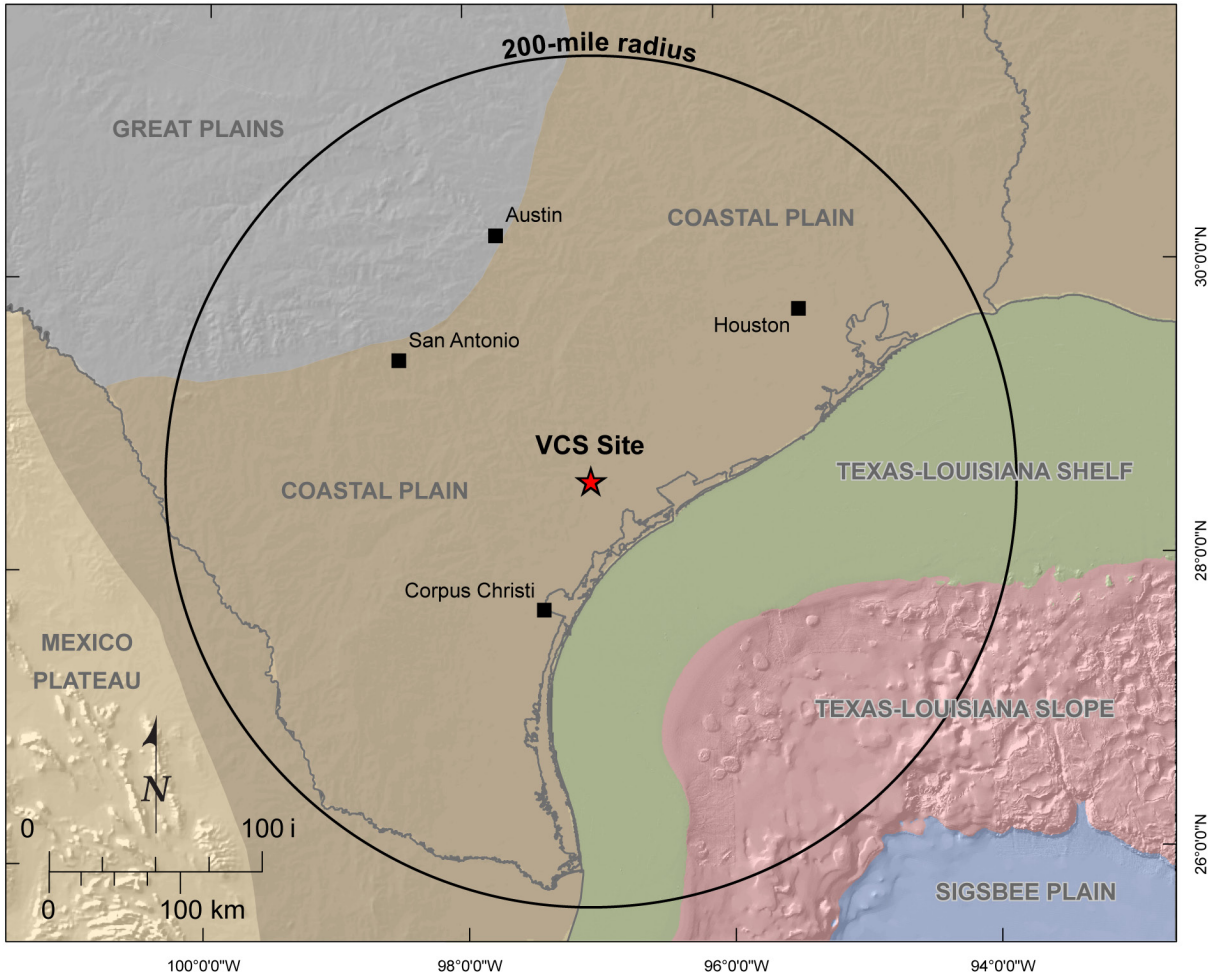



**Figure 2.5.1-1 Map of Physiographic Provinces**

Physiographic provisions modified from References 2.5.1-50 and 2.5.1-216.

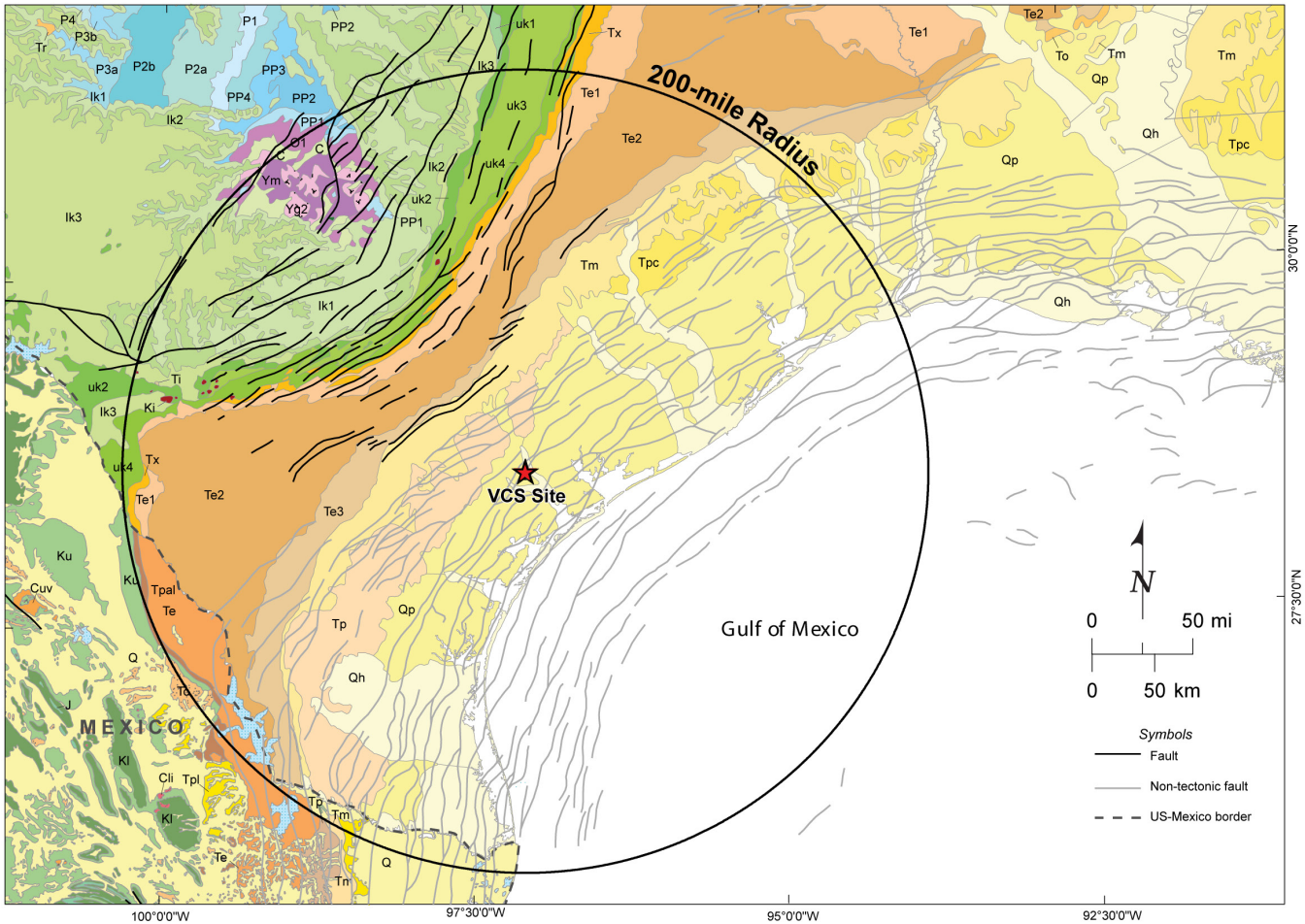



**Figure 2.5.1-2a Regional Geologic Map (200-Mile Radius)**

Note: U.S. geology from Reference 2.5.1-4 as digitized by Reference 2.5.1-5. Faults from Reference 2.5.1-6. Mexico geology from Reference 2.5.1-7.

**Unit Descriptions**

*Geology - United States*

*Quaternary*

- Qh Holocene
- Qp Pleistocene

*Tertiary*

- Tp Pliocene
- Tpc Pliocene continental
- Tm Miocene
- To Oligocene
- Te1 Eocene Wilcox Group
- Te2 Eocene Claiborne Group
- Te3 Eocene Jackson Group
- Tx Paleocene
- Ti Tertiary intrusive rocks

*Cretaceous*

- uK1 Woodbine and Tuscaloosa Groups
- uK2 Austin and Eagle Ford Groups
- uK3 Taylor Group
- uK4 Navarro Group
- lK1 Trinity Group
- lK2 Fredericksburg Group
- lK3 Washita Group
- Ki Cretaceous intrusive rocks

*Triassic*

- Tr Triassic

*Paleozoic*

- P1 Wolfcampian
- P2a Lower part of Leonardian Series
- P2b Upper part of Leonardian Series
- P3a Lower part of Guadalupian Series
- P3b Upper part of Guadalupian Series
- P4 Ochoan Series
- PP1 Atokan and Morrowan Series
- PP2 Des Moinesian Series
- PP3 Missourian Series
- PP4 Virgilian Series
- O1 Lower Ordovician (Canadian)
- C Cambrian

