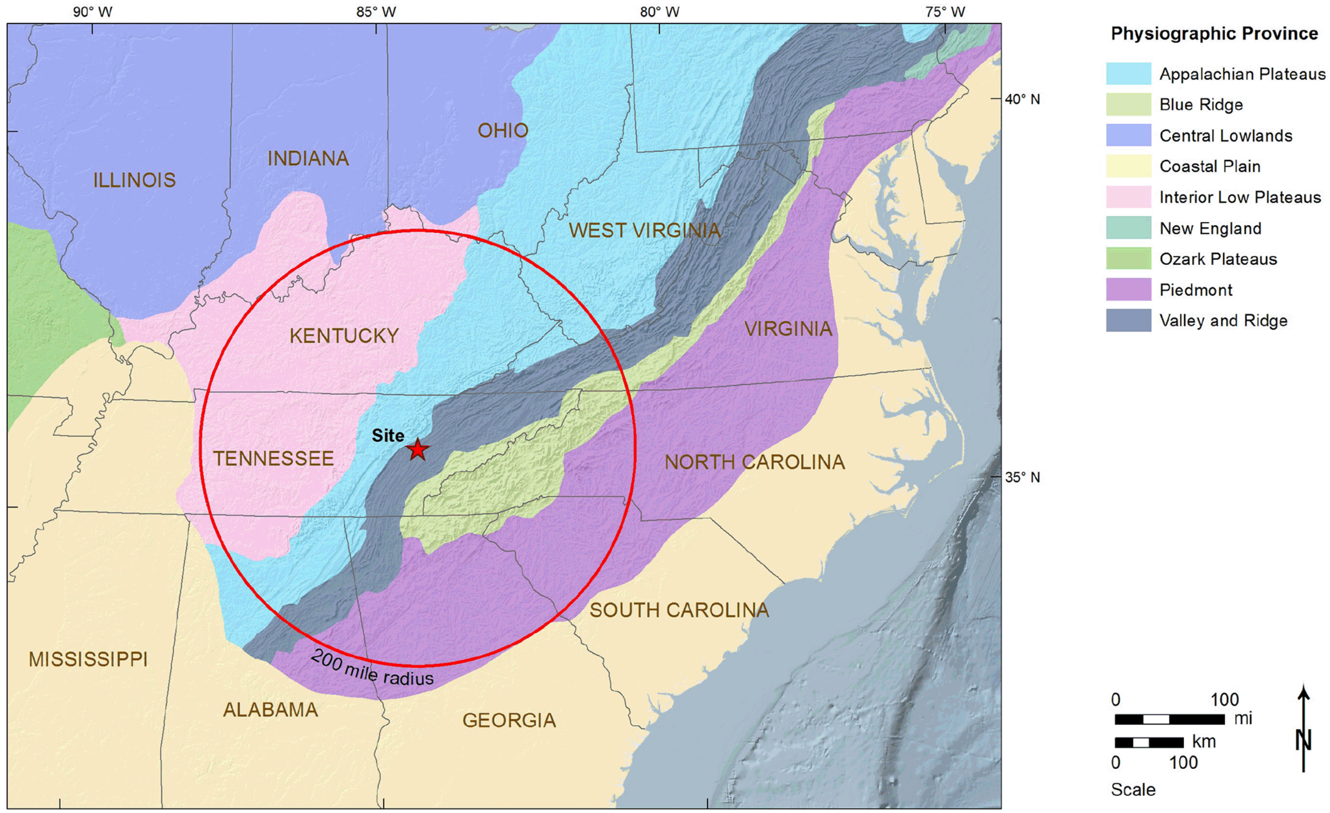
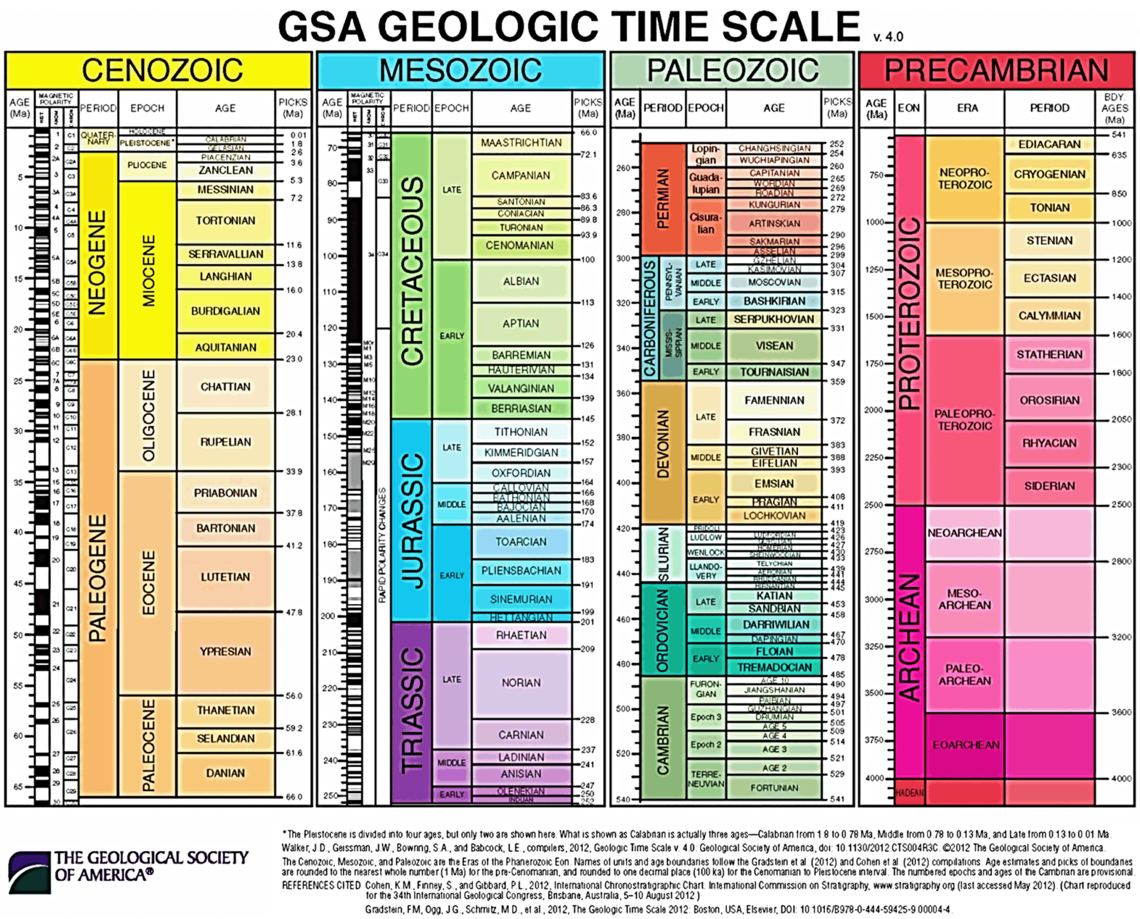
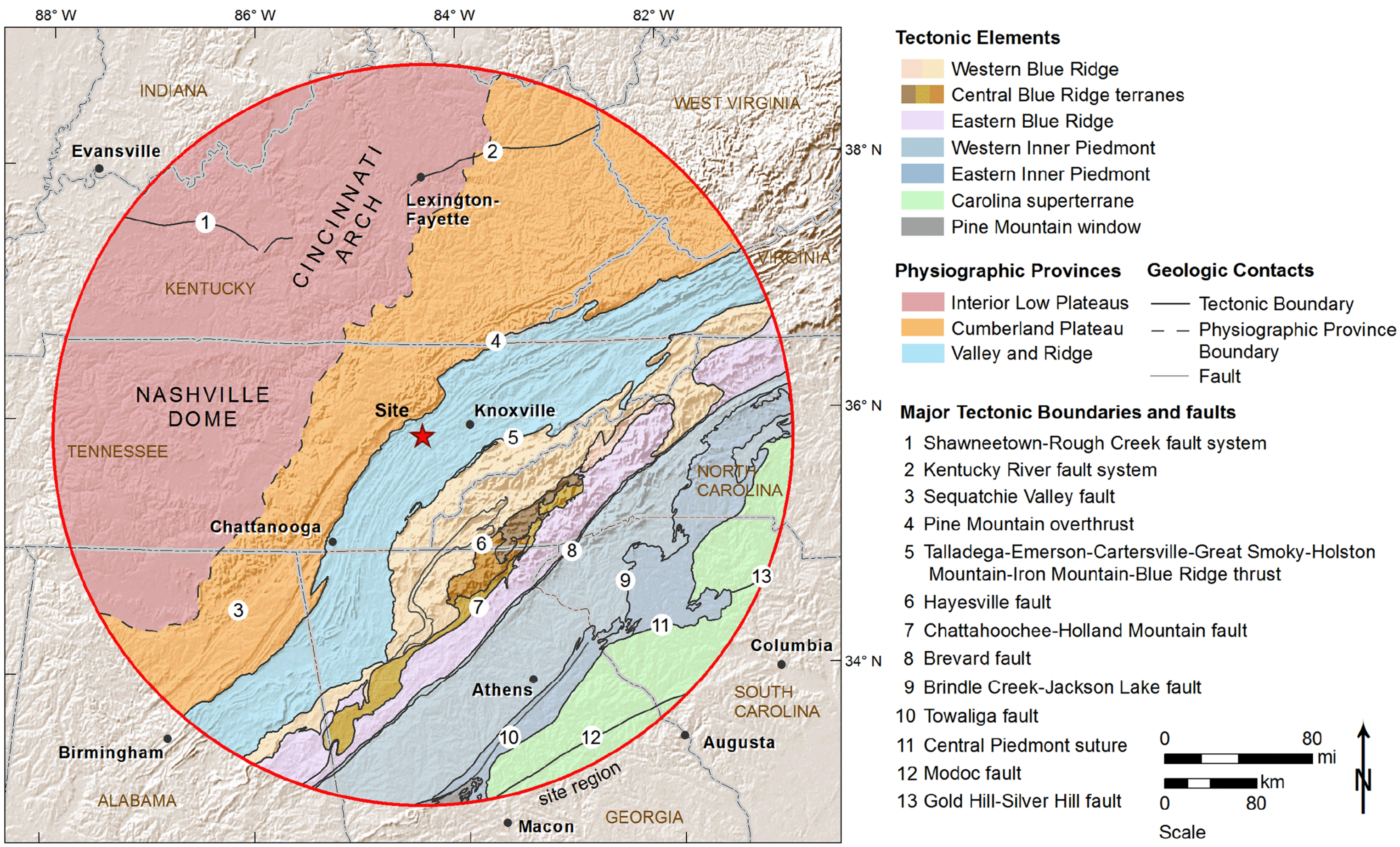



**Figure 2.5.1-1. Map of Physiographic Provinces**



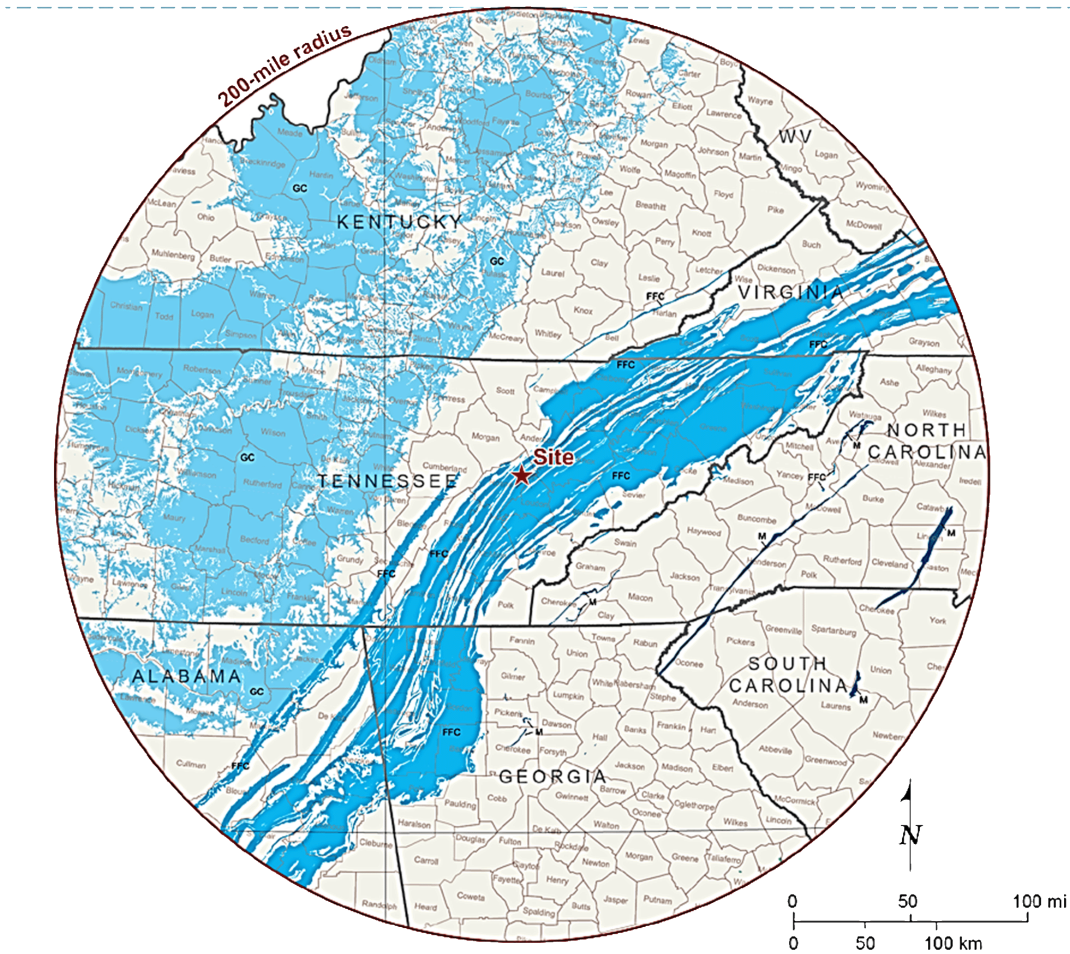

Source: Reference 2.5.1-33

**Figure 2.5.1-2. Geologic Time Scale**




Note: Modified from References 2.5.1-5, 2.5.1-24, and 2.5.1-34

**Figure 2.5.1-3. Map of Lithotectonic Tectonic Terranes, Provinces and Major Tectonic Boundaries**




Source: Modified from Reference 2.5.1-26

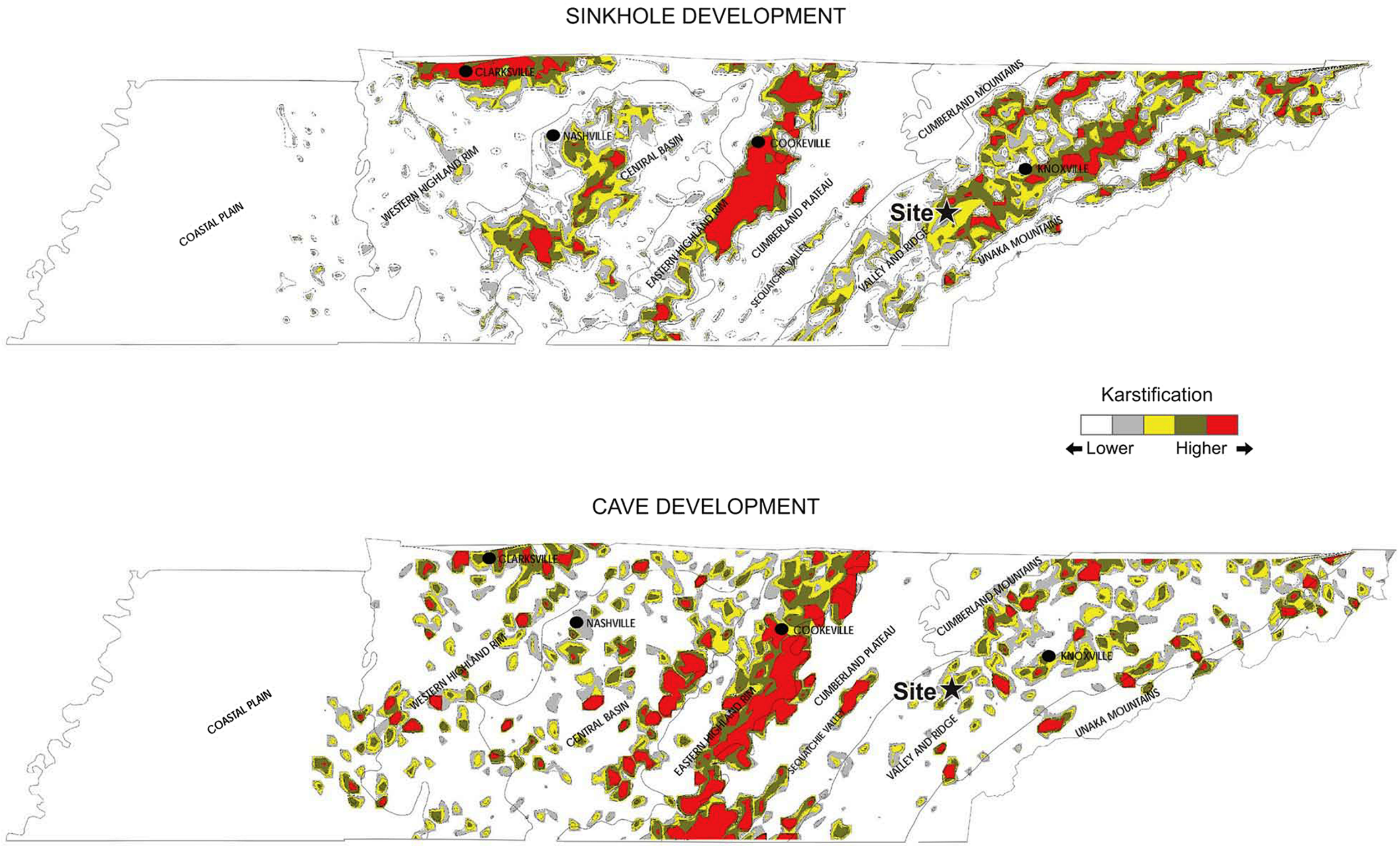
**Description of Map Units**

GC — Gently folded and flat-lying carbonates rocks: indurated limestone and dolomite that has not been strongly deformed. Predominantly found in interior plateaus and lowlands. Dissolution may produce solution, collapse, and cover-collapse sinkholes. Where carbonates are thick and extensive, cave systems may be long and complex. Where thin and interbedded with non-carbonates, caves are small and short. Geometry of cave passage patterns often shows stratigraphic and bedding-plane control often resulting in branchwork caves. (Reference 2.5.1-35)

FFC — Folded, faulted carbonate rocks: limestone and dolomite in areas flanking and in orogenic zones. May be intensely folded and faulted, commonly well jointed, commonly with cleavage. These rocks are located in the Valley and Ridge Province on this map and most are Paleozoic in age. Dissolution may produce solution, collapse, and cover-collapse sinkholes. Caves range from small and simple to long and complex systems. Geometry of cave passage patterns tend to show at least some structural control producing network caves. (Reference 2.5.1-35)

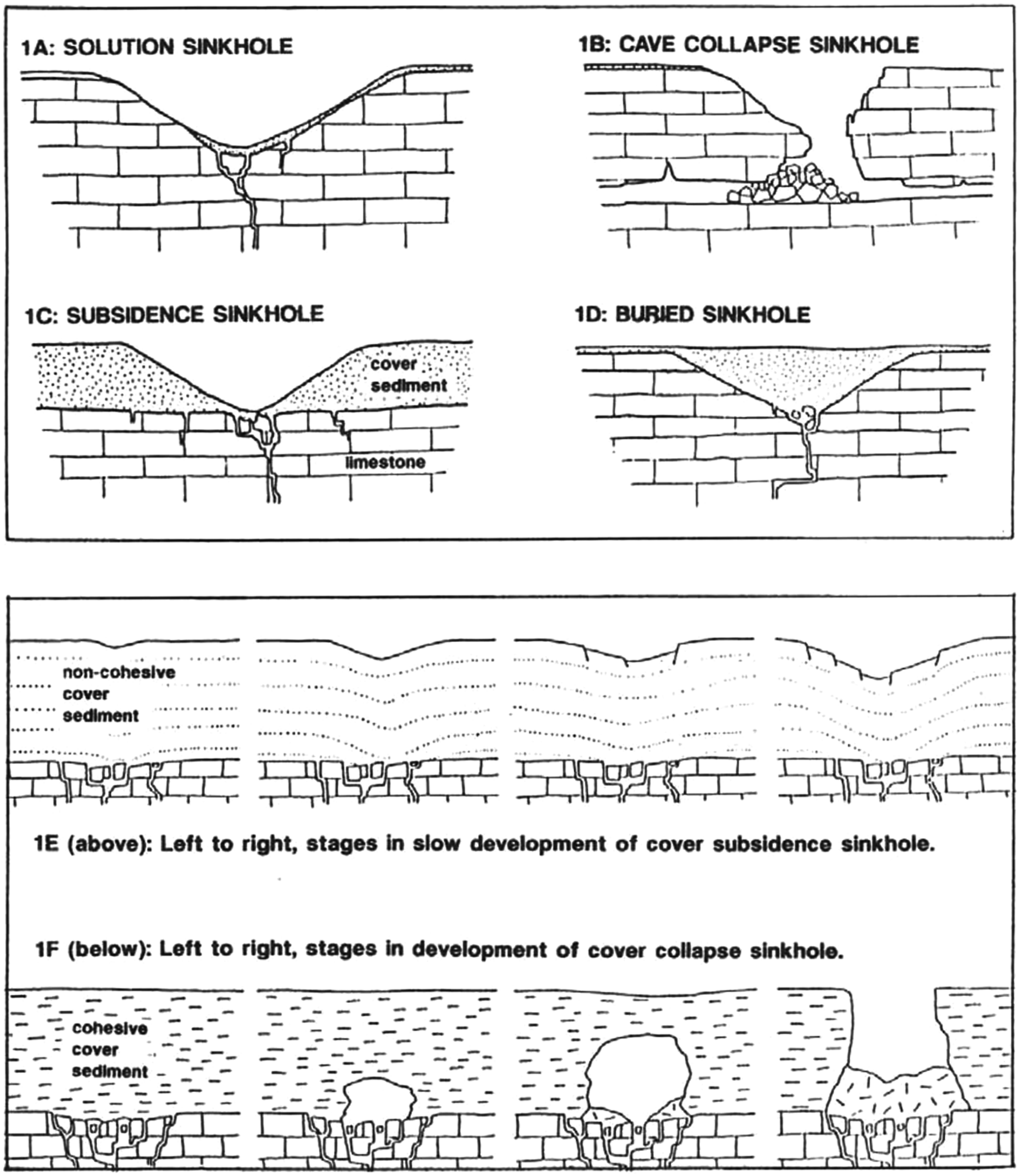
M — Marbles and metalimestones: highly deformed carbonate rocks, usually found in long, thin, linear belts or pods. Mapped areas are often exaggerated as these rocks are usually mapped with associated, non-soluble metamorphic rocks. Dissolution may result in solution, collapse, and cover-collapse sinkholes and small, short caves.

