drawn to capture mapped normal faults in the Adirondacks.	N
Higgins and van Breemen (1998)	3	Presents age dates and mapping for the Sept Iles layered mafic intrusion.	SLR	4	Used to define source geometry for Saguenay graben.	N
Hodych and Cox (2007)	3	Presents maps and age dates for the Lac Matapedia and Mt. St.-Anselme basalt flows of Quebec.	SLR	4	Used to define source geometry for eastern boundary.	N
Kamo et al. (1995)	3	Compilation of Iapetan faults, dikes, and other intrusive volcanic rocks.	SLR	5	Defines Ottawa graben and southern limit of rift system.	N

Table C-7.3.1 Data Evaluation
St. Lawrence Rift Zone

Identified Source
St. Lawrence Rift (SLR)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Kanter (1994)	3	Data is considered of good quality for defining location of major crustal divisions.	SLR	5	Used to define source geometry.	Y
McCausland and Hodych (1998)	3	Reviews interpretations of the Skinner Cove volcanic of Newfoundland.	SLR	4	Used to define source geometry for Ottawa graben and New York promontory.	N
Wheeler (1995)	3	Compilation of late Neoproterozoic to early Cambrian faults.	SLR	4	Used to define source geometry.	N
Whitmeyer and Karlstrom (2007)	3	Presents regional geologic map of North America documenting the assembly of the continent by successive tectonic events.	SLR	5	Used to define source geometry.	Y
Geodetic Strain						
Mazzotti and Adams (2005)	3	Modeled seismic moment rates from earthquake statistics.	SLR	3	Seismic moment rate varies from (0.1 to 0.5) × 10^{17} Nm/yr for entire zone rift system if Charlevoix is confined to its own zone or (0.1–5.0) × 10^{17} Nm/yr if Charlevoix is combined with the entire rift	N

Table C-7.3.1 Data Evaluation
St. Lawrence Rift Zone

Identified Source
St. Lawrence Rift (SLR)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
					system.	
Regional Stress						
CEUS SSC stress data set	4	Provides additional new measurements to World Stress Map.	SLR	1	Data includes thrust mechanisms with minor strike-slip. Orientations vary from E-W to NE-SW.	Y
Heidbach et al. (2008) (World Stress Map)	3	Compiled worldwide stress indicators from focal mechanisms, borehole breakouts, etc.	SLR	2	Entries for SLR are predominantly thrust mechanisms with some strike-slip. Orientations of maximum horizontal stress vary from E-W to NE-SW.	Y
Focal Mechanisms						
Bent (1992)	3	Analyzed historical waveforms for 1925 Charlevoix earthquake.	SLR	4	Used to characterize future ruptures.	N
Bent (1996a)	3	Analyzed historical waveforms for 1935 Timiskaming earthquake.	SLR	4	Used to characterize future ruptures.	N
Bent (1996b)	3	Analyzed historical waveforms for 1944 Cornwall-Massena earthquake.	SLR	4	Used to characterize future ruptures.	N

Table C-7.3.1 Data Evaluation
St. Lawrence Rift Zone

Identified Source
St. Lawrence Rift (SLR)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Bent and Perry (2002)	4	Determined focal depths for ENA earthquakes.	SLR	4	Used to characterize future ruptures.	N
Bent et al. (2002)	4	Determined earthquake parameters for 2000 Kipawa earthquake.	SLR	4	Used to characterize future ruptures.	N
Bent et al. (2003)	4	Determined focal mechanisms for Western Quebec seismic zone.	SLR	4	Used to characterize future ruptures.	N
Du et al. (2003)	4	Determined focal mechanisms for moderate earthquakes in NE United States and SE Canada.	SLR	4	Used to characterize future ruptures.	N
Lamontagne (1999)	4	Determined focal mechanisms for Charlevoix earthquakes.	SLR	4	Used to characterize future ruptures.	N
Lamontagne and Ranalli (1997)	4	Determined focal mechanisms.	SLR	4	Used to characterize future ruptures.	N

Table C-7.3.1 Data Evaluation
St. Lawrence Rift Zone

Identified Source
St. Lawrence Rift (SLR)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Lamontagne et al. (2004)	4	Determined focal mechanism for 1999 Côte-Nord earthquake.	SLR	4	Used to characterize future ruptures.	N
Li et al. (1995)	4	Determined focal mechanisms for two M 4 earthquakes.	SLR	4	Used to characterize future ruptures.	N
Nábělek and Suárez (1989)	3	Determined earthquake parameters for 1983 Goodnow, New York, earthquake.	SLR	4	Used to characterize future ruptures.	N
Seeber et al. (2002)	4	Determined earthquake parameters for 2002 Au Sable Forks, New York, earthquake.	SLR	4	Used to characterize future ruptures.	N
Paleoseismicity						
Aylsworth et al. (2000)	3	Documents disturbed sediment and paleolandslides along Ottawa River.	SLR	4	Provides evidence for persistent prehistoric earthquake activity along the eastern Ottawa-Bonnechere graben.	N
CEUS SSC paleoliquefaction database	5	Compilation (with attributions) of paleoliquefaction	SLR	4	Localization of liquefaction features in Charlevoix support characterization of a RLME	N

Table C-7.3.1 Data Evaluation
St. Lawrence Rift Zone

Identified Source
St. Lawrence Rift (SLR)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
		observations.			source.	
Doig (1990)	3	Documents silt layers in cores attributed to earthquake-induced landslides near Charlevoix.	SLR	4	Provides evidence for persistent prehistoric earthquake activity near Charlevoix.	N
Doig (1991)	3	Documents silt layers in cores attributed to earthquake-induced landslides near Saguenay.	SLR	4	Provides evidence for persistent prehistoric earthquake activity near Saguenay.	N
Doig (1998)	3	Documents silt layers in cores attributed to earthquake-induced landslides near Timiskaming.	SLR	4	Provides evidence for persistent prehistoric earthquake activity near Timiskaming.	N
Filion et al. (1991)	3	Provides ages for prehistoric landslides attributed to earthquakes.	SLR	4	Provides evidence for persistent prehistoric earthquake activity near Charlevoix.	N
Tuttle et al. (1990)	4	Documents liquefaction features associated with the 1988 Saguenay earthquake.	SLR	4	Provides evidence for at least one older earthquake near Saguenay.	Y

Table C-7.3.1 Data Evaluation
St. Lawrence Rift Zone

Identified Source
St. Lawrence Rift (SLR)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Tuttle et al. (1992)	4	Documents liquefaction features associated pre-1988 Saguenay earthquake.	SLR	4	Provides evidence for at least one older earthquake near Saguenay.	Y

Table C-7.3.2 Data Evaluation
Great Meteor Hotspot Zone

Identified Source
Great Meteor Hotspot (GMH)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Instrumental Seismicity						
CEUS SSC earthquake catalog	5	Comprehensive catalog; includes magnitude conversions and uncertainty assessments.	GMH	5	Used to evaluate recurrence parameters.	Y
Ma and Atkinson (2006)	5	Relocated hypocentral depth.	GMH	5	Focal depths cluster at 5, 8, 12, 15, and 22 km and may reflect layering in seismogenic properties within the crust.	N
Ma and Eaton (2007)	5	Relocated hypocentral depth.	GMH	5	Deep earthquakes (greater than 17 km in depth) are localized as clusters at Maniwaki and Mont-Laurier.	N
Ma et al. (2008)	5	Relocated hypocentral depth in Northern Ontario.	GMH	5	Spatial distribution of earthquakes indicates an aseismic area northwest of the GMH seismotectonic zone along the hotspot track.	N
Historical Seismicity						
Adams and Basham (1991)	3	Provides description of earthquakes in northeastern Canada.	GMH	4	Description of Western Quebec seismic zone considered in geometry for GMH seismotectonic zone. NW-trending band of seismicity north of Ottawa River attributed to GMH track.	N

Table C-7.3.2 Data Evaluation
Great Meteor Hotspot Zone

Identified Source
Great Meteor Hotspot (GMH)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
CEUS SSC earthquake catalog	5	Comprehensive catalog; includes magnitude conversions and uncertainty assessments.	GMH	5	Prior distribution for Mmax is modified by the largest observed historical earthquake taken from CEUS SSC earthquake catalog.	Y
Magnetic Anomaly						
CEUS SSC magnetic data set	5	High-quality regional data.	GMH	1	GMH zone is not subdivided based on different basement terranes or tectonic features imaged on magnetic anomaly map.	Y
Gravity Anomaly						
CEUS SSC gravity data set	5	High-quality regional data.	GMH	1	GMH zone is not subdivided based on different basement terranes or tectonic features imaged on magnetic anomaly map.	Y
Seismic Reflection						
Ma and Eaton (2007)	4	Compares location of seismicity to published interpretations of Lithoprobe Lines 52 and 53.	GMH	4	Seismicity does not generally correlate with structure in Western Quebec seismic zone (WQSZ); shear zones of Grenville province cut across NW-SE trend of WQSZ at high angle. The Maniwaki cluster exhibits repeating events with deep seismicity localized within footwall of Baskatong crustal ramp, and intermediate and shallow	N

