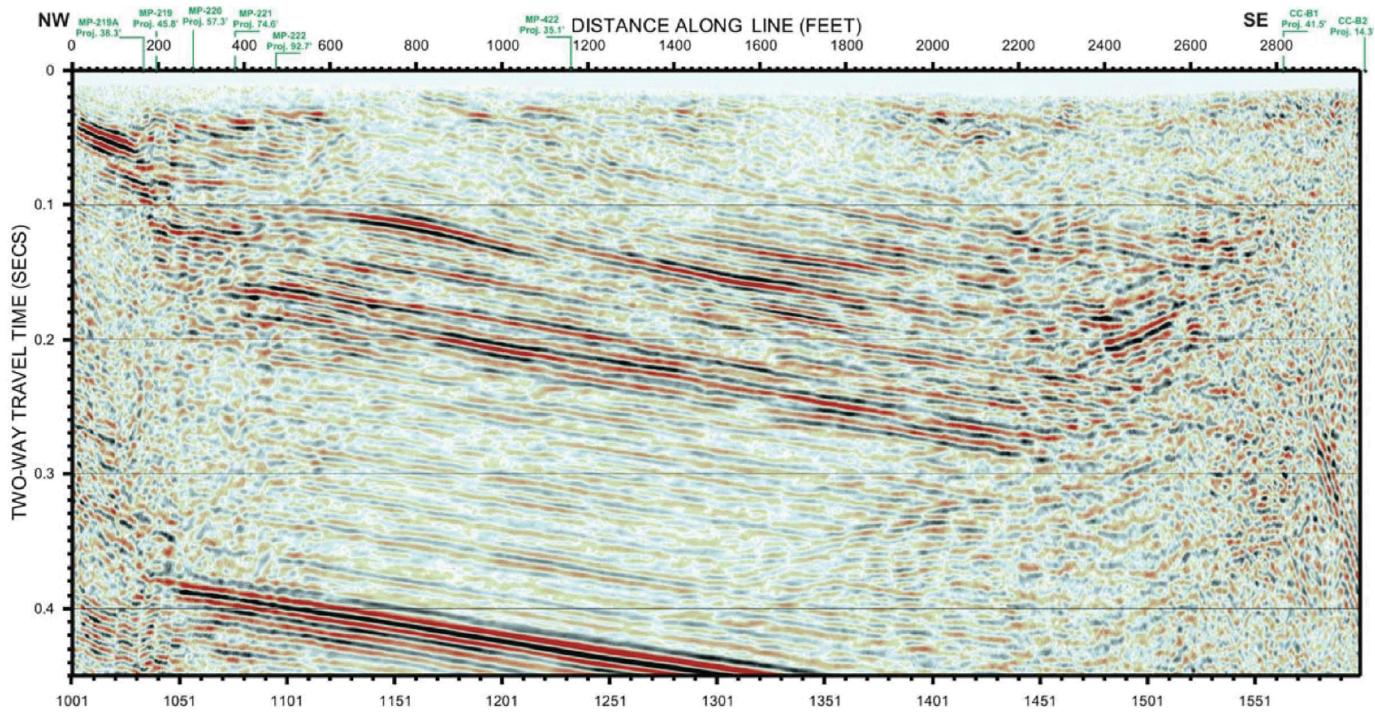


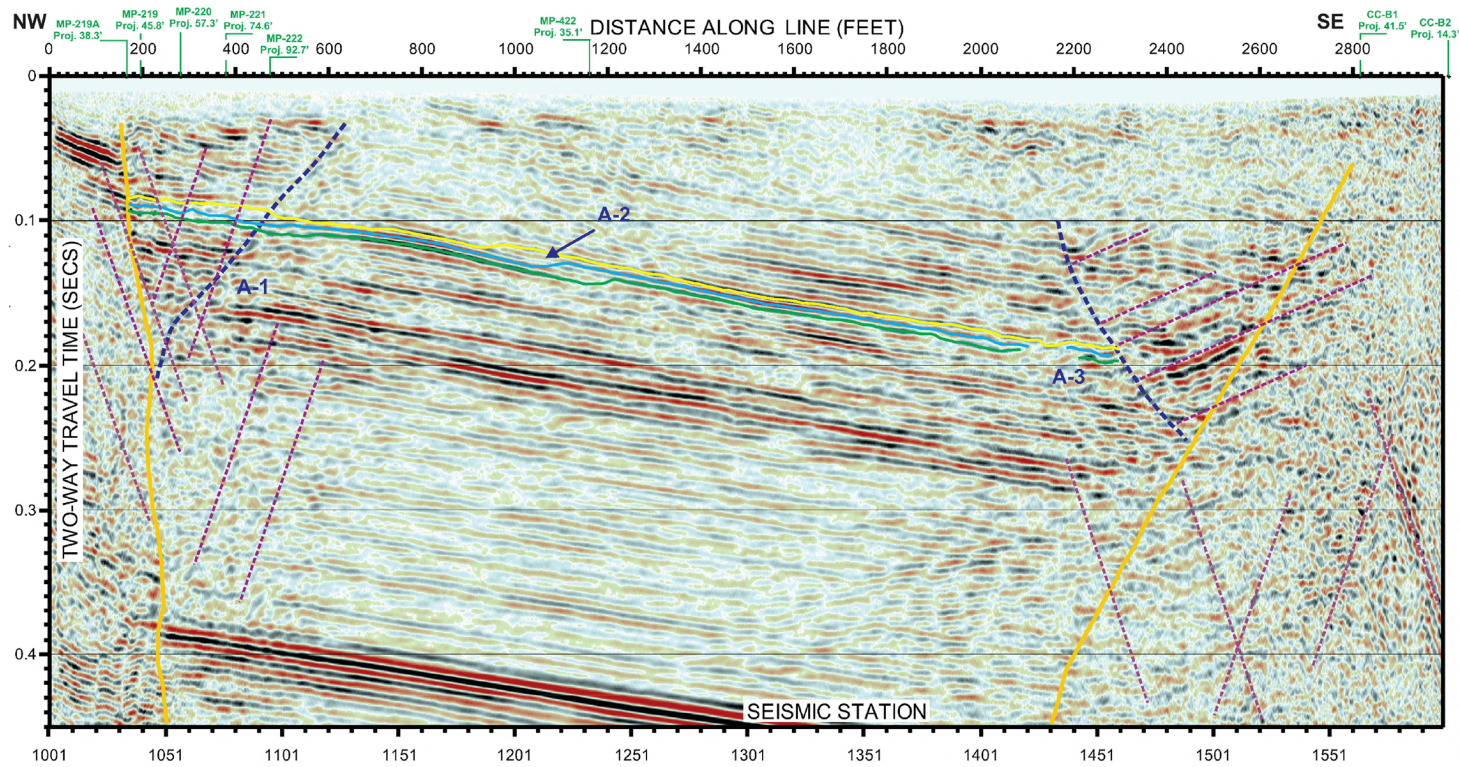
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Notes: Seismic reflection profile SRL-1 (Reference 2.5.1-214).

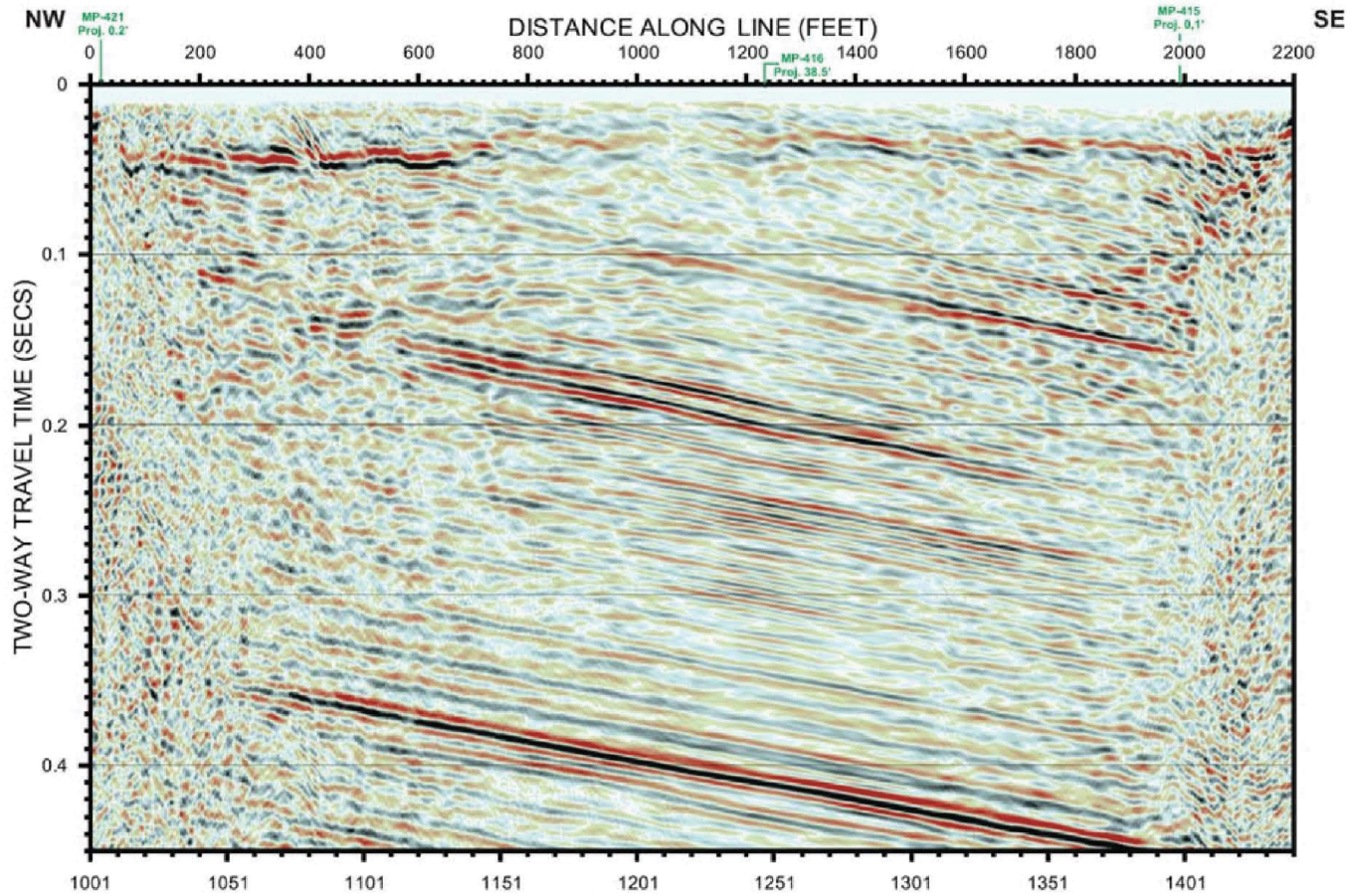
Figure 2.5.1-36. (Sheet 1 of 5) Seismic Reflection SRL-1—Without Interpretation

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Notes: Seismic reflection profile SRL-1 (Reference 2.5.1-214).

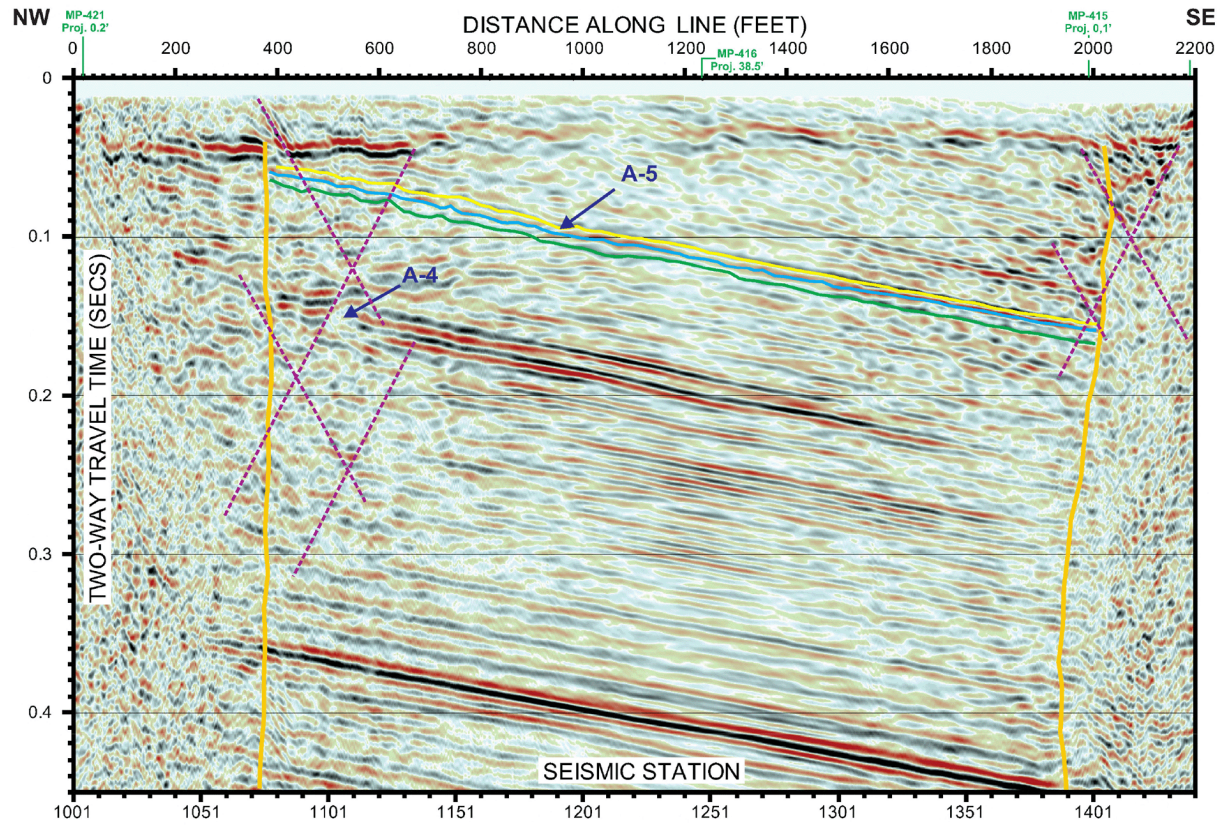
Figure 2.5.1-36. (Sheet 2 of 5) Seismic Reflection SRL-1—With Interpretation



Note: Seismic reflection profile SRL-2 (Reference 2.5.1-214).

Figure 2.5.1-36. (Sheet 3 of 5) Seismic Reflection SRL-2—Without Interpretation

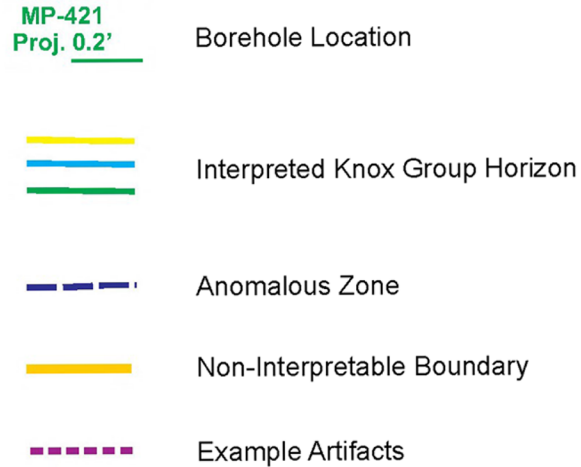
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Note: Seismic reflection profile SRL-2 (Reference 2.5.1-214).