**Figure 2.5.1-4. Regional Distribution of Carbonate Rocks**



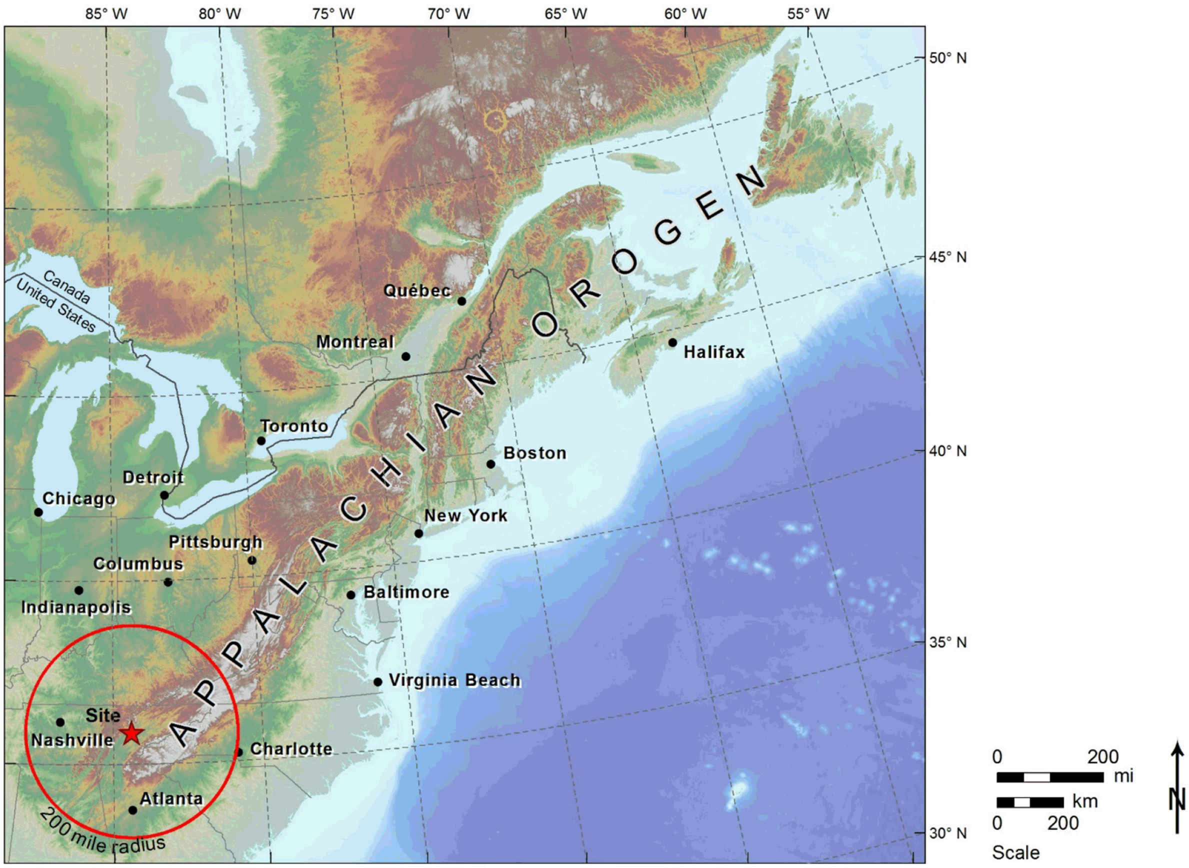

Source: Reference 2.5.1-25

**Figure 2.5.1-5. Map of Sinkhole and Cave Development for the State of Tennessee**



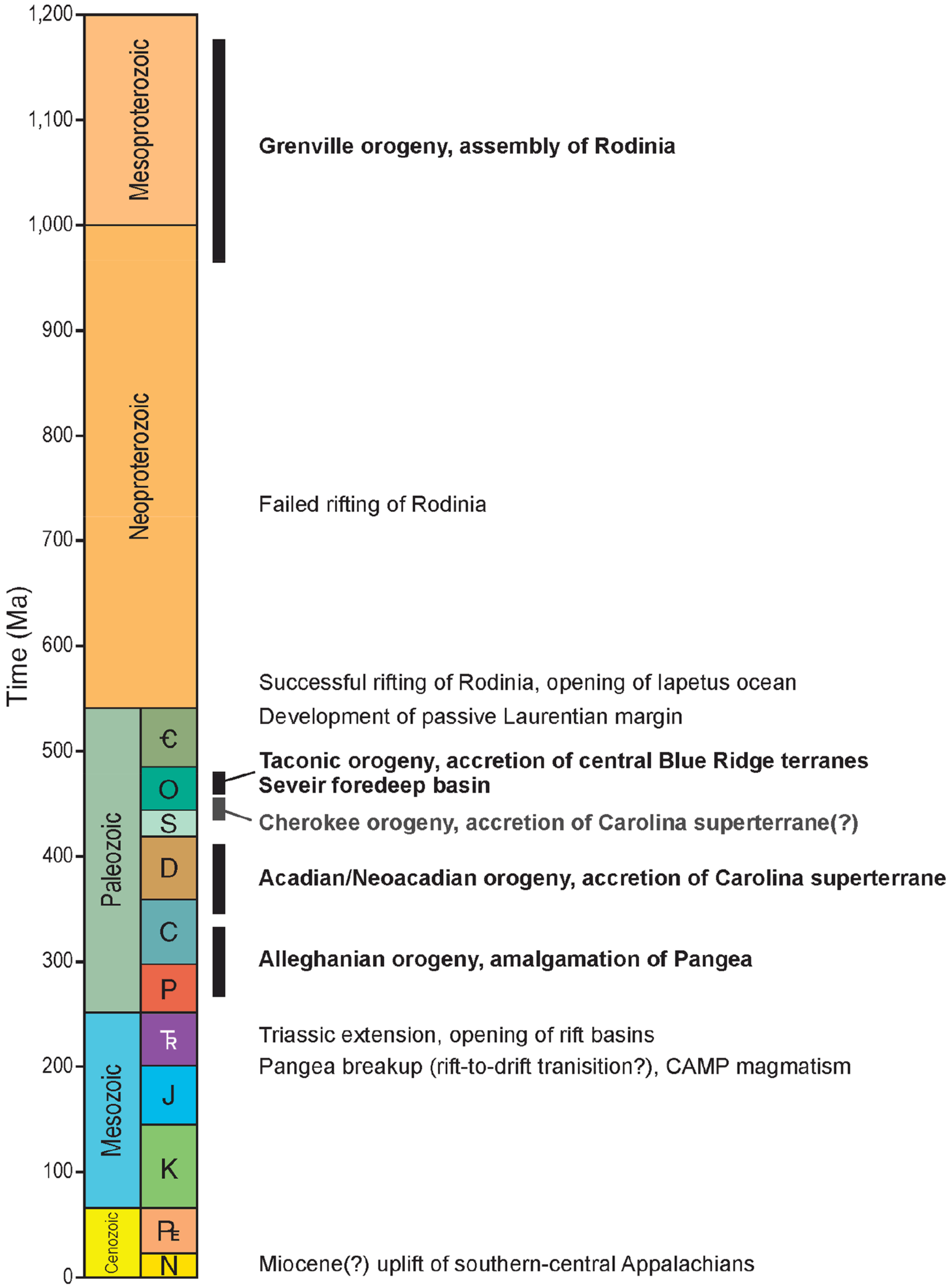

Note: Reference 2.5.1-27

**Figure 2.5.1-6. Sinkhole Types**



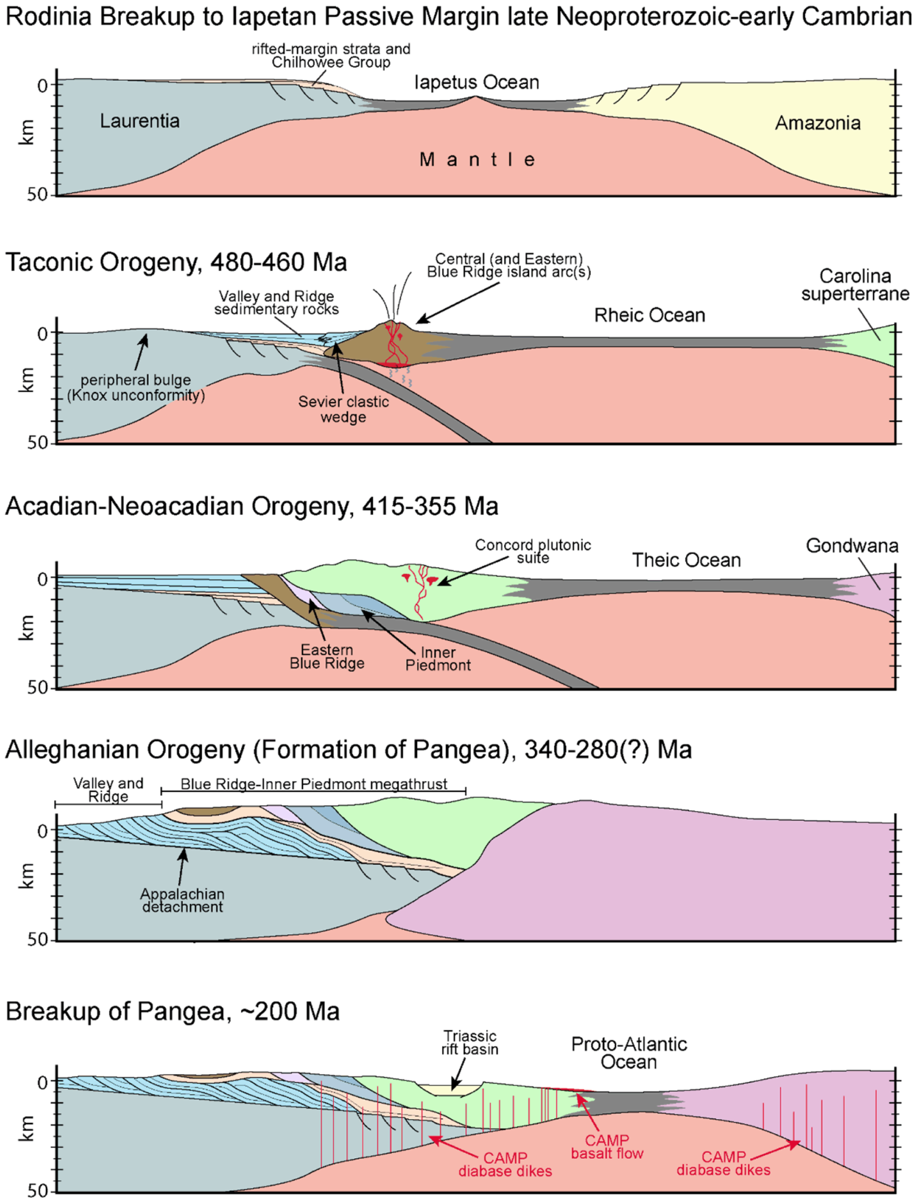

Note: Elevation and bathymetric data from Reference 2.5.1-190, Sheet A-1.

**Figure 2.5.1-7. Shaded Relief Map of Eastern North America Demonstrating the Extent of the Appalachian Orogenic Belt**



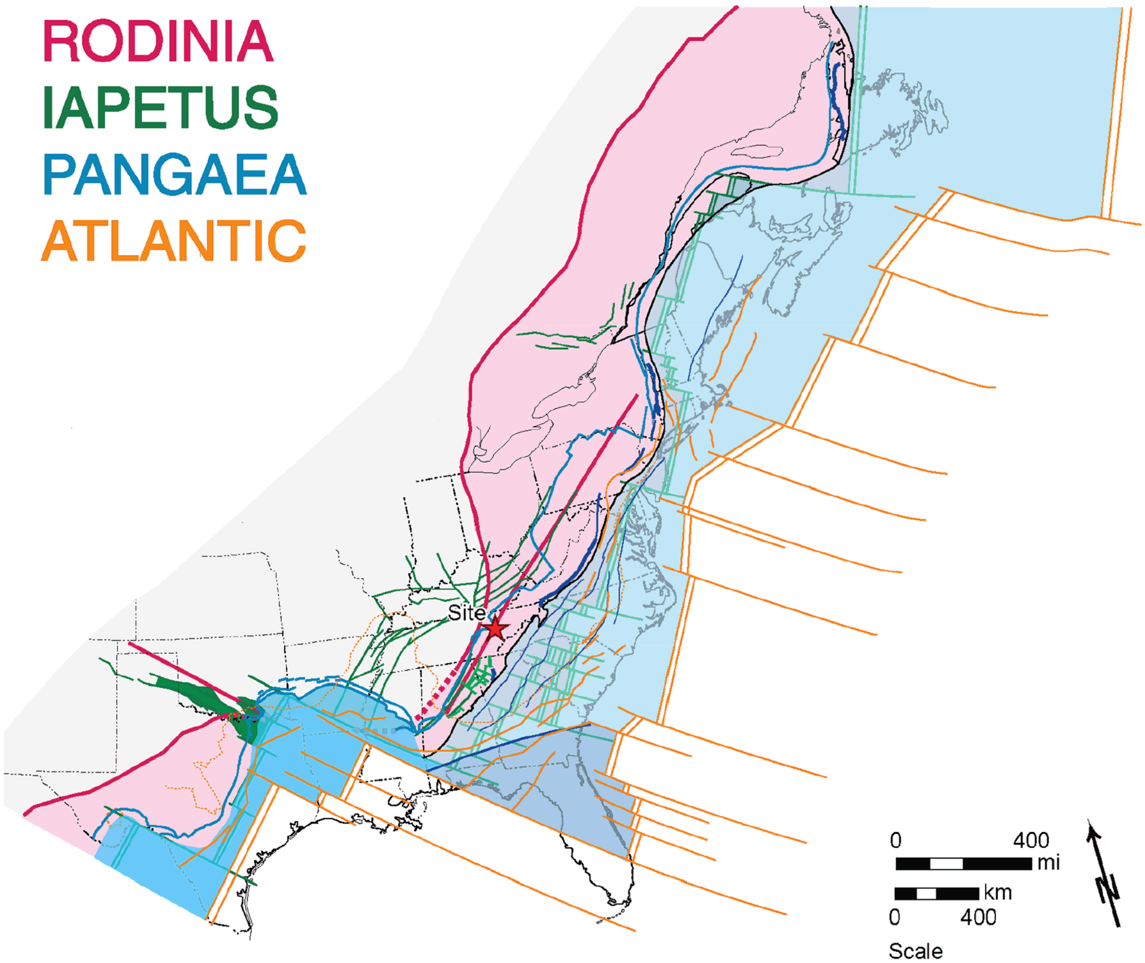

Note: Geologic time scale (Reference 2.5.1-33) with tectonic events that have affected the Appalachian orogenic belt (References 2.5.1-34 and 2.5.1-65).

**Figure 2.5.1-8. Geologic Time Scale with Orogenic Events**



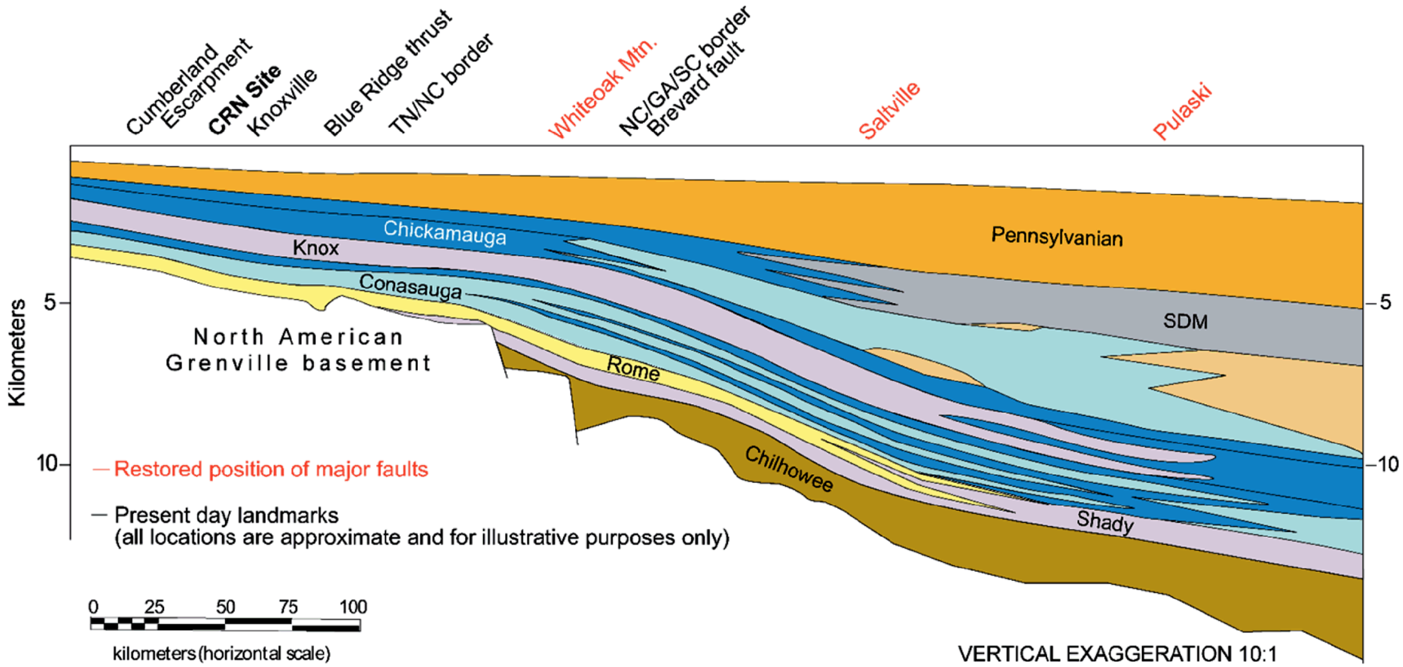

Notes:
Sequential development of the Appalachian orogen from the breakup of Rodinia to the breakup of Pangea, from Reference 2.5.1-73.
Deep crustal structure from Reference 2.5.1-277.
See Figure 2.5.1-3 for map of lithotectonic terranes.