*Precambrian*

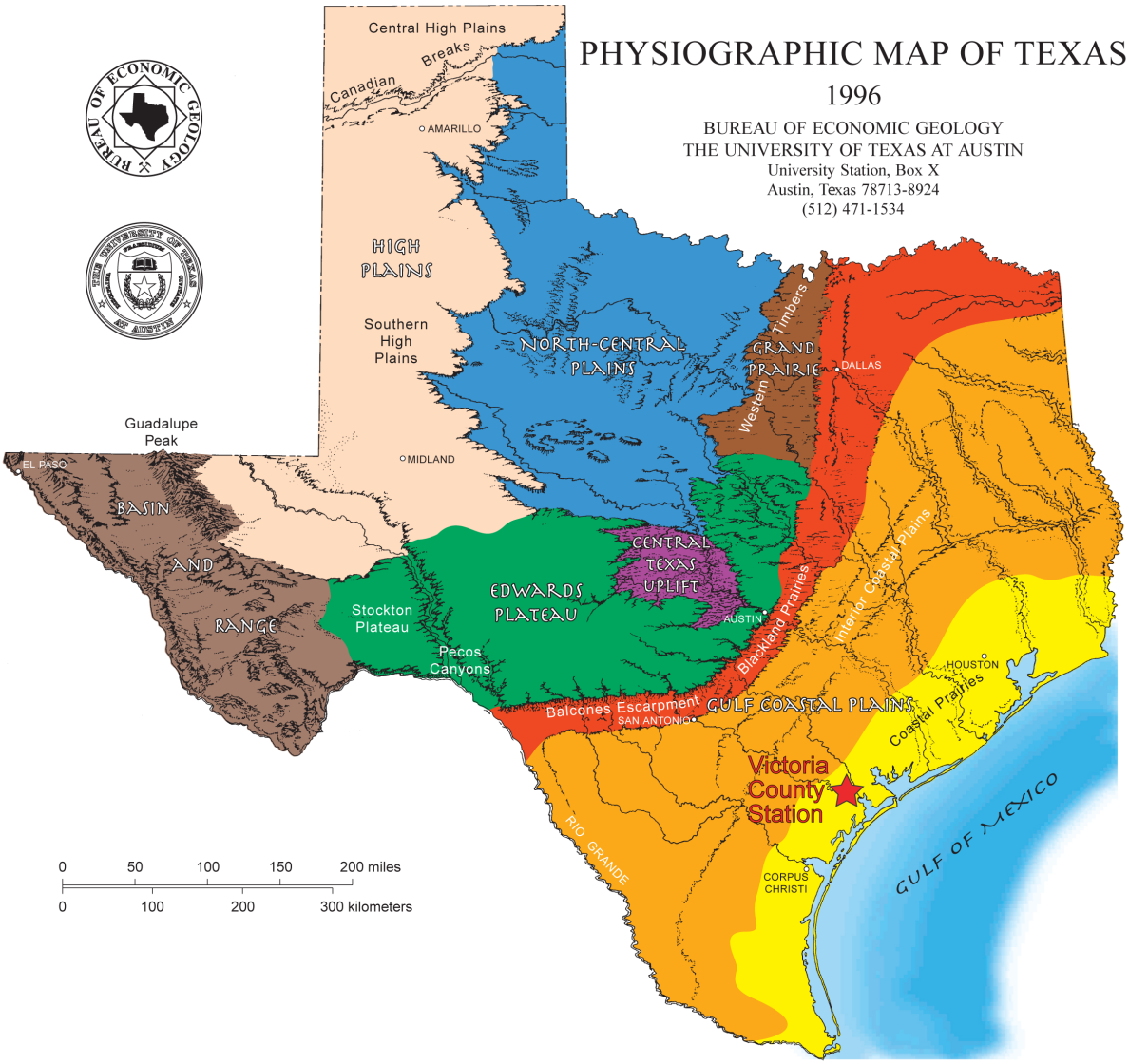
- Yg2 Younger Y granitic rocks
- Ym Paragneiss and Schist

*Geology - Mexico*

- Q Quaternary
- Tpl Pliocene
- Tm Miocene
- To Oligocene
- Te Eocene
- Tpal Paleocene
- Tc Tertiary Continental rocks
- Cuv Upper Cenozoic volcanic rocks
- Cli Lower Cenozoic intrusive rocks
- Ku Upper Cretaceous
- Kl Lower Cretaceous
- J Jurassic

- W Water

**Figure 2.5.1-2b Explanation for Regional Geologic Map (200-Mile Radius)**




| PROVINCE | MAX. ELEV. (ft) | MIN. ELEV. (ft) | TOPOGRAPHY | GEOLOGIC STRUCTURE | BEDROCK TYPES |
|---|---|---|---|---|---|
| Gulf Coastal Plains | | | | | |
| Coastal Prairies | 300 | 0 | Nearly flat prairie, <1 ft/mi to Gulf | Nearly flat strata | Deltaic sands and muds |
| Interior Coastal Plains | 800 | 300 | Parallel ridges (questas) and valleys | Beds tilted toward Gulf | Unconsolidated sands and muds |
| Blackland Prairies | 1000 | 450 | Low rolling terrain | Beds tilted south and east | Chalks and marls |
| Grand Prairie | 1250 | 450 | Low stairstep hills west; plains east | Strata dip east | Calcareous east; sandy west |
| Edwards Plateau | | | | | |
| Principal | 3000 | 450 | Flat upper surface with box canyons | Beds dip south; normal faulted | Limestones and dolomites |
| Pecos Canyons | 2000 | 1200 | Steep-walled canyons | | Limestones and dolomites |
| Stockton Plateau | 4200 | 1700 | Mesa-formed terrain; highs to west | Unfaulted, near-horizontal beds | Carbonates and alluvial sediments |
| Central Texas Uplift | 2000 | 800 | Knobby plain; surrounded by questas | Centripetal dips, strongly faulted | Granites; metamorphics; sediments |
| North-Central Plains | 3000 | 900 | Low north-south ridges (questas) | West dip; minor faults | Limestones; sandstones; shales |
| High Plains | | | | | |
| Central | 4750 | 2900 | Flat prairies slope east and south | Slight dips east and south | Eolian silts and fine sands |
| Canadian Breaks | 3800 | 2350 | Highly dissected; local solution valleys | | |
| Southern | 3800 | 2200 | Flat; many playas; local dune fields | | |
| Basin and Range | 8750 | 1700 | North-south mountains and basins | Some complex folding and faulting | Igneous; metamorphics; sediments |

**Figure 2.5.1-3 Physiographic Map of Texas**

Figure modified from Reference 2.5.1-8.

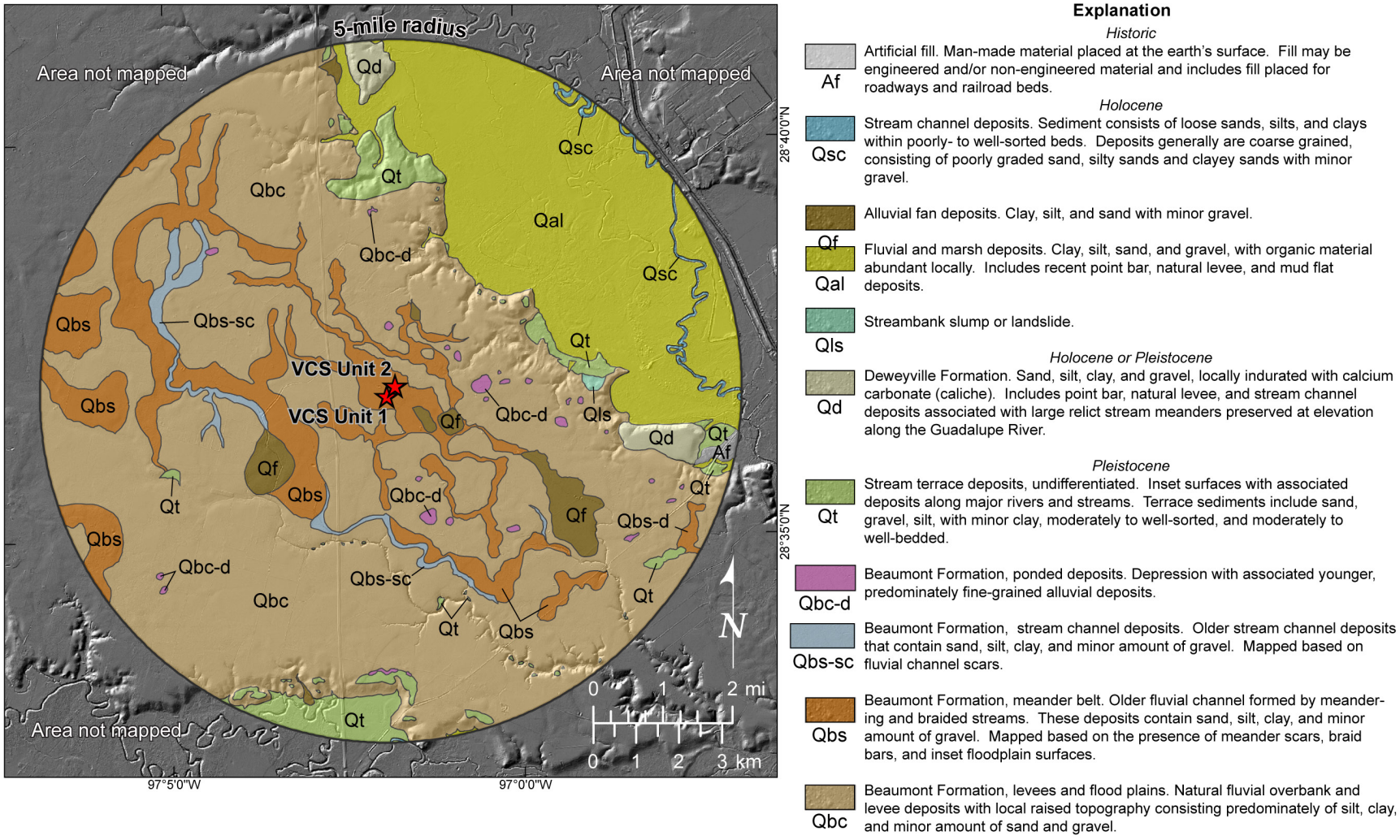



**Figure 2.5.1-4 Site Area Geologic Map (5-Mile Radius)**

Note: Shaded relief base from References 2.5.1-249 and 2.5.1-250.