Figure 2.5.1-36. (Sheet 4 of 5) Seismic Reflection SRL-2—With Interpretation

Explanation for Annotated Seismic Reflection Lines

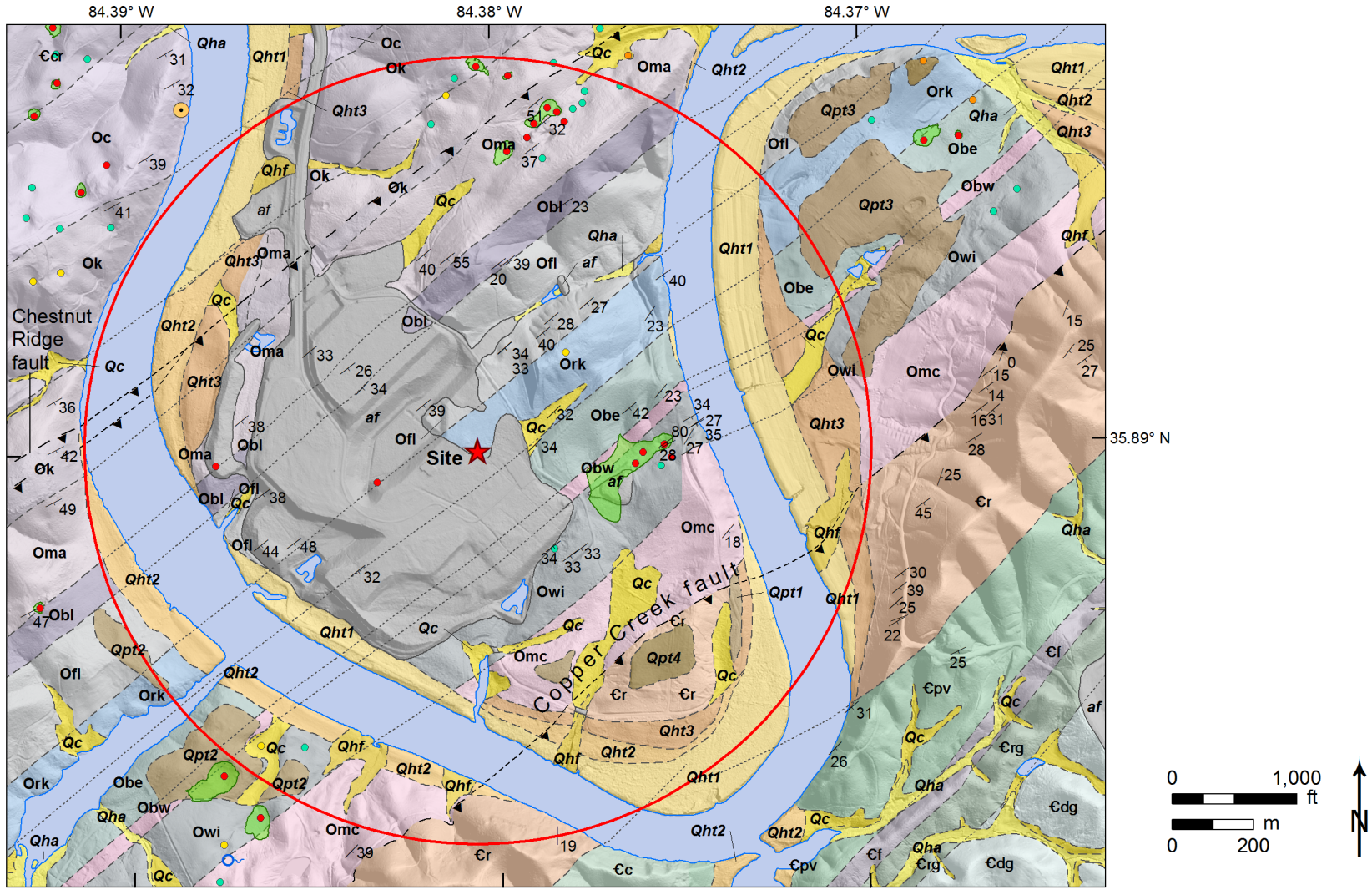


Notes:

Borehole locations are presented if projected less than 100 ft from the line unless noted.
Explanation for seismic reflection lines ([Reference 2.5.1-214](#))

Figure 2.5.1-36. (Sheet 5 of 5) Explanation for Seismic Line Figures

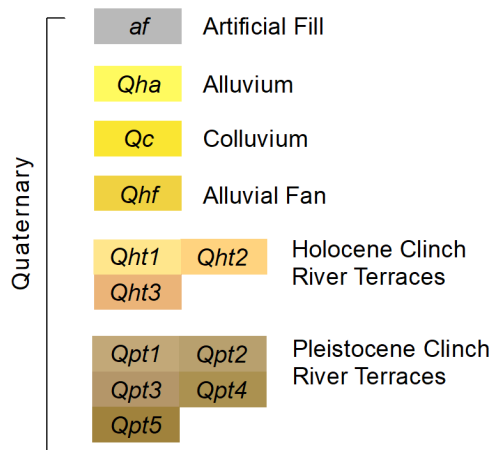
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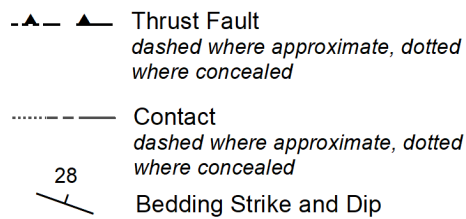
Note: Simplified geologic map of the Clinch River Nuclear site area.

Figure 2.5.1-37. (Sheet 1 of 2) Site Location Geologic Map

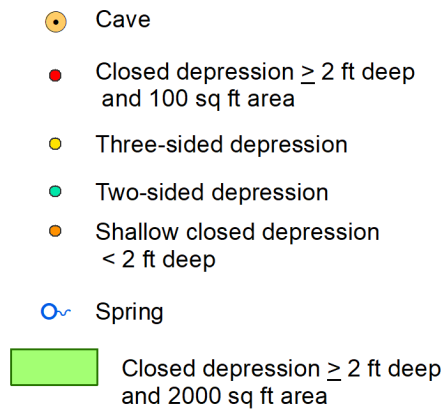
Quaternary Units



Geologic Structures



Karst Features



Bedrock Units

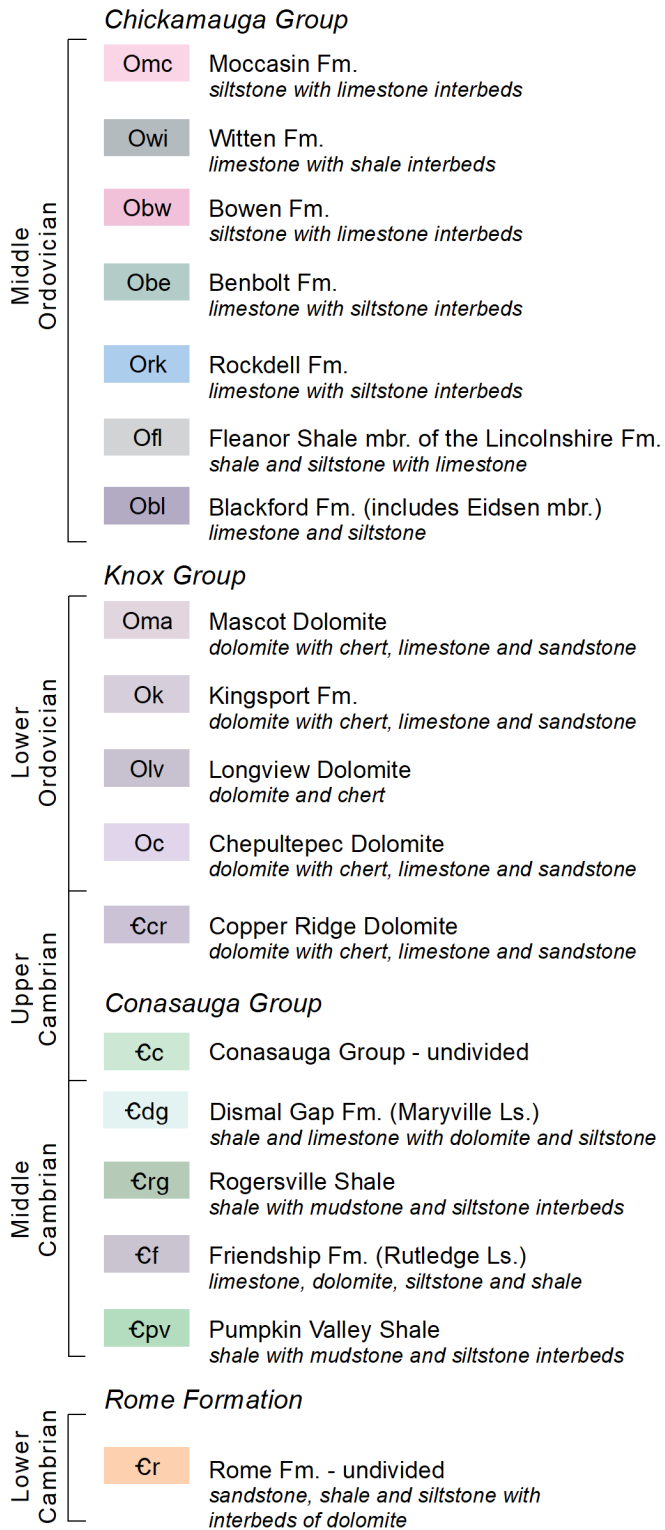


Figure 2.5.1-37. (Sheet 2 of 2) Site Location Geologic Map

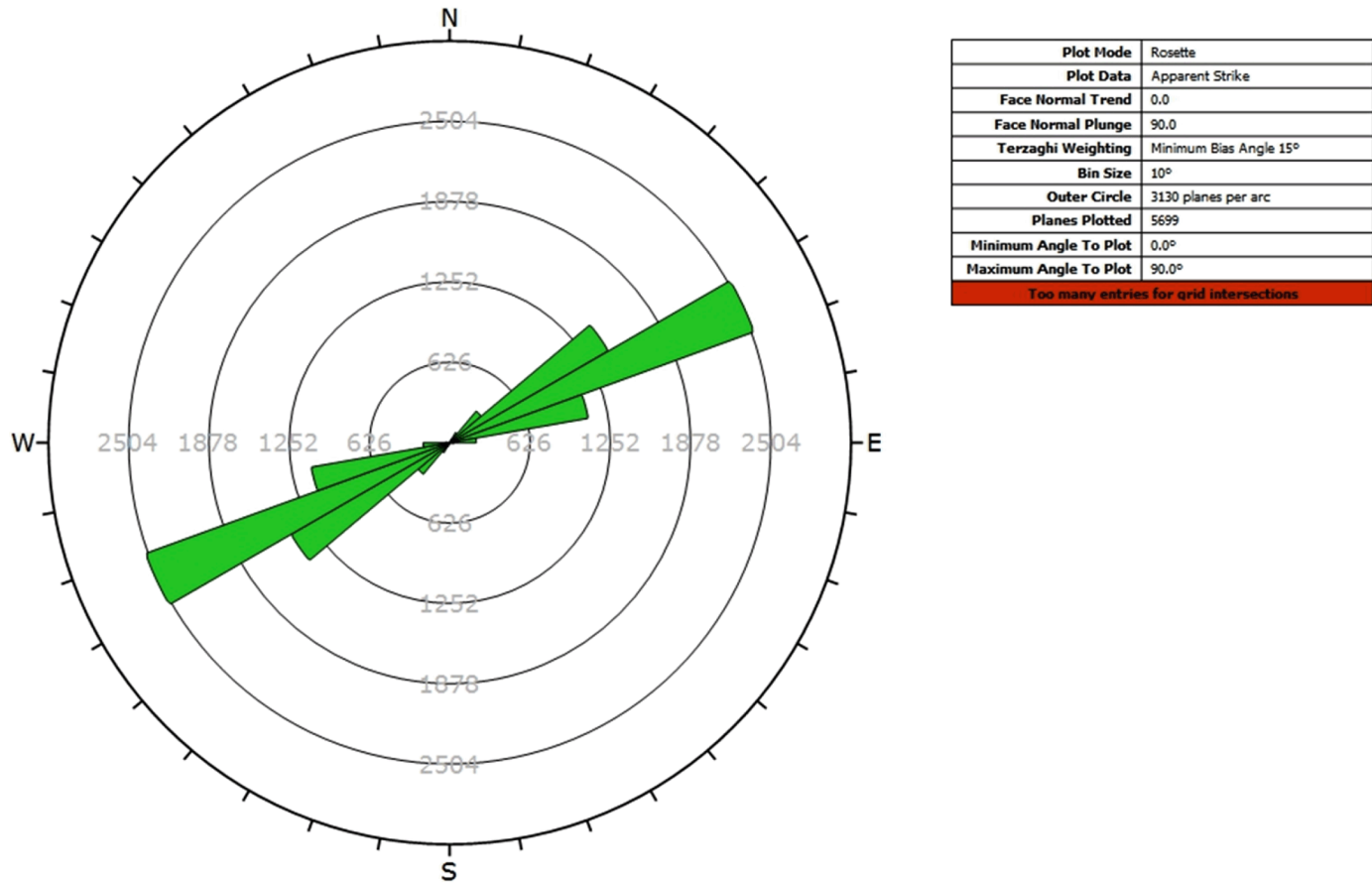


Figure 2.5.1-38. (Sheet 1 of 11) Acoustic Televiewer Data and Outcrop Mapping—Strike of Bedding

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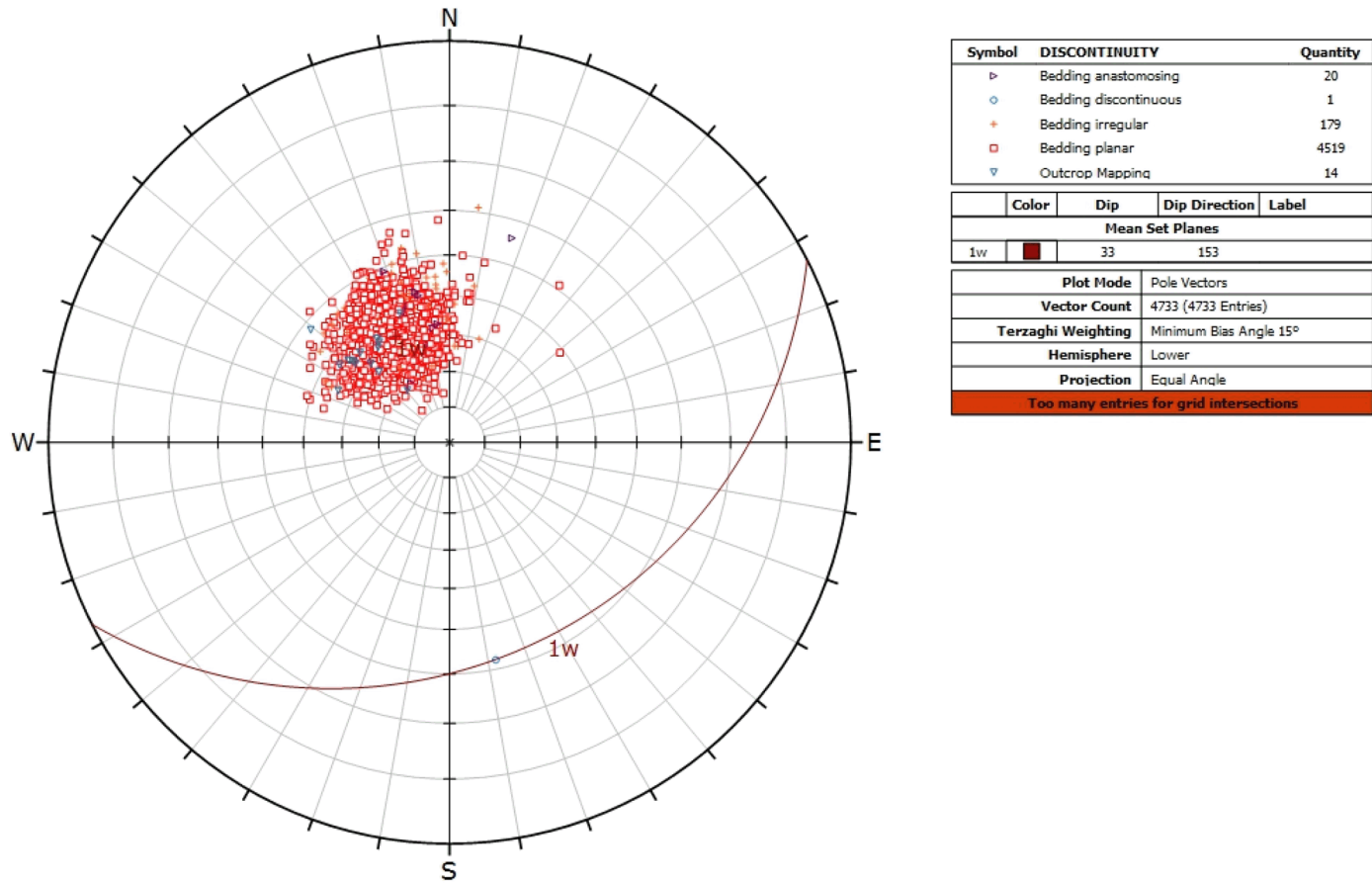