Table C-7.3.2 Data Evaluation
Great Meteor Hotspot Zone

Identified Source
Great Meteor Hotspot (GMH)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
					seismicity localized within hanging wall.	
Geophysical Anomalies						
Eaton et al. (2006)	4	Determined crustal thickness from teleseismic results that agree with previous published refraction surveys.	GMH	5	Minima on crustal thickness maps coincides with GMH source zone.	N
Li et al. (2003)	3	Determined velocity structure from inversion of Rayleigh waves.	GMH	3	Southwestern portion of zone includes deep negative crustal velocity anomaly.	N
Rondenay et al. (2000)	3	Modeled velocity of crust from travel time inversion of teleseismic data.	GMH	3	Images a low-velocity corridor oblique to GMH zone.	N
Local Geologic and Tectonic Maps						
Duncan (1984)	4	Determined Ar ages for offshore seamounts.	GMH	2	Source geometry for GMH was not drawn to encompass Cretaceous volcanism in region.	N
Faure et al. (1996b)	5	Paleostress analysis of Cretaceous rocks.	GMH	5	Monteregian plutons intruded along reactivated structures along Ottawa-Bonnechere graben.	N

Table C-7.3.2 Data Evaluation
Great Meteor Hotspot Zone

Identified Source
Great Meteor Hotspot (GMH)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Faure et al. (2006)	5	Jurassic paleostress orientations associated with opening of Atlantic.	GMH	5	Opening of Atlantic resulted in widespread extension hundreds of kilometers into craton. Paleostress orientations from Jurassic rocks differ from those in Cretaceous rocks.	N
Heaman and Kjarsgaard (2000)	5	Determined U-Pb perovskite ages for kimberlite dikes.	GMH	3	Source geometry for GMH was not drawn to encompass Cretaceous volcanism in the region.	N
Matton and Jebrak (2009)	4	Proposes that Cretaceous alkaline magmas result from periodic reactivation of preexisting zones of weakness combined with coeval asthenospheric upwelling during major stages of Atlantic tectonic evolution.	GMH	5	Provides mechanisms for widespread Cretaceous volcanisms and rational for not drawing a source zone along proposed hotspot tracks.	N
Poole (1970)	3	Provides descriptions and ages for Cretaceous Monteregian plutons.	GMH	3	Source geometry for GMH incorporates thin crust and deep earthquakes and was not drawn to encompass Cretaceous volcanism in the region.	N

Table C-7.3.2 Data Evaluation
Great Meteor Hotspot Zone

Identified Source
Great Meteor Hotspot (GMH)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Zartman (1977)	2	Compiled ages for plutonic rocks in White Mountains.	GMH	2	Source geometry for GMH incorporates thin crust and deep earthquakes and was not drawn to encompass Cretaceous volcanism in the region.	N
Geodetic Strain						
Mazzotti and Adams (2005)	3	Modeled seismic moment rates from earthquake statistics.	GMH	3	Seismic moment rate of (0.1–5.0) × 10^{17} N m/yr (Newton-meter per year) for entire zone, which corresponds to a M_w 7 earthquake every 150 years.	N
Regional Stress						
CEUS SSC stress data set	4	Provides additional new measurements to World Stress Map.	GMH	1	Data includes thrust mechanisms in a variety of orientations.	Y
Heidbach et al. (2008) (World Stress Map)	3	Compiled worldwide stress indicators from focal mechanisms, borehole breakouts, etc.	GMH	2	Limited entries for the GMH—dominantly thrust mechanisms with some strike-slip. Orientations of maximum horizontal stress vary from E-W to NW-SE, N-S, and NNE-SSW.	Y

Table C-7.3.2 Data Evaluation
Great Meteor Hotspot Zone

Identified Source
Great Meteor Hotspot (GMH)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Focal Mechanisms						
Bent (1996b)	3	Compiles existing focal mechanisms with data for the 1944 Cornwall-Massena earthquake.	GMH	3	Mechanisms of GMH are predominantly thrust mechanisms, although interpreting which nodal plane corresponds to the fault plane is ambiguous.	N
Bent et al. (2003)	4	Determines focal mechanisms from earthquakes occurring from 1994 through 2000.	GMH	4	Thrust or oblique-thrust in response to NE compression.	N
Du et al. (2003)	4	Reanalyzes earthquake source parameters from additional stations.	GMH	5	Focal mechanisms have strikes of one of their nodal planes parallel to the general trend of seismicity.	N
Lamontagne et al. (1994)	4	Determines earthquake parameters from several stations in network.	GMH	5	The October 19, 1990, Mont-Laurier earthquake has a reverse mechanism with steeply N-dipping, E-W-oriented nodal plane.	N
Ma and Eaton (2007)	4	Determined focal mechanism for February 25, 2006, M_w 3.7 earthquake and compiled existing focal mechanisms.	GMH	5	Reverse mechanisms have SW-trending P-axes that change to E-W-trending P-axes in southern portion of the zone.	N

Table C-7.3.2 Data Evaluation
Great Meteor Hotspot Zone

Identified Source
Great Meteor Hotspot (GMH)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Paleoseismicity						
Aylsworth et al. (2000)	3	Poor constraints on magnitude or location of paleoearthquakes causing observed deformation.	GMH	1	Study area located outside of GMH within St. Lawrence rift (SLR) seismotectonic zone. Location of paleoearthquakes may lie within SLR or GMH, but no geotechnical analysis of materials has been performed to constrain location and magnitude.	N
CEUS SSC paleoliquefaction database	5	Compilation (with attributions) of paleoliquefaction observations.	GMH	n/a	No data located within zone.	Y

Table C-7.3.3 Data Evaluation
Northern Appalachian Zone

Identified Source
Northern Appalachian (NAP)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Instrumental Seismicity						
CEUS SSC earthquake catalog	5	Comprehensive catalog; includes magnitude conversions and uncertainty assessments.	NAP	5	Used to evaluate recurrence parameters.	Y
Historical Seismicity						
Burke (2004)	4	Identifies historical earthquakes from newspapers.	NAP	4	Defines clusters of seismicity at Moncton, Passamaquoddy Bay, and Central Highlands (Miramichi). Eastern boundary drawn to exclude Passamaquoddy Bay seismicity from NAP to ECC.	N
Burke (2009)	5	Identifies historical earthquakes from newspapers and provides isoseismal maps where available.	NAP	5	Provides estimate of magnitude for historical earthquakes based on felt area.	N
CEUS SSC earthquake catalog	5	Comprehensive catalog; includes magnitude conversions and uncertainty assessments.	NAP	5	The prior distribution for Mmax is modified by the largest observed historical earthquake taken from the CEUS SSC earthquake catalog.	Y

Table C-7.3.3 Data Evaluation
Northern Appalachian Zone

Identified Source
Northern Appalachian (NAP)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Ebel (1996)	3	Estimates magnitude and location of 1638 earthquake.	NAP	5	Considered for maximum observed earthquake.	N
Leblanc and Burke (1985)	4	Estimates magnitude and location of four earthquakes in Maine and New Brunswick.	NAP	3	Provides magnitude estimates for historical earthquakes.	N
Magnetic Anomaly						
CEUS SSC magnetic anomaly data set	5	High-quality regional data.	NAP	2	The NAP is not subdivided based on different basement terranes or tectonic features imaged in the magnetic anomaly map. The eastern boundary follows magnetic highs west of the Fundy basin. Sparse magnetic highs parallel the western boundary.	Y
Gravity Anomaly						
CEUS SSC gravity data set	5	High-quality regional data.	NAP	1	The NAP generally encompasses a region of intermediate gravity anomalies with lower values to the west in the SLR and higher values to the east in ECC.	Y

Table C-7.3.3 Data Evaluation
Northern Appalachian Zone

Identified Source
Northern Appalachian (NAP)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Seismic Reflection						
Hughes and Luetgert (1991)	3	Seismic-refraction results from Adirondacks to Maine.	NAP	4	Delineates crustal thickness within seismotectonic zone.	N
Spencer et al. (1989)	3	Presents results of Quebec-Maine seismic-reflection and seismic-refraction profiles.	NAP	5	Images Iapetan growth faults below detachment.	N
Stewart et al. (1993)	3	Integrates results of Quebec-Maine seismic-reflection profiles in tectonostratigraphic units.	NAP	4	Delineates Appalachian terranes.	N
Geophysical Anomalies						
Li et al. (2003)	3	Determined velocity structure from inversion of Rayleigh waves.	NAP	3	SW portion of zone includes deep negative crustal velocity anomaly.	N

Table C-7.3.3 Data Evaluation
Northern Appalachian Zone

Identified Source
Northern Appalachian (NAP)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Local Geologic and Tectonic Maps						
CEUS SSC basins compilation	4	Data is considered of generally good quality; however, quality is likely variable as it represents a compilation from various published maps and various scales/detail.	NAP	5	SW boundary extends to Connecticut River valley in western Massachusetts and Connecticut; eastern boundary extends to Fundy basin.	Y
Klitgord et al. (1988)	3	Review of Mesozoic basins along Atlantic continental margin.	NAP	5	Eastern boundary of NAP drawn to the west of the Bay of Fundy shown on Plate 2C.	N
Moench and Aleinikoff (2003)	3	Presentation of updated tectonic map for northern New England.	NAP	4	Appalachian terrane boundaries from Figure 1 considered in NW boundary.	N
Murphy and Keppie (2005)	3	Compilation of major Paleozoic strike-slip faults.	NAP	4	Eastern boundary in Nova Scotia drawn along strike-slip faults.	N
Geodetic Strain						
Mazzotti and Adams (2005)	3	Modeled seismic moment rates from earthquake statistics.	NAP	3	Seismic moment rate of (0.1–5.0) × 10^{17} Nm/yr for entire zone.	N