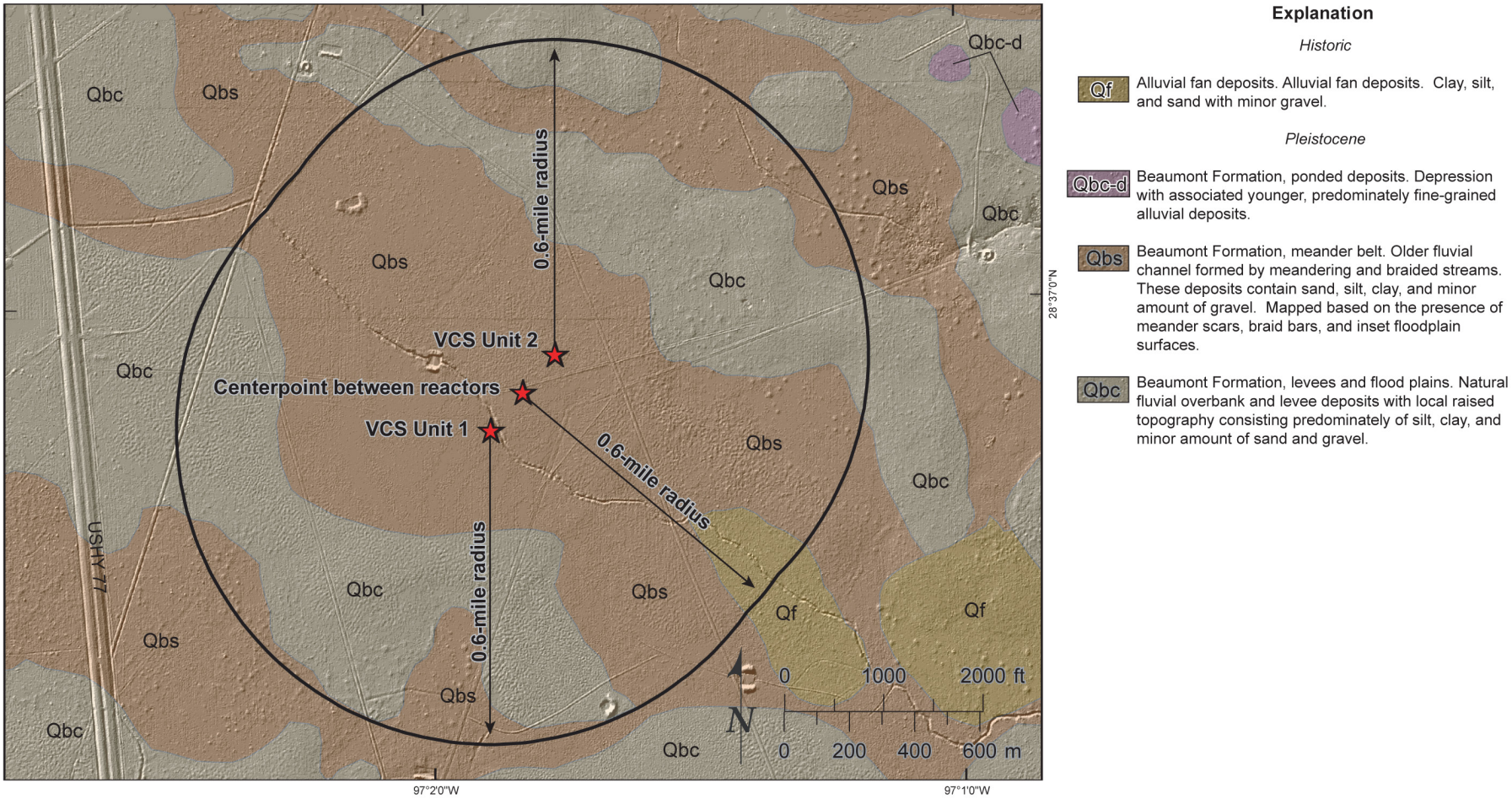



**Figure 2.5.1-5 Site Geologic Map (0.6-Mile Radius)**

Note: Shaded relief base from Reference 2.5.1-4.

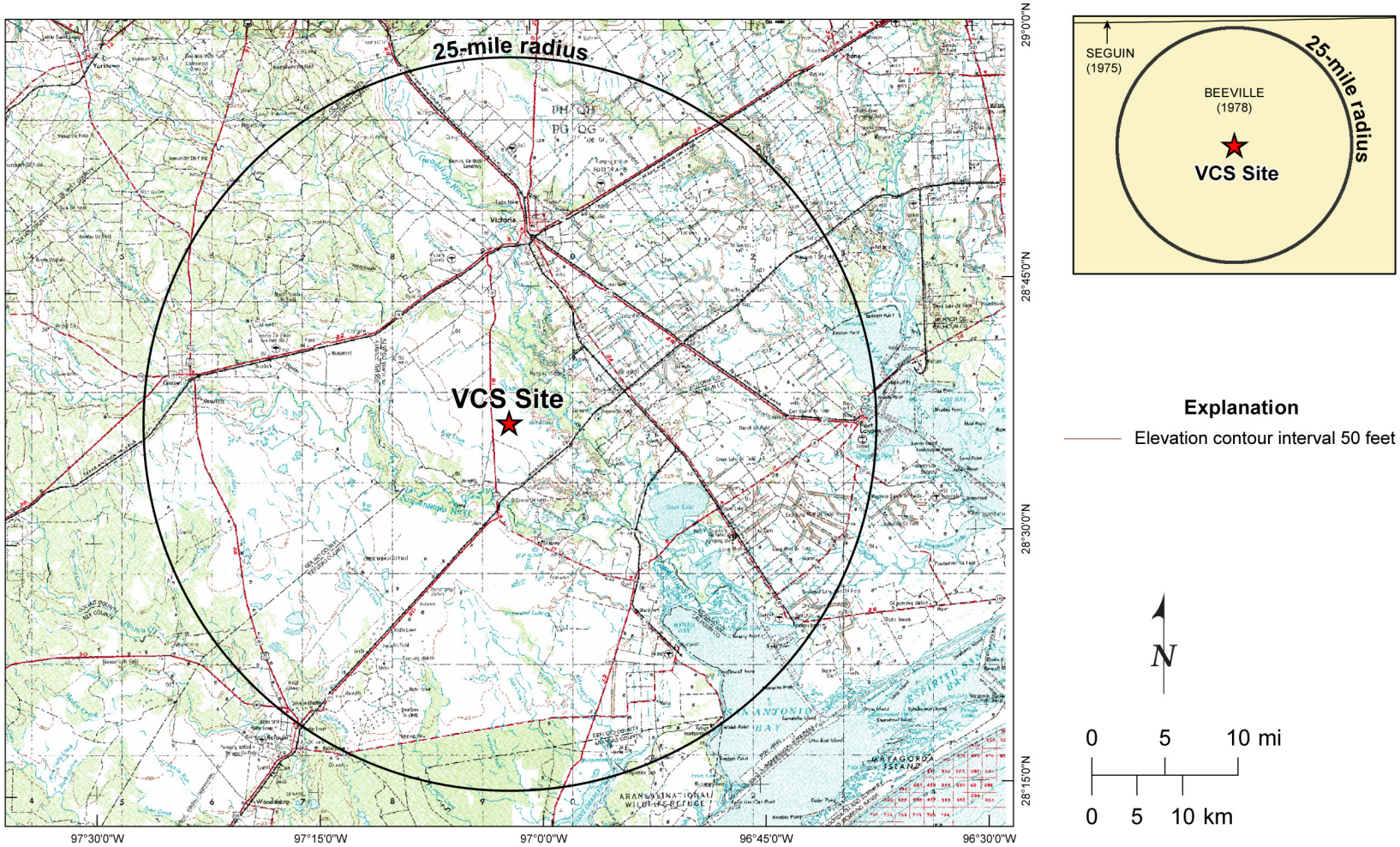
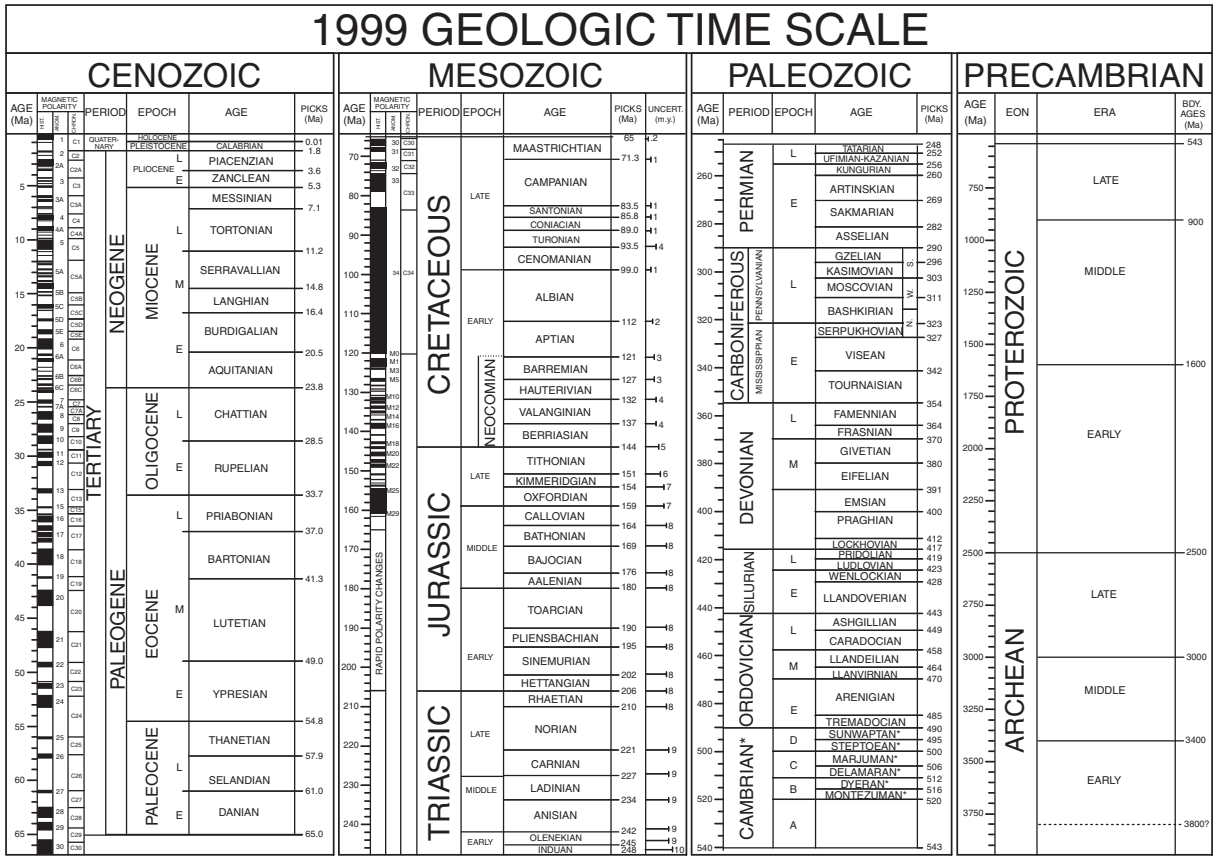



**Figure 2.5.1-6 Site Vicinity Topographic Map (25-Mile Radius)**

Note: Index of USGS quadrangle topographic maps, References 2.5.1-260 and 2.5.1-261, used as base.