**Figure 2.5.1-9. Sequential Development of Appalachians Profiles**



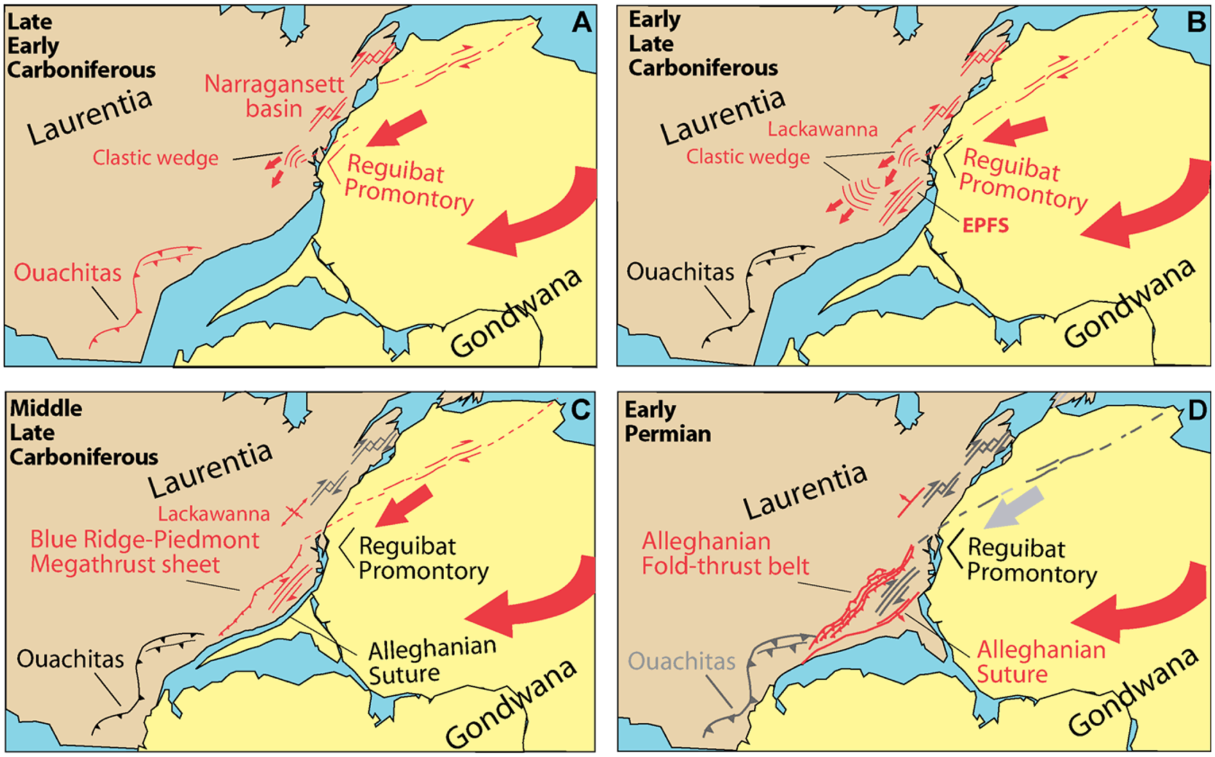

Notes:
Map of eastern North America, illustrating tectonic inheritance through the amalgamation and breakup of two supercontinents.
Features formed during the Grenville orogeny (formation of Rodinia) shown in red; those formed during the Appalachian orogenies (formation of Pangea) shown in blue.
Rifted margins that formed from supercontinent breakup are shown in green (Iapetus ocean) and orange (Atlantic Ocean).
*Modified from* Thomas, 2006 Reference 2.5.1-38.

**Figure 2.5.1-10. North American Rifted Margin**



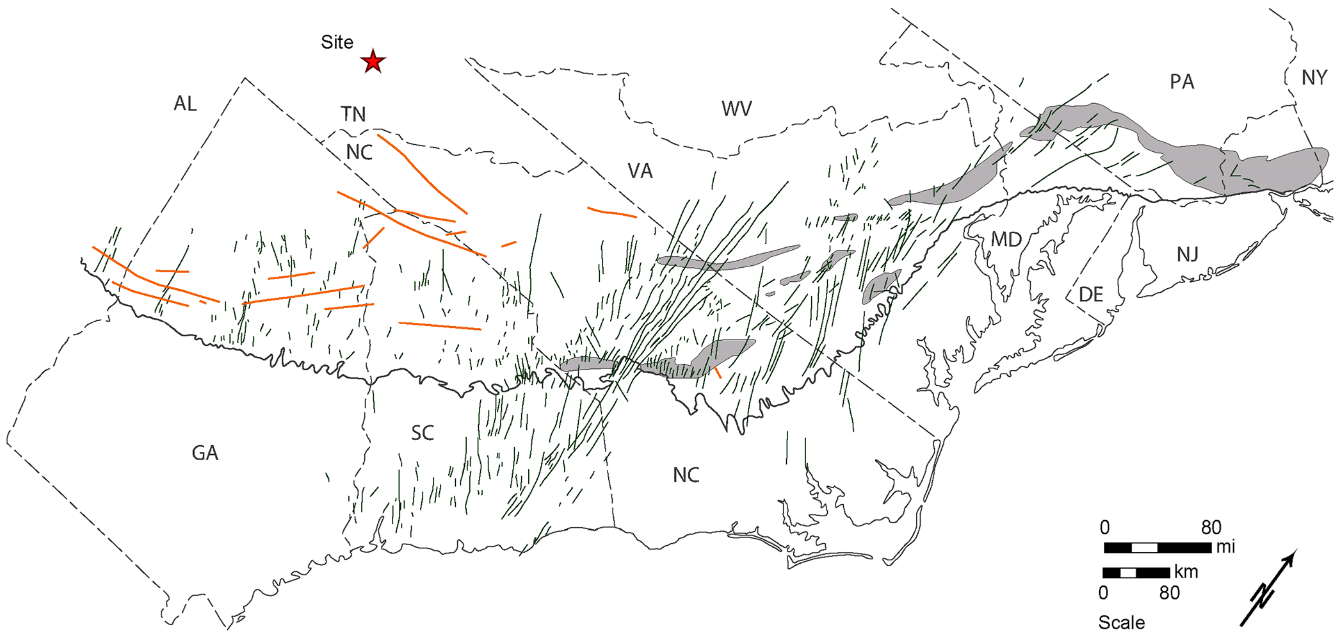

Notes:
Facies diagram of passive margin to stable shelf strata of the western Blue Ridge and Valley and Ridge (from Reference 2.5.1-13).
Units have been palinspastically restored along major Valley and Ridge thrust faults.
Blue — limestone facies; Lavender — dolomite facies; Light blue — shale facies; Beige and medium brown — coarse clastics and turbidites; Gray — siltstone facies; Light yellow — sandstone, shale, and dolomite intertidal facies.

**Figure 2.5.1-11. Facies Diagram of Stable Shelf Strata**




Notes:
Collision model for the Alleghanian orogeny (From Reference 2.5.1-74).
Red lines and symbols indicate the feature is active in the time interval shown.
A) Initial contact between Gondwana and Laurentia produced step-over basins in New England and deposition in the Appalachian basin.
B) Continued collision resulted in greater clastic input in the foreland, with the development of dextral strike-slip faults in the interior of the orogen.
C) Clockwise rotation of Gondwana begins to dominate the collision, resulting in a more head-on collision in the southern Appalachians.
D) Head-on collision in the southern Appalachians results in thrusting of the Blue Ridge-Piedmont megathrust sheet and foreland fold-thrust belt development.
EPFS — Eastern Piedmont Fault System.

**Figure 2.5.1-12. Alleghanian Zipper Tectonics**




Notes:
Distribution of Mesozoic features in the southern and central Appalachians.
Central Atlantic Magmatic Province (CAMP) diabase dikes shown as thin green lines, with silicified faults shown as heavy orange lines.
Dark shaded areas represent exposed Triassic rift basins.
From Reference 2.5.1-87.

**Figure 2.5.1-13. Mesozoic Features Map**

**Geologic Units**

*Pennsylvanian Middle*
- IPmu — Middle Pennsylvanian - undivided

*Pennsylvanian Lower*
- IPcf — Crooked Fork Group - undivided
- IPcg — Crab Orchard Mountains Group & Gizzard Group - undivided
- IPco — Crab Orchard Mountains Group - undivided
- IPg — Gizzard Group - undivided

*Mississippian Upper*
- Mp — Pennington Formation
- Mn — Newman Limestone

*Mississippian Lower - Devonian Upper*
- Mfp — Fort Payne Fm.
- MDc — Chattanooga Shale

*Silurian Lower*
- Sr — Rockwood Fm.

*Ordovician Upper*
- Os — Sequatchie Fm.
- Or — Reedsville Shale

*Ordovician Middle*

**Chickamauga Supergroup**

**Nashville Group**
- Ocn — Cannon Ls.
- Ocyl — Catheys and Leipers Fm. - undivided
- Oh — Hermitage Fm.

**Chickamauga Group**
- Och — Chickamauga group - undivided
- Omc — Moccasin Fm.
- Owi — Witten Fm.
- Obw — Bowen Fm.
- Obe — Benbolt Fm.
- Ork — Rockdell Fm.
- Ofl — Fleanor Shale
- Obl — Blackford Fm. (includes Eidsen mbr.)
- Obs — Bays formation
- Oo — Ottosee Shale
- Ocr — Chapman Ridge Sandstone
- Oho — Holston Formation
- Ole — Lenoir Ls.
- Oa — Athens Shale

**Stones River Group**
- Osr — Stones River Group - undivided
- Oca — Carters Ls.
- Olb — Lebanon Ls.
- Omp — Pierce Ls. and Murfreeboro Ls. - undivided
- Ops — Pong Spring Fm.
- Ord — Ridley Ls.

*Ordovician Lower*

**Knox Group**
- O€k — Knox Group - undivided
- Oma — Mascot Dolomite
- Ok — Kingsport Fm.
- Olv — Longview Dolomite
- Oc — Chepultepec Dolomite
- €cr — Copper Ridge Dolomite

*Cambrian Middle*

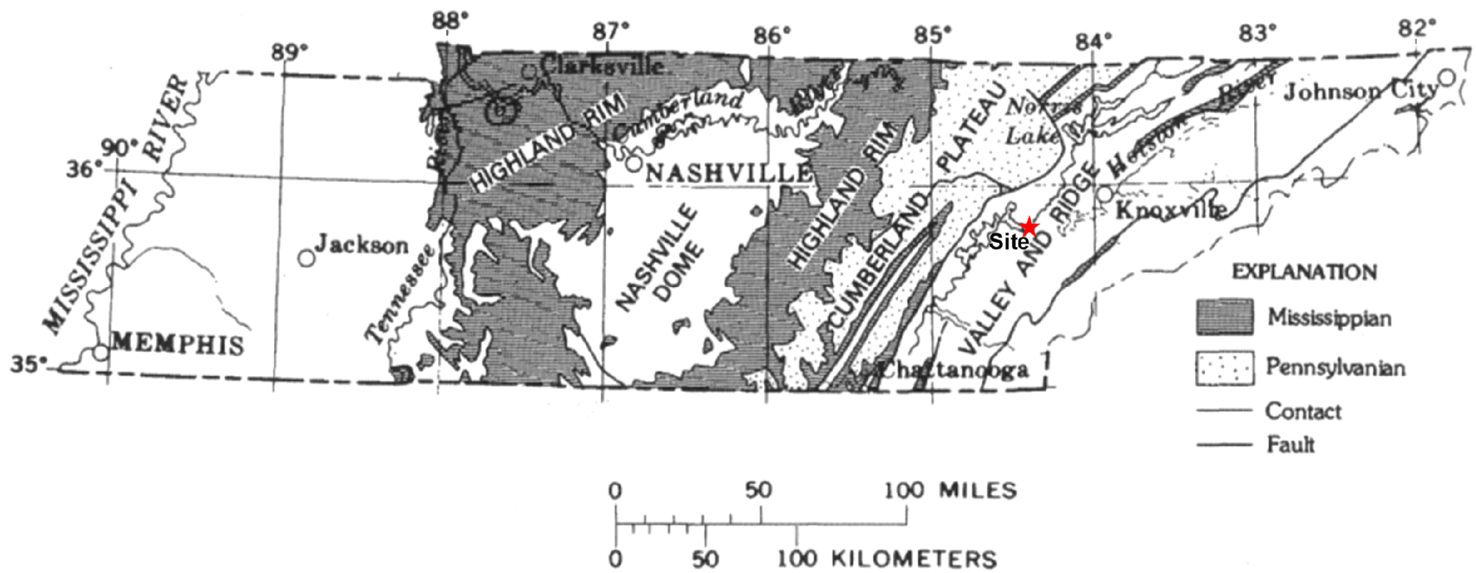
**Conasauga Group**
- €c — Conasauga Group - undivided
- €mn — Marynardville Ls.
- €n — Nolichucky Shale
- €dg — Dismal Gap Fm. (Maryville Ls.)
- €rg — Rogersville Shale
- €f — Friendship Fm. (Rutledge Ls.)
- €pv — Pumpkin Valley Shale

*Cambrian Lower*
- €r — Rome Fm. - undivided

**Geologic Structures**
- Syncline *dashed where approximate*
- Anticline *dashed where approximate*
- Overturned Syncline *dashed where approximate*
- Major Fault
- Minor Fault
- Contact *dashed where approximate, dotted where concealed*

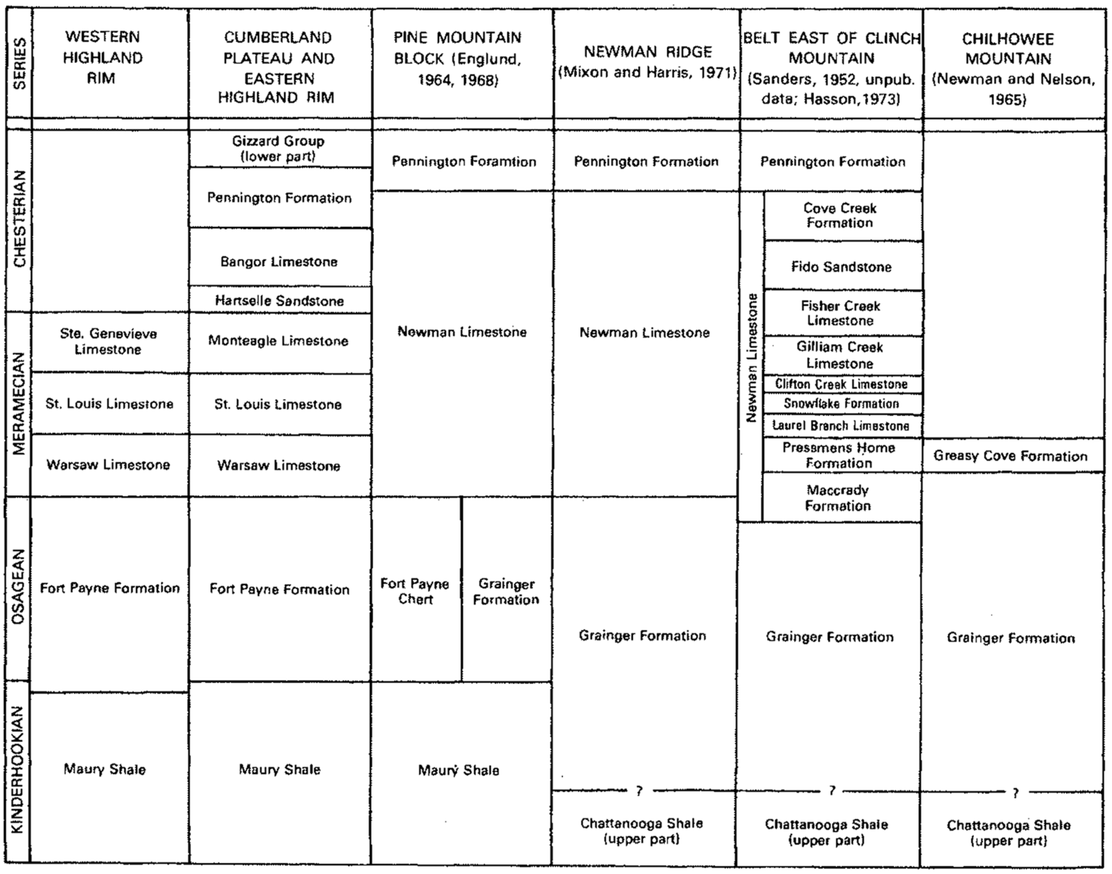
**Other**
- Source map boundary

**Figure 2.5.1-14. Site Vicinity Stratigraphic Columns**



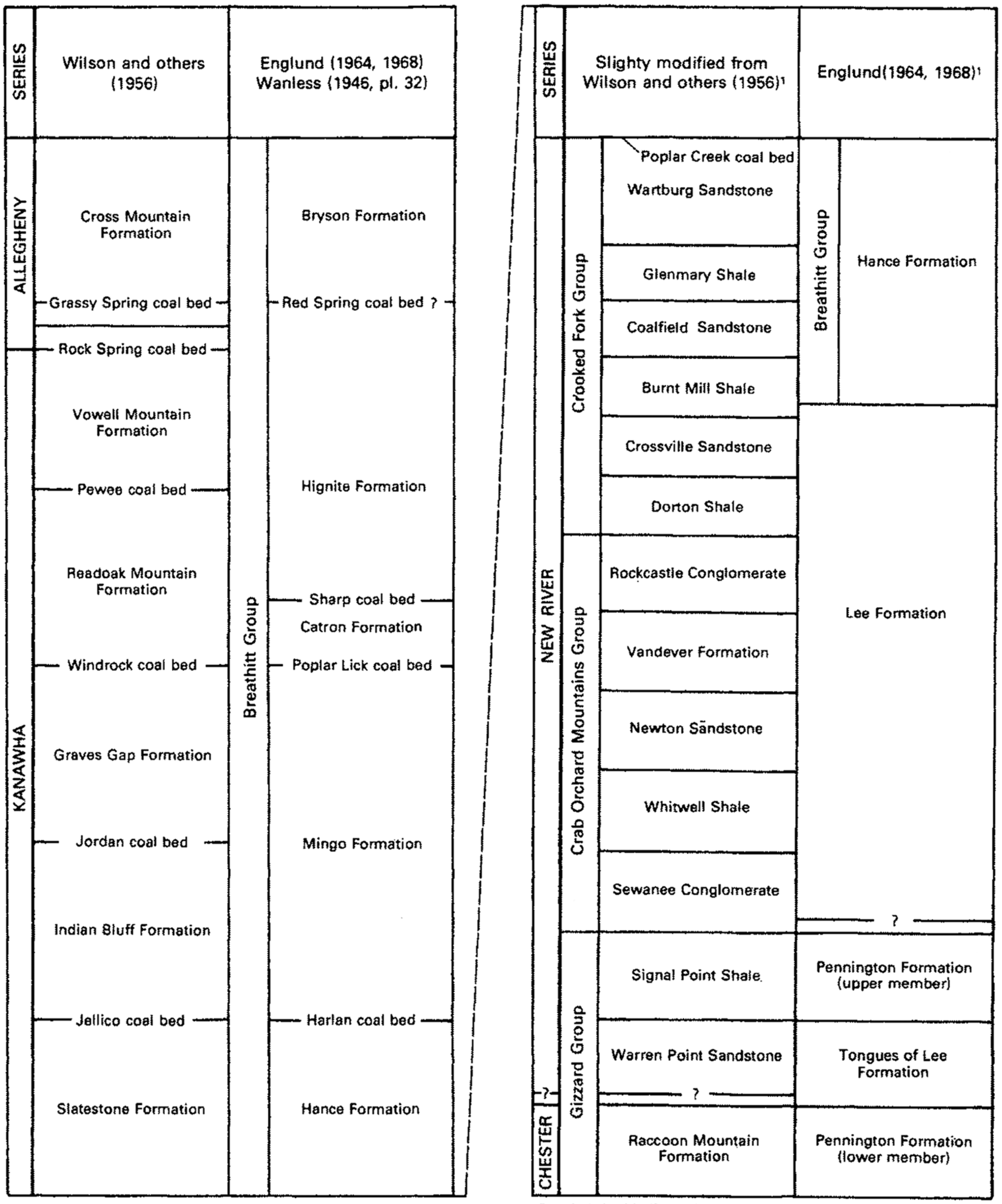

Note: After Reference 2.5.1-112

**Figure 2.5.1-15. The Cumberland Plateau and Interior Low Plateaus in Tennessee**




Notes:
From Reference 2.5.1-112

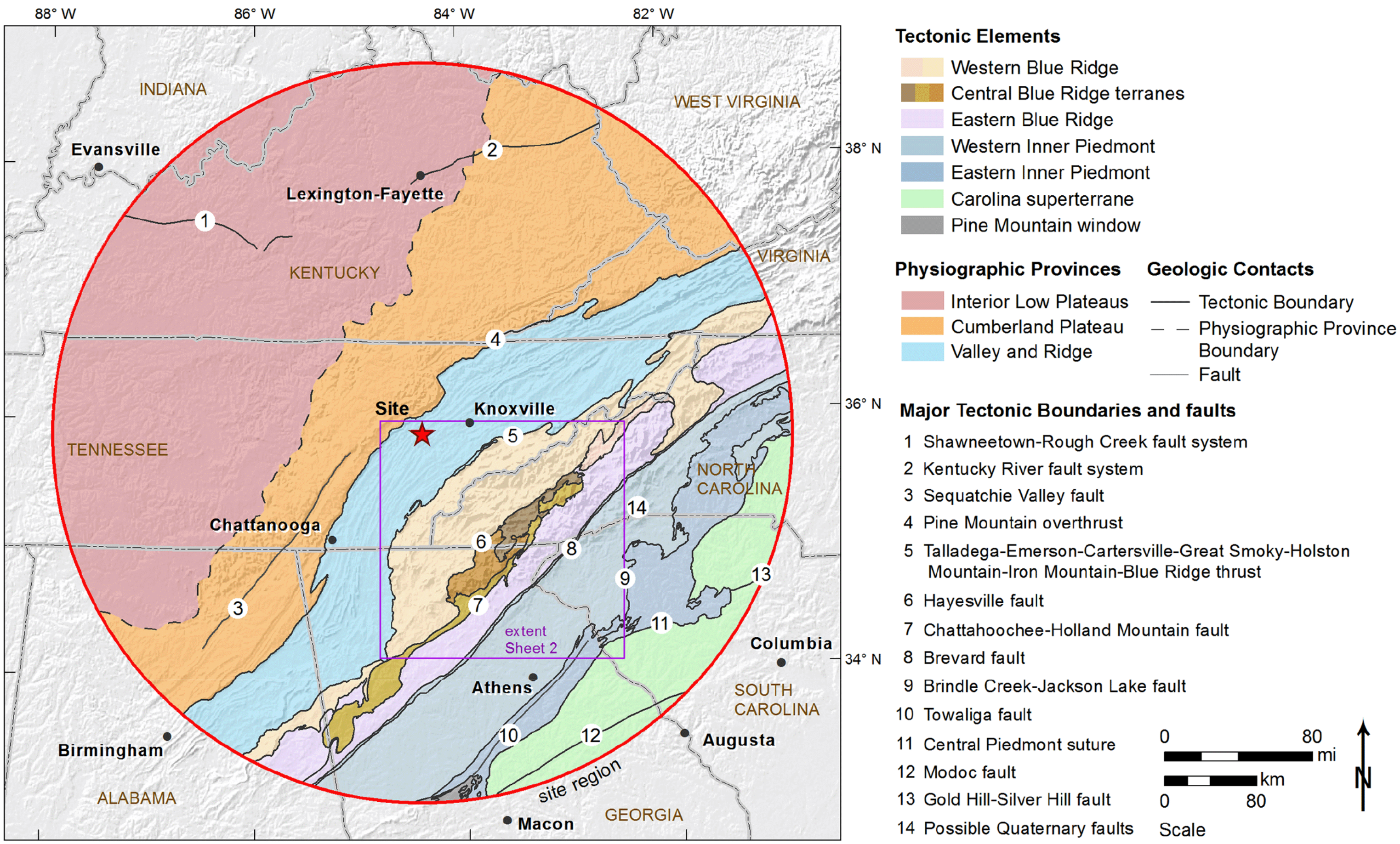
**Figure 2.5.1-16.  Mississippian Stratigraphic Units in Tennessee**




1Queried double lines show opinions concerning the Mississippian–Pennsylvanian boundary.