Table C-7.3.3 Data Evaluation
Northern Appalachian Zone

Identified Source
Northern Appalachian (NAP)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Regional Stress						
CEUS SSC stress data set	4	Provides additional new measurements to World Stress Map.	NAP	1	Data includes thrust mechanisms in a variety of orientations.	Y
Heidbach et al. (2008) (World Stress Map)	3	Compiled worldwide stress indicators from focal mechanisms, borehole breakouts, etc.	NAP	2	Limited entries for the NAP—dominantly thrust mechanisms with some strike-slip. Orientations of maximum horizontal stress vary from E-W to NW-SE, N-S and NNE-SSW.	Y
Focal Mechanisms						
Bent et al. (2003)	4	Focal mechanisms for two New Brunswick earthquakes.	NAP	4	Considered in future earthquake characteristics.	N
Brown and Ebel (1985)	3	Source parameters for aftershocks of 1982 Gaza, New Hampshire, earthquake.	NAP	3	Considered in future earthquake characteristics.	N
Ebel and Bouck (1988)	3	Source parameters for earthquakes occurring in NE from 1981 to 1987.	NAP	3	Considered in future earthquake characteristics.	N

Table C-7.3.3 Data Evaluation
Northern Appalachian Zone

Identified Source
Northern Appalachian (NAP)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Ebel et al. (1986)	3	Source parameters for 1940 Ossipee, New Hampshire, earthquakes.	NAP	3	Considered in future earthquake characteristics.	N
Paleoseismicity						
CEUS SSC paleoliquefaction database	4	Compilation (with attributions) of paleoliquefaction observations.	NAP	N	Mmax determined from the largest observed historical earthquake.	Y

Table C-7.3.4 Data Evaluation
Paleozoic Extended Crust Zone

Identified Source
Paleozoic Extended Crust Zone (PEZ) with alternatives: W: Wide; N: Narrow

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Instrumental Seismicity						
CEUS SSC earthquake catalog	5	Comprehensive catalog; includes magnitude conversions and uncertainty assessments.	PEZ-W, PEZ-N	5	Used to evaluate recurrence parameters.	Y
Dineva et al. (2004)	5	Relocated hypocenters near the Great Lakes.	PEZ-W	4	Used to evaluate the spatial relationships of seismicity with structure.	N
Historical Seismicity						
CEUS SSC earthquake catalog	5	Comprehensive catalog; includes magnitude conversions and uncertainty assessments.	PEZ-W, PEZ-N	5	The prior distribution for Mmax is modified by the largest observed historical earthquake taken from the CEUS SSC earthquake catalog.	Y
Seeber and Armbruster (1993)	3	Reviewed historical seismicity in the vicinity of Lakes Ontario and Erie.	PEZ-W	4	Added and removed historical earthquakes from CEUS SSC earthquake catalog.	N

Table C-7.3.4 Data Evaluation
Paleozoic Extended Crust Zone

Identified Source
Paleozoic Extended Crust Zone (PEZ) with alternatives: W: Wide; N: Narrow

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Magnetic Anomaly						
CEUS SSC magnetic anomaly data set	5	High-quality regional data.	PEZ-W, PEZ-N	2	The PEZ zone is not subdivided based on different basement terranes or tectonic features imaged in the magnetic anomaly map. New York–Alabama lineament not used to delineate source zone.	Y
Gravity Anomaly						
CEUS SSC gravity anomaly data set	5	High-quality regional data.	PEZ-W, PEZ-N	4	Eastern boundary defined by gravity gradient.	Y
Seismic Reflection						
Cook and Oliver (1981)	3	Regional synthesis of gravity data and seismic-reflection profiles.	PEZ-W, PEZ-N	4	Gravity gradient used to define the eastern boundary. Provides seismic evidence that gravity gradient is interpreted as an edge effect corresponding to the boundary between continental crust and former oceanic crust.	N
Fakundiny and Pomeroy (2002)	4	Reprocessed seismic data for the Clarendon-Linden fault system.	PEZ-W, PEZ-N	1	Shows evidence of reactivation of Clarendon-Linden fault system in lower Paleozoic units.	N

Table C-7.3.4 Data Evaluation
Paleozoic Extended Crust Zone

Identified Source
Paleozoic Extended Crust Zone (PEZ) with alternatives: W: Wide; N: Narrow

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Forsyth, Milkereit, Davidson, et al. (1994)	4	Reprocessed marine seismic lines from Lakes Erie and Ontario.	PEZ-W		Shows evidence of reactivation in lower Paleozoic units in eastern Lake Erie.	N
O'Dowd et al. (2004)	5	Interprets seismic data from Southern Ontario Seismic Project line 4 with magnetic data.	PEZ-W	5	Defines western boundary along the Central Metasedimentary Belt boundary zone.	N
Ouassaa and Forsyth (2002)	4	Reprocessed seismic data for the Clarendon-Linden fault system.	PEZ-W, PEZ-N	1	Shows evidence of reactivation of the Clarendon-Linden fault system in lower Paleozoic units.	N
Geophysical Anomalies						
Steltenpohl et al. (2010)	5	Reprocesses new magnetic data for Alabama.	PEZ-N	5	Defines the western boundary of PEZ-N.	N

Table C-7.3.4 Data Evaluation
Paleozoic Extended Crust Zone

Identified Source
Paleozoic Extended Crust Zone (PEZ) with alternatives: W: Wide; N: Narrow

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Local Geologic and Tectonic Maps						
CEUS SSC basins compilation	4	Data is considered of generally good quality; however, quality is likely variable as it represents a compilation from various published maps and various scales/detail.	PEZ-W, PEZ-N	5	Western limit of Mesozoic rift basins used to define eastern boundary	Y
Garrity and Soller (2009)	5	Database with 1:5,000,000-scale geologic map in GIS format compiled from various national maps.	SLR	4	Boundary drawn to capture mapped normal faults in the Adirondacks.	N
Kamo et al. (1995)	3	Compilation of Iapetan faults, dikes, and other intrusive volcanic rocks.	PEZ-N	4	Western Boundary includes Grenville dike swarm, which is coeval with Iapetan rifting.	N
Kanter (1994)	4	Data is considered good quality for defining location of major crustal divisions.	PEZ-W, PEZ-N	4	Used to define source geometry.	Y
McKenna et al. (2007)	2	Presents a heat flow map in Figure 2.	PEZ-W, PEZ-N	1	Data not used to define source geometry.	N

Table C-7.3.4 Data Evaluation
Paleozoic Extended Crust Zone

Identified Source
Paleozoic Extended Crust Zone (PEZ) with alternatives: W: Wide; N: Narrow

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Thomas (1991)	2	Locations of transforms and rift faults are approximate—based on palinspastic restorations.	PEZ-W, PEZ-N	3	Provides a conceptual basis for drawing zones; however, location of boundaries is refined by other data sets.	N
Wheeler (1995)	3	Compilation of late Neoproterozoic to early Cambrian faults.	PEZ-W, PEZ-N	4	Used to define source geometry.	N
Whitmeyer and Karlstrom (2007)	4	Presents regional geologic map of North America documenting assembly of the continent by successive tectonic events.	PEZ-W, PEZ-N	3	Used to define source geometry.	Y
Regional Stress						
CEUS SSC stress data set	4	Provides additional new measurements to World Stress Map.	PEZ-W, PEZ-N	1	Data includes strike-slip mechanisms with minor thrust mechanisms. Orientations generally trend NE-SW. Minor normal mechanisms.	Y

Table C-7.3.4 Data Evaluation
Paleozoic Extended Crust Zone

Identified Source
Paleozoic Extended Crust Zone (PEZ) with alternatives: W: Wide; N: Narrow

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Heidbach et al. (2008) (World Stress Map)	3	Compiled worldwide stress indicators from focal mechanisms, borehole breakouts, etc.	PEZ-W, PEZ-N	2	Data includes strike-slip mechanisms with minor thrust mechanisms. Orientations generally trend NE-SW. Minor normal mechanisms.	Y
Focal Mechanisms						
Herrmann (1978)	3	Earthquake parameters.	PEZ-W	4	Considers focal mechanisms and hypocentral depth for 1966 and 1967 Attica earthquakes.	N
Kim et al. (2006)	4	Parameters for an earthquake in Lake Ontario.	PEZ-W	4	Focal mechanism considered in characterization.	N
Paleoseismicity						
CEUS SSC paleoliquefaction database	5	Compilation (with attributions) of paleoliquefaction observations.	PEZ-W; PEZ-N	1	Considered in discussion along with references below; however, largest observed earthquake determined from historical seismicity.	Y
Law et al. (1994)	4	Paleoseismic investigations in New River Valley of Pembroke, Virginia.	PEZ-N; PEZ-W	3	Describes fault and graben structures in alluvial deposits.	N

Table C-7.3.4 Data Evaluation
Paleozoic Extended Crust Zone

Identified Source
Paleozoic Extended Crust Zone (PEZ) with alternatives: W: Wide; N: Narrow