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*International ages have not been established. These are regional (Laurentian) only. Boundary Picks were based on dating techniques and fossil records as of 1999. Paleomagnetic attributions have errors, Please ignore the paleomagnetic scale.

Sources for nomenclature and ages: Primarily from Gradstein, F., and Ogg, J., 1996, *Episodes*, v. 19, nos. 1 & 2; Gradstein, F., et al., 1995, SEPM Special Pub. 54, p. 95–128; Berggren, W. A., et al., 1995, SEPM Special Pub. 54, p. 129–212; Cambrian and basal Ordovician ages adapted from Landing, E., 1998, *Canadian Journal of Earth Sciences*, v. 35, p. 329–338; and Davidek, K., et al., 1998, *Geological Magazine*, v. 135, p. 305–309. Cambrian age names from Palmer, A. R., 1998, *Canadian Journal of Earth Sciences*, v. 35, p. 323–328.

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**Figure 2.5.1-7 Geologic Time Scale**

Source: Reference 2.5.1-267

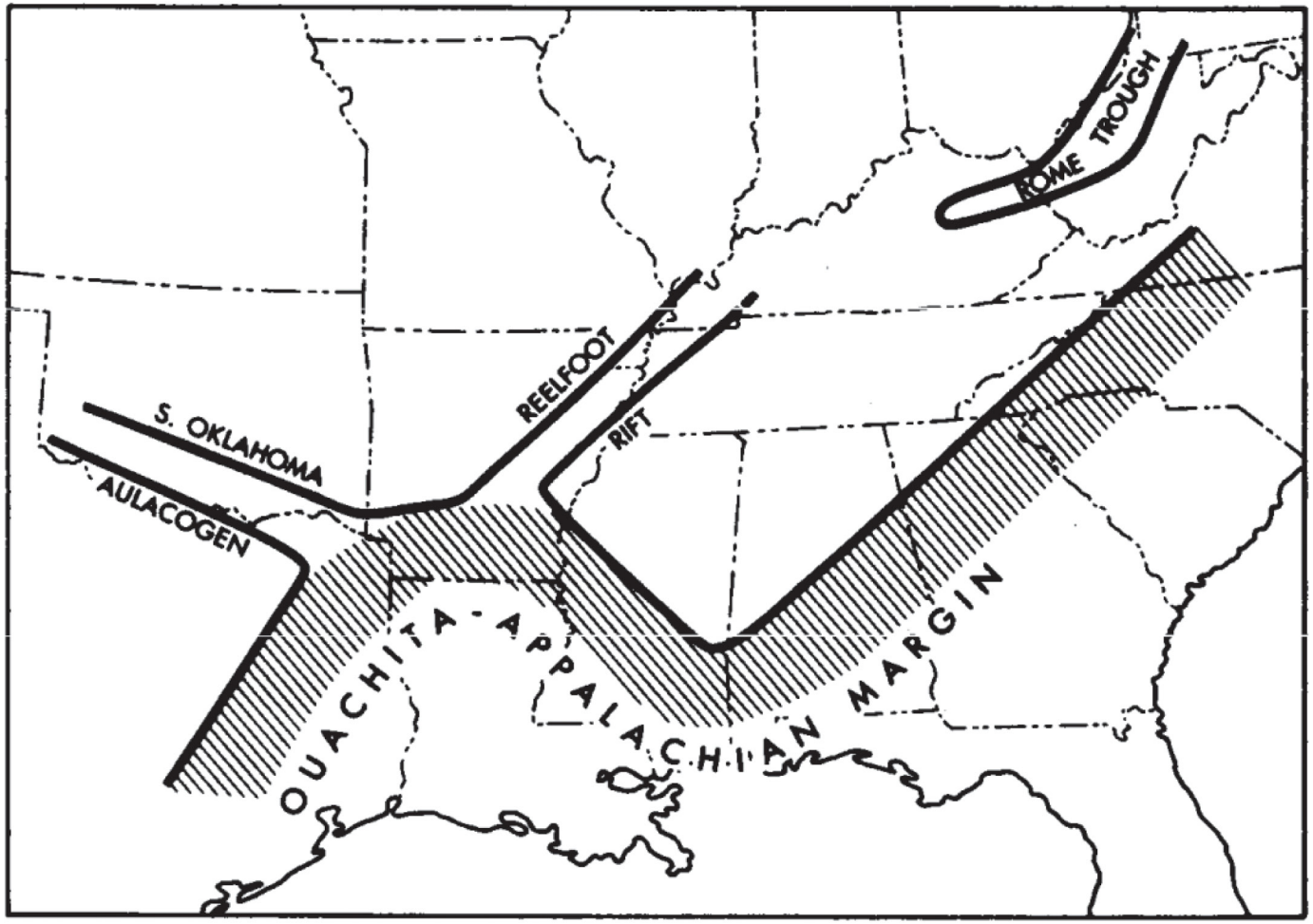



**Figure 2.5.1-8 Aulacogens of Laurentia**

Note: From Reference 2.5.1-60

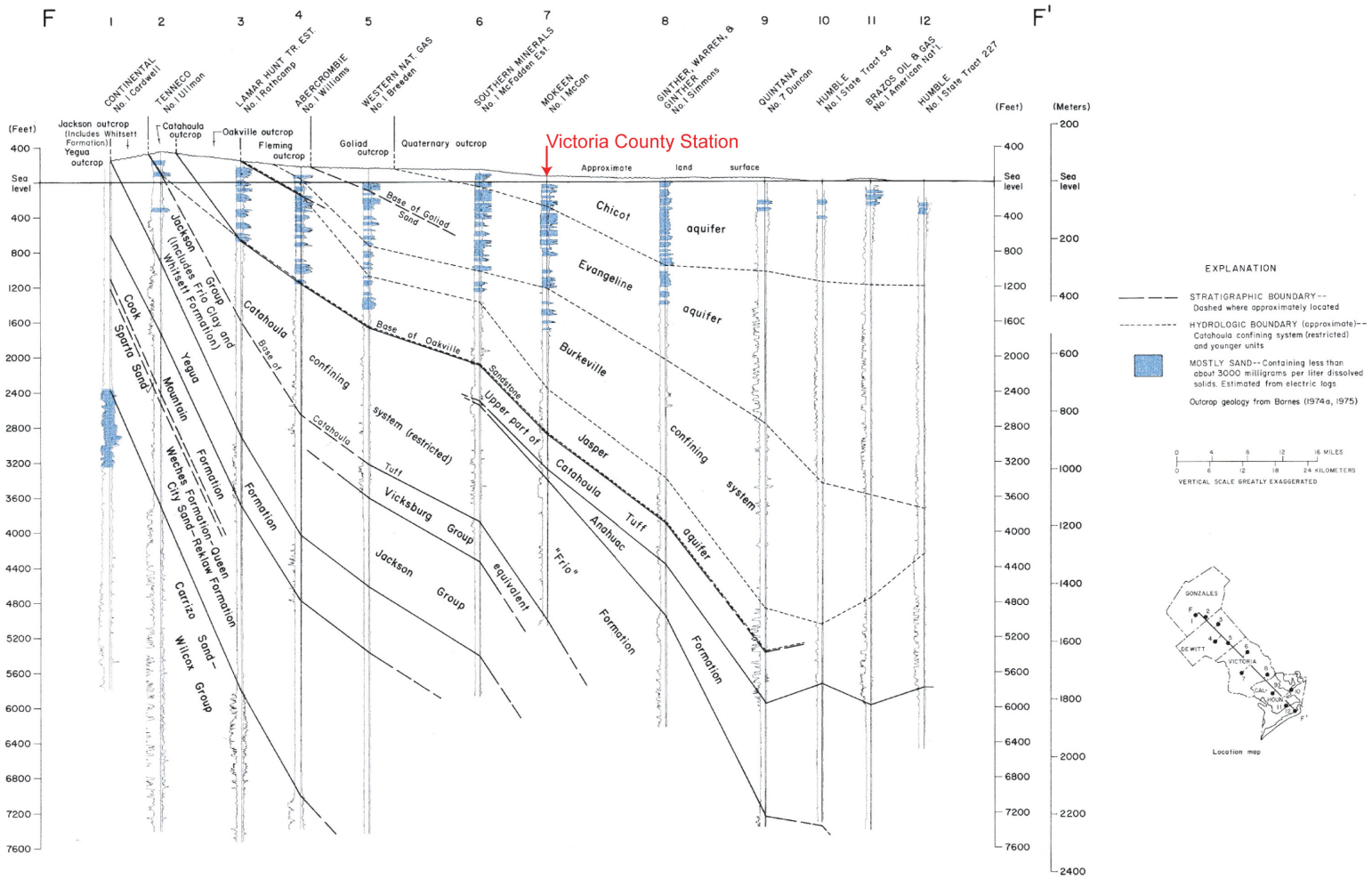



**Figure 2.5.1-9 Regional Cross Section**

Figure modified from Reference 2.5.1-266

| ERATHEM | SYSTEM | SERIES | STAGE | GROUP | AGE mya | FORMATION | MEMBER | LITHOLOGY | THICKNESS (ft) |
|---|---|---|---|---|---|---|---|---|---|
| MESOZOIC | CRETACEOUS | Upper Cretaceous | | Navarro Gp. | | Escondido Fm | | claystone, marl | 1050 |
| | | | | | | Olmos Fm | | shale, sandstone | 900 |
| | | | | Taylor Gp. | | San Miguel Fm | | sandstone & limestone | 1150 |
| | | | | | | Anacacho Limestone | | mudstone | 500 |
| | | | | | | Upson Fm | | limestone | 800 |
| | | | | Austin Gp. | | | | chalk | 555 |
| | | | | Eagle Ford Group | | | | shale w. limestone | 40 |