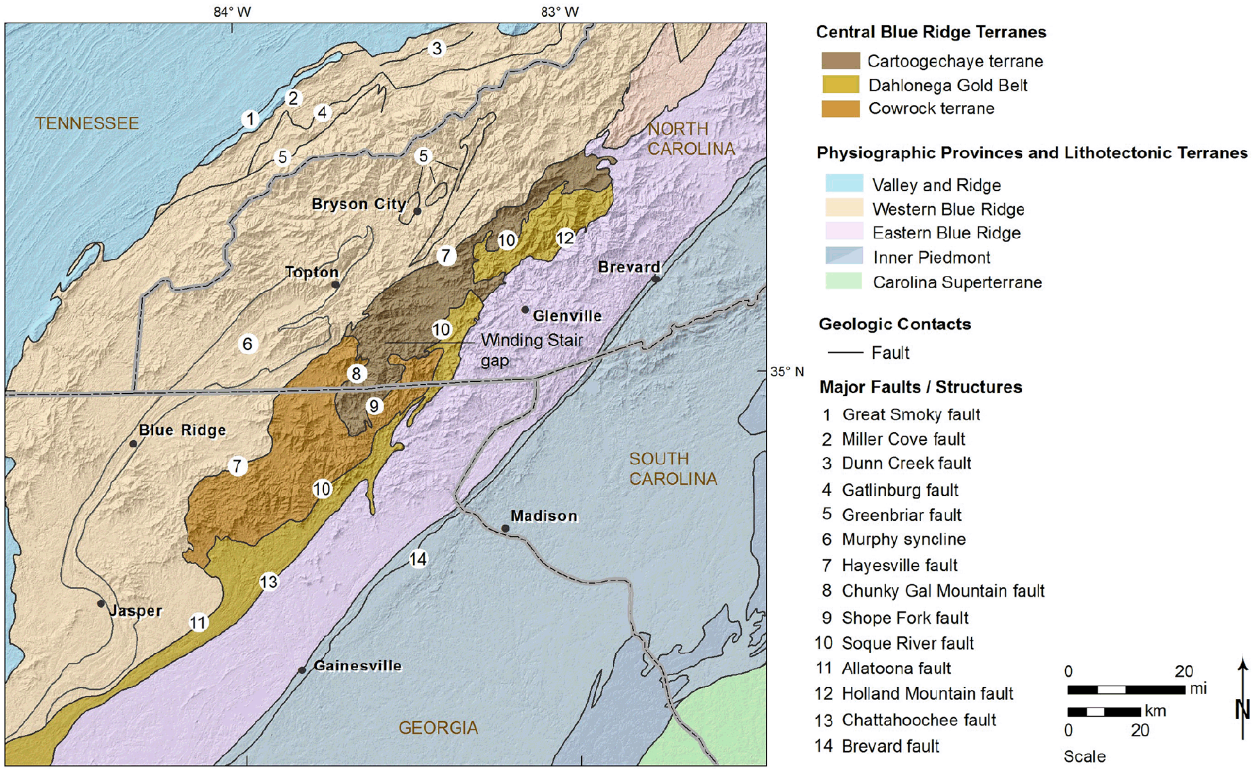
Note: Reference 2.5.1-112

**Figure 2.5.1-17. Pennsylvanian System in Tennessee**



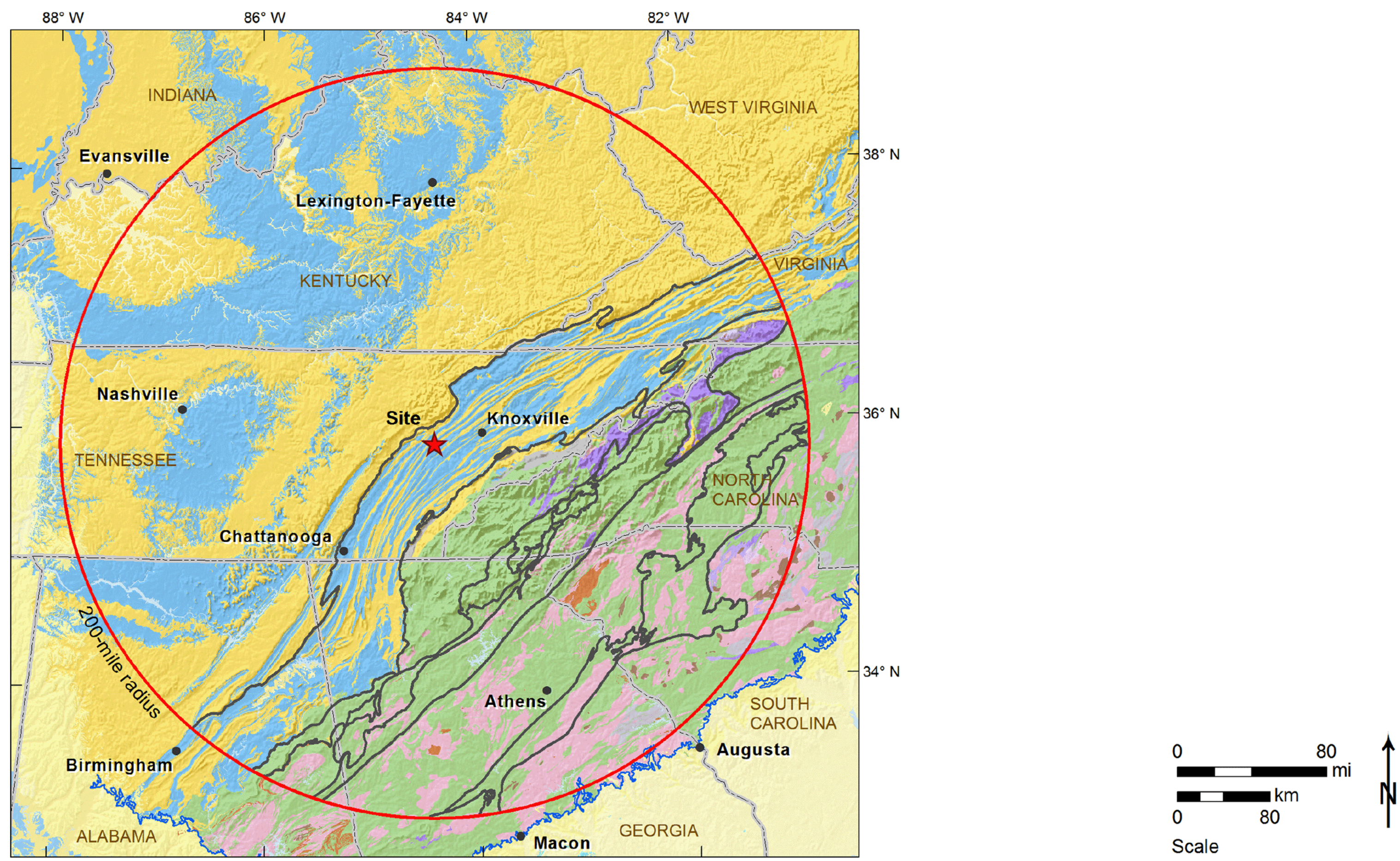

Notes:
Lithotectonic terranes, provinces, and major tectonic boundaries (after References 2.5.1-24, 2.5.1-34, and 2.5.1-137)

**Figure 2.5.1-18. (Sheet 1 of 2) Lithotectonic Terrane Map**



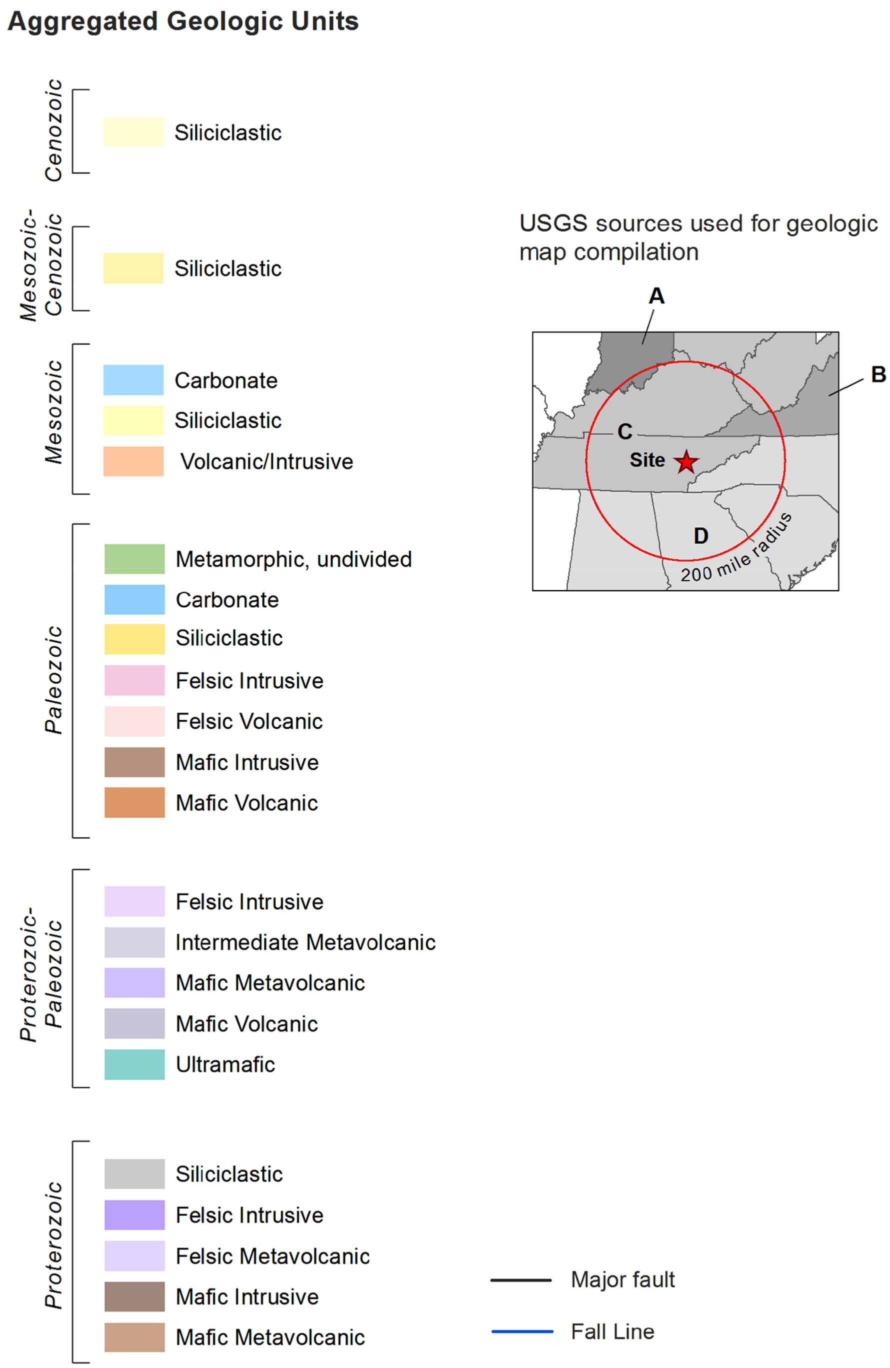

Note:
Simplified tectonic map of the Central Blue Ridge terranes.

**Figure 2.5.1-18. (Sheet 2 of 2) Lithotectonic Terrane Map—Blue Ridge Zoom**



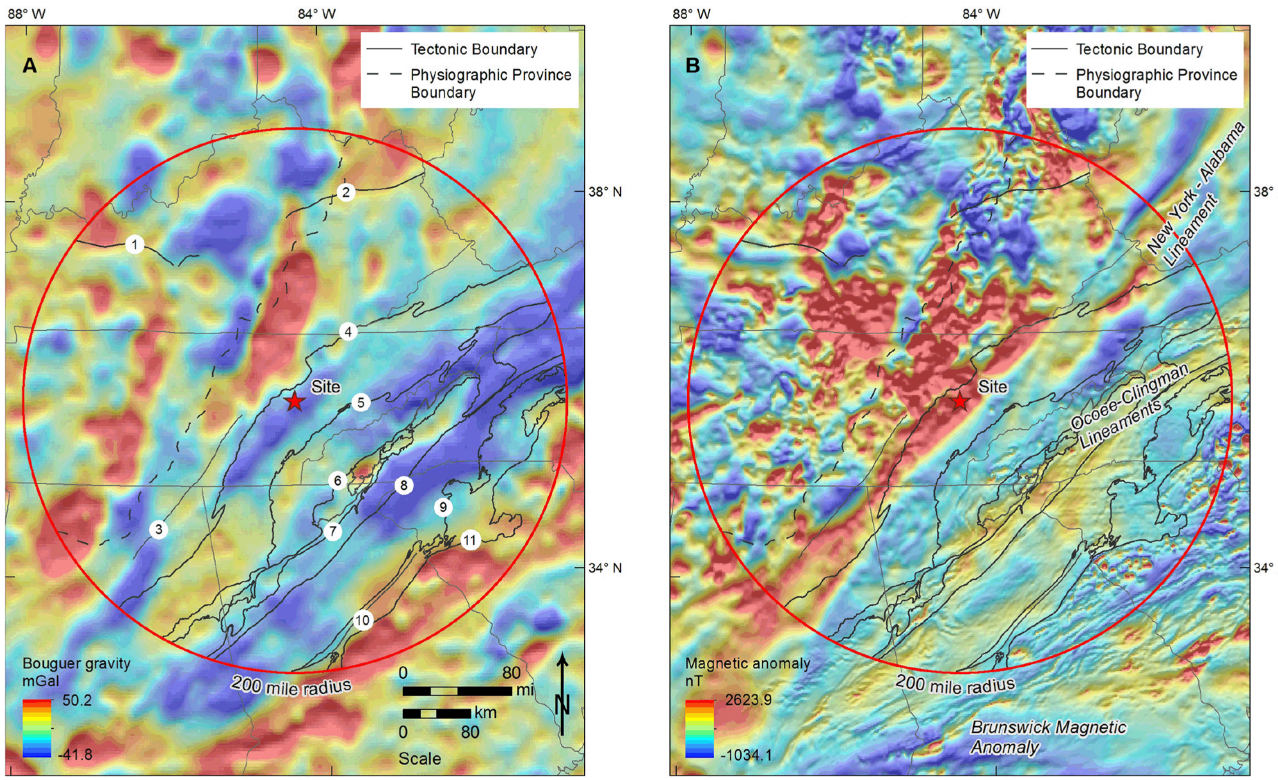

Note:
USGS sources for geologic map: A - OFR-04-1355, Reference 2.5.1-116; B - OFR-05-1325, Reference 2.5.1-115; C - OFR-05-1323, Reference 2.5.1-114; D - OFR-05-1324, Reference 2.5.1-117. Major faults from References 2.5.1-24 and 2.5.1-34. Fall Line from Reference 2.5.1-20.

**Figure 2.5.1-19. (Sheet 1 of 2) Site Region Geologic Map**



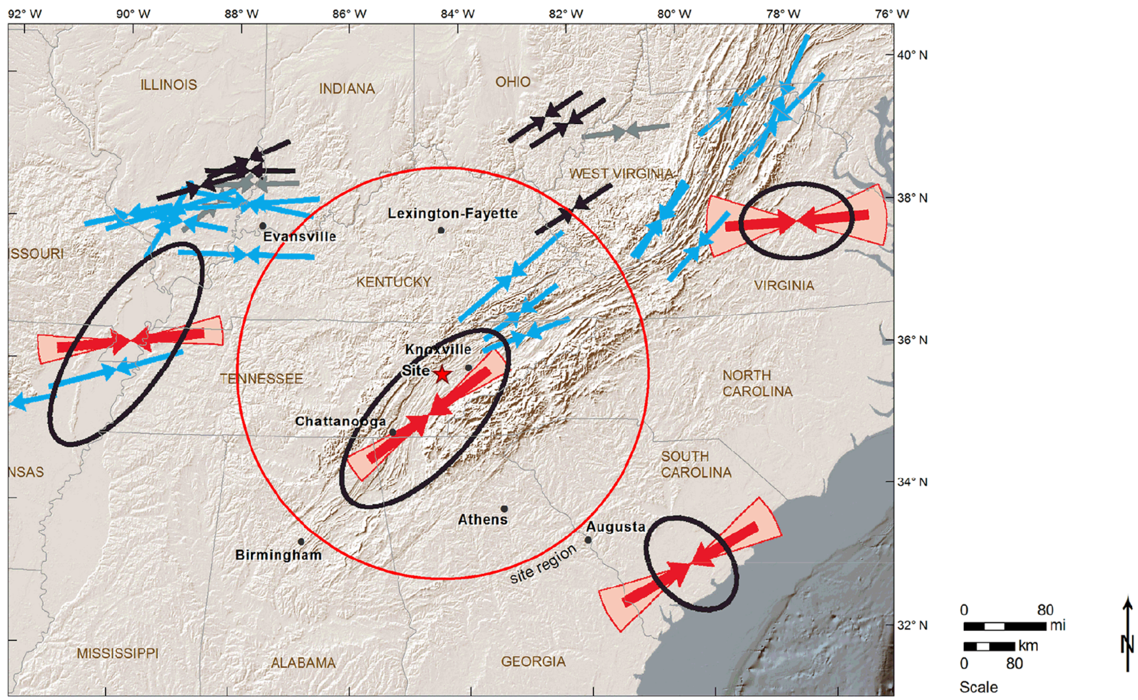

Note:
USGS sources for geologic map: A - OFR-04-1355, Reference 2.5.1-116; B - OFR-05-1325, Reference 2.5.1-115; C - OFR-05-1323, Reference 2.5.1-114; D - OFR-05-1324, Reference 2.5.1-117. Major faults from References 2.5.1-24 and 2.5.1-34. Fall Line from Reference 2.5.1-20.