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Law et al. (2000)	4	Paleoseismic investigations in New River Valley of Pembroke, Virginia.	PEZ-N; PEZ-W	3	Describes extensional and reverse faults cutting alluvial surfaces.	N
Tuttle et al. (2002)	5	Paleoliquefaction investigation surrounding the Clarendon-Linden fault system.	PEZ-W	4	Identifies a lack of paleoliquefaction features. Historical seismicity used to evaluate maximum magnitude.	N

Table C-7.3.5 Data Evaluation
Illinois Basin-Extended Basement Zone

Identified Source
Illinois Basin-Extended Basement (IBEB)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Instrumental Seismicity						
CEUS SSC earthquake catalog	5	Comprehensive catalog; includes magnitude conversions and uncertainty assessments.	IBEB	5	Used to evaluate recurrence parameters.	Y
Hamburger et al. (2008)	3	Abstract	IBEB	4	Style of faulting and future earthquake characteristics—Reactivation of structures in contemporary stress regime in Illinois basin region—04:30 CDT, April 18, 2008, M 5.4 earthquake, located near New Harmony fault at depth of ~14 km (~9 mi.).	Y
Withers et al. (2009)	3	Abstract—citing preliminary analysis.	IBEB	4	Style of faulting and future earthquake characteristics—Reactivation of structures in contemporary stress regime in Illinois basin region—April 18, 2008, M_w 5.2 (M_w 5.4 GCMT [http://www.globalcmt.org]) Mt. Carmel, Illinois, earthquake. Largest event in 20 years in Wabash Valley seismic zone.	Y

Table C-7.3.5 Data Evaluation
Illinois Basin-Extended Basement Zone

Identified Source
Illinois Basin-Extended Basement (IBEB)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Yang et al. (2009)	3	Abstract—citing preliminary analysis.	IBEB	4	Style of faulting and future earthquake characteristics—Reactivation of structures in contemporary stress regime in Illinois basin region. Analysis of aftershocks from 2008 M 5.4 Mt. Carmel earthquake using sliding-window cross-correlation technique and double-difference relocation algorithm gives a best-fit plane having a nearly E-W trend with an orientation of 248 degrees and a dip angle of 81 degrees. Fault is nearly vertical down to ~20 km (~12.5 mi.). Provides constraints on seismogenic width.	N
Historical Seismicity						
Bakun and Hopper (2004a)	5	Analysis of specific historical earthquakes.	IBEB	4	Earthquake catalog and recurrence—Incorporated into earthquake catalog used to evaluate recurrence.	Y

Table C-7.3.5 Data Evaluation
Illinois Basin-Extended Basement Zone

Identified Source
Illinois Basin-Extended Basement (IBEB)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
McBride et al. (2007)	5	Integrated assessment based on seismicity, borehole, geophysical, and industry seismic profile data analysis.	IBEB	5	Style of faulting and future rupture characteristics—Discusses possible association of recent earthquakes (April 3, 1974, m_b 4.7; June 10, 1987, m_b 5.2; and November 9, 1968, m_b 5.5 events) with three distinct upper-crust sources in Illinois basin region. Provides detailed discussion of parameters (magnitude, depth, focal mechanism) for each event.	Y
Magnetic Anomaly						
CEUS SSC magnetic anomaly data set	5	High-quality regional data.	IBEB	2	Boundaries of proto-Illinois basin (Precambrian rift basin and extended basement terrane) as outlined in publications (based on seismic data, deep boreholes, and geopotential data) are not uniquely defined by magnetic anomaly map. Geopotential field data used by researchers to define published boundaries of basins.	Y

Table C-7.3.5 Data Evaluation
Illinois Basin-Extended Basement Zone

Identified Source
Illinois Basin-Extended Basement (IBEB)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
McBride et al. (2001)	2	Extended abstract summarizing observations on geopotential field derivative maps.	IBEB	2	Constraints on boundaries to the IBEB—First vertical derivative of the reduced-to-pole magnetic intensity map shows a subdued magnetic intensity character associated with Proterozoic rifting and/or volcanic sequences in the basement as inferred from deep seismic-reflection profiles; pattern continues to the north and east beyond limits of deep-reflection profile data. Outer margins of sequences, especially to the south and west, marked by prominent coincident closed-contour magnetic and gravity anomalies, which indicate mafic igneous source intrusions.	N
Gravity Anomaly						
CEUS SSC gravity anomaly data set	5	High-quality regional data.	IBEB	2	Boundaries of proto-Illinois basin (Precambrian rift basin and extended basement terrane) as outlined in publications (based on seismic data, deep boreholes, and geopotential data) are not uniquely defined by gravity anomaly map. Geopotential field data used by researchers to define published boundaries of basins.	Y

Table C-7.3.5 Data Evaluation
Illinois Basin-Extended Basement Zone

Identified Source
Illinois Basin-Extended Basement (IBEB)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Seismic Reflection						
McBride, Hildenbrand, et al. (2002)	5	Simplified line drawings and interpretations of four reprocessed migrated seismic profiles. Excerpts of reprocessed seismic-reflection profiles. Detailed geologic discussion based on integrated review of seismic and geopotential data.	IBEB	4	Used to define style of faulting and possible basement source structures within source zone.	N

Table C-7.3.5 Data Evaluation
Illinois Basin-Extended Basement Zone

Identified Source
Illinois Basin-Extended Basement (IBEB)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
McBride et al. (2007)	5	Builds on McBride, Hildenbrand, et al. (2002) and provides additional interpretations of seismic-reflection data. Presents both raw (selected excerpts) and interpreted sections.	IBEB	4	Concepts and ideas in paper help inform drawing the zone boundaries. Style of faulting and future earthquake characteristics—Used to define style of faulting and possible reactivated basement structures within source zone. Notes that limitations of available data preclude a precise interpretation of "correspondence" between specific earthquakes and subsurface structures. Notes that geopotential field data display trends that mimic the structural trends interpreted from reflection profiles and earthquake information. This suggests that mapped fault zones correspond in a general way to gross lateral lithologic changes.	N

Table C-7.3.5 Data Evaluation
Illinois Basin-Extended Basement Zone

Identified Source
Illinois Basin-Extended Basement (IBEB)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Pratt et al. (1992)	4	Integrated analysis of seismic profile, geopotential anomaly maps, and drilling data to characterize Precambrian basement rocks.	IBEB	2	Describes layered Precambrian rock sequences and internal features (half graben and sequence boundaries that indicate depositional basin) beneath Illinois basin. Shows examples of COCORP lines. Limited constraints on boundary of zone—discusses extent of Centralia sequence (Precambrian layered igneous sequence) and notes presence of half graben and faults within sequence.	N
Regional Geologic and Tectonic Maps						
Baranoski et al. (2009)	3	Interpretation of seismic, boring, and geophysical data sets.	IBEB	4	Concepts and ideas in paper help inform drawing the zone boundaries—Map of the East Continent rift basin used to define limits of IBEB zone.	Y
Drahovzal (2009)	3	Interpretation of seismic, boring, and geophysical data sets.	IBEB	4	Concepts and ideas in paper help inform drawing the zone boundaries—Map of the East Continent rift basin used to define limits of IBEB zone.	Y
McBride, Pugin, et al. (2003)	3	Interpretation of seismic, boring, and geophysical data sets.	IBEB	4	Concepts and ideas in paper help inform drawing the zone boundaries—Map of proto-Illinois basin used to define limits of IBEB zone.	Y

Table C-7.3.5 Data Evaluation
Illinois Basin-Extended Basement Zone

Identified Source
Illinois Basin-Extended Basement (IBEB)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Nelson (1995)	5	Comprehensive compilation of structural mapping for entire state of Illinois and adjoining regions. (Digital format)	IBEB	2	Identifies major structural trends (Wabash Valley fault system, La Salle anticlinal belt). Although some historical earthquakes, such as the 1987 m_b 5.2 earthquake, may be associated with a fault-propagation fold (possible reactivation of a basement fault during Laramide orogeny, McBride et al. (2007) suggest that a clear association of seismicity with mapped structural trends is not well documented throughout southern Illinois basin.	Y
Geodetic Strain						
Hamburger et al. (2002)	1	Only one year of data.	IBEB	1	Generally consistent with focal mechanism data from historical events.	N

Table C-7.3.5 Data Evaluation
Illinois Basin-Extended Basement Zone

Identified Source
Illinois Basin-Extended Basement (IBEB)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Hamburger et al. (2008)	3	Abstract	IBEB	3	Style of faulting—analysis of GPS data suggests systematic NW motion of about 0.5–0.7 mm/yr with respect to Stable North American Reference Frame. Block models, which assume boundaries along Cottonwood Grove–Rough Creek Graben (CGRCG) and Wabash Valley fault system (WVFS), indicate marginal block velocities, with possible strike-slip motion along the WVFS and E-W motions along the CGRCG.	N
Hamburger et al. (2009)	3	Abstract	IBEB	2	Localization and stationarity of more concentrated seismicity—data from a 56-site-campaign GPS geodetic network in southern Illinois basin indicate systematic NW motion of about 0.5–0.7 mm/yr with respect to Stable North American Reference Frame. Average strains for entire network show marginally significant strains, with an orientation rotated 45 degrees from overall direction of intraplate stress in U.S. midcontinent. Significant changes in strain and seismicity rates in southern Illinois basin can persist for several hundred years following New Madrid earthquakes. The	N