Figure 2.5.1-38. (Sheet 2 of 11) Acoustic Televiwer Data and Outcrop Mapping—Strike and Dip of Bedding Planes

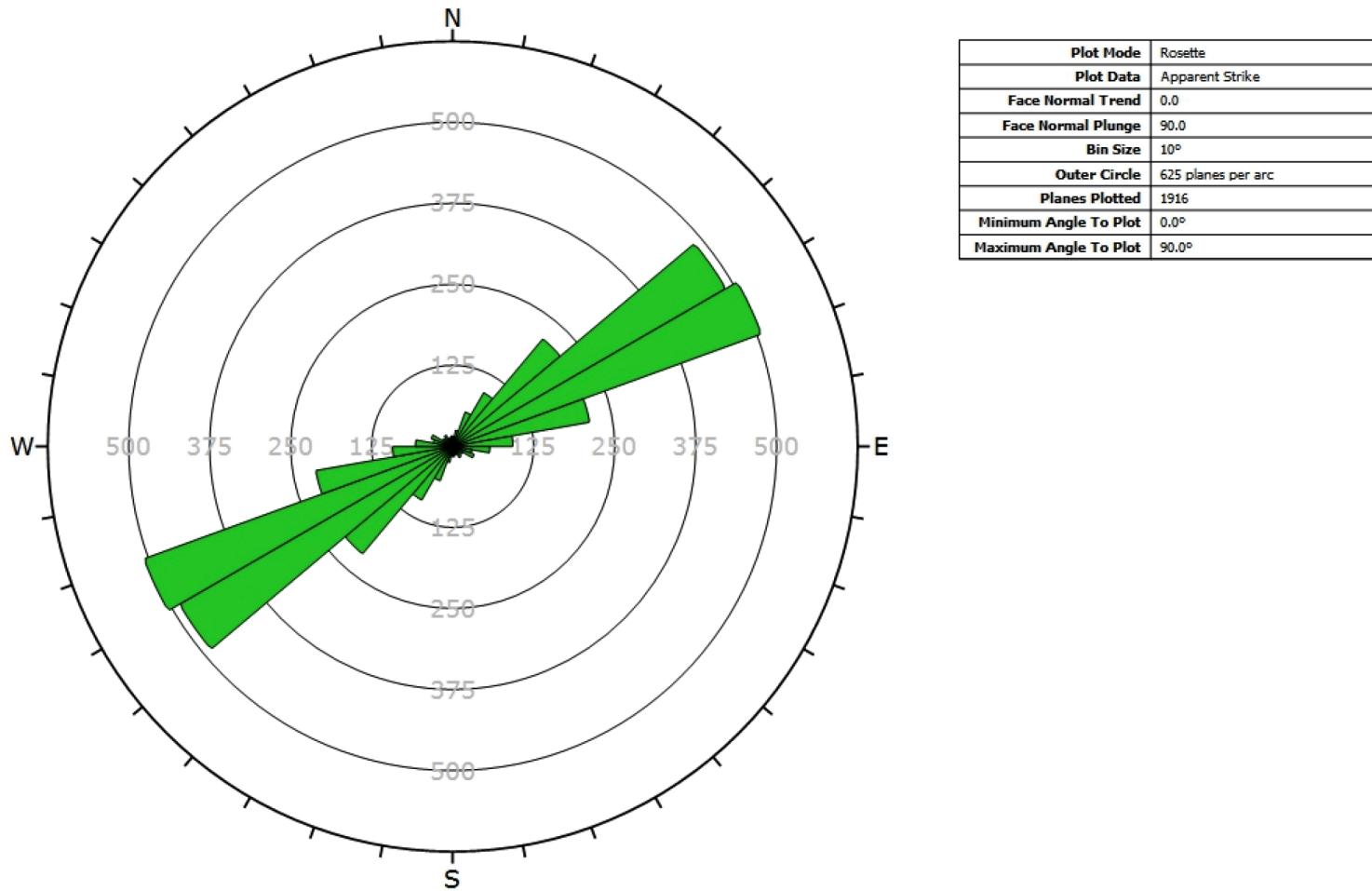


Figure 2.5.1-38. (Sheet 3 of 11) Acoustic Televiewer Data and Outcrop Mapping—Strike of Fractures

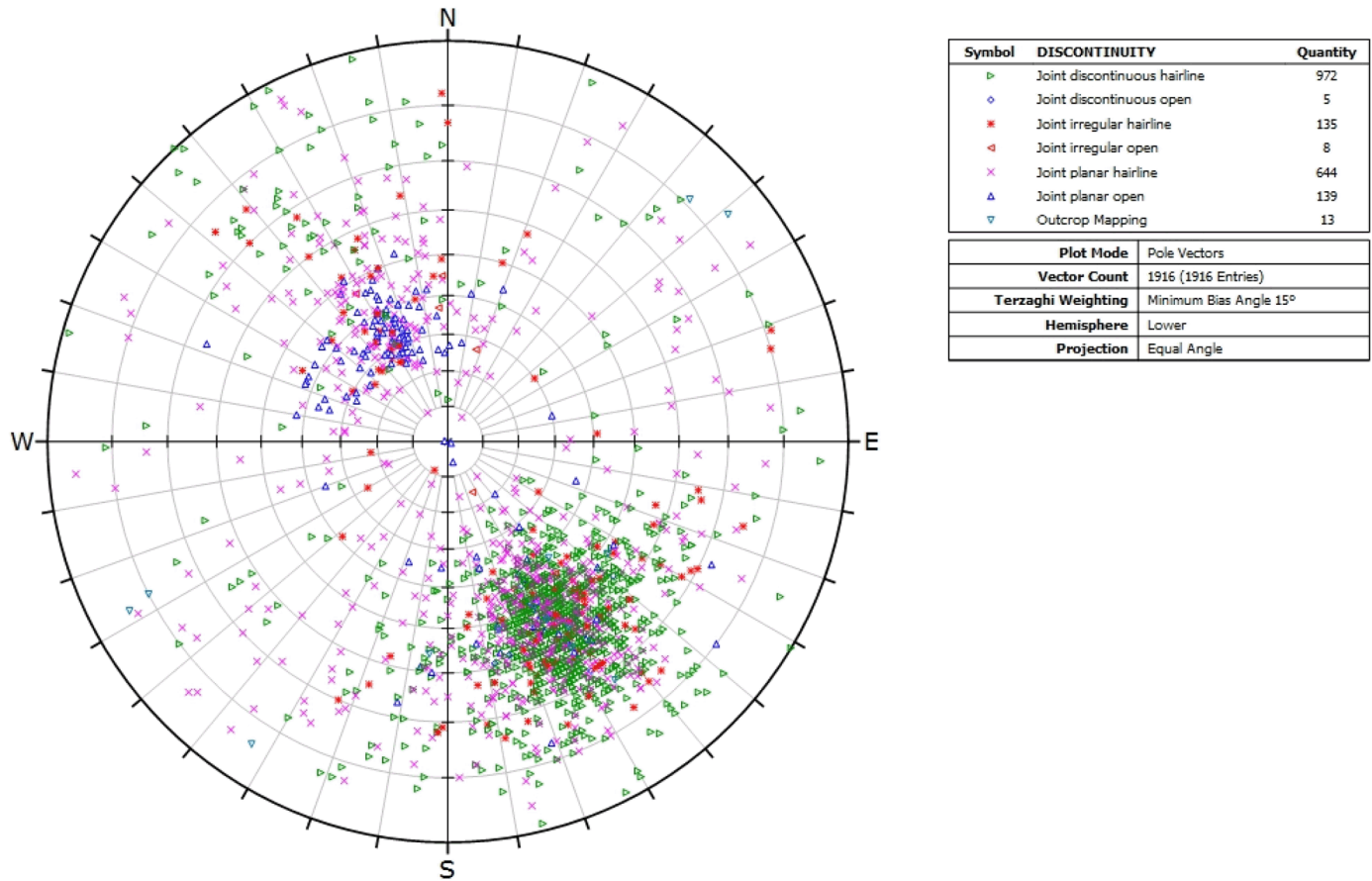


Figure 2.5.1-38. (Sheet 4 of 11) Acoustic Televiwer Data and Outcrop Mapping—Orientation of all Fractures

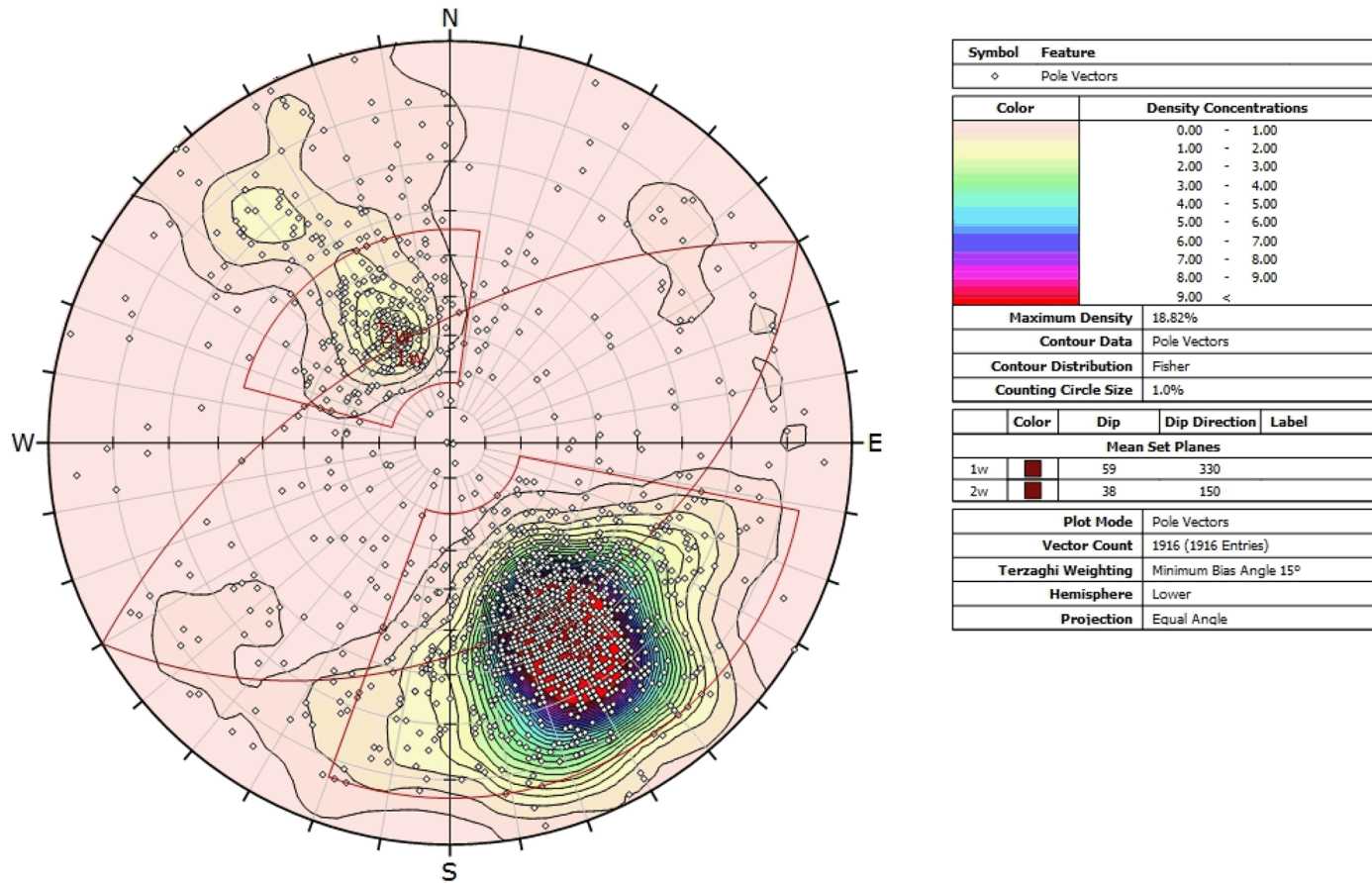


Figure 2.5.1-38. (Sheet 5 of 11) Acoustic Televiewer Data and Outcrop Mapping—Strike and Dip of Primary Fracture Sets

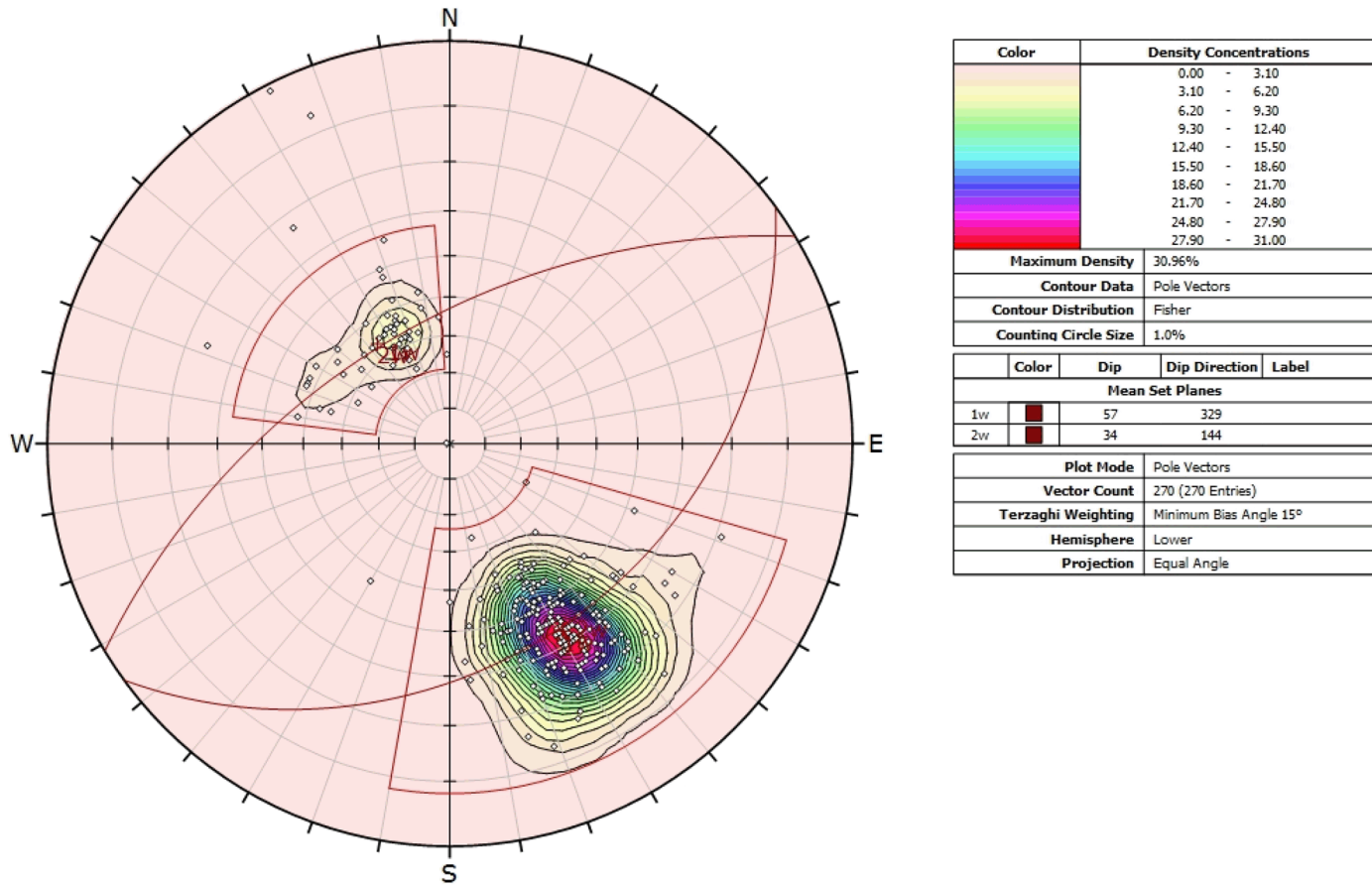


Figure 2.5.1-38. (Sheet 6 of 11) Acoustic Televiwer Data and Outcrop Mapping—Orientation of Fractures in the Benbolt Formation