| | | | | Woodbine Group | | | | shale | 60 |
| | | | | Washita Gp. | | Buda LS Fm | | limestone | 45 |
| | | | | | | Del Rio Fm | | shale | 45 |
| | | | | | | Georgetown Fm | | limestone | 25 |
| | | | | Fredricksburg Gp. | | Edwards Fm | McKnight Evaporite | anhydrite | 485 |
| | | | | | | | McKnight Limestone | limestone | |
| | | | | | | | West Nueces Limestone | limestone | |
| | | | | | | Glen Rose Formation | | shale | |
| | | Lower Cretaceous | | Trinity Gp. | | | | limestone | 3250 |
| | | | | | | | | limestone | |
| | | | | | | Pearsall Fm | Bexar Shale | shale & limestone | |
| | | | | | | | James (Cow Creek) Limestone | | |
| | | | | | | | Pine Island Shale | | |
| | | | | | | Sligo Fm | | limestone | |
| | | | | | | Hosston | | sandstone, shale, chert | |
| | JURASSIC | Upper Jurassic | Tithonian | Cotton Valley Gp. | 144 | Schuler Fm | | sandstone, siltstone, shale | 1600 |
| | | | | | | Bossier Fm | | shale | |
| | | | Kimmeridgian | Louark Gp. | | Haynesville Fm | Gilmer mbr | limestone, anhydrite | 1600 |
| | | | | | | | Buckner mbr | | |
| | | | Oxfordian | | | Smackover Fm | | limestone & shale | 1600 |
| | | Middle Jurassic | | Louann Gp | | Norphlet Fm | | sandstone | 150 |
| | | | | | 208 | Louann Salt | | salt | 3300 |
| | TRIASSIC | Upper Triassic | | | | Eagle Mills Fm | | sandstone, shale, siltstone, salt | 4100 |
| | | Lower Triassic | | | 245 | | | | |

Figure is not to scale.

**Figure 2.5.1-10 Mesozoic Stratigraphic Column**

Figure modified from Reference 2.5.1-27

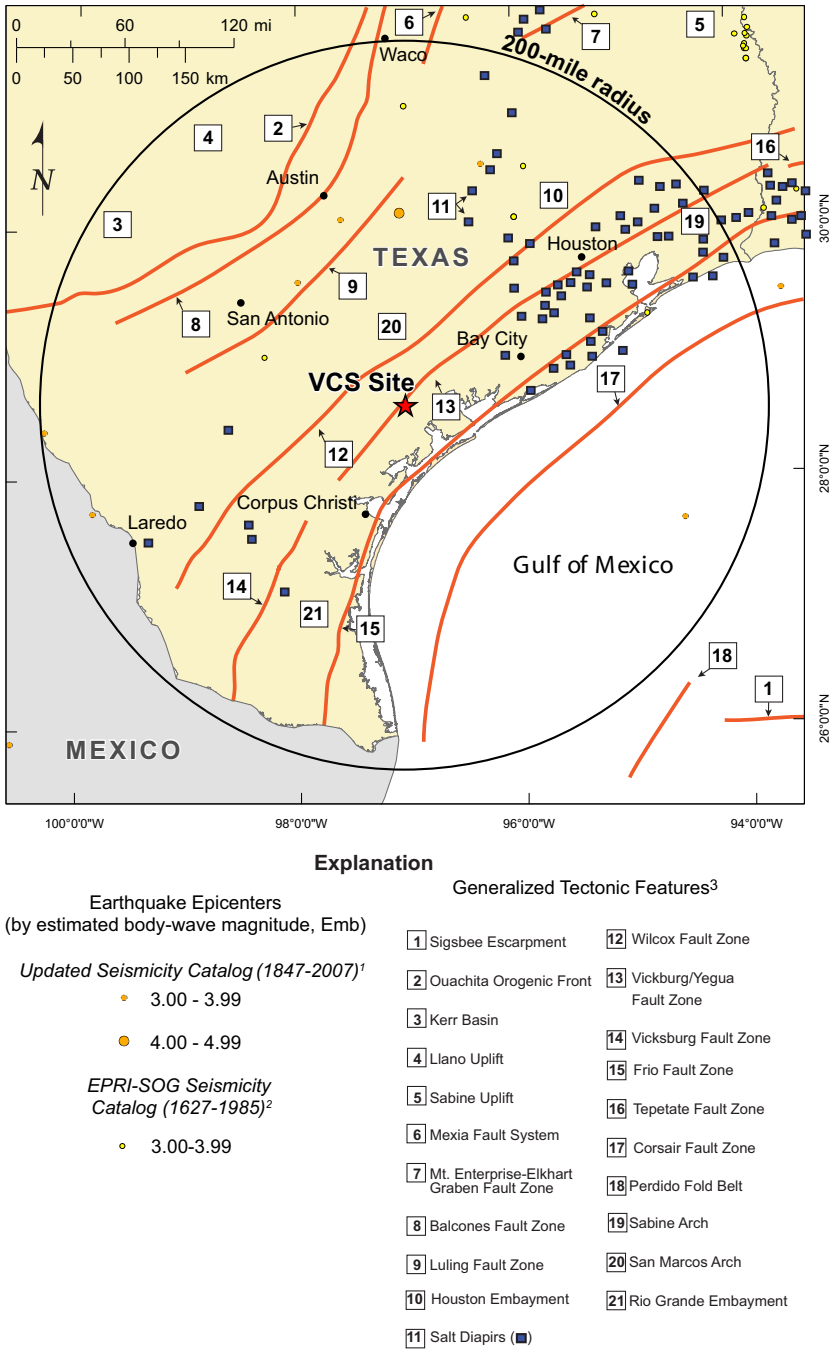



**Figure 2.5.1-11 Simplified Map of Tectonic Features in Site Region (200-Mile Radius)**

Notes:
1. See Subsection 2.5.2.1
2. Includes Proterozoic to Cenozoic structures from Reference 2.5.1-57
3. Geologic tectonic features from Reference 2.5.1-124