Table C-7.3.5 Data Evaluation
Illinois Basin-Extended Basement Zone

Identified Source
Illinois Basin-Extended Basement (IBEB)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
					seismicity rate can increase by as much as a factor of seven over background rate in the near field, but by a much smaller amount in the far field.	
Regional Stress						
CEUS SSC stress data set	4	No additional stress measurements from World Stress map except for two events in Wabash Valley RLME.	IBEB	0	Same as World Stress Map—No additional new data.	Y
Heidbach et al. (2008) (World Stress Map)	3	Worldwide compilation of stress data.	IBEB	3	Three events used by the World Stress Map, while tectonically and spatially distinct, represent contemporary maximum horizontal compressive stress that trends just north of east in southern Illinois and Indiana (McBride et al., 2007).	Y

Table C-7.3.5 Data Evaluation
Illinois Basin-Extended Basement Zone

Identified Source
Illinois Basin-Extended Basement (IBEB)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Tectonic Strain Focal Mechanisms						
Hamburger et al. (2008) Larson (2002) Larson et al. (2009) McBride, Hildenbrand, et al. (2002) McBride et al. (2007) Withers et al. (2009) Yang et al. (2009)	4	Well-constrained focal mechanisms for several recent moderate-sized (M 4–5.4) earthquakes in Wabash Valley region of southern Illinois and Indiana.	IBEB	4	Focal mechanisms indicate ongoing deformation along reactivated Precambrian and Paleozoic basement structures. Analyses indicate three seismotectonic environments in upper crust: strike-slip (E-NE and NE trends) and reverse fault.	N
Larson et al. (2009)	3	Abstract—citing preliminary analysis	IBEB	4	04:30 CDT, April 18, 2008, M 5.4 earthquake, E-W focal mechanism.	Y

Table C-7.3.5 Data Evaluation
Illinois Basin-Extended Basement Zone

Identified Source
Illinois Basin-Extended Basement (IBEB)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Paleoseismicity						
Paleoliquefaction studies by numerous researchers (see Table 6.1.9-1 and Appendix E—CEUS SSC paleoliquefaction database)	4–5	One of best paleoliquefaction data sets available for a region in CEUS.	IBEB	5	Constraint on zone boundary—Evidence for several moderate- to large-magnitude prehistoric earthquakes suggest possible different recurrence rate in southern Illinois/Indiana relative to surrounding regions Mmax—paleoearthquakes are used to modify likelihood function for Mmax distribution.	Y

Table C-7.3.6 Data Evaluation
Reelfoot Rift Zone

Identified Sources
Reelfoot Rift Zone (RR); Reelfoot Rift–Rough Creek Graben (RR-RCG)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Instrumental Seismicity						
CEUS SSC earthquake catalog	5	Comprehensive catalog; includes magnitude conversions and uncertainty assessments.	RR and RR-RCG	5	Used to develop recurrence parameters.	Y
Chiu et al. (1992)	4	Publication discussing results of PANDA survey.	RR	5	Focal depth—Seismic activity in central NMSZ occurs continuously between ~5 and 14 km (~3 and 9 mi.) depth.	N
Chiu et al. (1997)	4	Peer-reviewed publication. Results from three seismic networks (1974–1994).	RR (SE margin)	4	Focal depth—Nine earthquakes with focal mechanisms; 6.3–22.8 km (4–14.2 mi.); five earthquakes between 13.9 and 17.3 km (8.6–10.7 mi.).	N
Magnetic Anomaly						
CEUS SSC magnetic anomaly data set	5	High-quality regional data.	RR and RR-RCG	4	Used to evaluate alternate geometries of RR.	Y
Hildenbrand and Hendricks (1995)	5	Detailed discussion of interpretations of geopotential data sets.	RR and RR-RCG	5	Source boundaries—Used to evaluate locations of plutons of possible Mesozoic or younger age (limits of significant Mesozoic extension).	N

Table C-7.3.6 Data Evaluation
Reelfoot Rift Zone

Identified Sources
Reelfoot Rift Zone (RR); Reelfoot Rift–Rough Creek Graben (RR-RCG)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Gravity Anomaly						
CEUS SSC gravity anomaly data set	5	High-quality regional data.	RR and RR-RCG	1	Source boundaries—Used to evaluate alternate geometries of RR.	Y
Seismic Reflection						
(See Table D-6.1.5 Data Summary—Reelfoot Rift–New Madrid Seismic Zone)	n/a	n/a	RR	1	Seismic-reflection data integrated into publications that define structures within RR. Specific lines not used directly in this study.	N
Odum et al. (2010)	3	Provides interpreted high-resolution seismic profile data to support alternative structural model. Discusses evidence for recency.	RR	2	Style of faulting and future rupture characteristics—Potential fault source within RR that is not modeled as an RLME.	N
Pratt (2009)	3	Abstract and poster presentation (pers. comm., October 29, 2010, USGS Memphis meeting).	RR	3	Broad zone of faulting is present in the rift.	N

Table C-7.3.6 Data Evaluation
Reelfoot Rift Zone

Identified Sources
Reelfoot Rift Zone (RR); Reelfoot Rift–Rough Creek Graben (RR-RCG)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Regional Geologic and Tectonic Maps						
Csontos et al. (2008)	3	Integrated structure-contour map of top of basement showing subbasins and bounding NE- and SE-striking faults.	RR	5	Source boundaries—Used to constrain boundaries of RR. Geometry and style of faulting—Used to evaluate future rupture characteristics.	N
Bear et al. (1997) Hildenbrand and Hendricks (1995) Hildenbrand and Ravat (1997) Kolata and Hildenbrand (1997) Wheeler (1997)	3	Published articles that provide good documentation of data that can be used to evaluate northern limit of RR.	RR	4	Various publications that provide evidence for northern terminus of RR and lack of continuity with Rough Creek graben (RCG) and structures in Wabash Valley seismic zone region.	N
Hildenbrand et al. (2001)	3	Detailed discussion of structures in the New Madrid seismic zone region of the RR. Good-quality figures showing interpretations.	RR	5	Source boundaries—Used to constrain boundaries of RR.	N

Table C-7.3.6 Data Evaluation
Reelfoot Rift Zone

Identified Sources
Reelfoot Rift Zone (RR); Reelfoot Rift–Rough Creek Graben (RR-RCG)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Soderberg and Keller (1981) Kolata and Nelson (1991) Potter and Drahovzal (1994) Nelson (1995)	5	Published articles that provide good documentation of data that can be used to evaluate continuity of RR and RCG.	RR-RCG	4	Possible structural continuity of RR and RCG—The RCG in western Kentucky is structurally connected to northern portion of RR that includes Fluorspar area of southern Illinois.	Y
Local Geologic and Tectonic Maps						
Nelson and Lumm (1987) Kolata and Nelson (1991)	4	Published articles based on integration of subsurface geologic, seismologic, and geophysical data. Published figures are of a quality that can be used to define structures.	RR-RCG	5	Boundaries of RCG—Bounded on north by south-dipping, listric Rough Creek fault, and on NW by Shawneetown fault. Southern boundary approximately follows Pennyrile fault system, which forms southern margin to the Paleozoic syn-rift deposits.	N
Regional Stress						
Forte et al. (2007)	3	Regional analysis of properties of upper mantle and lower crust.	RR and RR-RCG	1	Provides rationale for concentrating seismic stress in the vicinity of RR, but is not specific enough to use to draw source zone boundaries.	N

Table C-7.3.6 Data Evaluation
Reelfoot Rift Zone

Identified Sources
Reelfoot Rift Zone (RR); Reelfoot Rift–Rough Creek Graben (RR-RCG)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Grana and Richardson (1996)	3	Detailed discussion of stress data in NMSZ.	RR	1	Modeling indicates that stresses from the load of rift pillow may still be present in upper crust and may still play a role in present-day deformation. Justification for RR.	N
Li et al. (2009)	3	Process-oriented paper based on 3-D viscoelasto-plastic finite-element model.	RR and RR-RCG (out-of-cluster model)	2	Supports migration of seismicity within RR. Model replicates some of the spatiotemporal complexity of clustered, episodic, and migrating intraplate earthquakes. Time-scale-dependent spatio-temporal patterns of intraplate seismicity support suggestions that seismicity patterns observed from short-term seismic records may not reflect long-term patterns of intraplate seismicity.	N

Table C-7.3.6 Data Evaluation
Reelfoot Rift Zone

Identified Sources
Reelfoot Rift Zone (RR); Reelfoot Rift–Rough Creek Graben (RR-RCG)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Focal Mechanisms						
Shumway (2008)	4	Detailed analysis of seismicity data using recent velocity model and appropriate depths to bedrock beneath seismic stations.	RR	4	Style of faulting and depth of seismogenic crust based on well-constrained focal mechanism date.	N
Zoback (1992)	4	Well-constrained focal mechanisms.	RR and RR-RCG	3	Style of faulting in RR—Four focal mechanisms show predominantly strike-slip motion.	N
Paleoseismicity						
Database of published and unpublished data provided by Dr. M. Tuttle (included in CEUS SSC paleoliquefaction database)	5	Well-documented database.	RR and RR-RCG	5	No evidence to date for repeated Holocene earthquakes in RCG.	Y
Harrison and Schultz (2002) Wheeler (2005)	3	Published descriptions of Quaternary deformation in Slinkard Quarry, Missouri.	RR	3	Activity and style of faulting—Evidence for possible prehistoric earthquakes in Cape Girardeau, Missouri, area.	N