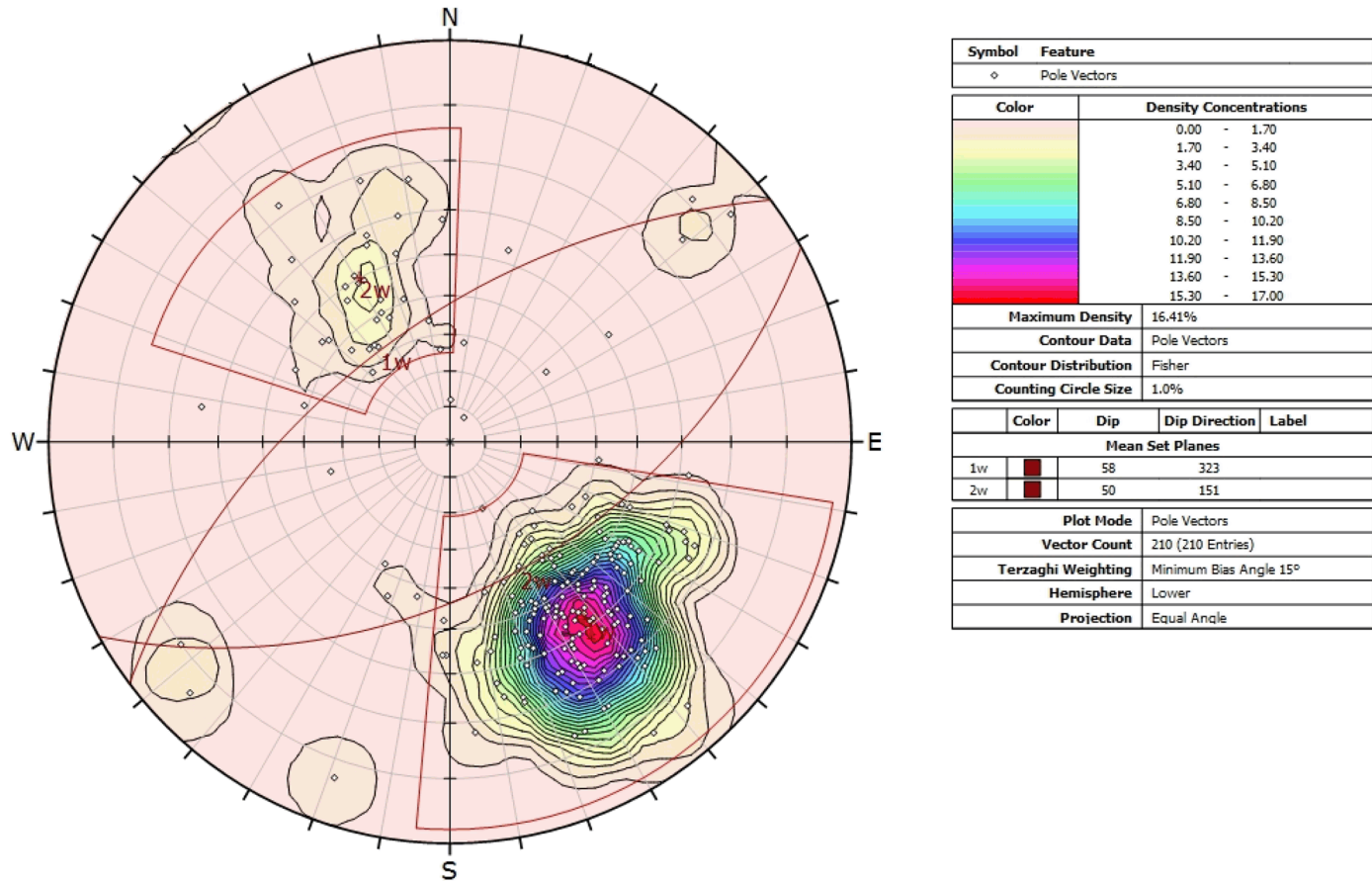


Figure 2.5.1-38. (Sheet 7 of 11) Acoustic Televiewer and Outcrop Mapping—Orientation of Fractures in the Blackford Formation

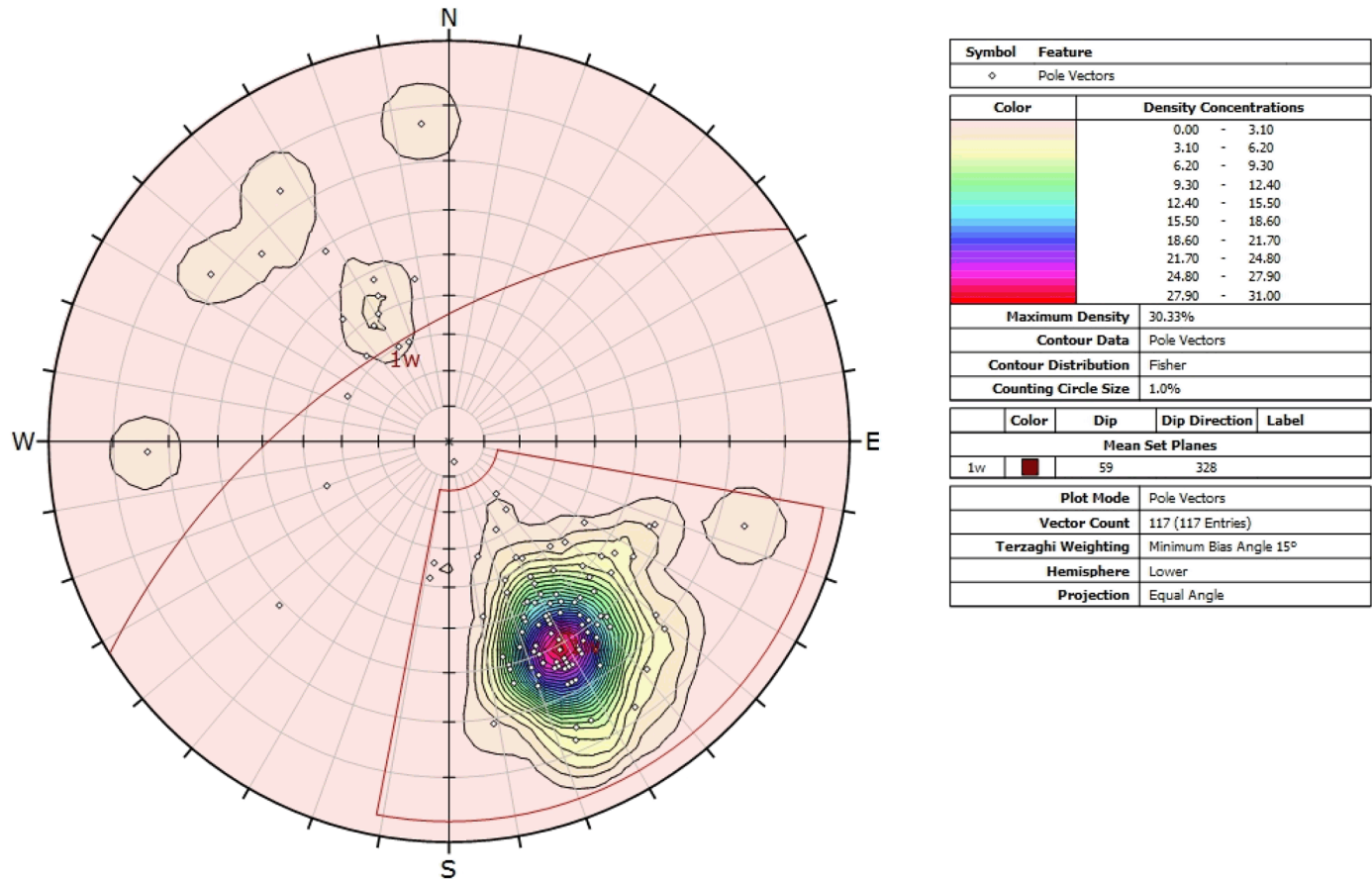


Figure 2.5.1-38. (Sheet 8 of 11) Acoustic Televiwer Data and Outcrop Mapping—Orientation of Fractures in the Eidson Formation

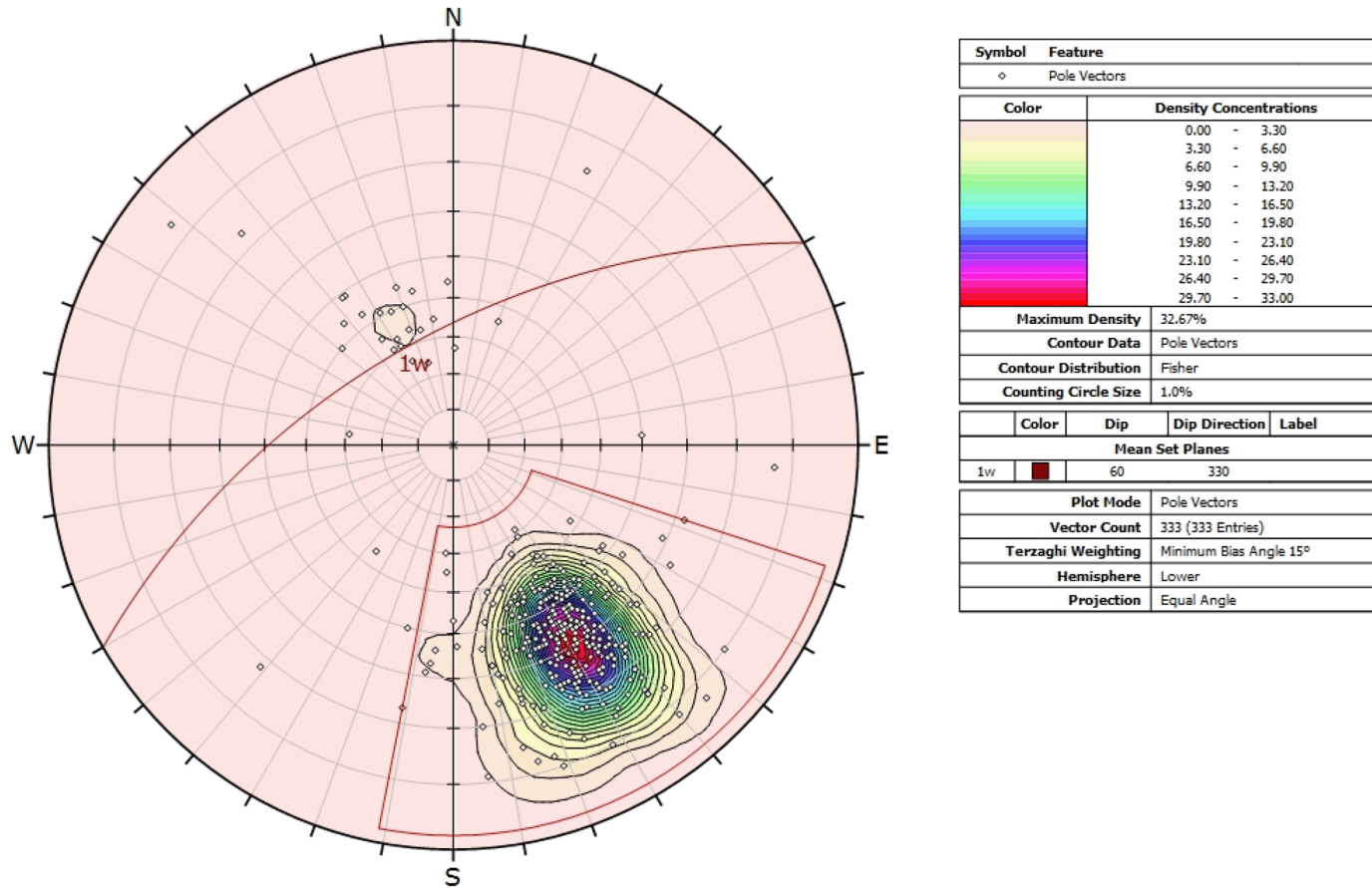


Figure 2.5.1-38. (Sheet 9 of 11) Acoustic Televiewer Data and Outcrop Mapping—Orientation of Fractures in the Fleanor Shale

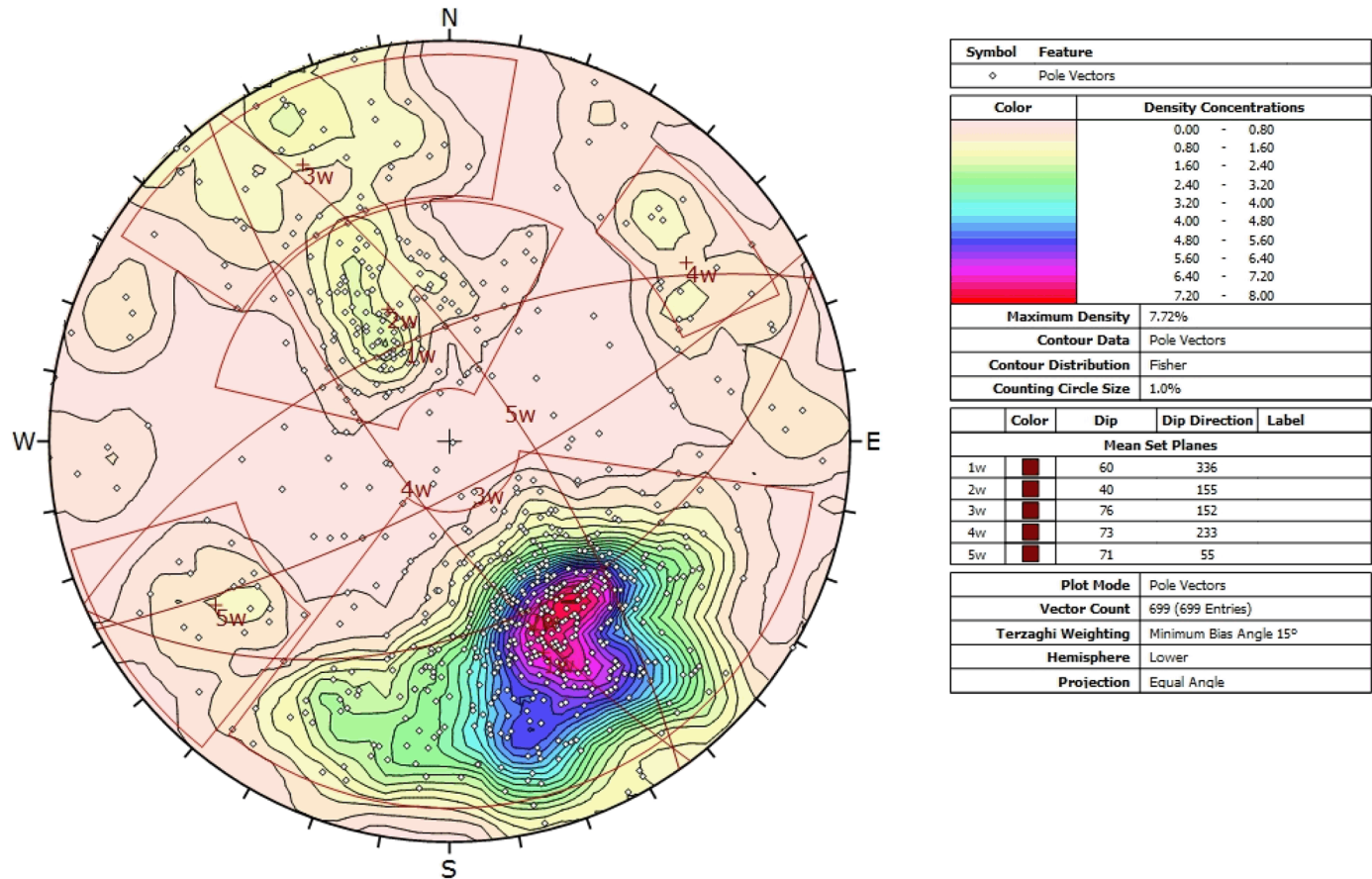


Figure 2.5.1-38. (Sheet 10 of 11) Acoustic Televiewer Data and Outcrop Mapping—Orientation of Fractures in the Newala Limestone