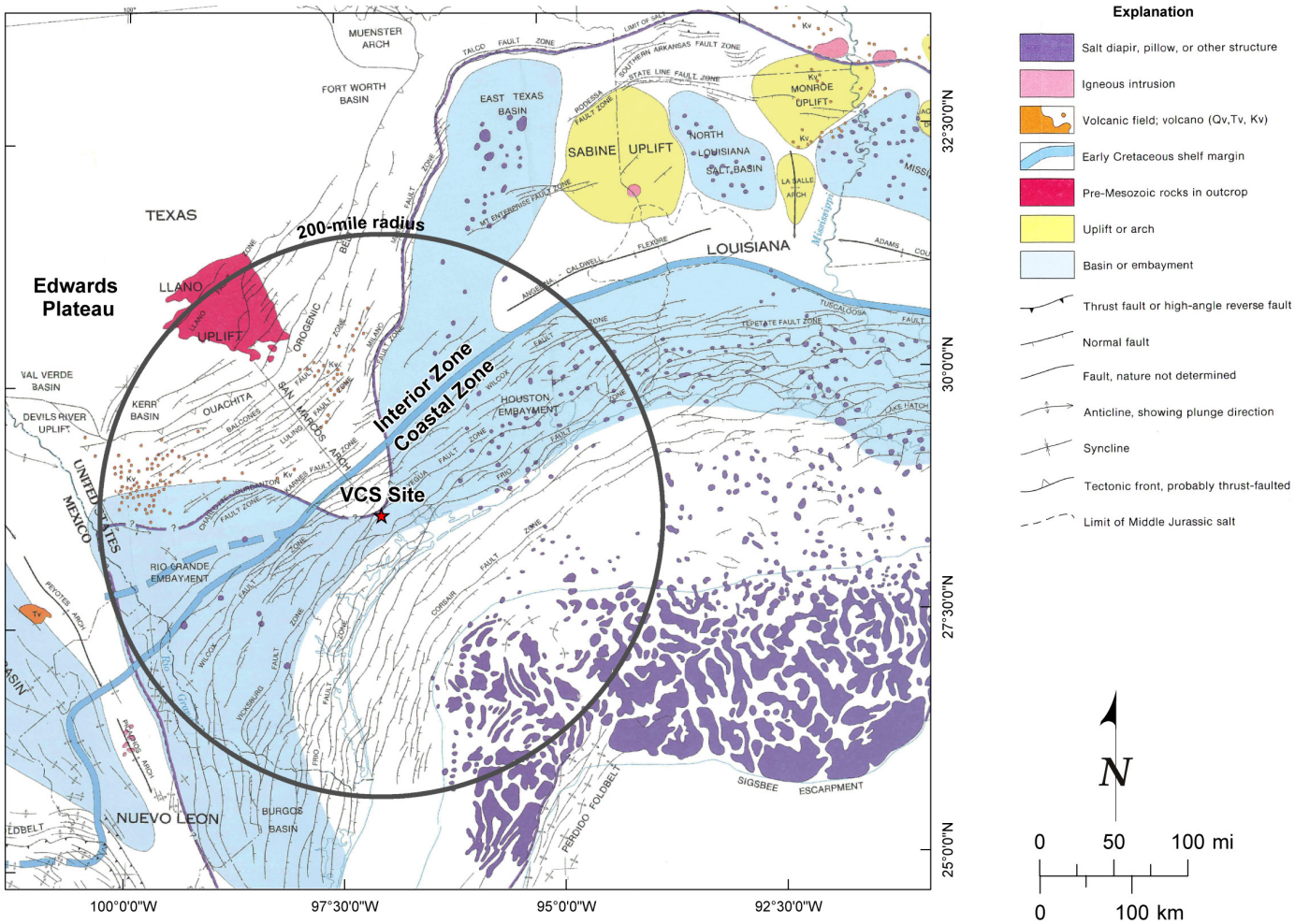



**Figure 2.5.1-12 Geologic Features of the Gulf Coast Region**

Modified from Reference 2.5.1-124

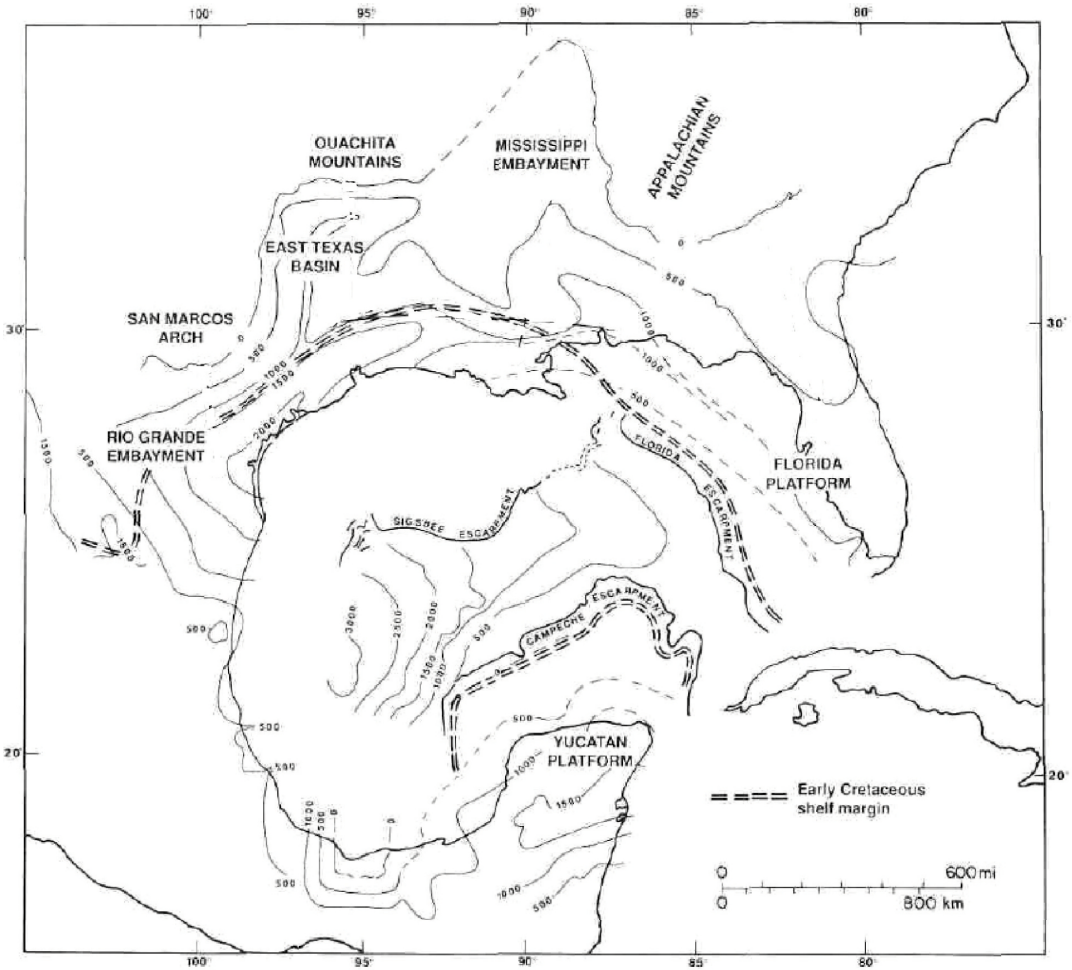



**Figure 2.5.1-13 Isopach Map of the Upper Cretaceous Rocks of the Gulf of Mexico Basin**

Notes:
1. Thicknesses are in meters
2. Figure modified from Reference 2.5.1-32

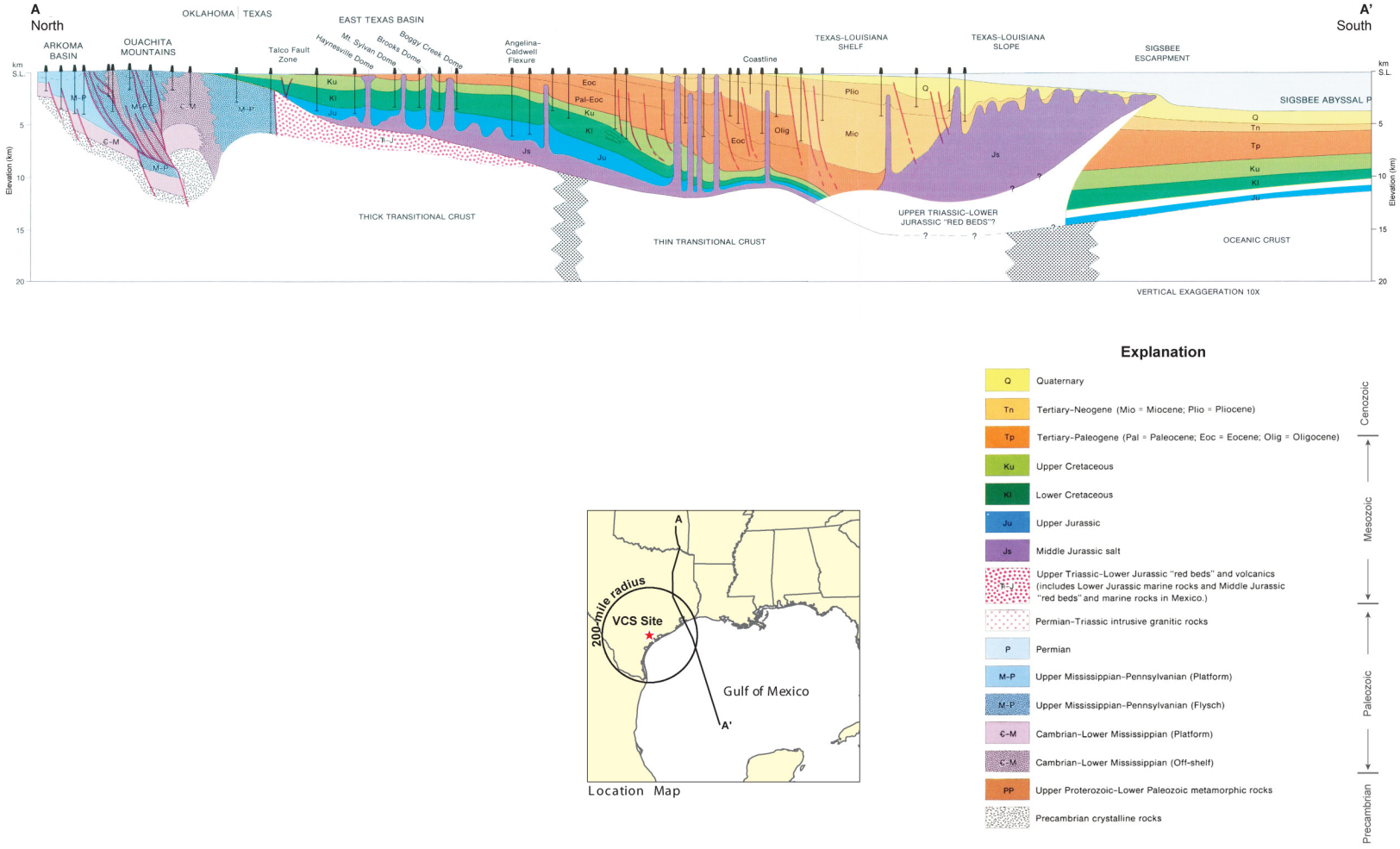



**Figure 2.5.1-14 Crustal Structure of the Ouachita Mountains, Coastal Plains, and Northern Gulf of Mexico**

Modified from Reference 2.5.1-27

| ERATHEM | SYSTEM | SERIES | AGE m.y. | Victoria County Station | | Approximate Thickness Undifferentiated (feet) | Approximate elevation of formation top (feet) | Hydrostratigraphy | |
|---|---|---|---|---|---|---|---|---|---|
| CENOZOIC | QUATERNARY | Holocene | 0.10 | Alluvium & Terrace Deposits | Undifferentiated Deweyville Terrace Deposits | 0-50 | | | |
| | | Pleistocene | 2 | | Beaumont Fm<br>Lissie Fm<br>Willis Formation | 400<br>600-700 | 0±<br>-400 | Coastal Lowlands Aquifer System | Chicot aquifer |
| | TERTIARY | Pliocene | 5 | | Goliad sand | 800 to 1,000 | -1,000 to -1,100 | | Evangeline aquifer |
| | | Miocene | 24 | | Fleming Formation<br>Oakville Sandstone | 3,400 to 4,500 | -1,800 to -2,100 | | Burkeville Confining System<br>Jasper aquifer |
| | | Oligocene | | Catahoula Tuff | Catahoula Sand<br>Anahuac Formation<br>Frio Formation | 3,000 | -5,200 to -6,600 | | Catahoula Confining System |
| | | | 38 | | Frio Clay (Vicksburg Group) | 200 | -8,000 to -9,600 | Coastal Uplands Aquifer System | Vicksburg - Jackson Confining System |
| | | Eocene | | Jackson Group | Whitsett<br>Manning clay<br>Welborn<br>Caddell | 500 to 1,100 | -8,400 to -9,800 | | |
| | | | | Claiborne Group | Yegua<br>Cook Mountain<br>Sparta Sand<br>Weches Fm<br>Queen City Snd<br>Reklaw Fm<br>Carrizo | 1,400 to 4,500 | -8,900 to -10,900 | | Upper Claiborne Aquifer<br>Middle Claiborne Confining System<br>Midddle Claiborne Aquifer<br>Confining System<br>Lower Claiborne-Upper Wilcox Aquifer |
| | | | 58 | Wilcox Group | Undifferentiated | 2,000 | -10,300 to -15,400 | | Middle Wilcox Aquifer<br>Not Present |
| | | Paleocene | 66 | Midway Grp | Wills Point<br>Kincaid Fm | 2,500 | -12,300 to -17,400 | Midway Confining System | |