Table C-7.3.6 Data Evaluation
Reelfoot Rift Zone

Identified Sources
Reelfoot Rift Zone (RR); Reelfoot Rift–Rough Creek Graben (RR-RCG)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
McBride, Nelson, and Stephenson (2002)	4	Integrated analysis of evidence; good-quality maps and figures.	RR	4	Discussion of evidence for timing of earthquakes on Fluorspar Area fault complex; hypothesis of temporal changes and migration of seismicity within rift.	N

Tables C-7.3.7/7.3.8 Data Evaluation
Extended Continental Crust—Atlantic

Identified Sources
Extended Continental Crust—Atlantic Margin (ECC-AM); Atlantic Highly Extended Crust (AHEX)

Data Reference	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Instrumental Seismicity						
CEUS SSC earthquake catalog	5	Comprehensive catalog; includes magnitude conversions and uncertainty assessments.	ECC-AM, AHEX	5	Used to define recurrence parameters.	Y
Historical Seismicity						
Bakun et al. (2003)	4	Detailed assessment of Cape Ann earthquake and two other historical events using new MMI model and site corrections for eastern North America.	ECC-AM	4	Location of western ECC-AM boundary offshore Massachusetts drawn to include the preferred location of Cape Ann earthquake. The 95% confidence level for location was used in weighting possibility that Cape Ann earthquake should be used to modify Mmax prior distribution for both ECC-AM and NAP.	N
Bollinger et al. (1991)	3	Spatial distribution (including depth) of earthquakes in the CEUS through 1986. Data largely superseded by the CEUS SSC earthquake catalog.	ECC-AM	2	Hypocenters of Coastal Plain shocks are distributed throughout upper 13 km of crust, where focal mechanisms indicate a N-NE maximum compressive stress.	N

Tables C-7.3.7/7.3.8 Data Evaluation
Extended Continental Crust—Atlantic

Identified Sources
Extended Continental Crust—Atlantic Margin (ECC-AM); Atlantic Highly Extended Crust (AHEX)

Data Reference	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Ebel (2006)	4	Detailed re-examination of 1755 Cape Ann earthquake from firsthand historical accounts.	ECC-AM	4	Location of western ECC-AM boundary offshore Massachusetts drawn to include location of Cape Ann earthquake.	N
Magnetic Anomaly						
CEUS SSC magnetic anomaly database	5	High-quality regional data set	ECC-AM, AHEX	3	Considered for defining boundaries of zone along eastern and southern margins. ECC zone is not subdivided based on different basement terranes or tectonic features imaged in the magnetic anomaly map.	N
Holbrook (1994a, 1994b)	4	Multichannel seismic-reflection and wide-angle ocean-bottom seismic profiles provide seismic velocity model of U.S. Atlantic continental margin	ECC-AM, AHEX	4	Concludes that transitional igneous crust was created by rift-related intrusives, marking eastern boundary of extended continental crust. These studies confirm that the western margin of East Coast magnetic anomaly (ECMA) marks boundary between extended continental crust and transitional crust, and eastern margin of ECMA corresponds approximately to western margin of oceanic crust.	N

Tables C-7.3.7/7.3.8 Data Evaluation
Extended Continental Crust—Atlantic

Identified Sources
Extended Continental Crust—Atlantic Margin (ECC-AM); Atlantic Highly Extended Crust (AHEX)

Data Reference	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Klitgord et al. (1988)	4	Regional synthesis of structural and geophysical data to develop tectonic framework of U.S. Atlantic continental margin.	ECC-AM, AHEX	4	Eastern boundary follows ECMA presented on Plate 2A.	N
McBride and Nelson (1988)	4	Integration of magnetic anomaly analysis with COCORP deep-reflection data.	ECC-AM	4	Uses seismic data to investigate source of Brunswick magnetic anomaly and concludes that it is a deep structure marking Alleghanian collision. This was used to define southern border of ECC-AM.	N
Gravity Anomaly						
CEUS SSC gravity anomaly database	5	High-quality regional data set	ECC-AM, AHEX	2	The ECC zone is not subdivided based on different basement terranes or tectonic features imaged in the gravity anomaly map.	Y
Klitgord et al. (1988)	4	Regional synthesis of structural and geophysical data to develop tectonic framework of U.S. Atlantic continental margin.	ECC-AM, AHEX	5	Eastern boundary follows landward edge of oceanic crust shown on Plate 2B.	N

Tables C-7.3.7/7.3.8 Data Evaluation
Extended Continental Crust—Atlantic

Identified Sources
Extended Continental Crust—Atlantic Margin (ECC-AM); Atlantic Highly Extended Crust (AHEX)

Data Reference	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Pratt (1988)	4	Regional seismic reflection line across Virginia Piedmont.	ECC-AM	4	Concludes that Appalachian gravity anomaly gradient marks a fundamental zone of weakness coincident with western extent of thinned continental crust.	N
Seismic Reflection						
[various studies]	3-5	Interpretations from various publications such as Cook and Vasudevan (2006); Glover et al. (1995); Hatcher et al. (1994); and Sheridan et al. (1993). (See ECC Data Summary Table.)	ECC-AM, AHEX	1	Interpretations of deep crustal seismic profiles (COCORP) provide good information for identifying and characterizing structures and major terrane boundaries in basement. No basement structures, however, are identified as specific seismic sources in this study.	N
Geophysical Anomaly						
Li et al. (2003)	4	Determined velocity structure from inversion of Rayleigh waves.	ECC-AM	4	NW-trending prong of ECC in eastern New York, western Massachusetts, and SW Vermont captures the negative crustal velocity anomaly attributed to the Great Meteor hotspot.	N

Tables C-7.3.7/7.3.8 Data Evaluation
Extended Continental Crust—Atlantic

Identified Sources
Extended Continental Crust—Atlantic Margin (ECC-AM); Atlantic Highly Extended Crust (AHEX)

Data Reference	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Regional Geologic and Tectonic Maps						
CEUS SSC basins compilation	4	Data is considered of generally good quality; however, quality is likely variable as it represents a compilation from various published maps and various scales/detail.	ECC-AM	5	Data set includes digital GIS compilation of Mesozoic basins from a variety of published sources. Used to delineate western margin of ECC zone.	Y
Kanter (1994)	4	Data is considered of good quality for defining location of major crustal divisions (e.g., oceanic crust, extended crust, transitional crust) in the Gulf of Mexico region.	ECC-AM	5	Data on the location of extended crust were used for defining the source geometry.	N

Tables C-7.3.7/7.3.8 Data Evaluation
Extended Continental Crust—Atlantic

Identified Sources
Extended Continental Crust—Atlantic Margin (ECC-AM); Atlantic Highly Extended Crust (AHEX)

Data Reference	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Klitgord et al. (1988)	4	Regional synthesis of structural and geophysical data to develop tectonic framework of U.S. Atlantic continental margin.	ECC-AM	4	Eastern boundary includes Carolina trough, Baltimore canyon trough, Georgia Banks basin, and Scotia basin inboard of the East Coast magnetic anomaly illustrated on Plate 2C. Western boundary of ECC in New England drawn to the west of Bay of Fundy shown on Plate 2C.	N
Murphy and Keppie (2005)	3	Regional compilation of major Paleozoic strike-slip faults.	ECC-AM	4	Western boundary in Nova Scotia drawn along strike-slip faults separating Avalonia and Meguma terranes.	N
Pe-Piper and Piper (2004)	4	Regional-scale fault mapping in Grand Banks region of Atlantic Canada.	ECC-AM	4	Western boundary in Nova Scotia drawn along strike-slip fault system separating Avalonia and Meguma terranes.	N
Regional Stress						
CEUS SSC stress data set	4	Provides additional new measurements to World Stress Map	ECC-AM	1	Update of World Stress Map data for CEUS shows consistent orientation of maximum horizontal stress in ECC.	Y
Zoback and Zoback (1989)	4	Good-quality data regional set that is outdated but still consistent with updated stress measurements.	ECC-AM	1	Maximum horizontal stress in eastern U.S. roughly NE to ENE.	N

Tables C-7.3.7/7.3.8 Data Evaluation
Extended Continental Crust—Atlantic

Identified Sources
Extended Continental Crust—Atlantic Margin (ECC-AM); Atlantic Highly Extended Crust (AHEX)

Data Reference	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Paleoseismicity						
CEUS SSC paleoliquefaction database	5	High-quality data set	ECC-AM	2	With the exception of the Charleston RLME, paleoliquefaction data is insufficient for constraining source parameters within ECC-AM.	Y
Obermeier and McNulty (1998)	2	Abstract	ECC-AM	0	The search for paleoliquefaction along 300 km of rivers in Central Virginia seismic zone (CVSZ) documented only two to three features and does not provide evidence for RLME, which, in part, is why CVSZ is not broken out as a separate seismic source in this study. Increased rate of seismicity can be modeled with spatial smoothing.	N