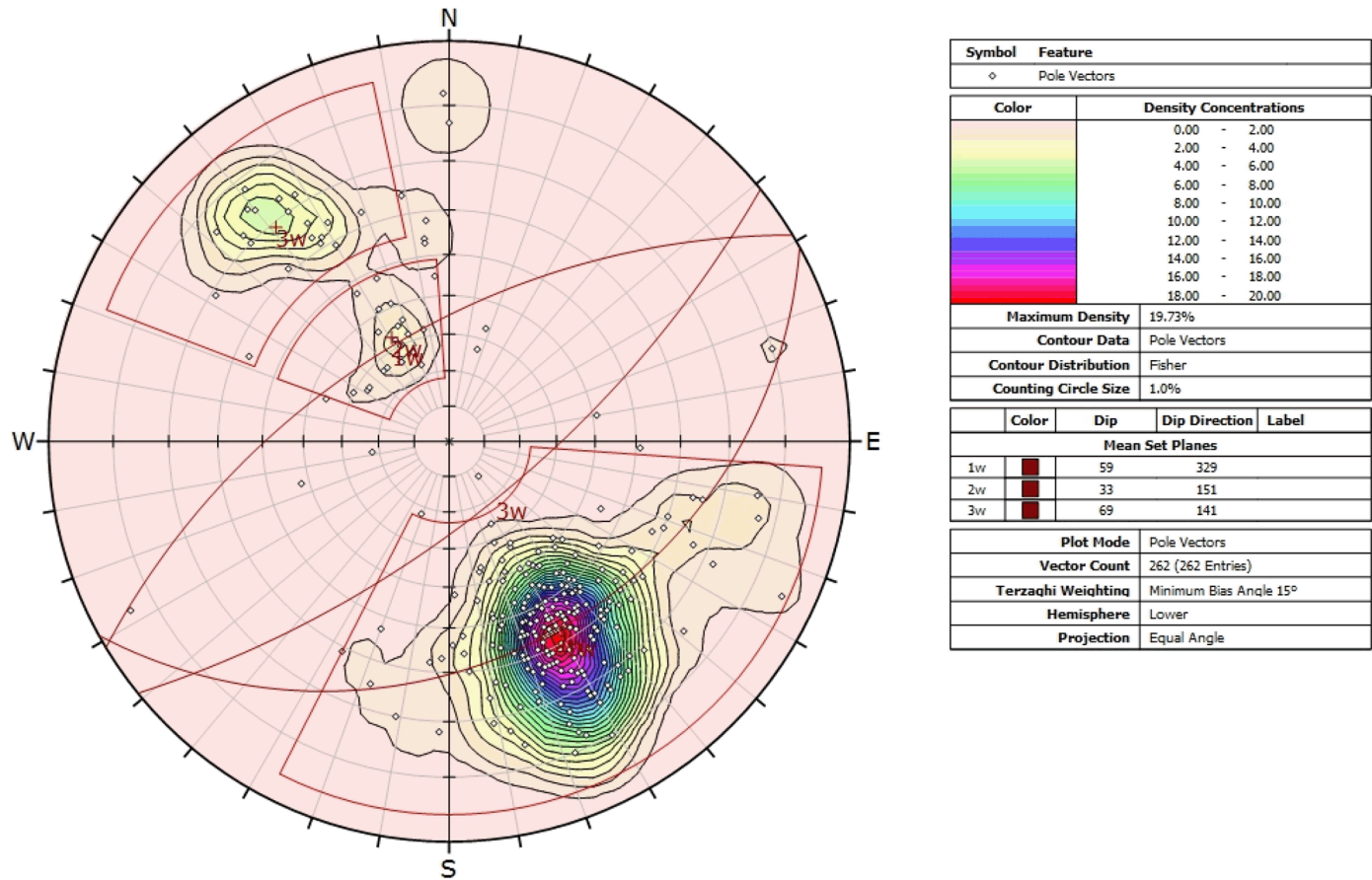
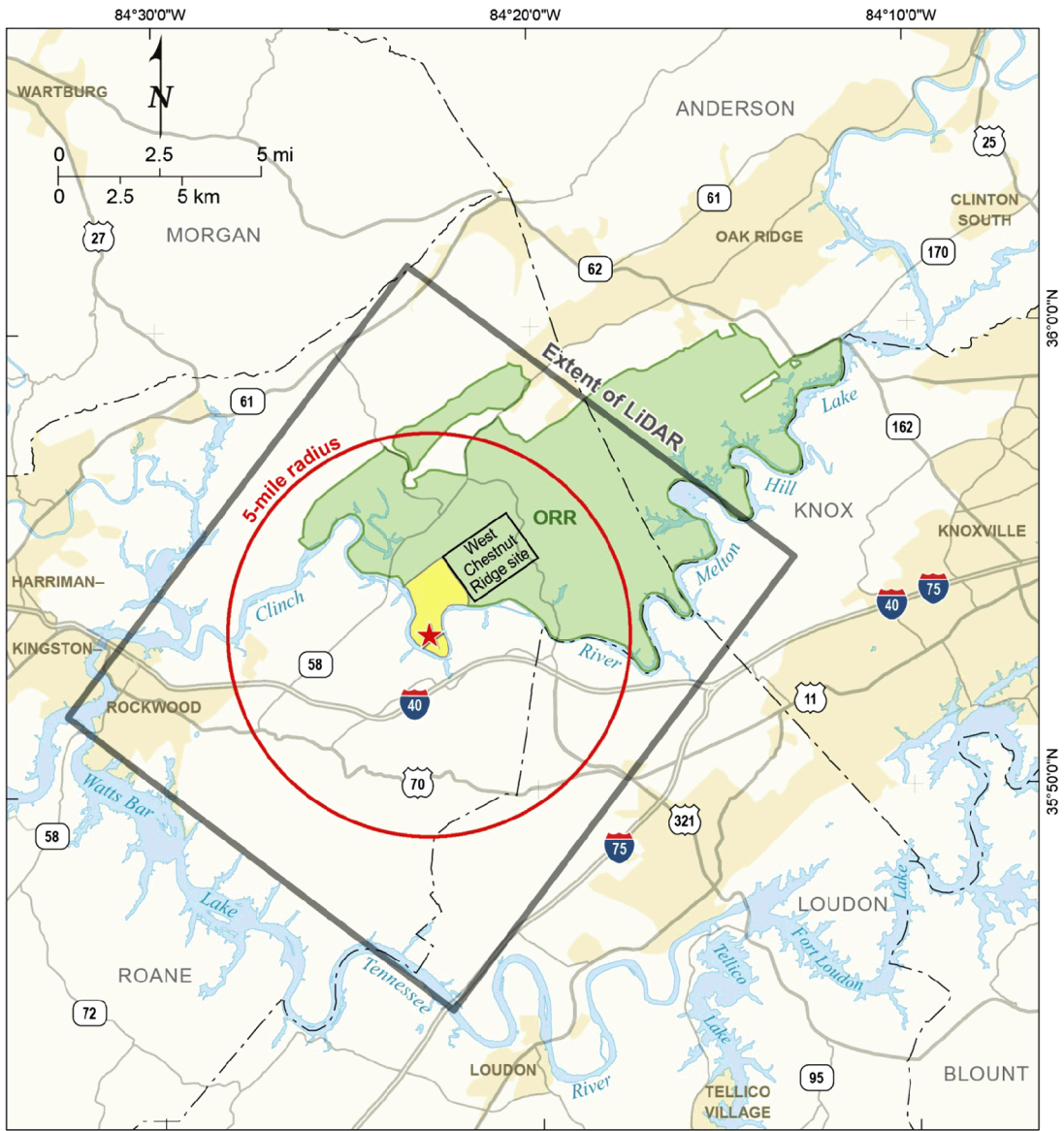


Figure 2.5.1-38. (Sheet 11 of 11) Acoustic Televiewer Data and Outcrop Mapping—Orientation of Fractures in the Rockdell Formation

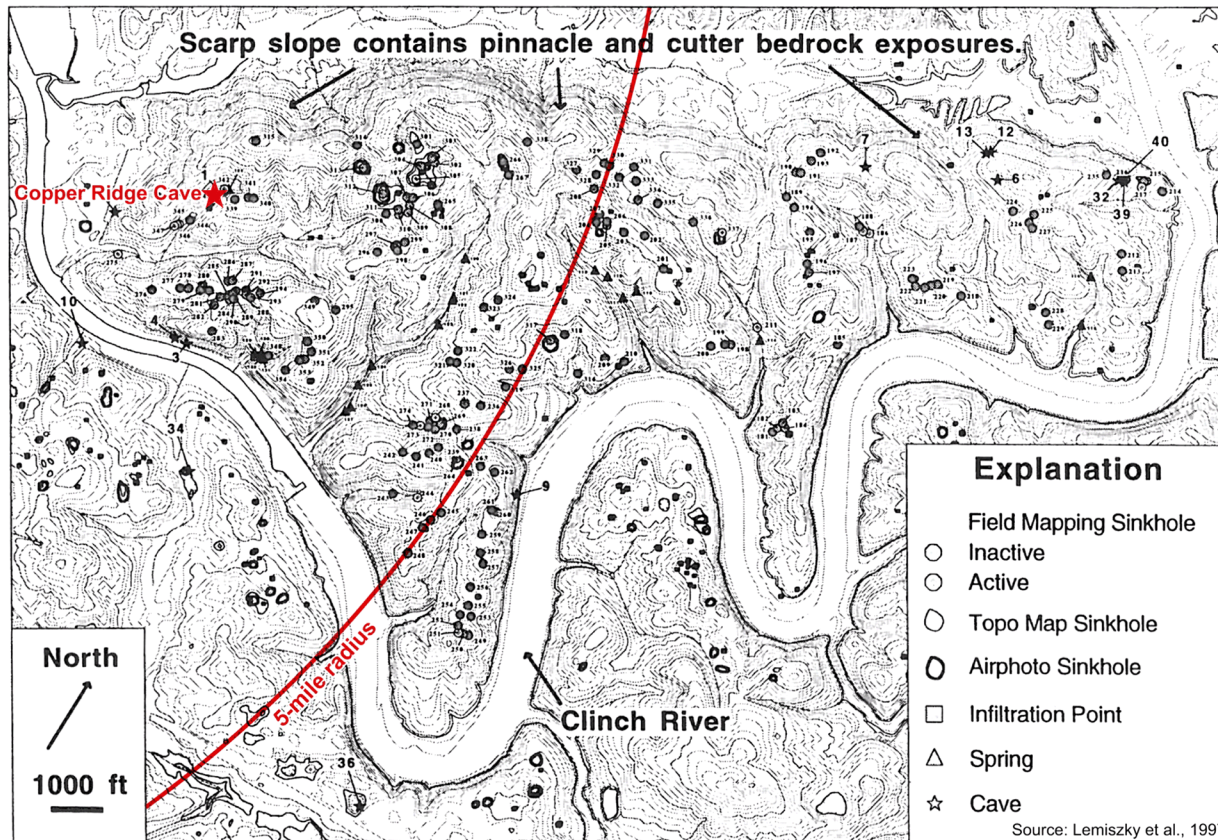
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Explanation

- Current DOE Oak Ridge Reservation (ORR)
- TVA Clinch River property
- CRN site centerpoint

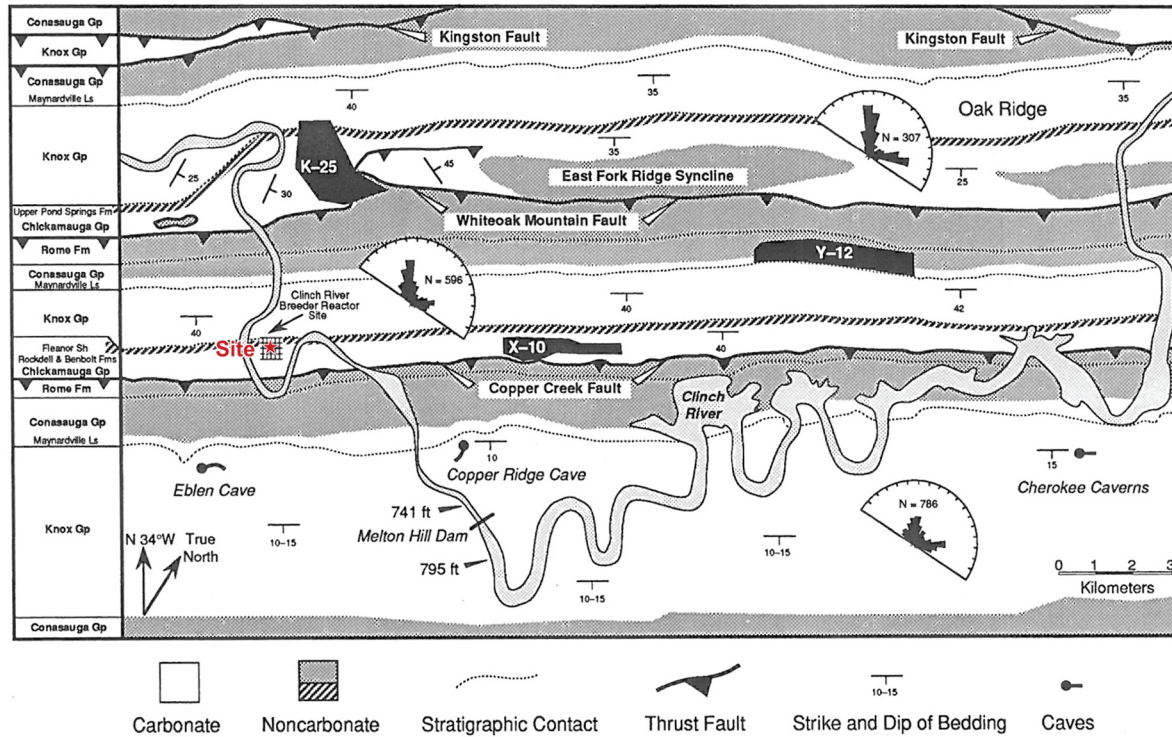
Figure 2.5.1-39. Site Area Map



Source: Reference 2.5.1-239

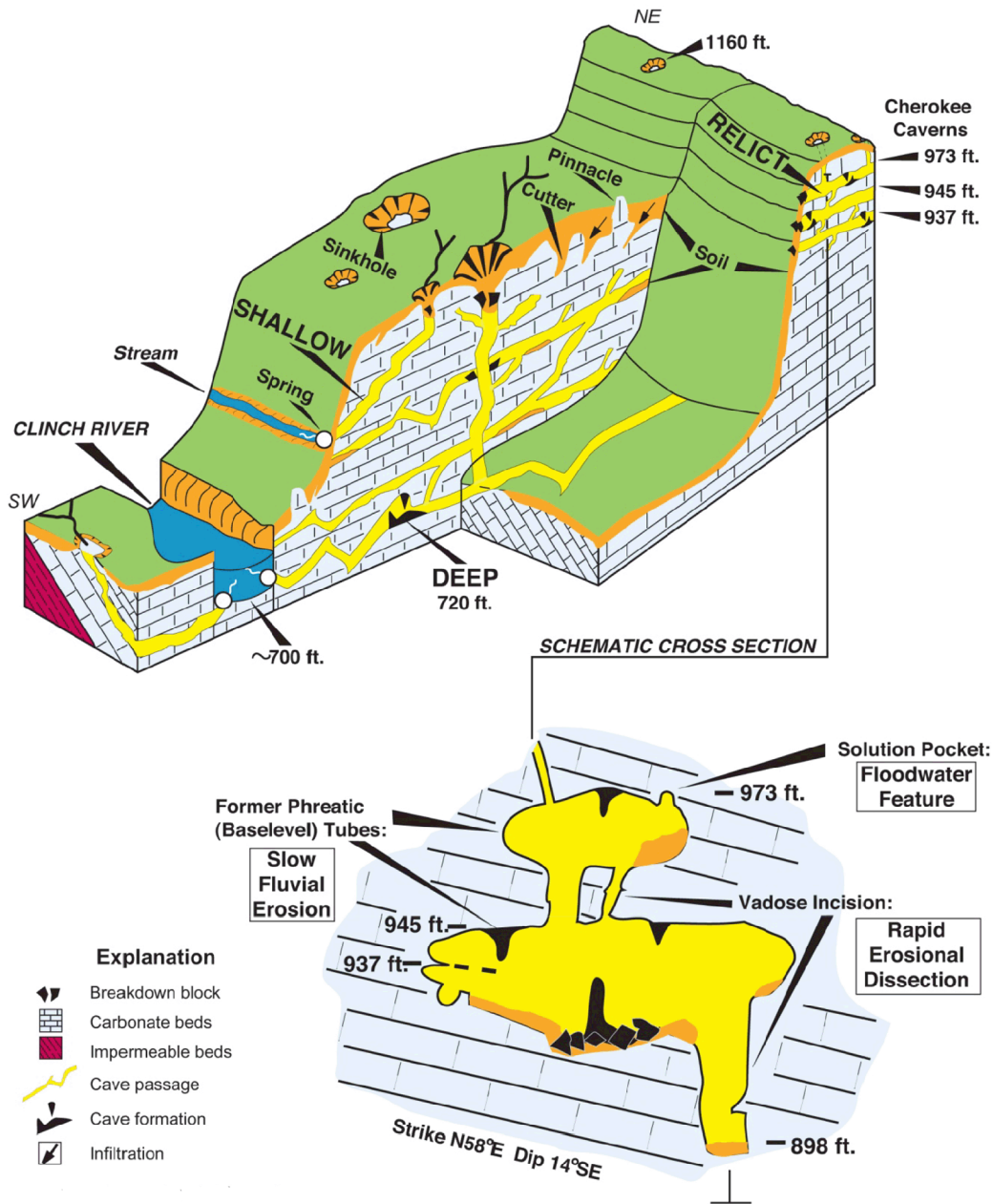
Figure 2.5.1-40. Karst Features near Copper Ridge Cave