**Figure 2.5.1-19. (Sheet 2 of 2) Site Region Geologic Map**



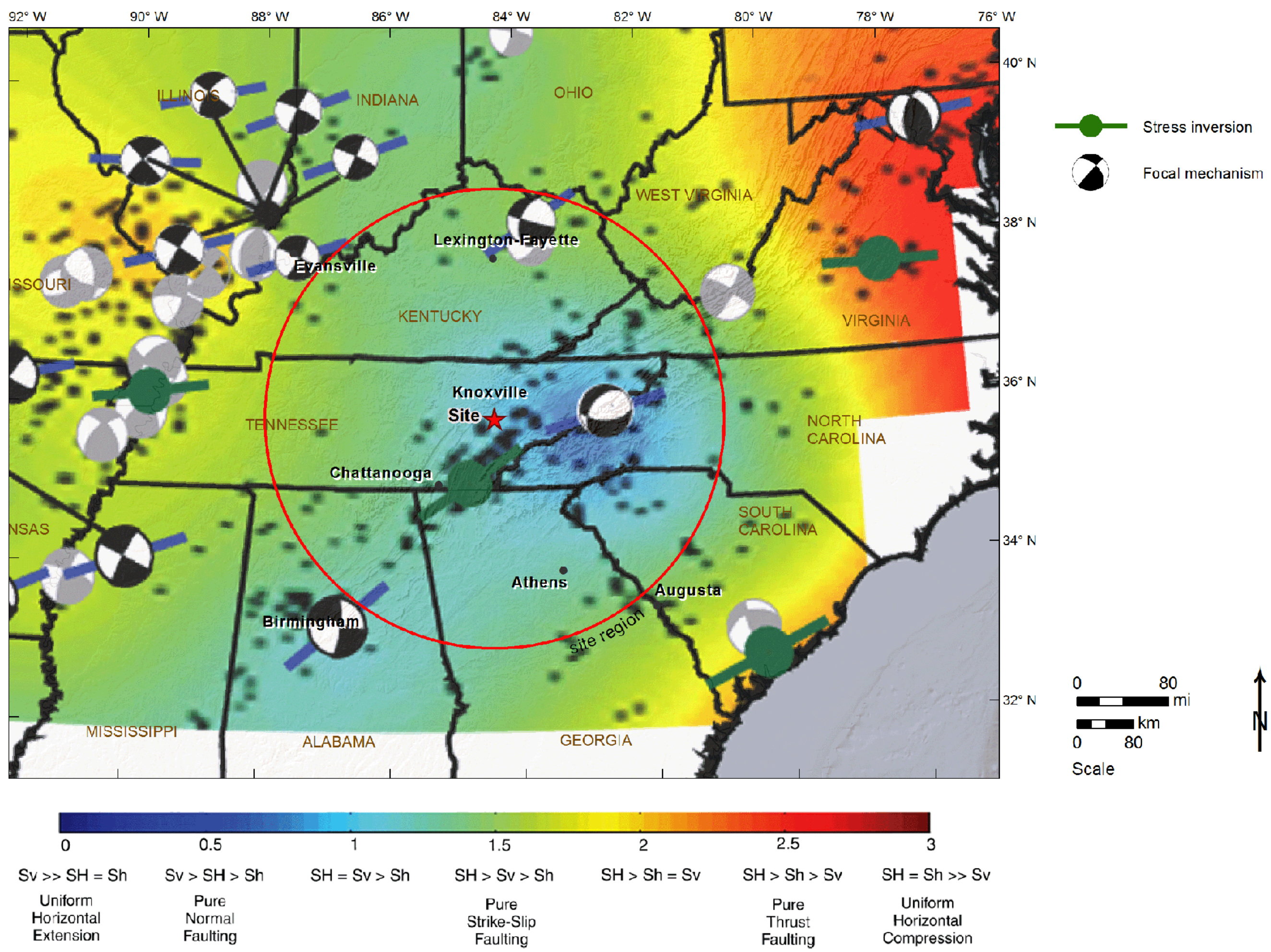

Notes:
Gravity anomaly (A) and aeromagnetic residual data (B) from CEUS SSC (Reference 2.5.1-190).
See Figure 2.5.1-18, Sheet 1 for numbered fault references.

**Figure 2.5.1-20. Aeromagnetic and Gravity Maps**




Notes:
Map of current stresses in the central and eastern U.S. (after Reference 2.5.1-185).
Black and gray arrows – orientation from borehole observations;
Blue arrows – borehole observations used in calculating the regional average within 250 km (155 mi) of the seismic zones (solid ellipses);
Red arrows and angular sectors – orientation from focal mechanism inversion.

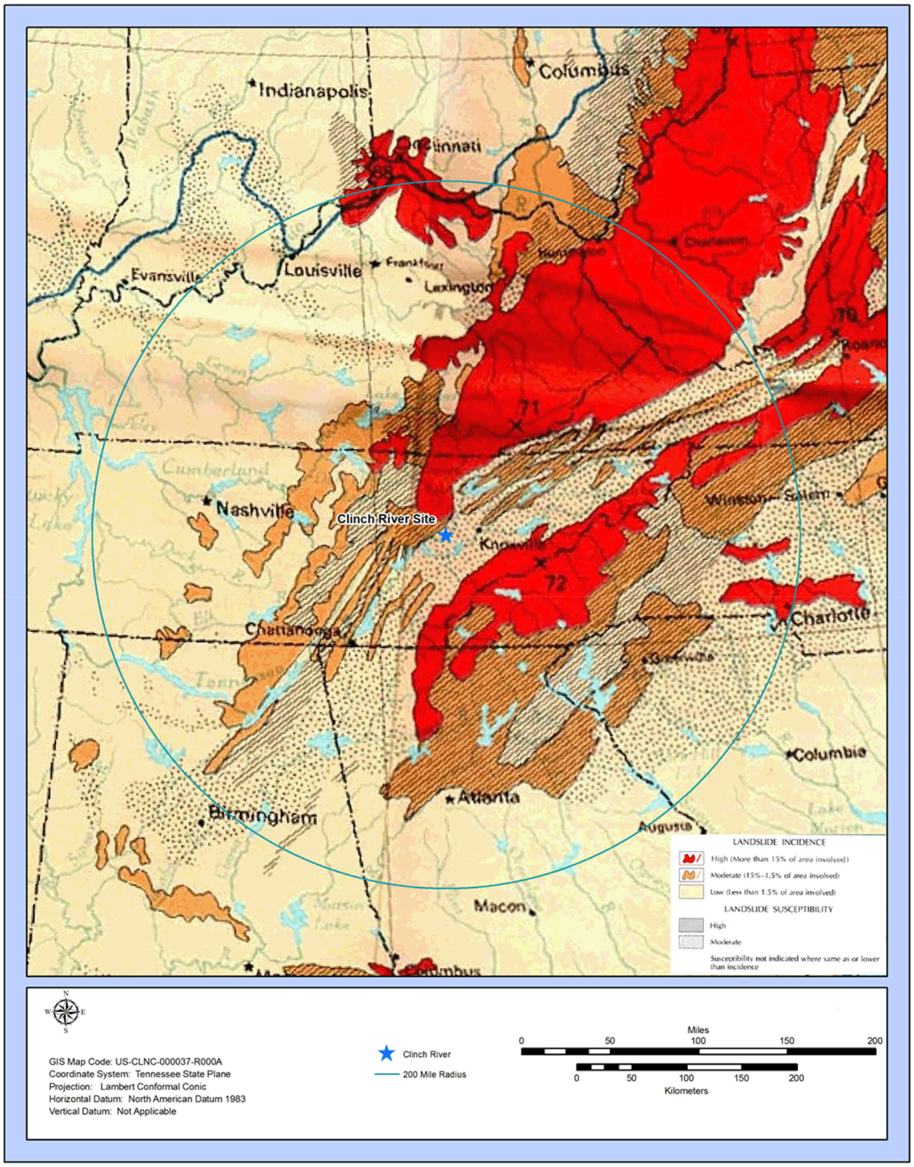
**Figure 2.5.1-21. (Sheet 1 of 2) Current Compressive Stress—Eastern United States**




Notes:
Gray focal mechanisms from Reference 2.5.1-183; black focal mechanisms from Reference 2.5.1-306.
SH – maximum horizontal stress; Sh – minimum horizontal stress; Sv – vertical stress.

Source: Reference 2.5.1-306

**Figure 2.5.1-21. (Sheet 2 of 2) Regional Stress Map from Hurd and Zoback**




Note: Modified from Reference 2.5.1-202

**Figure 2.5.1-22. Landslide Hazard Map for the Clinch River Nuclear Site Region**

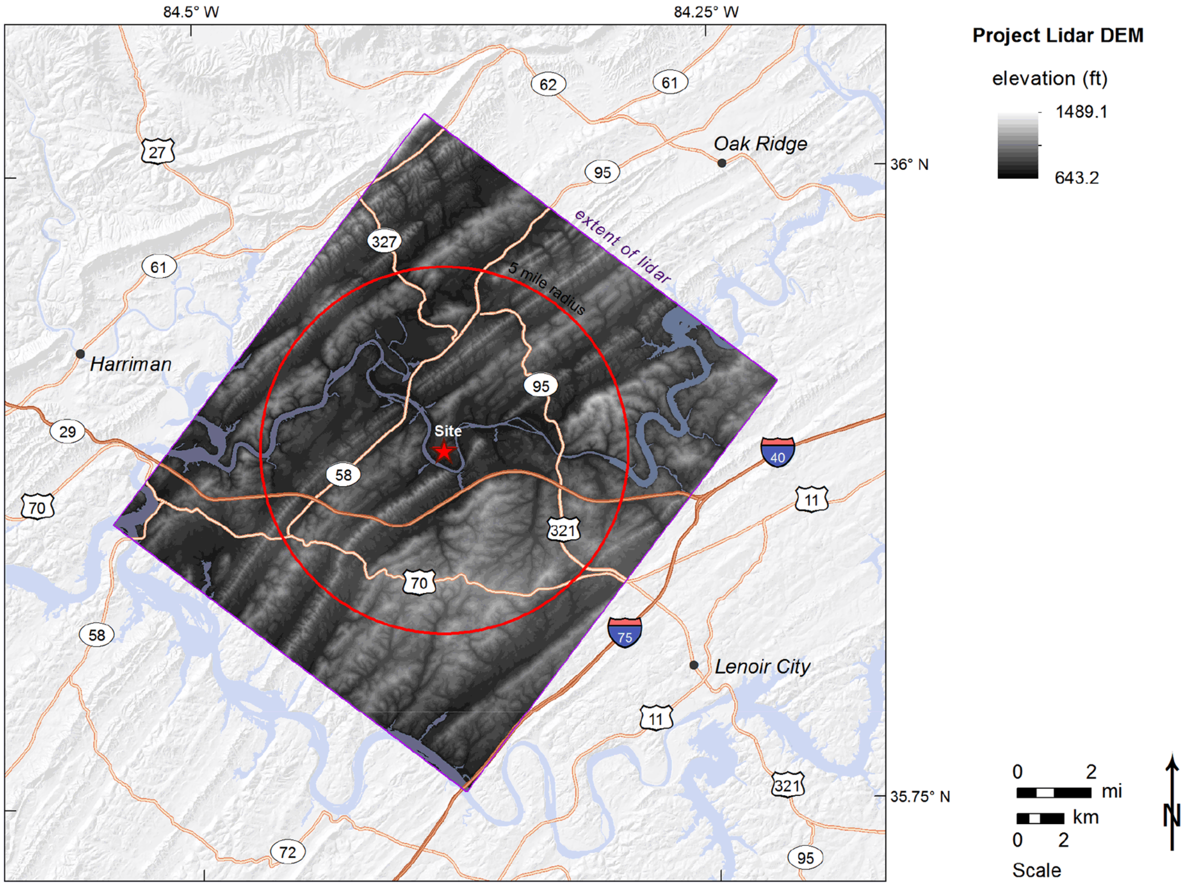
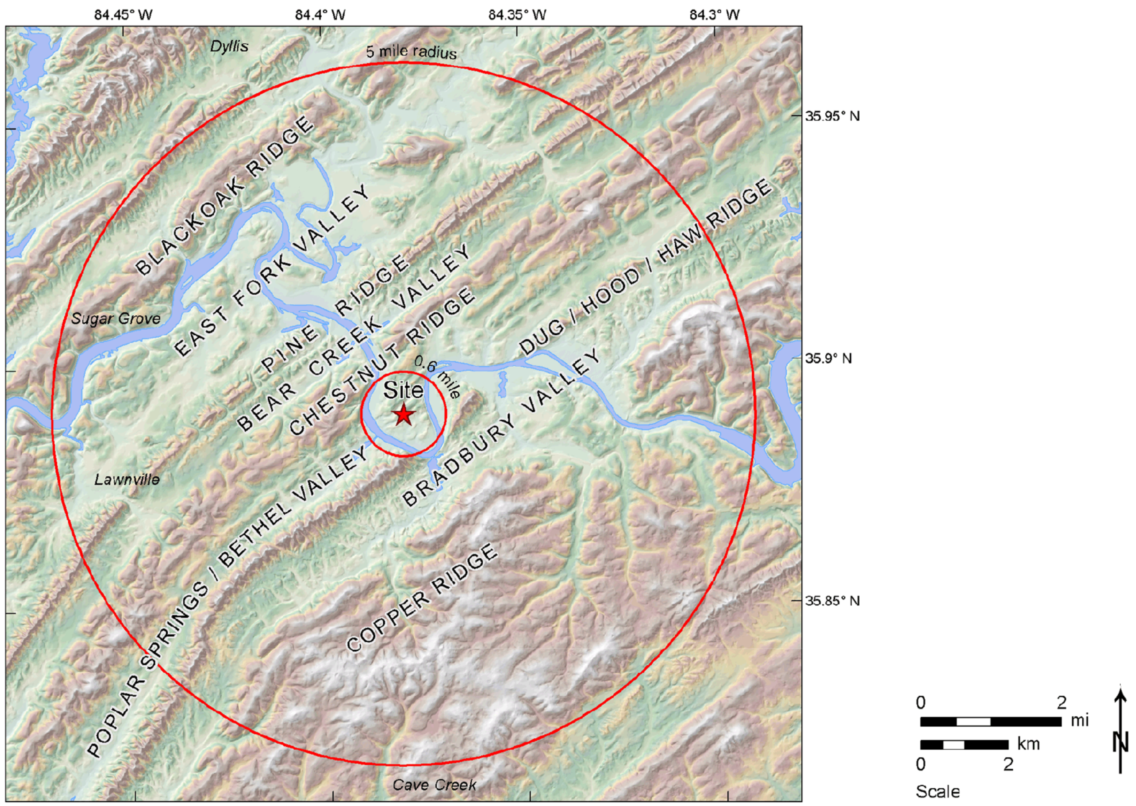



**Figure 2.5.1-23. LiDAR Digital Elevation Model Coverage**




Note: Local geographic nomenclature from Lemiszki (Reference 2.5.1-215)

**Figure 2.5.1-24. Local Physiography with Local Nomenclature for Valleys and Ridges**

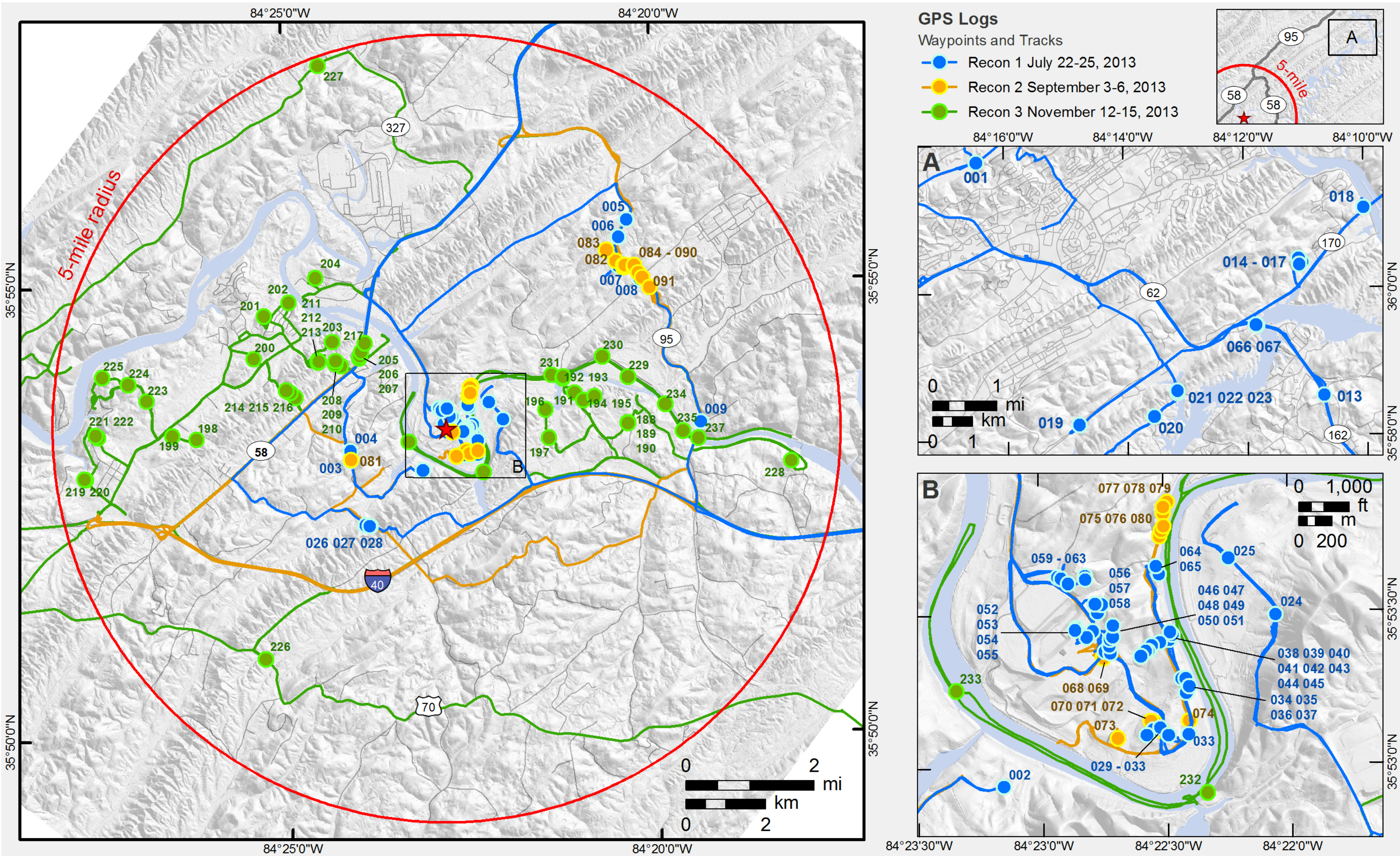



**Figure 2.5.1-25. Geologic Field Reconnaissance Waypoint Locations**

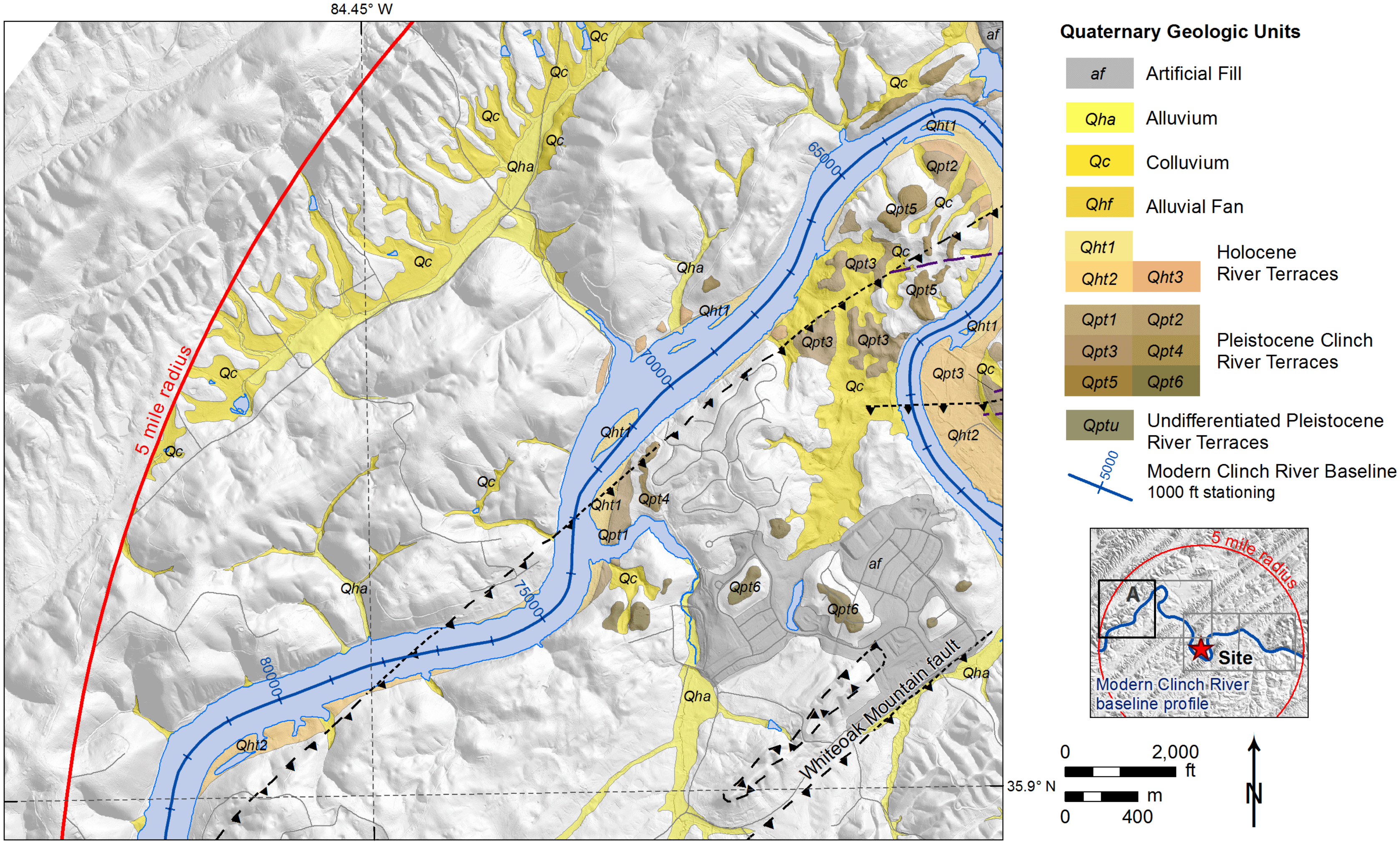



**Figure 2.5.1-26. (Sheet 1 of 6) Quaternary Terrace Map Adjacent to the Clinch River Arm of the Watts Bar Reservoir Within the Clinch River Nuclear Site Area, Location A**