Tables C-7.3.9/7.3.10 Data Evaluation
Extended Continental Crust–Gulf Coast

Identified Sources
Extended Continental Crust–Gulf Coast (ECC-GC); Gulf Coast Highly Extended Crust (GHEX)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Instrumental Seismicity						
CEUS SSC earthquake catalog	5	Comprehensive catalog; includes magnitude conversions and uncertainty assessments.	ECC-GC, GHEX	5	Used to define recurrence parameters.	Y
Magnetic Anomaly						
CEUS SSC magnetic anomaly database	5	High-quality regional data.	ECC-GC, GHEX	0	Considered for defining boundaries of zone.	Y
Gravity Anomaly						
CEUS SSC gravity anomaly database	5	High-quality regional data.	ECC-GC, GHEX	0	Considered for defining boundaries of zone.	Y
Regional Geologic and Tectonic Maps						
Baksi (1997)	3	Data considered of moderate quality for defining northern extent of Mesozoic extension.	ECC-GC	1	Concepts and ideas in paper helped inform drawing zone boundaries.	N

Tables C-7.3.9/7.3.10 Data Evaluation
Extended Continental Crust–Gulf Coast

Identified Sources
Extended Continental Crust–Gulf Coast (ECC-GC); Gulf Coast Highly Extended Crust (GHEX)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Bird et al. (2005)	4	Data considered of good quality for defining extent of oceanic crust in Gulf of Mexico.	GHEX	5	Northern boundary of oceanic crust used in defining southern boundary of the zone.	N
Buffler and Sawyer (1985)	3	Data considered of moderate quality for defining extent of transitional and oceanic crust in Gulf of Mexico.	ECC-GC, GHEX	1	Concepts and ideas in paper helped inform drawing the zone boundaries.	N
Byerly (1991)	3	Data considered of moderate quality for defining northern extent of Mesozoic extension.	ECC-GC	1	Concepts and ideas in paper helped inform drawing the zone boundaries.	N
Cook et al. (1979)	3	Data considered of moderate quality for defining extent of Rio Grande rift–related extension.	ECC-GC	2	Used to inform western extent of boundary.	N

Tables C-7.3.9/7.3.10 Data Evaluation
Extended Continental Crust–Gulf Coast

Identified Sources
Extended Continental Crust–Gulf Coast (ECC-GC); Gulf Coast Highly Extended Crust (GHEX)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Daniels et al. (1983)	4	Data considered of good quality for defining eastern extent of Mesozoic extension.	ECC-GC	4	Eastern extent of Mesozoic extension considered in defining eastern boundary of the zone.	N
Dellinger, Dewey, et al. (2007) Dellinger, Ehlers, and Clarke (2007)	3	Data considered of moderate quality for discussing characteristics of Green Canyon earthquake.	GHEX	3	Used to help inform maximum observed earthquake in the zone.	N
Dewey and Dellinger (2008)	3	Data considered of moderate quality for discussing characteristics of Green Canyon earthquake.	GHEX	3	Used to help inform maximum observed earthquake in the zone.	N
Dickerson and Muehlberger (1994)	3	Data considered of moderate quality for defining extent of Rio Grande rift–related extension.	ECC-GC	2	Used to inform western extent of boundary.	N

Tables C-7.3.9/7.3.10 Data Evaluation
Extended Continental Crust–Gulf Coast

Identified Sources
Extended Continental Crust–Gulf Coast (ECC-GC); Gulf Coast Highly Extended Crust (GHEX)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Gray et al. (2001)	2	Data considered of moderate quality for defining extent of Rio Grande rift–related extension.	ECC-GC	1	Used to inform western extent of boundary.	N
Hall and Najmuddin (1994)	3	Data considered of moderate quality for defining extent of oceanic crust.	GHEX	1	Concepts and ideas in paper help inform drawing the zone boundaries.	N
Harry and Londono (2004)	3	Data considered of moderate quality for defining extent of Mesozoic extension.	ECC-GC	1	Concepts and ideas in paper help inform drawing the zone boundaries.	N
Hatcher et al. (2007)	3	Data considered of moderate quality for defining northern extent of Mesozoic extension.	ECC-GC	1	Concepts and ideas in paper help inform drawing the zone boundaries.	N
Hendricks (1988)	3	Data considered of moderate quality for defining northern extent of Mesozoic extension.	ECC-GC	1	Concepts and ideas in paper help inform drawing the zone boundaries.	N

Tables C-7.3.9/7.3.10 Data Evaluation
Extended Continental Crust–Gulf Coast

Identified Sources
Extended Continental Crust–Gulf Coast (ECC-GC); Gulf Coast Highly Extended Crust (GHEX)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Hildenbrand and Hendricks (1995)	4	Data considered of good quality for presenting location of Cretaceous igneous intrusions in southern Arkansas.	ECC-GC	4	Used in defining northern extent of the zone in region of southern Arkansas and eastern Texas.	N
Kanter (1994)	4	Data considered of good quality for defining location of major crustal divisions (e.g., oceanic crust, extended crust, transitional crust) in Gulf of Mexico region.	ECC-GC, GHEX	5	Data on the location of oceanic crust and extent of transitional crust were used in defining source geometries.	Y
Klitgord et al. (1984)	4	Data considered of good quality for defining eastern extent of Mesozoic extension.	ECC-GC	4	Eastern extent of Mesozoic extension considered in defining eastern boundary of the zone.	N
Marton and Buffler (1994)	3	Data considered of moderate quality for defining extent of transitional and oceanic crust in Gulf of Mexico.	ECC-GC, GHEX	1	Concepts and ideas in paper help inform drawing the zone boundaries.	N

Tables C-7.3.9/7.3.10 Data Evaluation
Extended Continental Crust–Gulf Coast

Identified Sources
Extended Continental Crust–Gulf Coast (ECC-GC); Gulf Coast Highly Extended Crust (GHEX)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
McBride and Nelson (1988)	3	Data considered of moderate quality for defining northern extent of Mesozoic extension.	ECC-GC	1	Concepts and ideas in paper help inform drawing the zone boundaries.	N
McBride et al. (2005)	3	Data considered of moderate quality for defining northern extent of Mesozoic extension.	ECC-GC	1	Concepts and ideas in paper help inform drawing the zone boundaries.	N
Murray (1961)	2	Data considered of moderate quality for defining extent of Rio Grande rift–related extension.	ECC-GC	1	Used to inform the western extent of boundary.	N
Nagihara and Jones (2005)	4	Data considered of good quality for defining extent of oceanic crust in Gulf of Mexico.	GHEX	4	Northern boundary of oceanic crust was used in defining southern boundary of the zone.	N

Tables C-7.3.9/7.3.10 Data Evaluation
Extended Continental Crust–Gulf Coast

Identified Sources
Extended Continental Crust–Gulf Coast (ECC-GC); Gulf Coast Highly Extended Crust (GHEX)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Nettles (2007)	3	Data considered of moderate quality for discussing characteristics of the Green Canyon earthquake.	GHEX	3	Used to help inform the maximum observed earthquake in the zone.	N
Petersen et al. (2008)	4	Data considered of good quality for defining landward limit of Precambrian Iapetan rifting.	ECC-GC	5	Limit of Precambrian rifting was used in defining NE boundary of the zone.	N
Pindell and Kennan (2001)	4	Data considered of good quality for defining extent of oceanic crust and transitional crust in Gulf of Mexico.	GHEX	2	Concepts and ideas in paper help inform drawing zone boundaries.	N
Pindell et al. (2000)	4	Data considered of good quality for defining extent of oceanic crust and transitional crust in Gulf of Mexico.	GHEX	4	Northern boundary of the oceanic crust was used in defining southern boundary of the zone.	N

Tables C-7.3.9/7.3.10 Data Evaluation
Extended Continental Crust–Gulf Coast

Identified Sources
Extended Continental Crust–Gulf Coast (ECC-GC); Gulf Coast Highly Extended Crust (GHEX)

Data/References	Quality (1=low, 5=high)	Notes on Quality of Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Discussion of Data Use	In GIS Database
Salvador (1991a)	3	Data considered of moderate quality for defining extent of Mesozoic extension.	ECC-GC	2	Concepts and ideas in paper help inform drawing zone boundaries.	N
Sawyer et al. (1991)	4	Data considered of good quality for defining extent of oceanic crust in Gulf of Mexico.	ECC-GC, GHEX	3	Northern boundary of the oceanic crust was used in defining southern boundary of the zone, and the boundary between the thick and thin transitional crust was used in defining boundaries between the GHEX and ECC-GC zones.	N
Thomas (1988) Thomas (2006)	3	Data considered of moderate quality for defining extent of Mesozoic extension.	ECC-GC	2	Concepts and ideas in paper help inform drawing zone boundaries.	N N
Wheeler and Frankel (2000)	4	Data considered of good quality for defining location of the Iapetan margin of the ancestral North American continent.	ECC-GC	4	Used in defining northern extent of the zone in regions where (1) the Mesozoic rifting is thought to be coincident with Paleozoic rifting, or (2) there is considerable uncertainty in the limit of Mesozoic rifting and the various interpretations of rifting encompass the Iapetan margin boundary.	N

Table C-7.3.12 Data Evaluation
Midcontinent-Craton Zone

Identified Sources
Alternative Midcontinent-Craton (MidC) source zone configurations (MIDC-A, MIDC-B, MIDC-C, and MIDC-D) are based on different combinations of alternative zone boundaries for the Paleozoic Extended Zone (Table C-7.3.4) and Reelfoot Rift Zone (Table C-7.3.6)