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Source: Reference 2.5.1-240

Figure 2.5.1-41. Generalized Geologic Map of the Oak Ridge Area



Source: Reference 2.5.1-240

Figure 2.5.1-42. Conceptual Model for Karst Systems in the Oak Ridge Area

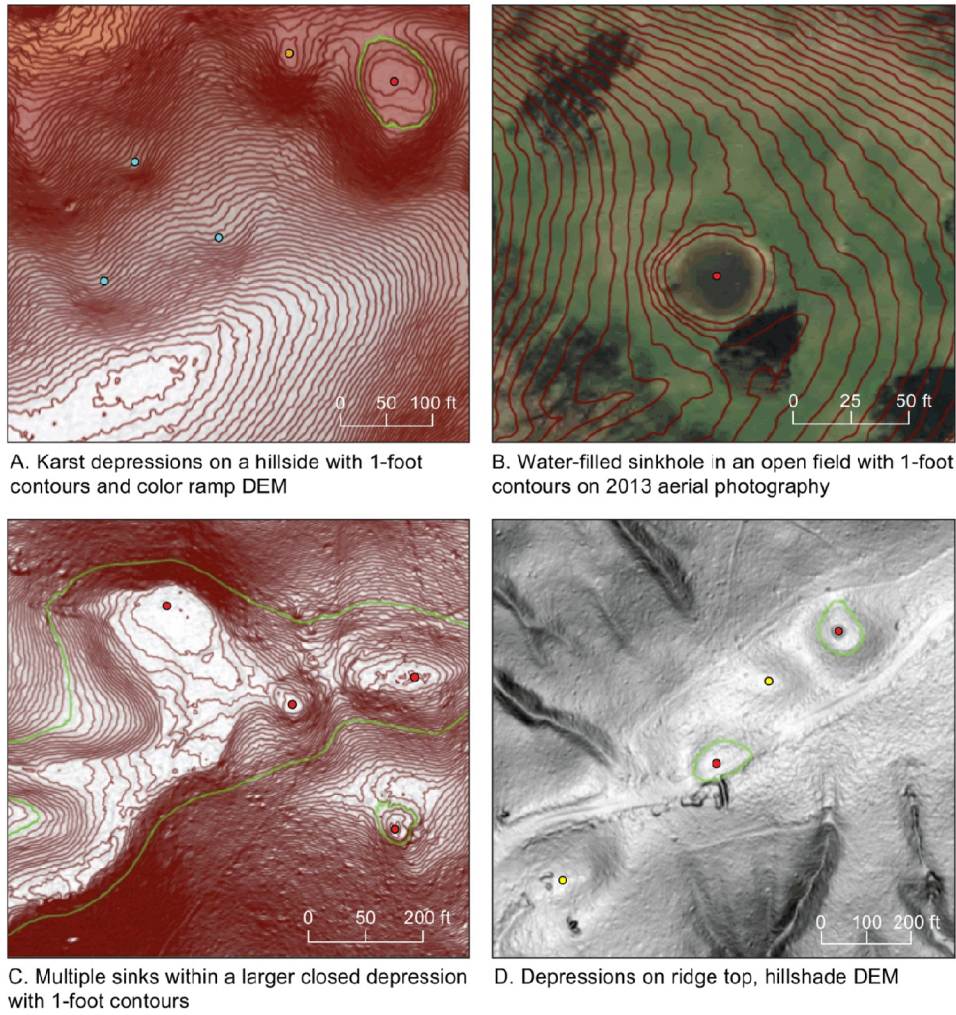


Figure 2.5.1-43. Examples of Karst Depressions Mapped from LIDAR Data

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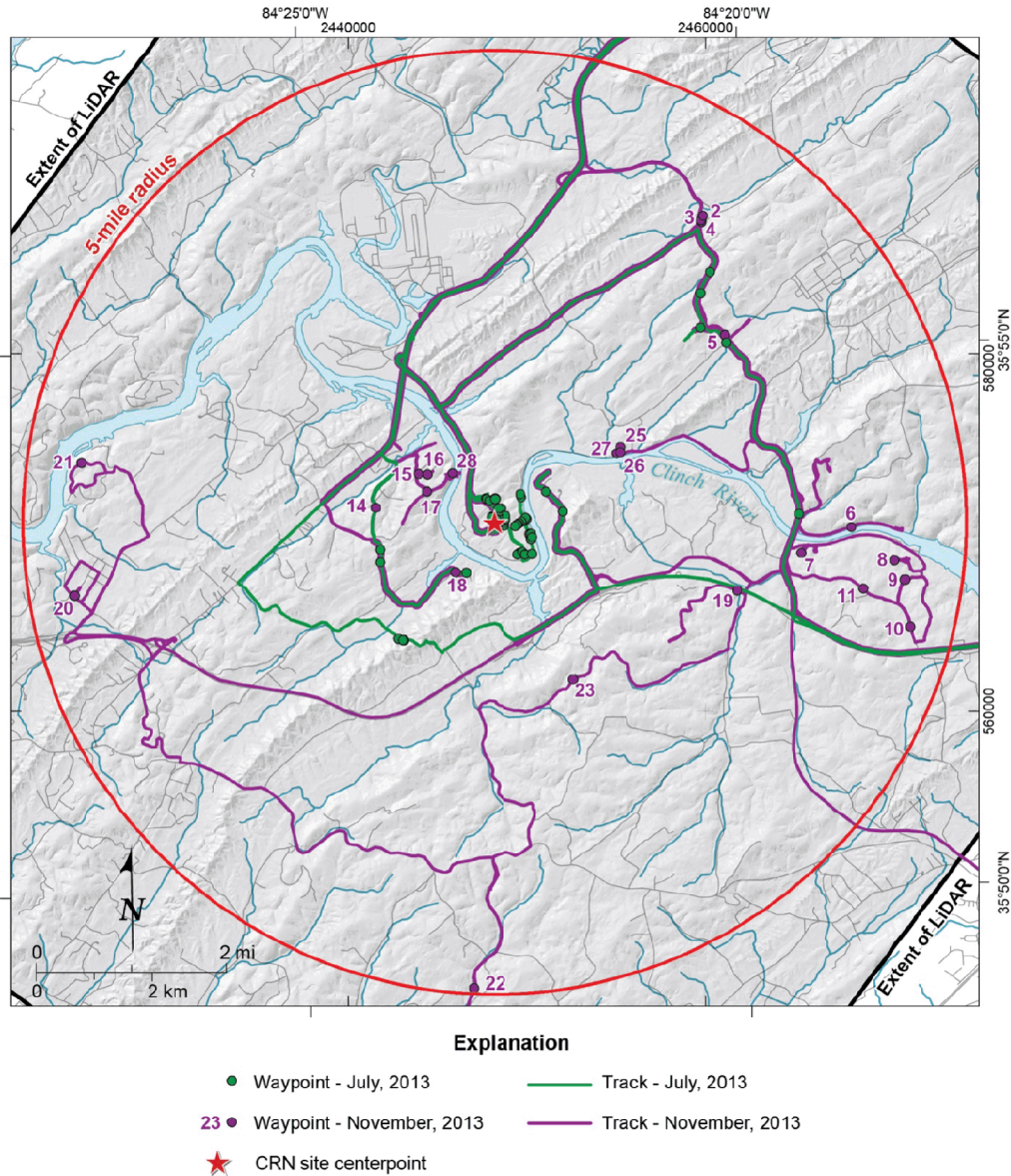


Figure 2.5.1-44. Location of Karst Field Reconnaissance



A. Pond in depression, Knox Group



B. Gentle depression, Knox Group



C. Active swallet, Witten Formation



D. Flat floor of depression, Witten Formation

Figure 2.5.1-45. Field Photographs of Karst Depressions

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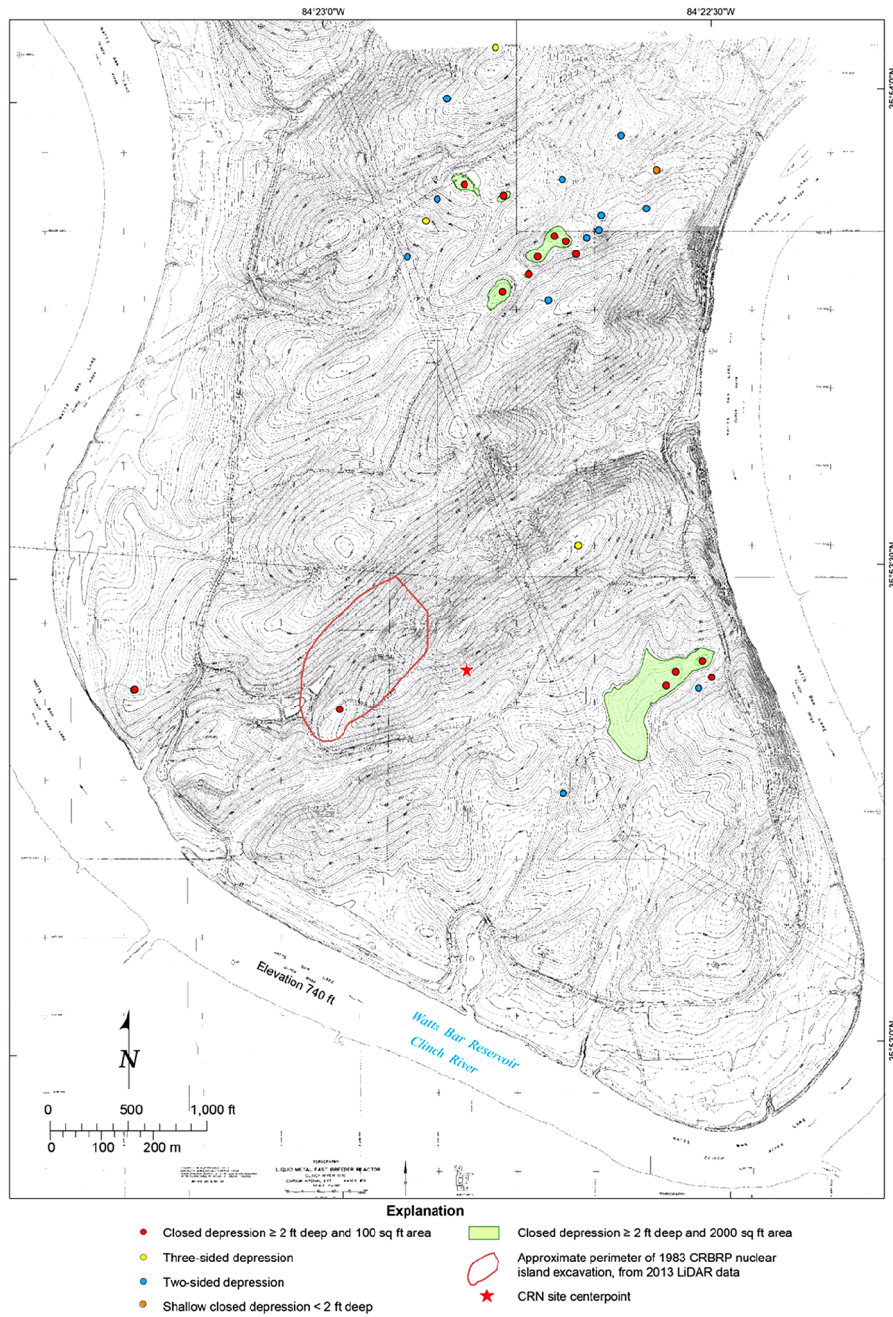


Figure 2.5.1-46. Surface Karst Features and Site Topography Associated with CRBRP Investigations (1973)

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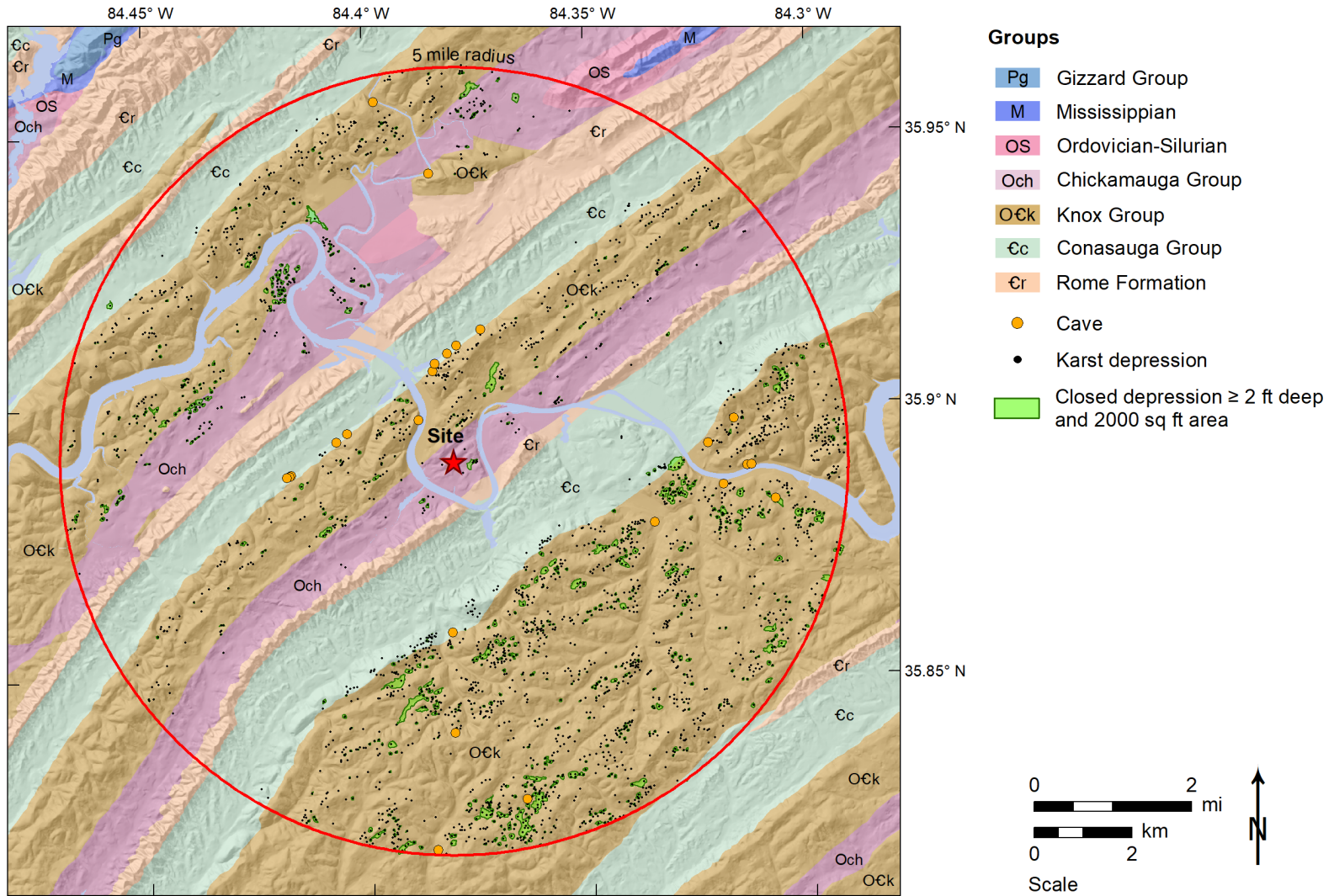