**Figure 2.5.1-15 Cenozoic Stratigraphic Column**

Notes:

1. Thicknesses estimated from References 2.5.1-33, 2.5.1-35 and 2.5.1-266
2. Hydrostratigraphy from Reference 2.5.1-25

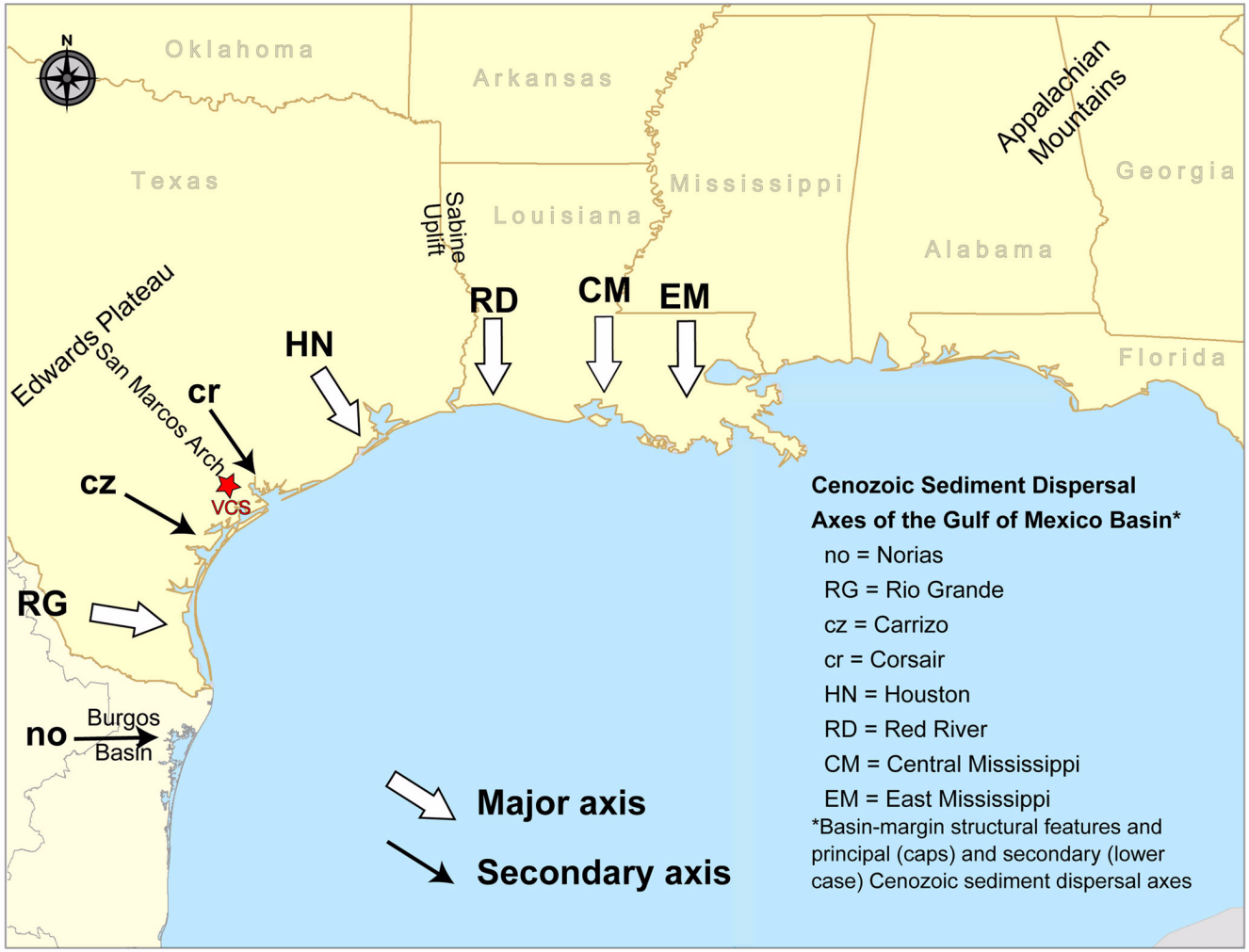



**Figure 2.5.1-16 Cenozoic Sediment Dispersal Axes of the Gulf of Mexico**

Modified from Reference 2.5.1-34

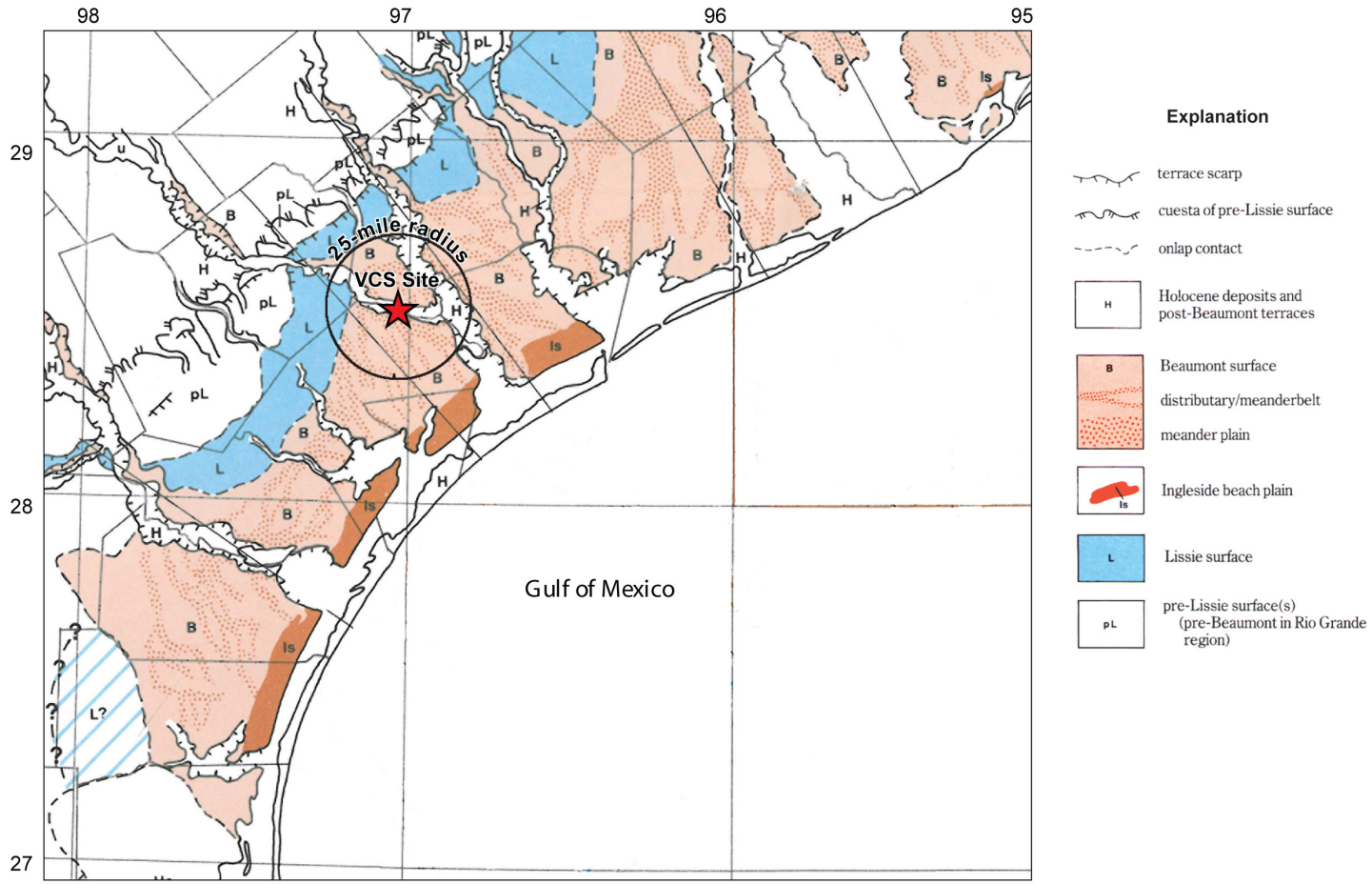



**Figure 2.5.1-17 Quaternary Deposits of the Gulf Coastal Plains**

Modified from Reference 2.5.1-34

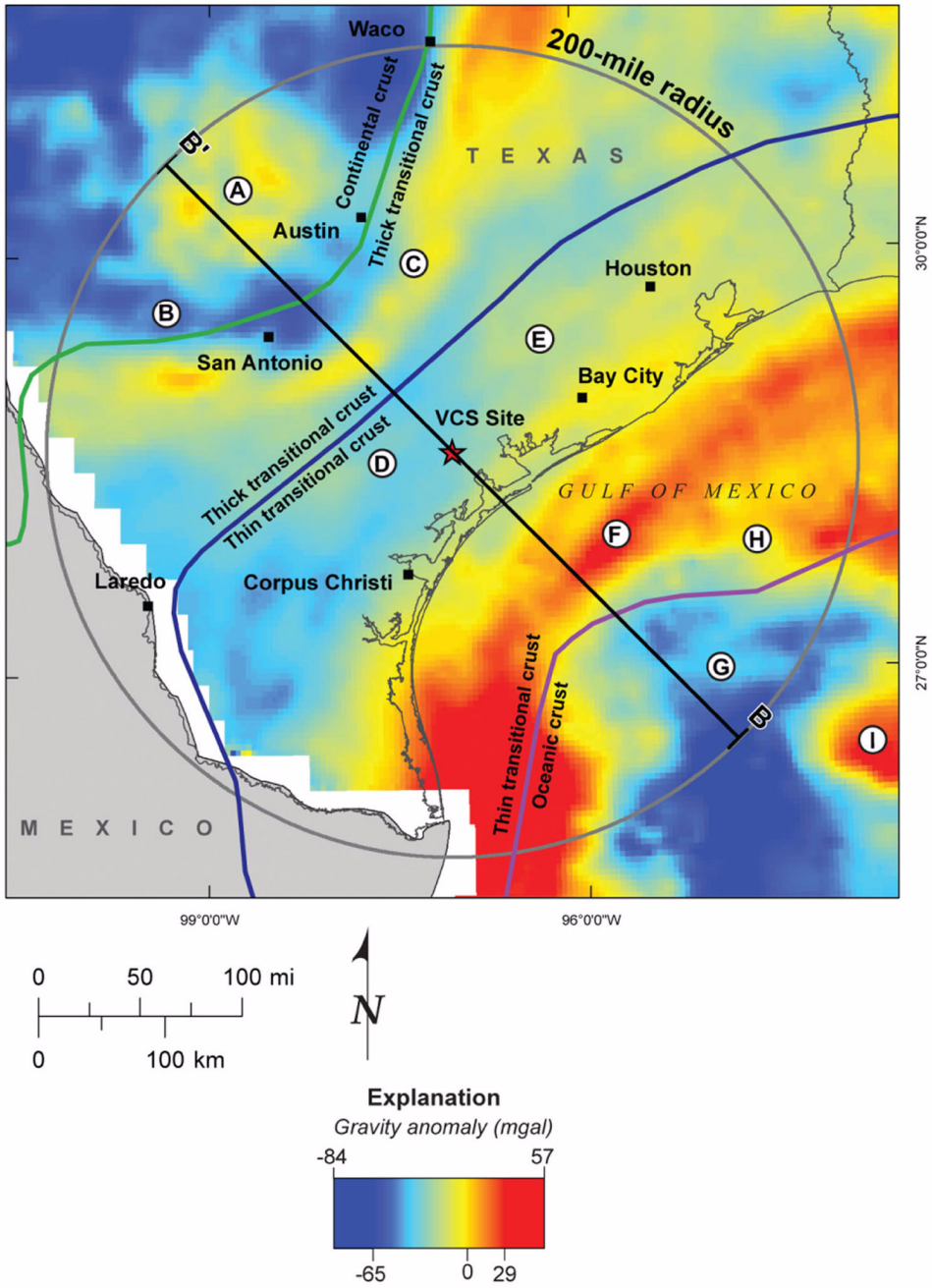



**Figure 2.5.1-18 Gravity Anomalies, Crustal Transitions, and Gravity Features in Site Region (200-Mile Radius)**

Gravity data from Reference 2.5.1-203 as available in Reference 2.5.1-204. Bouguer anomaly onshore; free-air anomaly offshore. Crustal boundaries from References 2.5.1-46, 2.5.1-47, and 2.5.1-49