Data Type/References	Quality (1=low, 5=high)	Notes on Quality or Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Description of Data Use	In GIS Database
Instrumental Seismicity						
CEUS SSC earthquake catalog	5	Comprehensive catalog; includes magnitude conversions and uncertainty assessments.	MIDC-A, MIDC-B, MIDC-C, MIDC-D	5	Used to evaluate recurrence parameters.	Y
Historical Seismicity						
Bakun and Hopper (2004a)	4	Reanalysis of intensity data.	MIDC-A, MIDC-B, MIDC-C, MIDC-D	4	Estimated magnitude for historical earthquake used in recurrence and Mmax assessments—Associates an April 9, 1952, M 4.9 (4.5–5.2) earthquake with the Nemaha fault in Oklahoma.	N
CEUS SSC earthquake catalog	5	Comprehensive catalog includes magnitude conversions and uncertainty assessments.	MIDC-A, MIDC-B, MIDC-C, MIDC-D	5	The prior distribution for Mmax is modified by the largest observed historical earthquake taken from the CEUS SSC earthquake catalog.	Y

Table C-7.3.12 Data Evaluation
Midcontinent-Craton Zone

Identified Sources
Alternative Midcontinent-Craton (Mid-C) source zone configurations (MIDC-A, MIDC-B, MIDC-C, and MIDC-D) are based on different combinations of alternative zone boundaries for the Paleozoic Extended Zone (Table C-7.3.4) and Reelfoot Rift Zone (Table C-7.3.6)

Data Type/References	Quality (1=low, 5=high)	Notes on Quality or Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Description of Data Use	In GIS Database
Niemi et al. (2004)	1	This paper, which relies on a previous assessment of size of historical earthquake (Seeber and Armbruster, 1991), does not provide any independent analysis of the earthquake catalog.	MIDC-A, MIDC-B, MIDC-C, MIDC-D	2	Considered in evaluating association of a historical earthquake (1867 M 5.2 Wamego earthquake) with basement Nemaha Ridge–Humboldt fault structures.	N
Magnetic Anomaly						
Atekwana (1996) Hinze et al. (1975) Klasner et al. (1982) Bickford et al. (1986) Van Schmus (1992) NICE Working Group (2007)	3	Publications that describe basement terranes that have been mapped and identified in part from interpretation of patterns and characteristics of the magnetic anomalies	MIDC-A, MIDC-B, MIDC-C, MIDC-D	2	Style of faulting and future ruptures—Provides indication of structural trends in basement.	N

Table C-7.3.12 Data Evaluation
Midcontinent-Craton Zone

Identified Sources
Alternative Midcontinent-Craton (MidC) source zone configurations (MIDC-A, MIDC-B, MIDC-C, and MIDC-D) are based on different combinations of alternative zone boundaries for the Paleozoic Extended Zone (Table C-7.3.4) and Reelfoot Rift Zone (Table C-7.3.6)

Data Type/References	Quality (1=low, 5=high)	Notes on Quality or Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Description of Data Use	In GIS Database
CEUS SSC magnetic anomaly data set	5	High-quality regional data.	MIDC-A, MIDC-B, MIDC-C, MIDC-D	2 (except for border with Reelfoot rift where the reliance was 4)	The Mid-C zone is not subdivided based on different basement terranes or tectonic features imaged in the magnetic anomaly map. The border between Reelfoot Rift and Mid-C seismotectonic zones is defined in part by the limit of magnetic anomalies that are interpreted to be Mesozoic plutons associated with Mesozoic rifting in the RR.	Y
Gravity Anomaly						
CEUS SSC gravity anomaly data set	5	High-quality regional data.	MIDC-A, MIDC-B, MIDC-C, MIDC-D	1	The Mid-C zone is not subdivided based on different basement terranes or tectonic features imaged in the gravity anomaly map.	Y

Table C-7.3.12 Data Evaluation
Midcontinent-Craton Zone

Identified Sources
Alternative Midcontinent-Craton (Mid-C) source zone configurations (MIDC-A, MIDC-B, MIDC-C, and MIDC-D) are based on different combinations of alternative zone boundaries for the Paleozoic Extended Zone (Table C-7.3.4) and Reelfoot Rift Zone (Table C-7.3.6)

Data Type/References	Quality (1=low, 5=high)	Notes on Quality or Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Description of Data Use	In GIS Database
Keller (2010)	2	Unpublished report: Provides limited interpretation of area in Oklahoma.	MIDC-A, MIDC-B, MIDC-C, MIDC-D	1	Evaluation of zone of structures associated with a region of elevated seismicity—Midcontinent rift system (MRS)—concludes that MRS may extend south to Wichita uplift and seismicity may be associated with this feature and Nemaha fault zone/ridge. This is accounted for in the variable smoothing of seismicity within the zone.	Y
Seismic Reflection						
(See Table D-7.3.12 Data Summary—Midcontinent-Craton Zone)	3-5	Interpretations from various publications.	MIDC-A, MIDC-B, MIDC-C, MIDC-D	1	Interpretations of deep crustal seismic profiles (COCORP, GLIMPCE) provide best information for identifying and characterizing structures and major terrane boundaries in the basement. No basement structures, however, are identified in this study as specific seismic sources.	N

Table C-7.3.12 Data Evaluation
Midcontinent-Craton Zone

Identified Sources
Alternative Midcontinent-Craton (MidC) source zone configurations (MIDC-A, MIDC-B, MIDC-C, and MIDC-D) are based on different combinations of alternative zone boundaries for the Paleozoic Extended Zone (Table C-7.3.4) and Reelfoot Rift Zone (Table C-7.3.6)

Data Type/References	Quality (1=low, 5=high)	Notes on Quality or Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Description of Data Use	In GIS Database
Geodetic Strain						
Calais et al. (2006)	3	Provides a combination of two independent geodetic solutions using data from close to 300 continuous GPS stations covering CEUS.	MIDC-A, MIDC-B, MIDC-C, MIDC-D	3	Surface deformation in North American Plate interior is best fit by a model that includes rigid rotation of North America with respect to global reference point and a component of strain related to glacial isostatic adjustment (GIA). No significant deviation from rigidity resolvable at the 0.7 mm/yr level. EW strain < 1.5×10^{-10} yr^{-1}. No areas of localized strain found.	N
Regional Stress						
CEUS SSC stress data set	4	Provides additional new measurements to World Stress Map.	MIDC-A, MIDC-B, MIDC-C, MIDC-D	1	An additional measurement in NE Oklahoma is consistent with previous measurements.	Y

Table C-7.3.12 Data Evaluation
Midcontinent-Craton Zone

Identified Sources
Alternative Midcontinent-Craton (Mid-C) source zone configurations (MIDC-A, MIDC-B, MIDC-C, and MIDC-D) are based on different combinations of alternative zone boundaries for the Paleozoic Extended Zone (Table C-7.3.4) and Reelfoot Rift Zone (Table C-7.3.6)

Data Type/References	Quality (1=low, 5=high)	Notes on Quality or Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Description of Data Use	In GIS Database
Heidbach et al. (2008) (World Stress Map)	3	Most current published version of map.	MIDC-A, MIDC-B, MIDC-C, MIDC-D	2	Limited entries for the Mid-C—Maximum horizontal compressional stress orientations vary from E-W (NE Kansas) to E-NE (Wisconsin and Ohio) to N-NE (W Minnesota, SW Kansas).	Y
Focal Mechanisms						
Zoback (1992)	4	Well-constrained focal mechanisms.	MIDC-A, MIDC-B, MIDC-C, MIDC-D	3	Limited focal mechanisms for the craton (e.g., W Minnesota; Illinois platform; Sharpsburg, Kentucky) Perry, Ohio; generally indicate strike-slip motion.	N
Paleoseismicity						
CEUS SSC paleoliquefaction database	5	Compilation (with attributions) of paleoliquefaction observations.	MIDC-A, MIDC-B, MIDC-C, MIDC-D	3	Mmax assessment—Evidence for possible prehistoric earthquakes in St. Louis area.	Y

Table C-7.3.12 Data Evaluation
Midcontinent-Craton Zone

Identified Sources
Alternative Midcontinent-Craton (MidC) source zone configurations (MIDC-A, MIDC-B, MIDC-C, and MIDC-D) are based on different combinations of alternative zone boundaries for the Paleozoic Extended Zone (Table C-7.3.4) and Reelfoot Rift Zone (Table C-7.3.6)

Data Type/References	Quality (1=low, 5=high)	Notes on Quality or Data	Source Considered	Used in SSC and Reliance Level (0=no, 5=high)	Description of Data Use	In GIS Database
Niemi et al. (2004)	3	Detailed evaluation of historical seismicity and neotectonic field investigations (including paleoliquefaction studies) in E Kansas.	MIDC-A, MIDC-B, MIDC-C, MIDC-D	3	Nemaha Ridge/Humboldt fault (Kansas)—Initial results suggest that liquefaction features (e.g., clastic dikes), which may be attributed to seismically induced liquefaction, are present, but may not be pervasive in this region. These data suggest that the 1867 M 5.2 Wamego earthquake may characterize the seismic source in this region.	N
Tuttle, Chester, et al. (1999) Tuttle (2005a) Tuttle (2005b)	4	Results of regional paleoliquefaction study in SE Missouri; provides detailed description of features and postulated locations of causative faults (possibly in IBEB).	MIDC-A, MIDC-B, MIDC-C, MIDC-D	3	Mmax assessment—Evidence for possible prehistoric earthquakes in St. Louis area. Location and magnitude of paleoearthquakes is not well constrained by data. There is not sufficient data to support characterization of an RLME source in St. Louis.	N