Figure 2.5.1-47. Distribution of Mapped Karst Features in the Site Area



A. Small stream passage, 3 ft-high, with alluvial deposits on floor



B. Large stream passage, 16 ft-wide, following bedding dip



C. Solution enlargement at the intersection of joint and bedding plane



D. Ceiling collapse along bedding plane.

Figure 2.5.1-48. Field Photographs of Cave Features

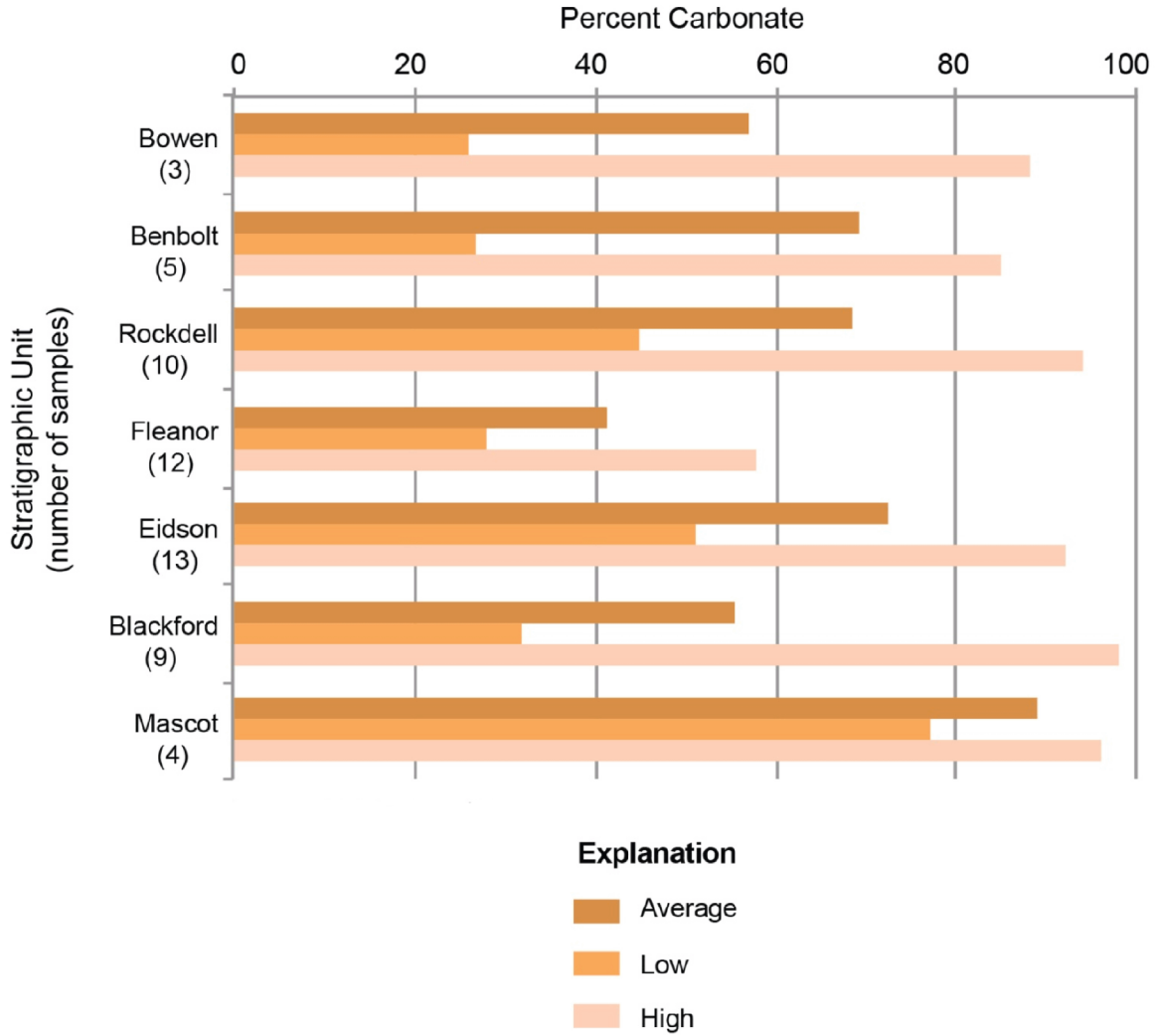
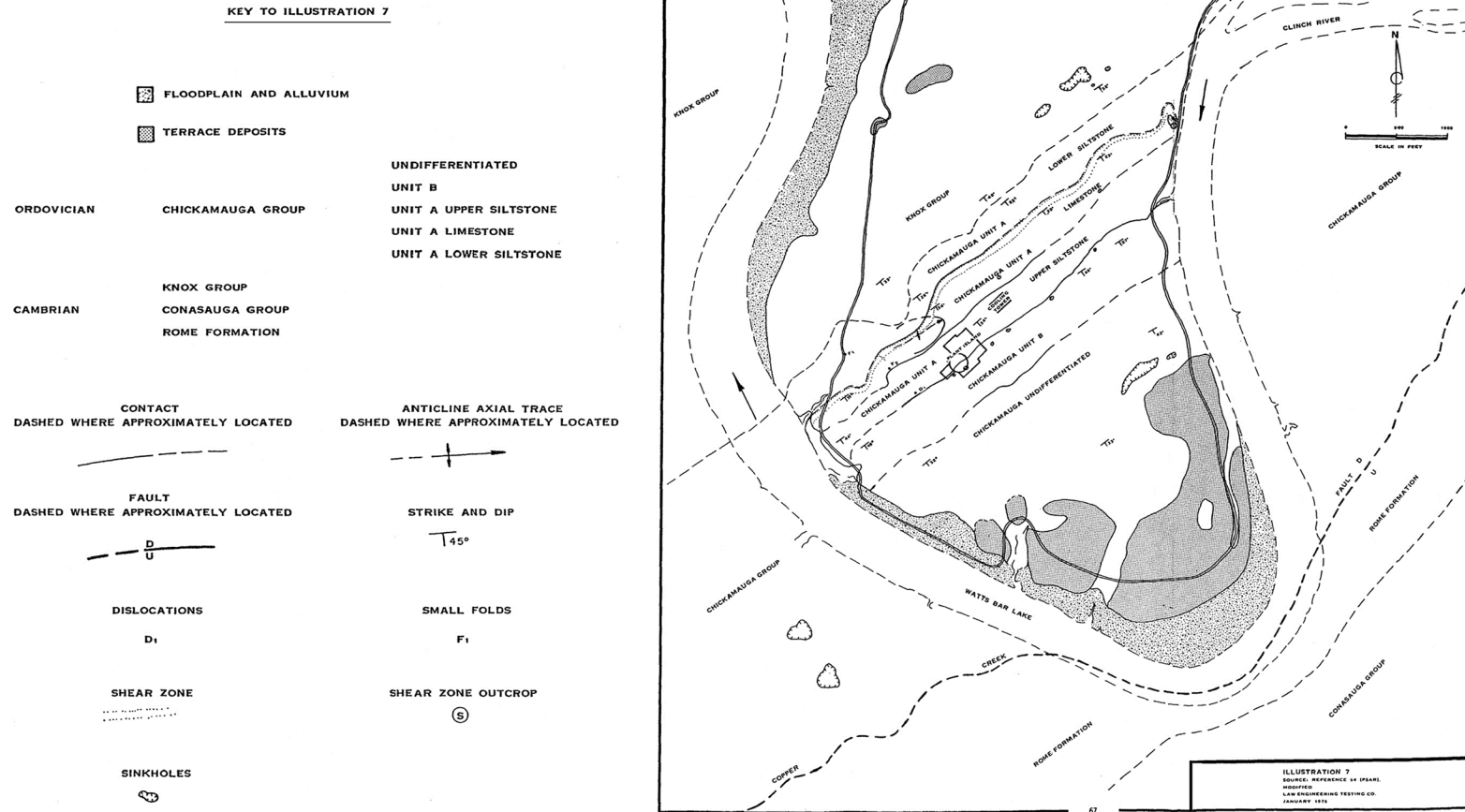


Figure 2.5.1-49. Carbonate Content of Rock Core Samples by Stratigraphic Unit

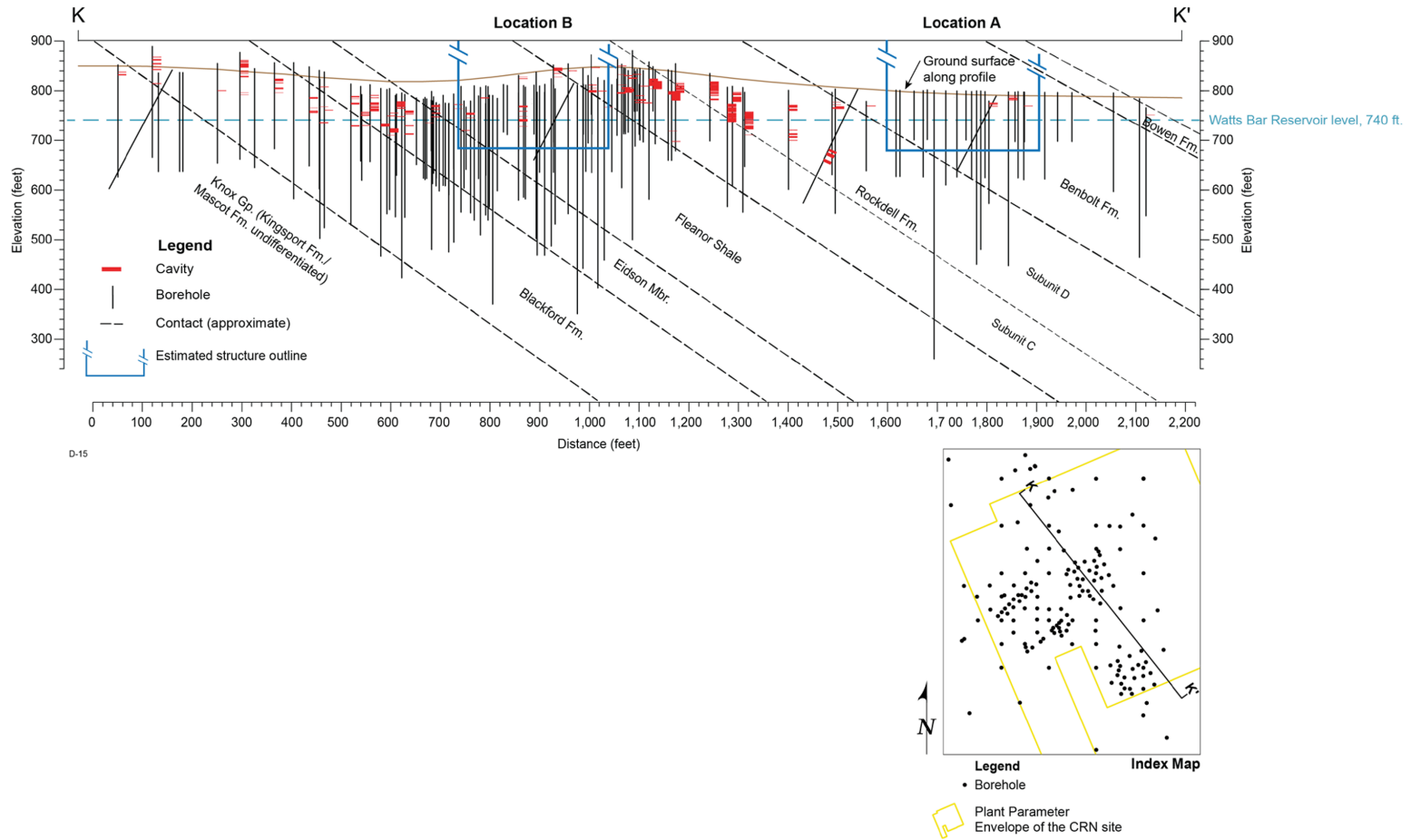
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Source: Page 216 of [Reference 2.5.1-238](#)

Figure 2.5.1-50. Clinch River Breeder Reactor Project Geologic Map

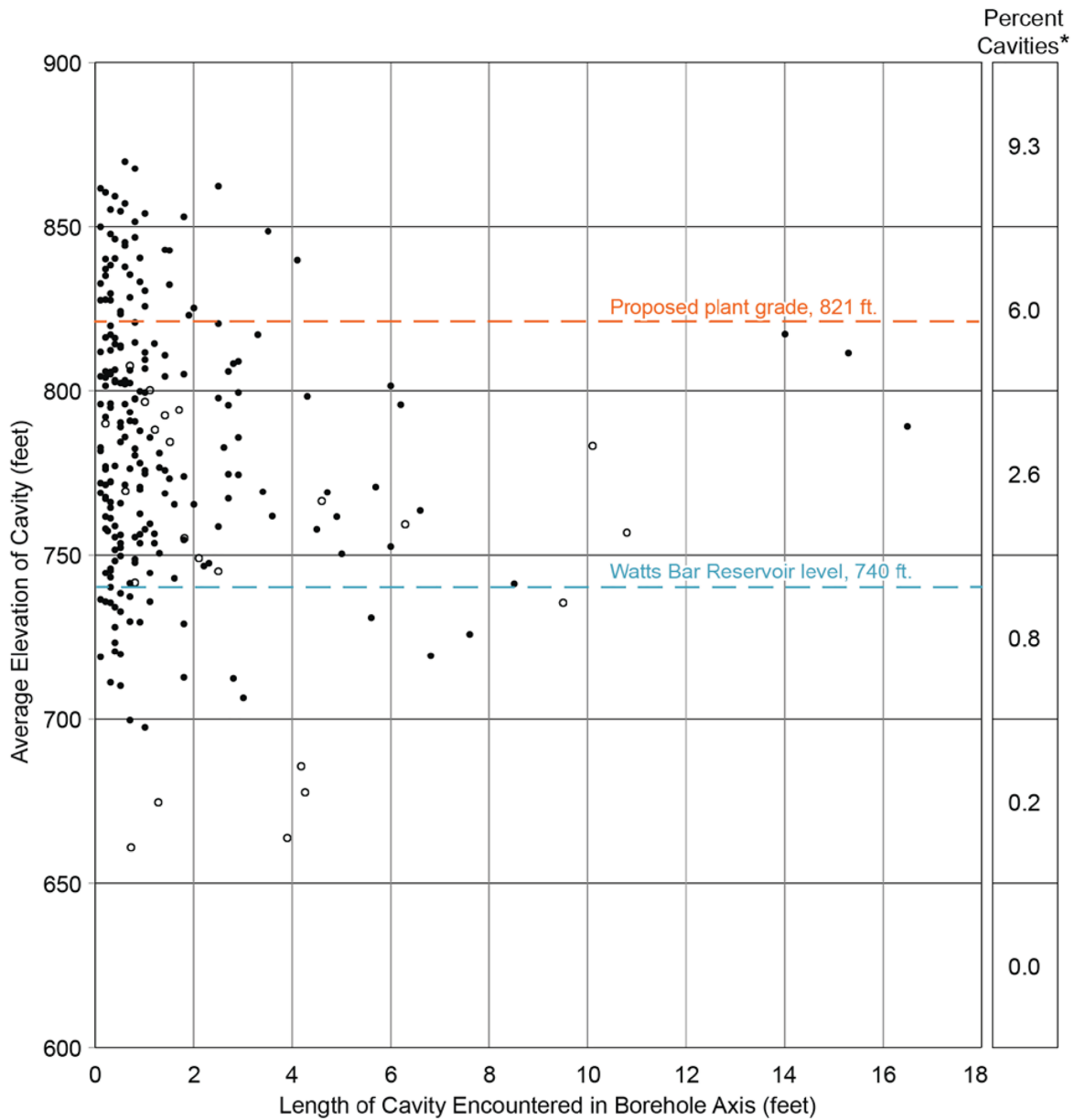
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Notes:

1. Boreholes are projected on to a vertical plane oriented perpendicular to bedding strike of N52°E.
2. Borehole data are compiled from the CRBRP (Reference 2.5.1-100) and the CRN investigation (Reference 2.5.1-214).