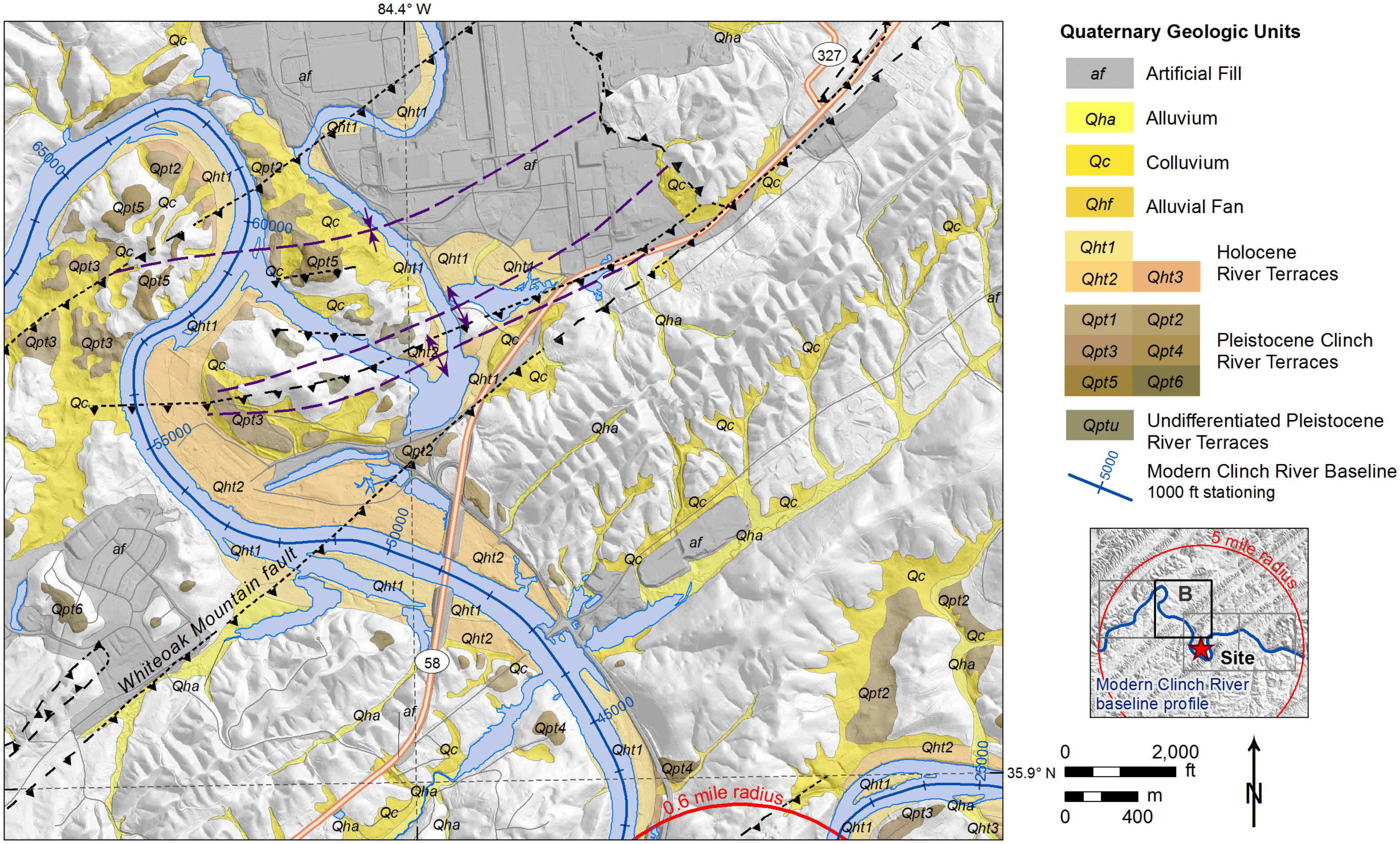



**Figure 2.5.1-26. (Sheet 2 of 6) Quaternary Terrace Map Adjacent to the Clinch River Arm of the Watts Bar Reservoir Within the Clinch River Nuclear Site Area, Location B**

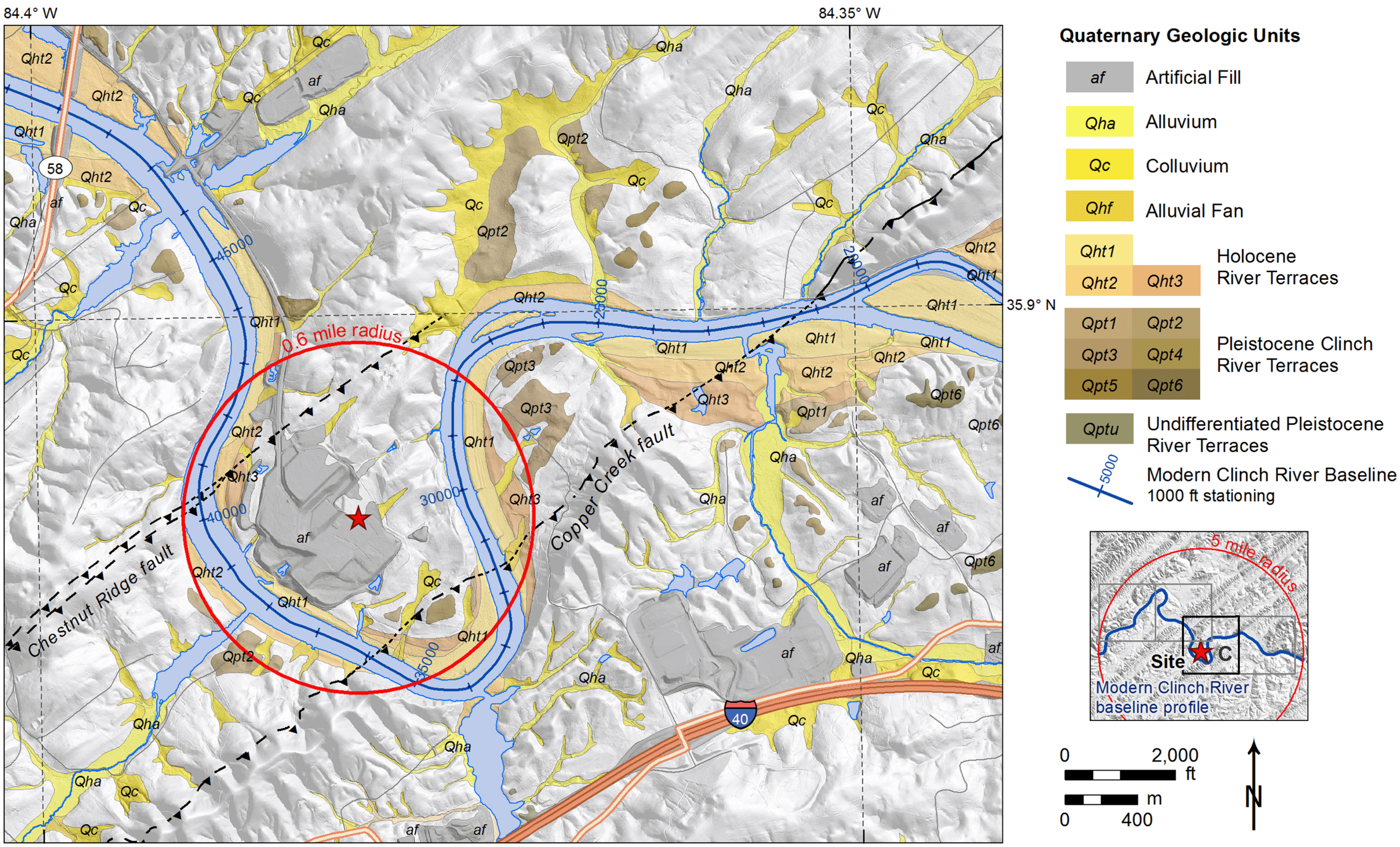



**Figure 2.5.1-26. (Sheet 3 of 6) Quaternary Terrace Map Adjacent to the Clinch River Arm of the Watts Bar Reservoir Within the Clinch River Nuclear Site Area, Location C**

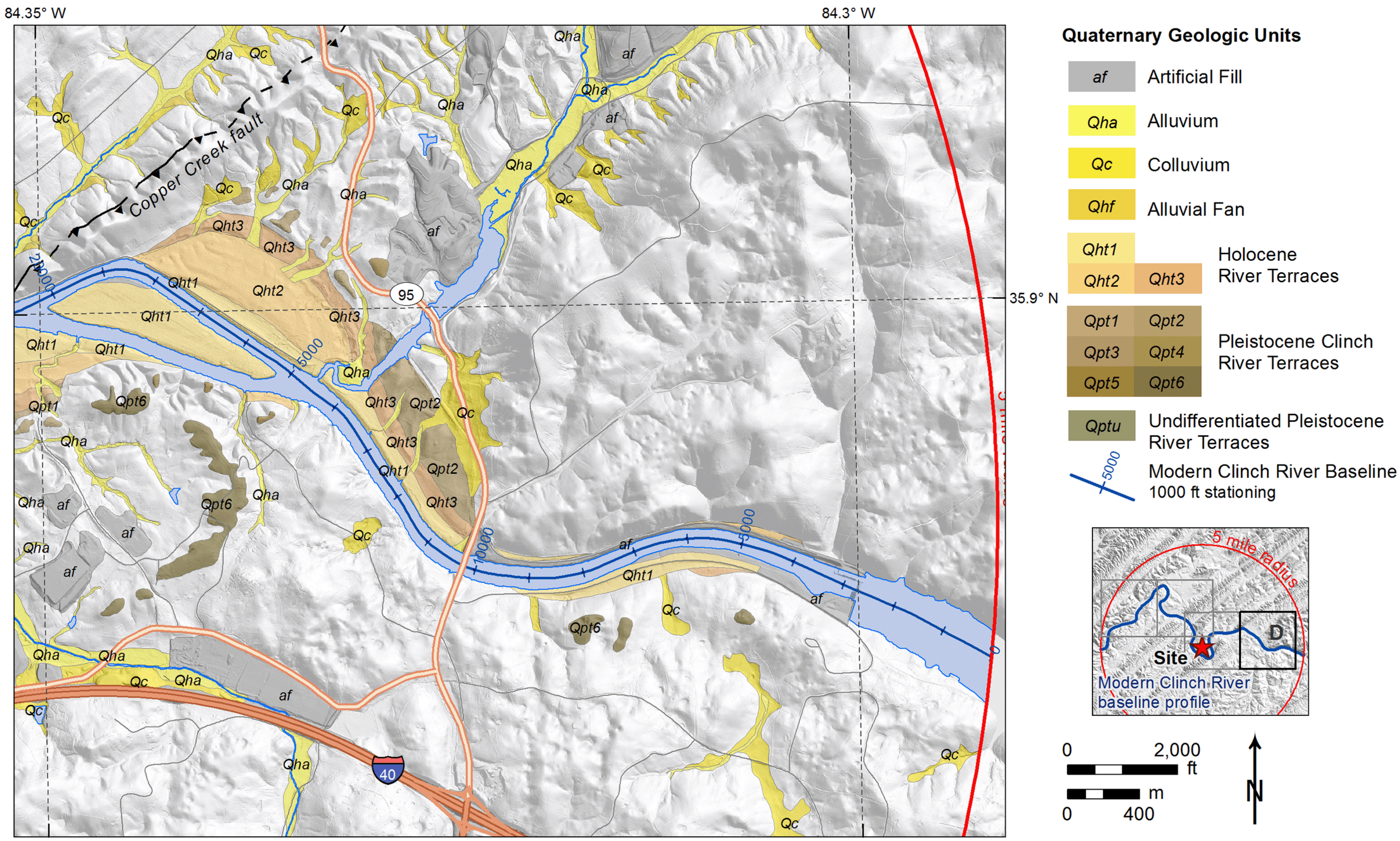
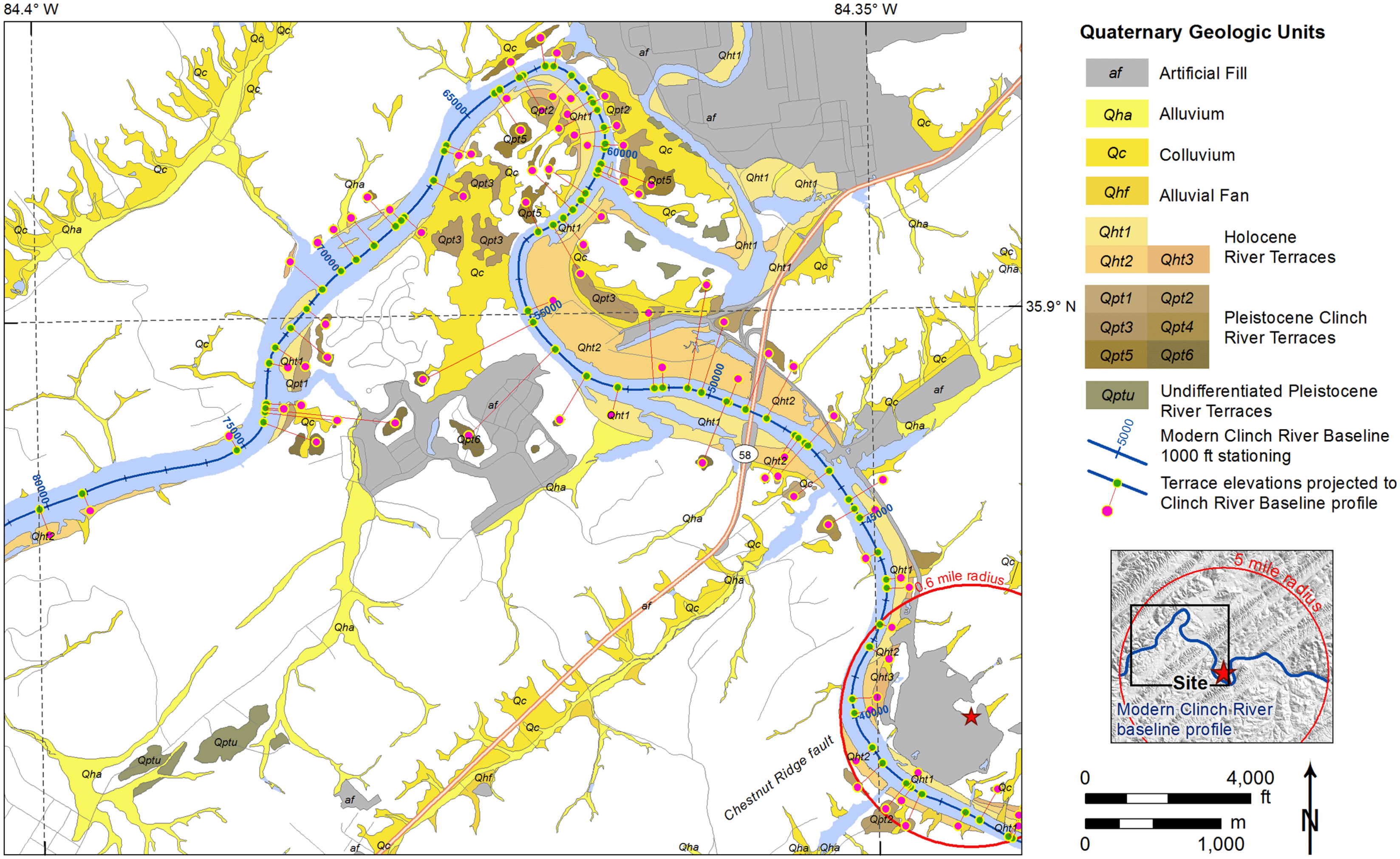
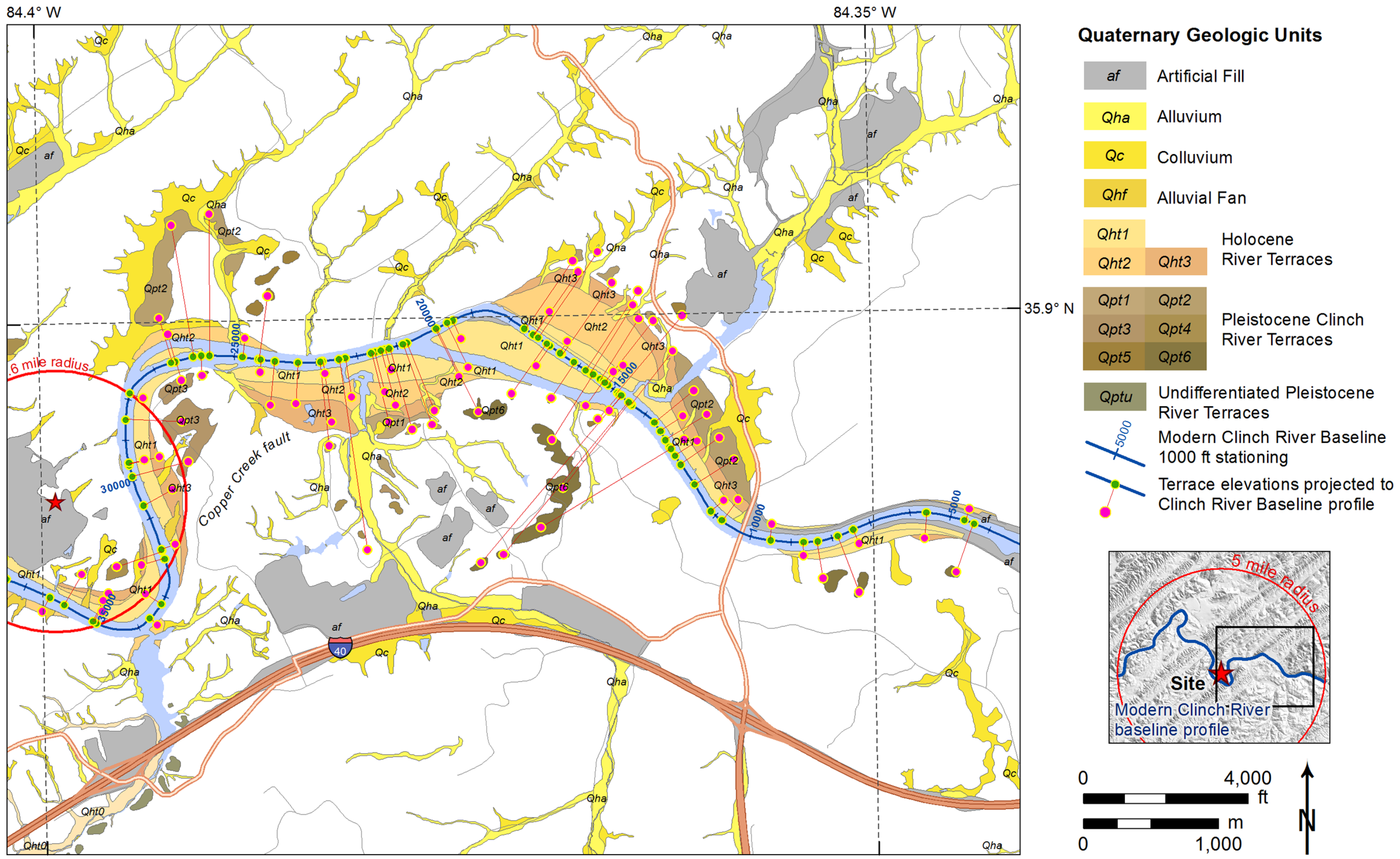