1. Geophysical profile B-B' shown in Figure 2.5.1-29
2. Circled letters refer to features discussed in Subsection 2.5.1.1.5

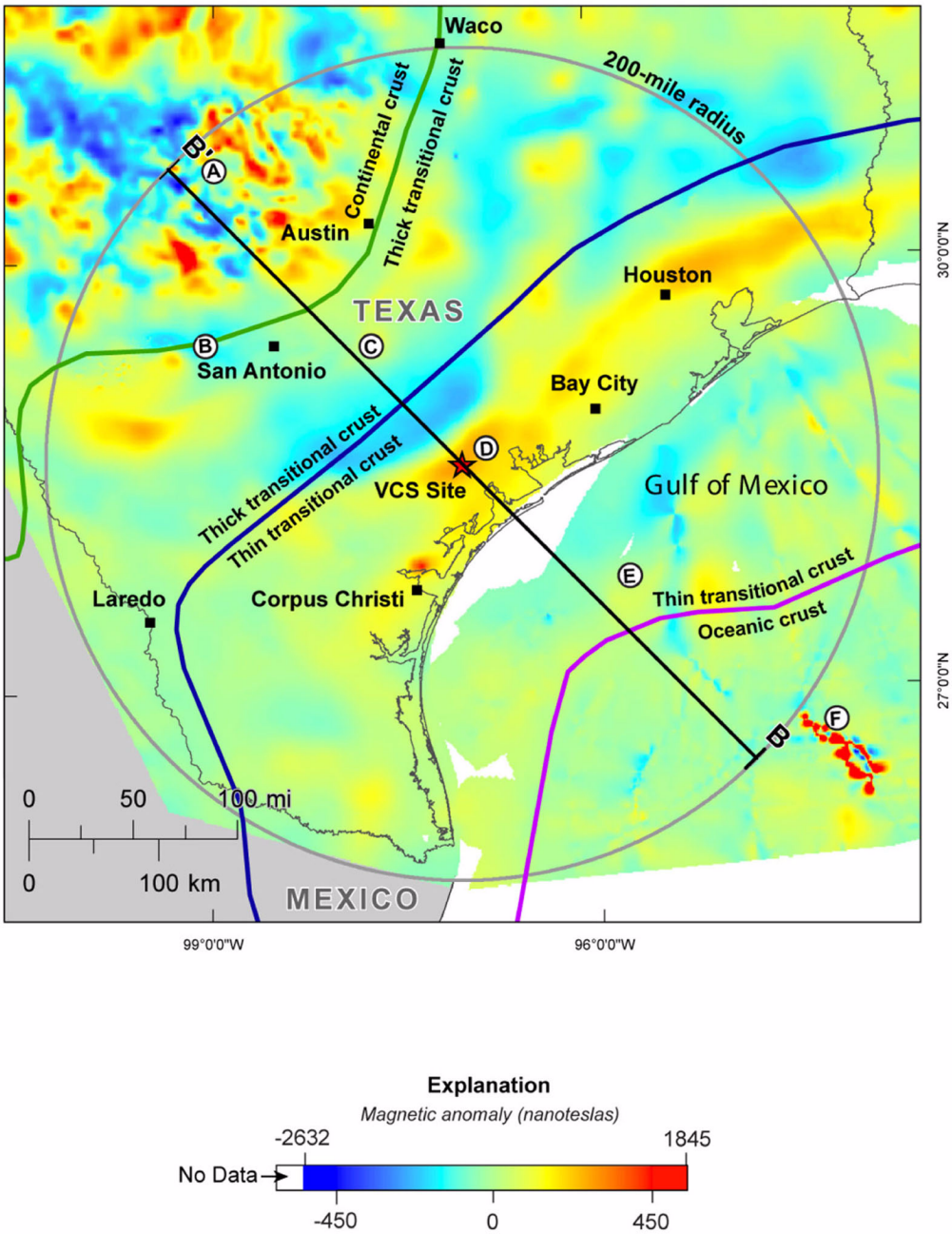
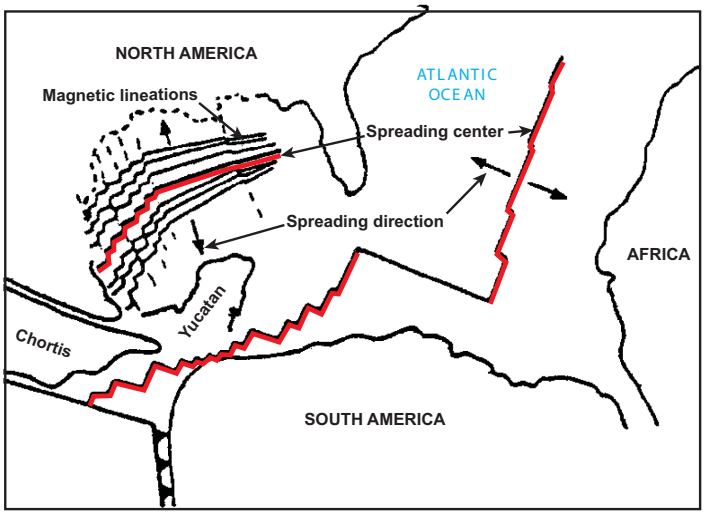



**Figure 2.5.1-19 Magnetic Anomalies, Crustal Transitions, and Magnetic Features in the Site Region (200-Mile Radius)**

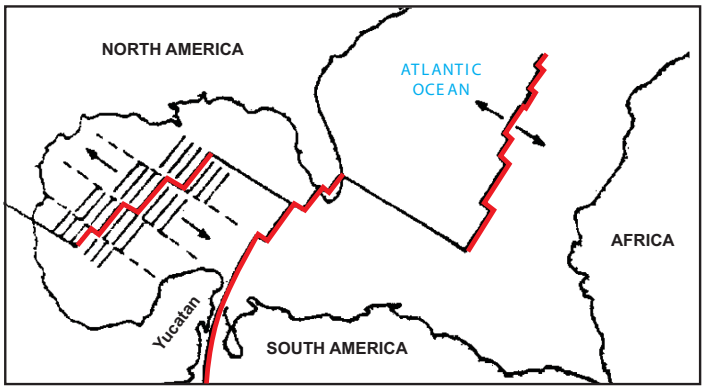
Magnetic data from Reference 2.5.1-200. Crustal boundaries from References 2.5.1-46, 2.5.1-47, and 2.5.1-88.

Notes:

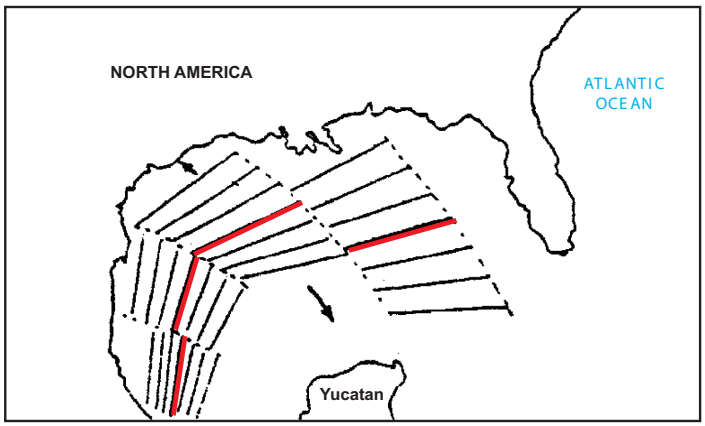
1. Geophysical profile B-B' shown in Figure 2.5.1-29
2. Circled letters refer to features discussed in Subsection 2.5.1.1.5




MODEL A: Rotation of Yucatan counterclockwise




MODEL B: Yucatan diverges with South America




MODEL C: Rotation of Yucatan clockwise

**Figure 2.5.1-20 Classification of Gulf Opening Models**

Note: From Reference 2.5.1-75