**Figure 2.5.1-26. (Sheet 4 of 6) Quaternary Terrace Map Adjacent to the Clinch River Arm of the Watts Bar Reservoir Within the Clinch River Nuclear Site Area, Location D**



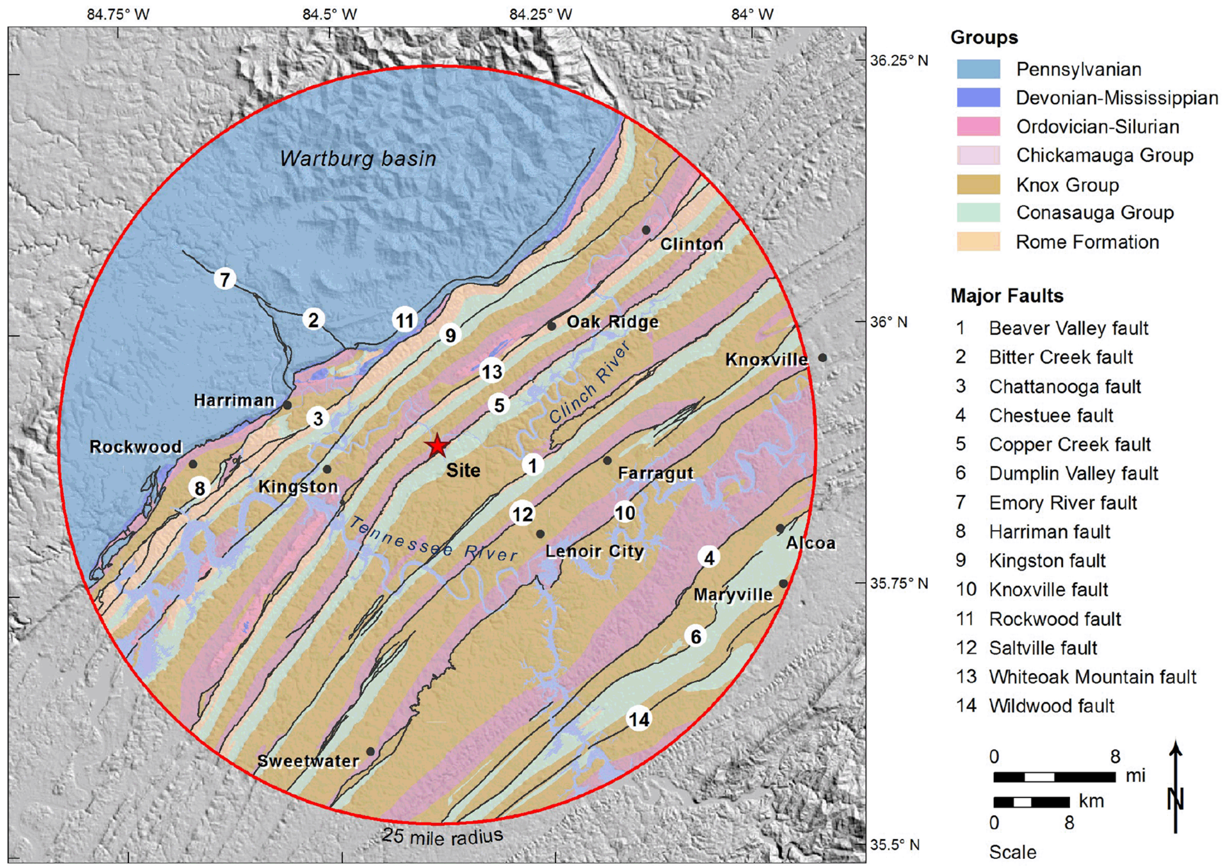

Notes:
See Figure 2.5.3-4 for Longitudinal Profiles of Quaternary Terraces along the Clinch River.
Quaternary mapping by Lettis Consultants International, Inc.

**Figure 2.5.1-26. (Sheet 5 of 6) Quaternary Terrace Projections to the Clinch River for creation of Longitudinal Profile**



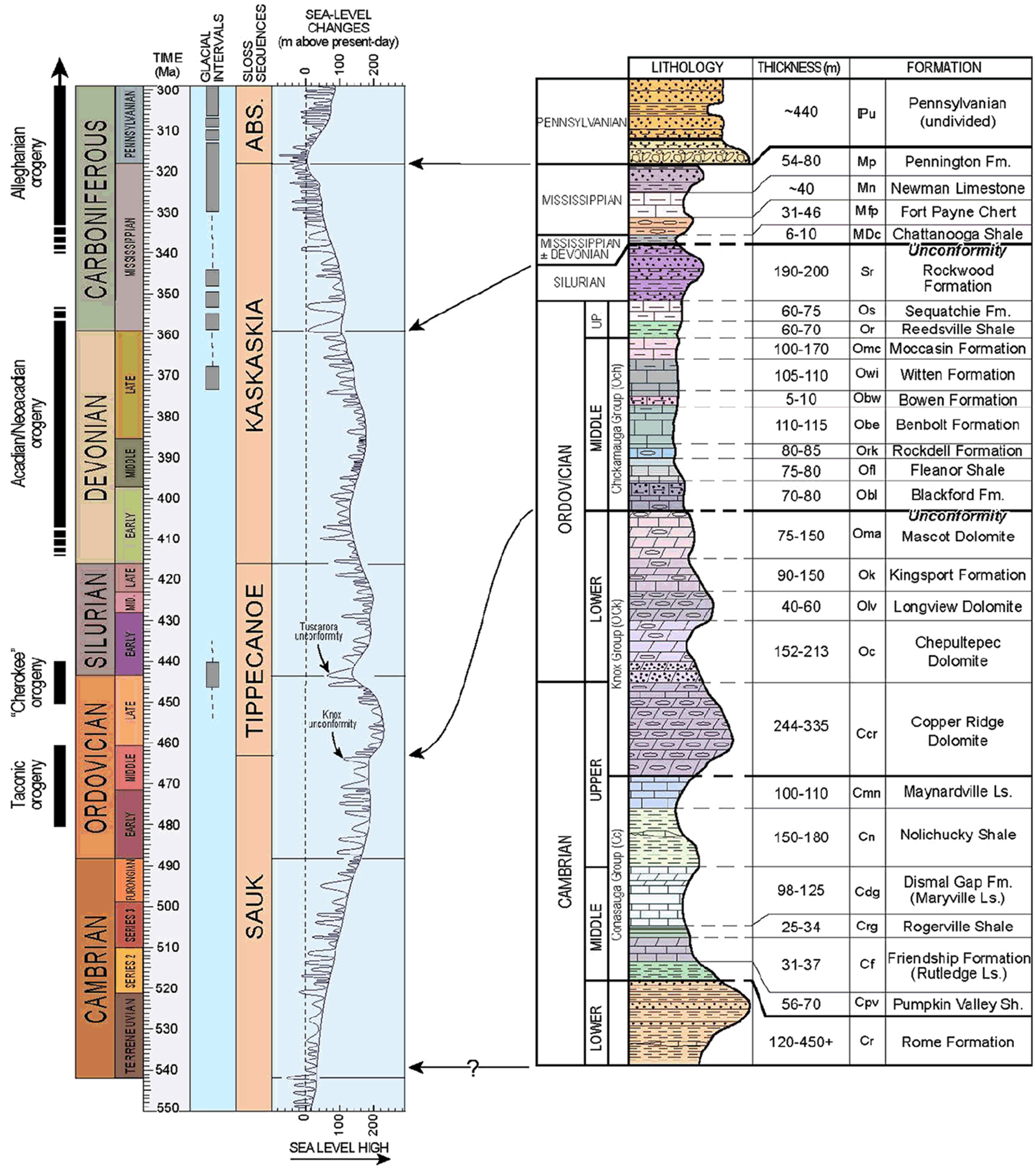

Notes:
See Figure 2.5.3-4 for Longitudinal Profiles of Quaternary Terraces along the Clinch River.
Quaternary mapping by Lettis Consultants International, Inc.

**Figure 2.5.1-26. (Sheet 6 of 6) Quaternary Terrace Projections to the Clinch River for creation of Longitudinal Profile**




Note: Simplified geologic map of the Clinch River Nuclear site vicinity.

**Figure 2.5.1-27. Simplified Site Vicinity Geologic Map**




Notes:
Generalized stratigraphic column of the geology of the CRN site vicinity (right) with Paleozoic sea level curves, Reference 2.5.1-49 cratonic sequences, glacial intervals, and tectonic events (left; modified from Reference 2.5.1-206) that correspond to the time interval represented by the stratigraphic section (modified from Reference 2.5.1-9).
ABS-Absaroka

**Figure 2.5.1-28. Stratigraphic Column with Sea Level Curve**

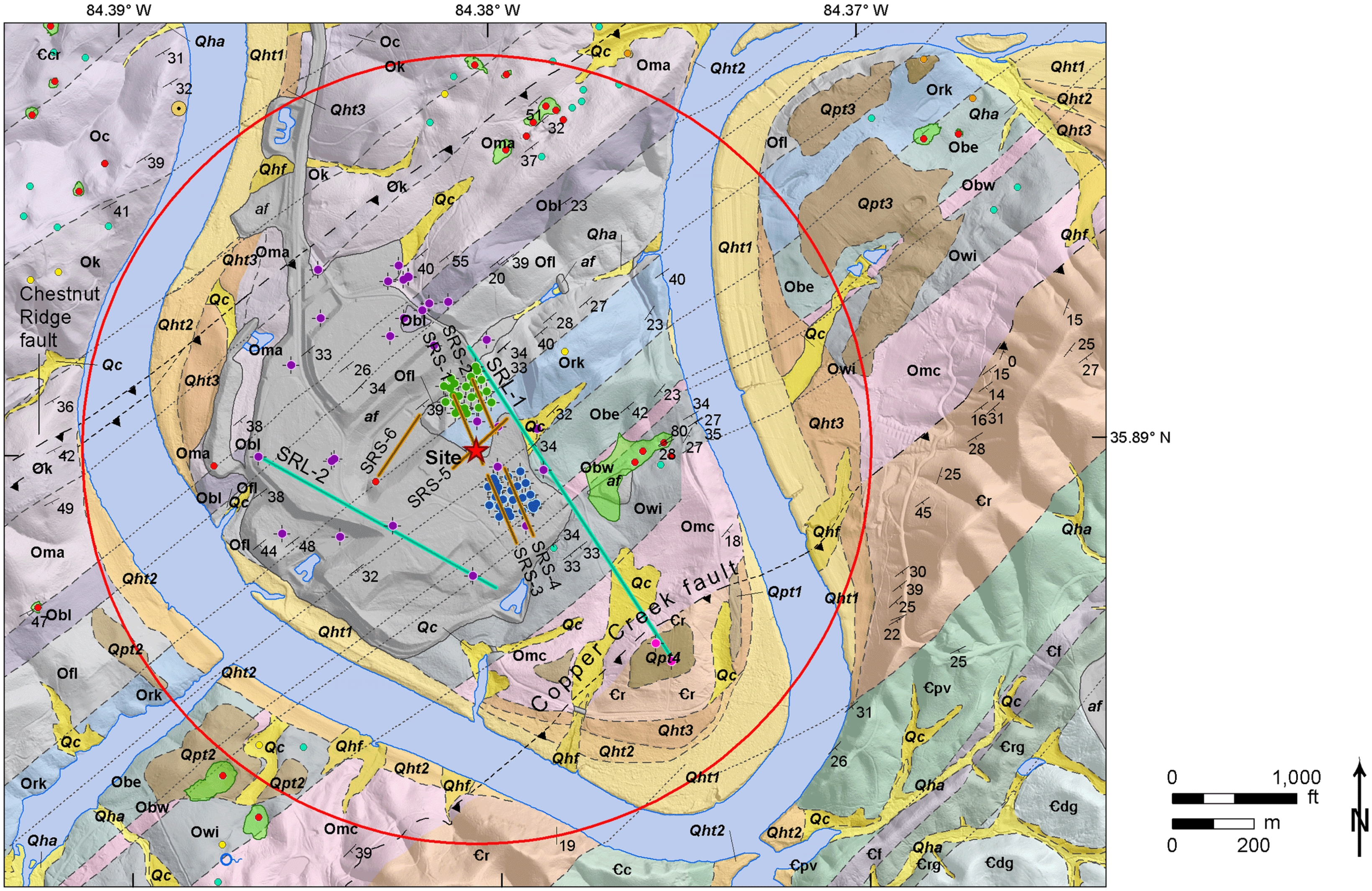


**Figure 2.5.1-29. (Sheet 1 of 2) Site Location Geologic Map Showing Borings**

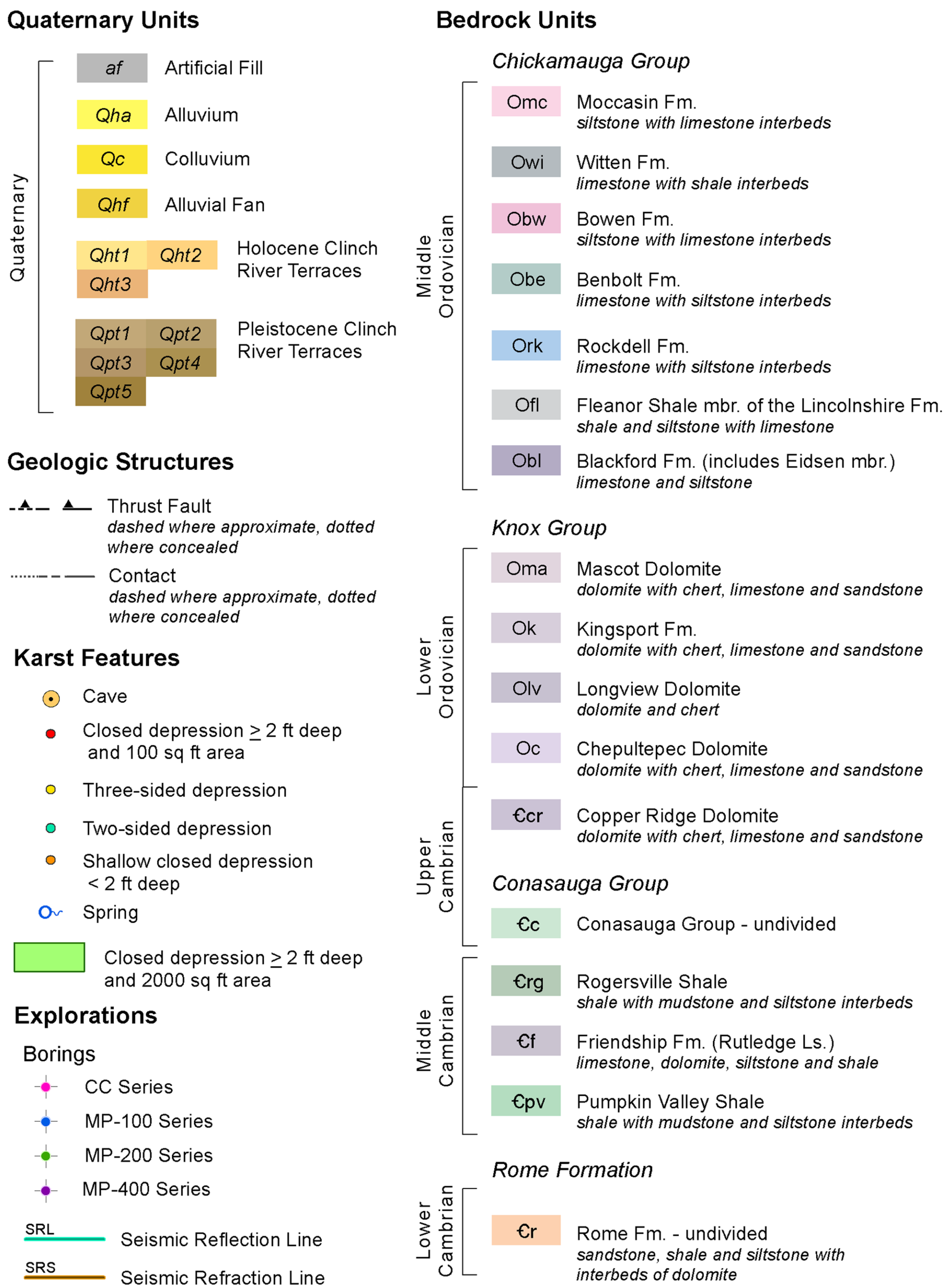



**Figure 2.5.1-29. (Sheet 2 of 2) Site Location Geologic Map Showing Borings**

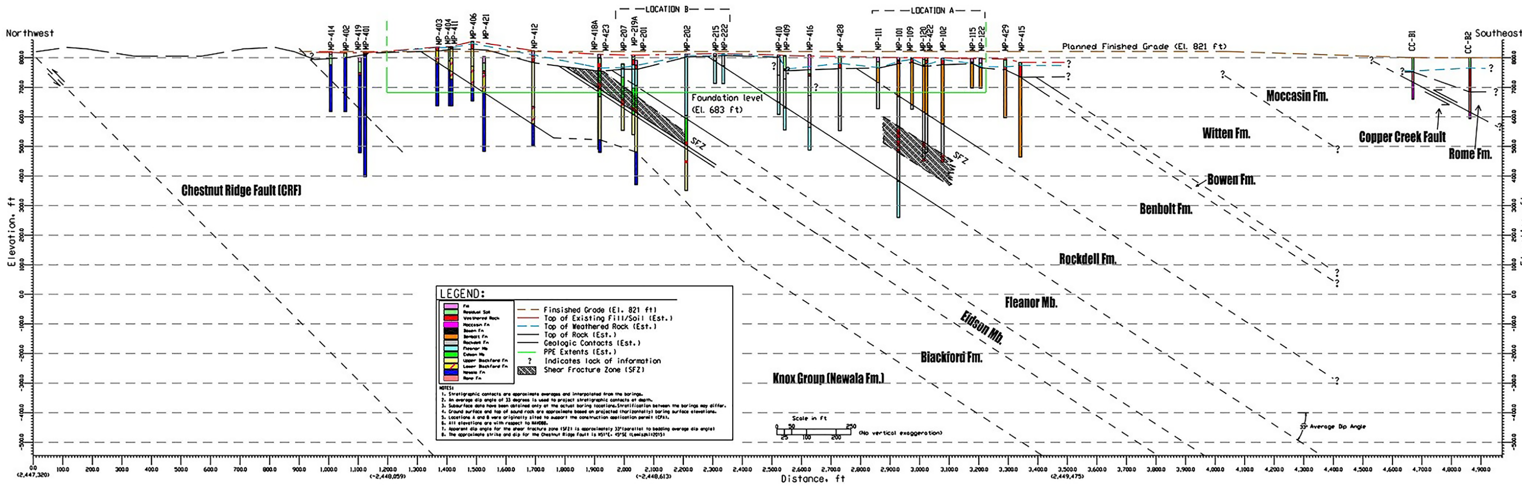



**Figure 2.5.1-30. Geologic Cross-Section K–K′ of the Clinch River Nuclear Site**

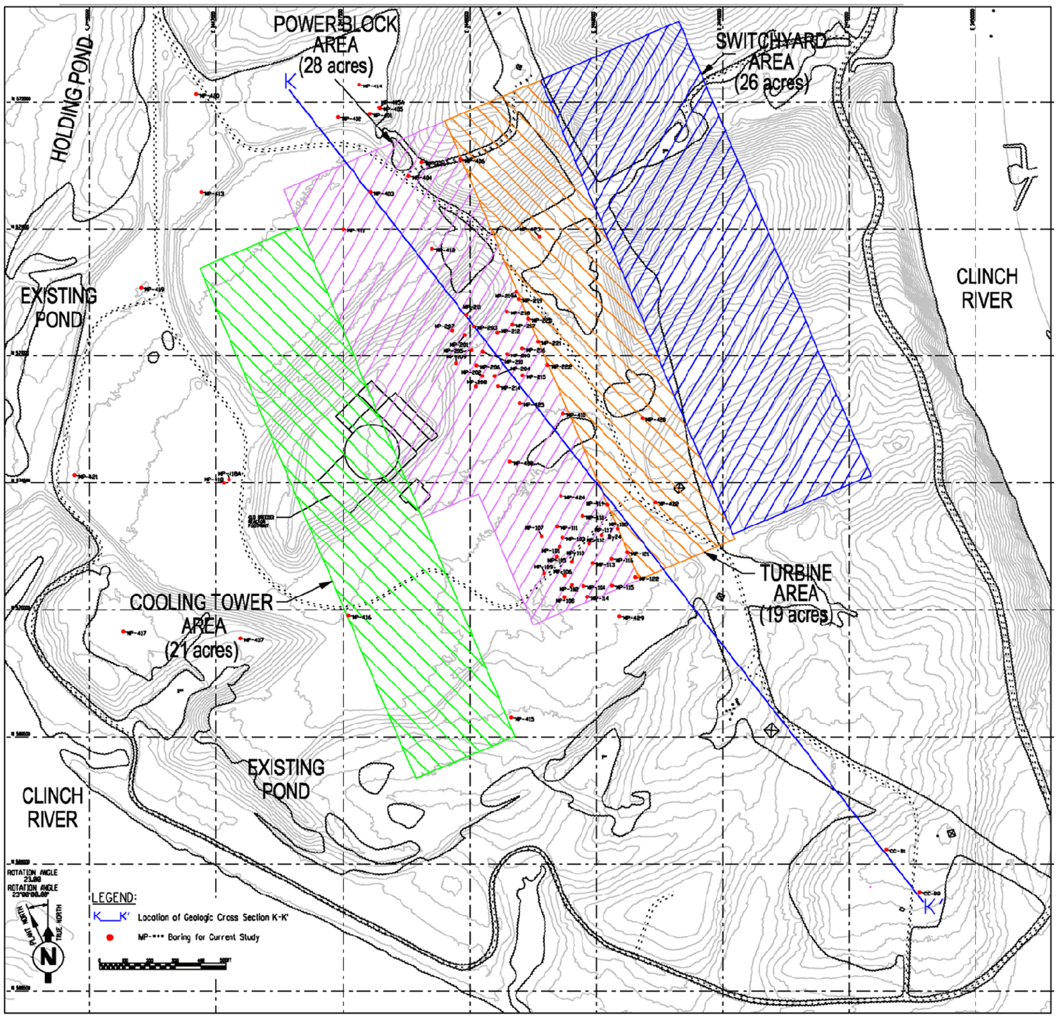
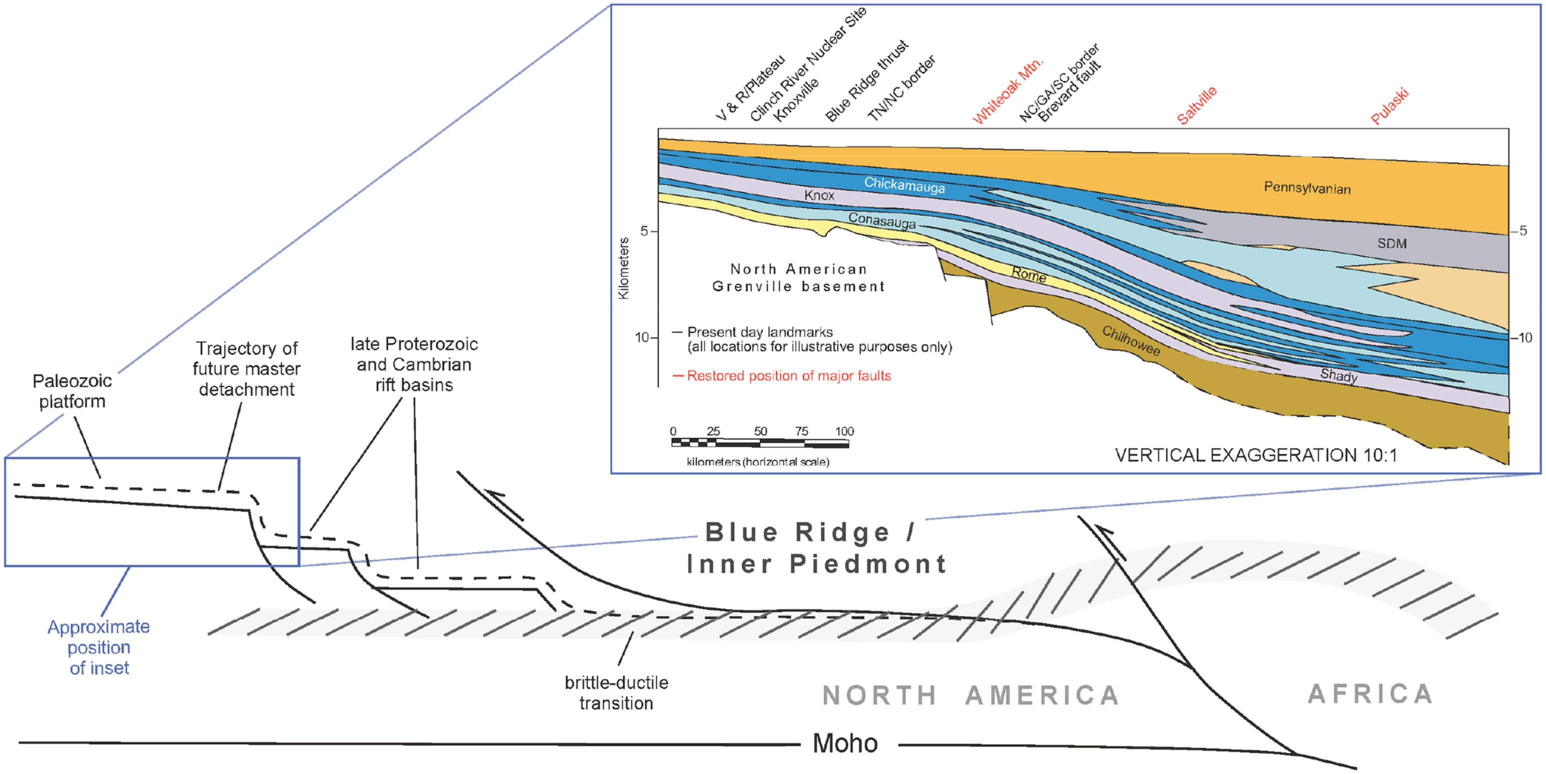
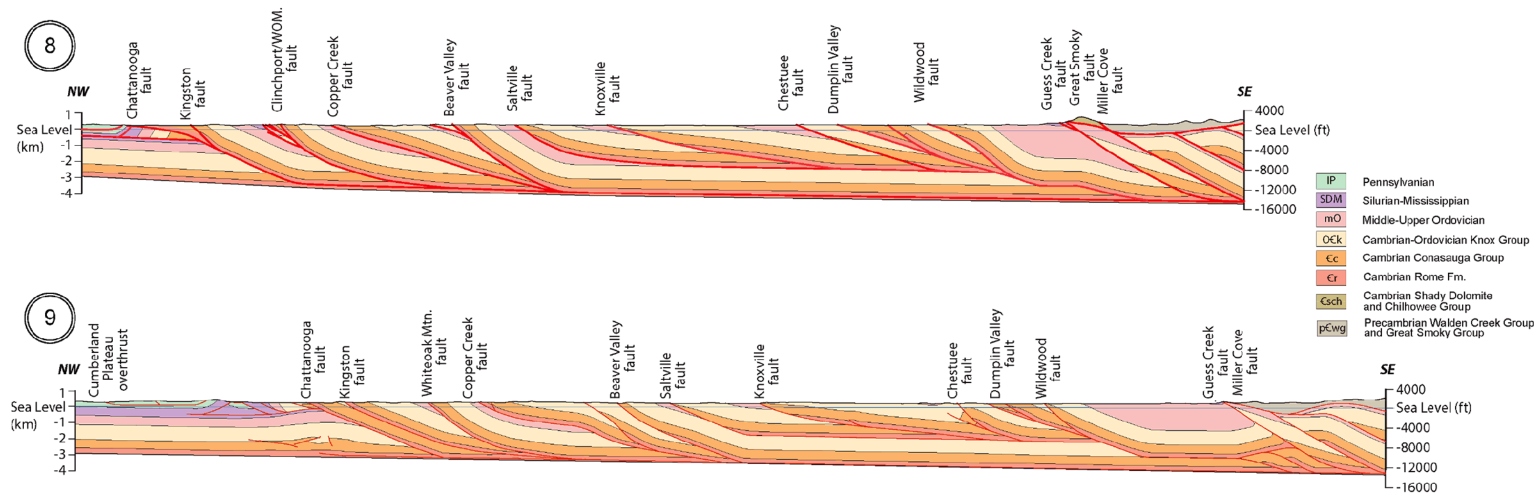



**Figure 2.5.1-31. Subsurface Investigation Borehole and Geologic Cross-Section K–K′ Locations**



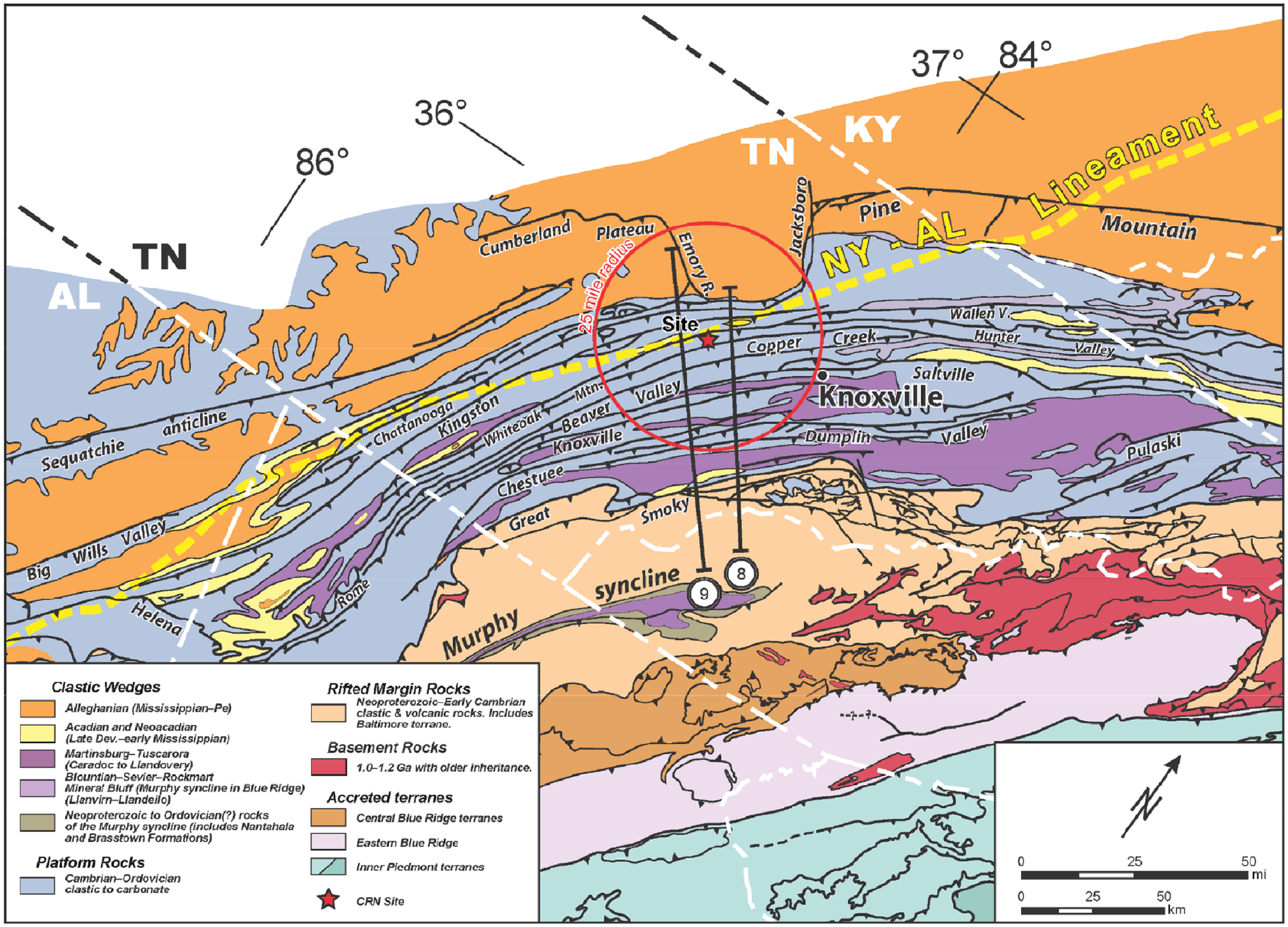

Notes:
Diagrammatic illustration of the propagation of the master Appalachian detachment (modified from Reference 2.5.1-159).
Inset shows palinspastically restored facies diagram of Neoproterozoic to late Paleozoic passive margin strata that was deposited along the Iapetan margin (modified from Reference 2.5.1-13).
Blue box indicates the approximate location of area depicted in inset.

**Figure 2.5.1-32. Schematic Appalachian Detachment**



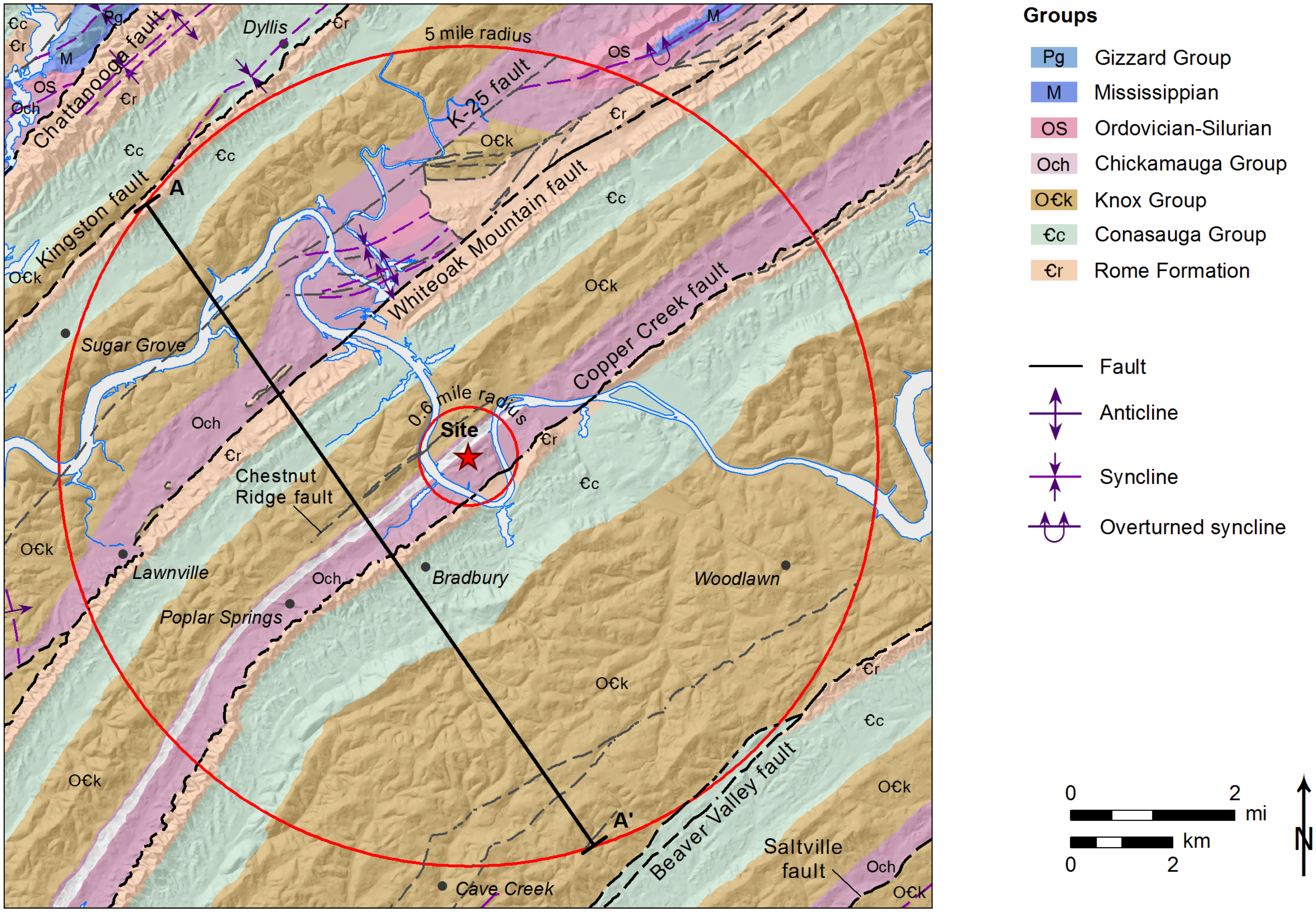

Note: Balanced cross-sections through the Valley and Ridge province from Reference 2.5.1-230 that intersect the Clinch River Nuclear site vicinity.

**Figure 2.5.1-33. (Sheet 1 of 2) Tectonic Map Cross-Sections—Valley and Ridge**



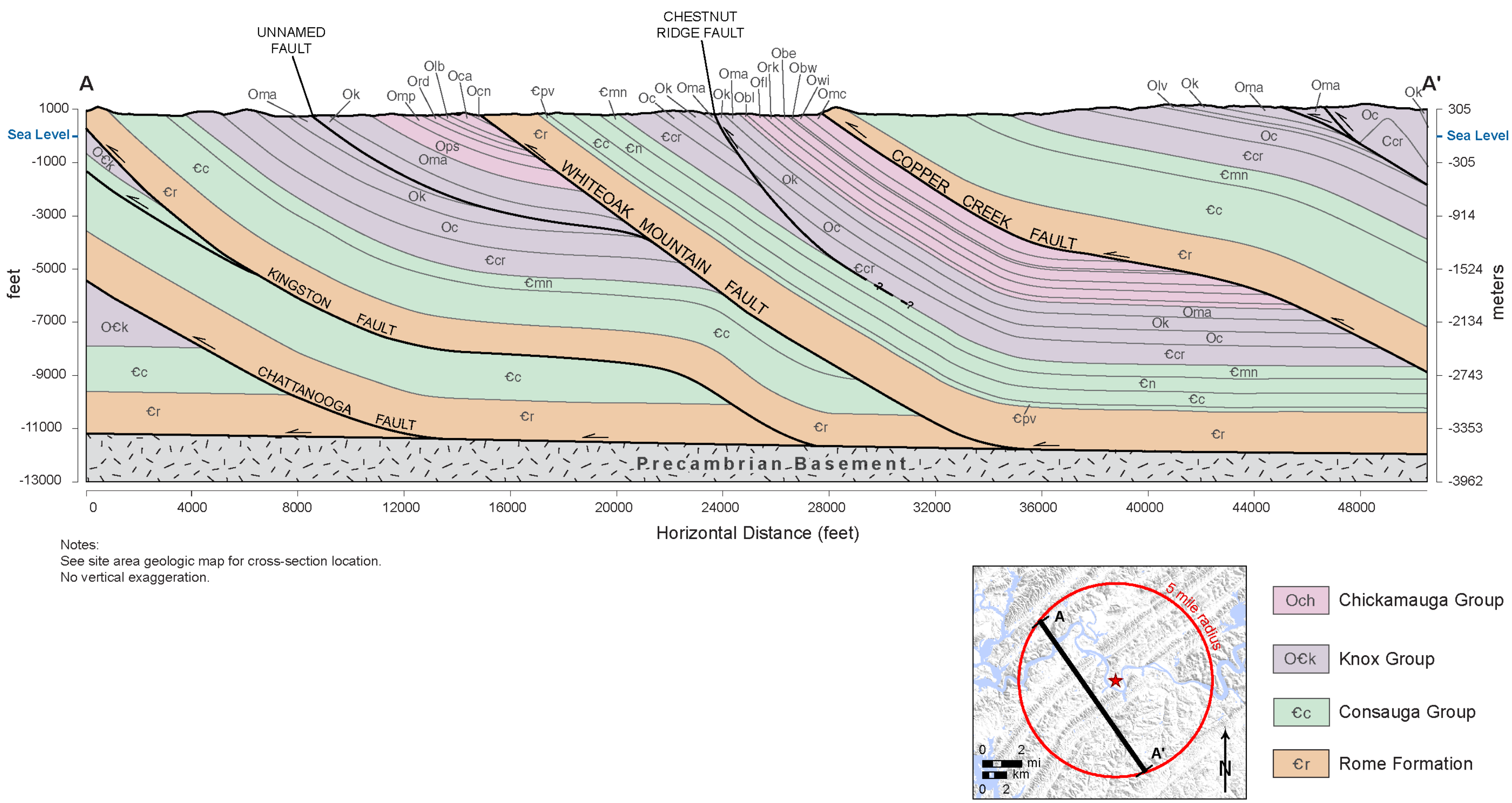

Notes:
Location of cross-sections shown in (A).
Tectonic map modified from Reference 2.5.1-102.

**Figure 2.5.1-33. (Sheet 2 of 2) Tectonic Map Cross-Sections—Locations**




Notes:
Simplified geologic map of the Clinch River Nuclear site area developed by Lettis Consultants International, Inc.
See Site Area Geologic Cross Section A-A' (Figure 2.5.1-35).
See Plate 2 in Part 8 for more detailed geologic map of the site area.

**Figure 2.5.1-34. Site Area Geologic Map**




Notes:
See site area geologic map for cross-section location (Plate 2).
Cross section developed by Lettis Consultants International, Inc. No vertical exaggeration.
Geologic cross-section through the site area projected to Precambrian basement.

**Figure 2.5.1-35. Site Area Geologic Cross-Section A-A'**