Figure 2.5.1-51. Cross-Section Distribution of Cavities in Rock Core



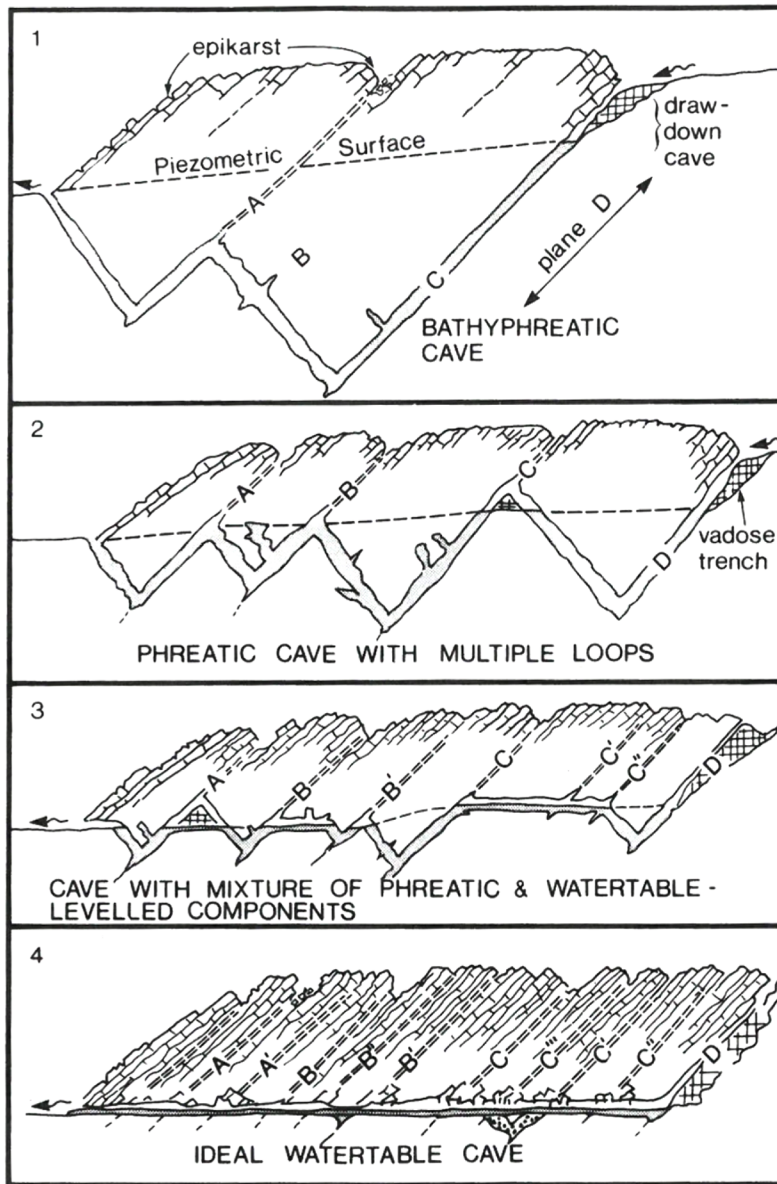
Explanation

- 2013 boring
- 1973-1978 boring

$$* \frac{\sum \text{length of cavities}}{\sum \text{length of rock core}} \times 100$$

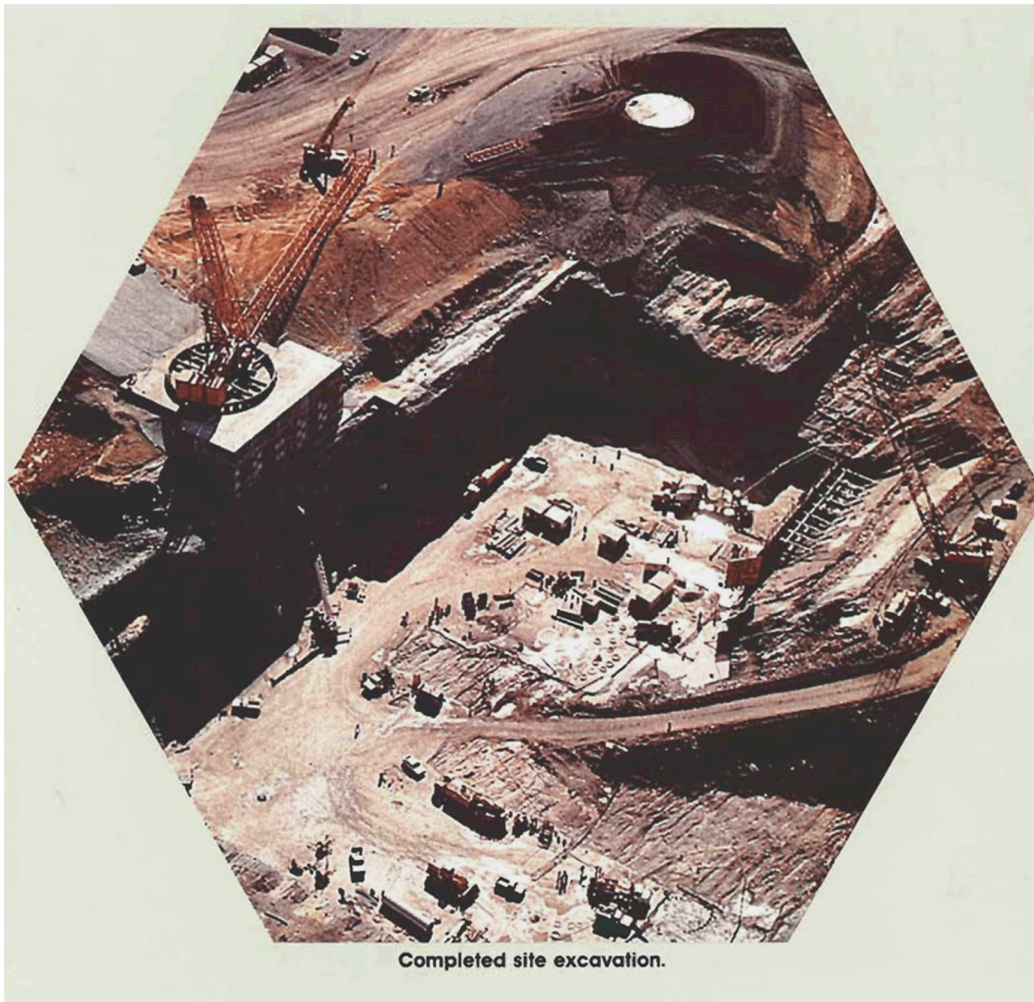
Sources: Reference 2.5.1-100, Reference 2.5.1-214

Figure 2.5.1-52. Cavity Size and Elevation in Borings



Source: Reference 2.5.1-7

Figure 2.5.1-53. Model Showing Types of Phreatic and Water Table Caves



Source: Reference 2.5.1-246
Oblique view south.

Figure 2.5.1-54. Photograph of Completed Clinch River Breeder Reactor Project Excavation, 1983



Figure 2.5.1-55. Dissolution of Limestone Interbeds in the Blackford Formation

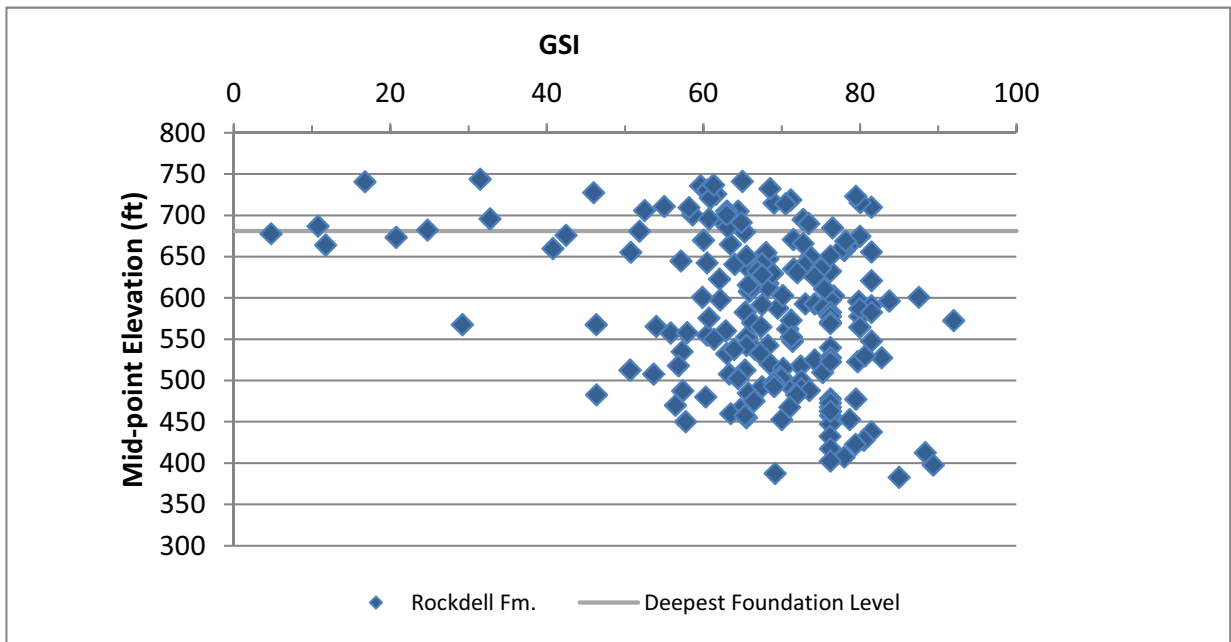
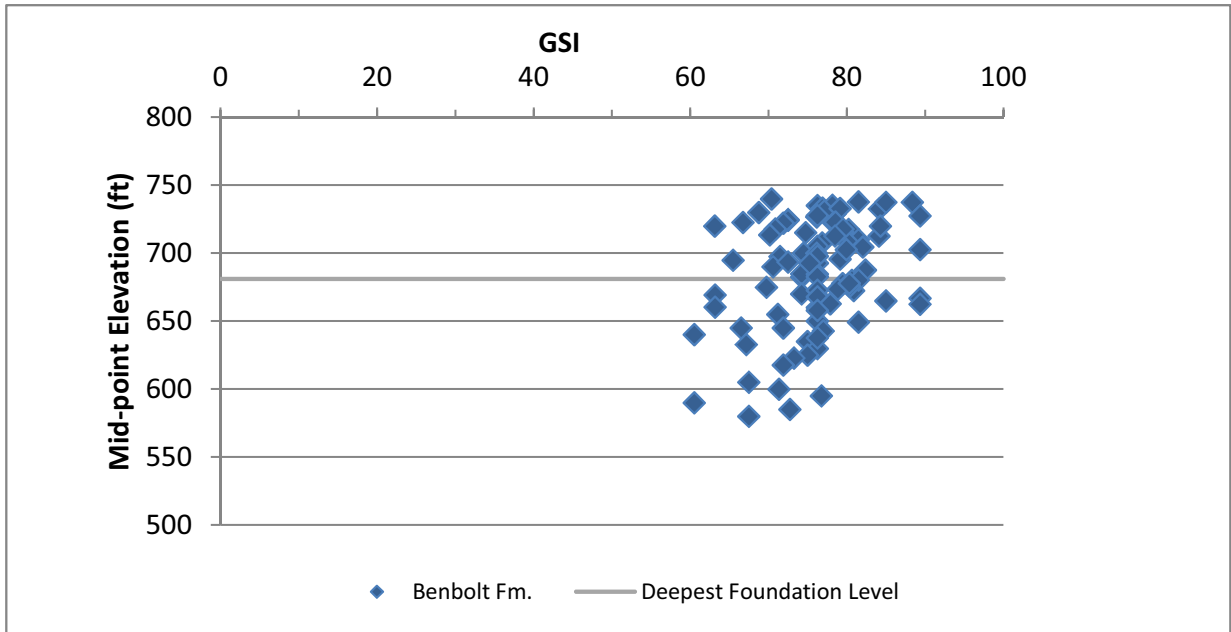


Figure 2.5.1-56. (Sheet 1 of 3) Scatter Plots of Geological Strength Index per Bedrock Unit

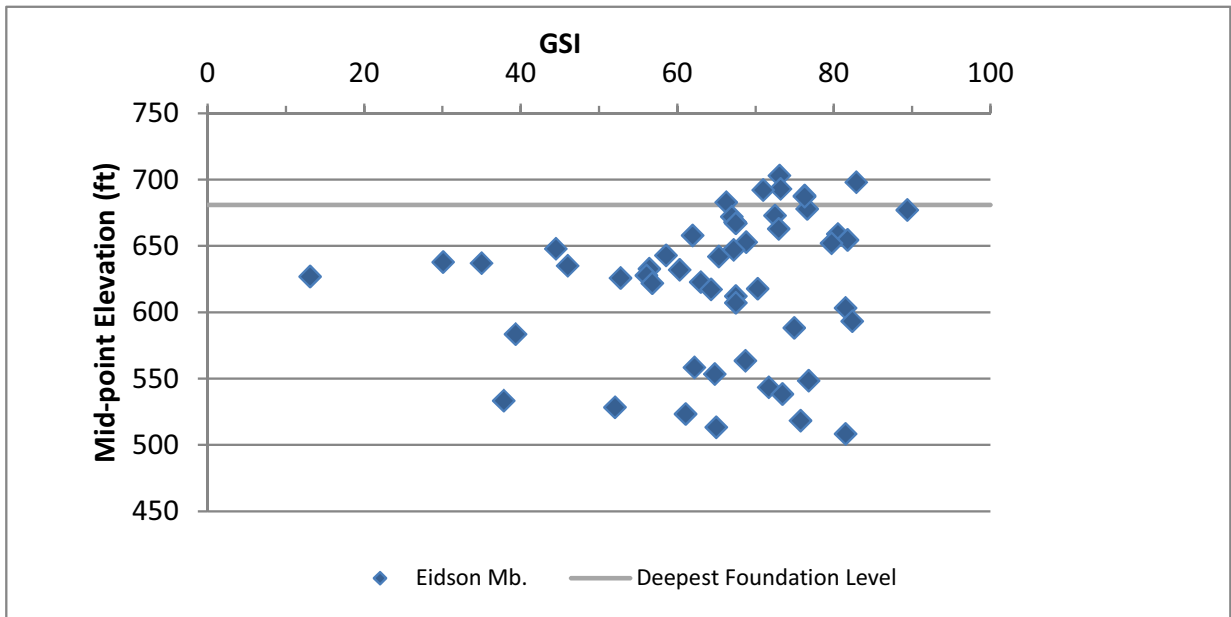
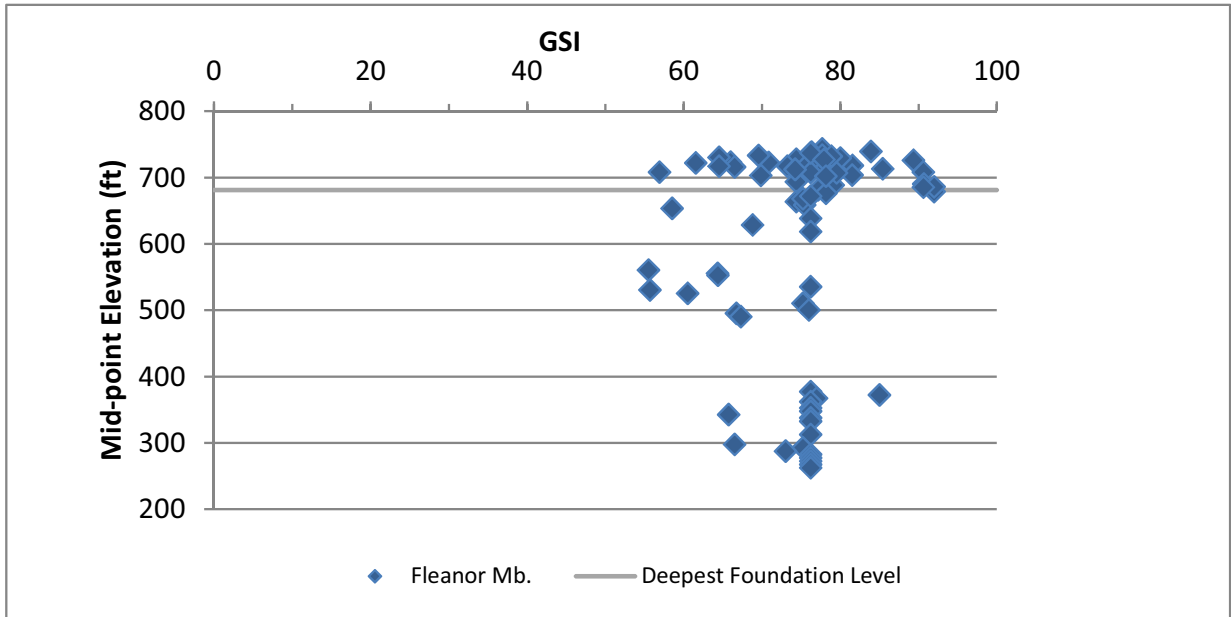


Figure 2.5.1-56. (Sheet 2 of 3) Scatter plots of Geological Strength Index per Bedrock Unit

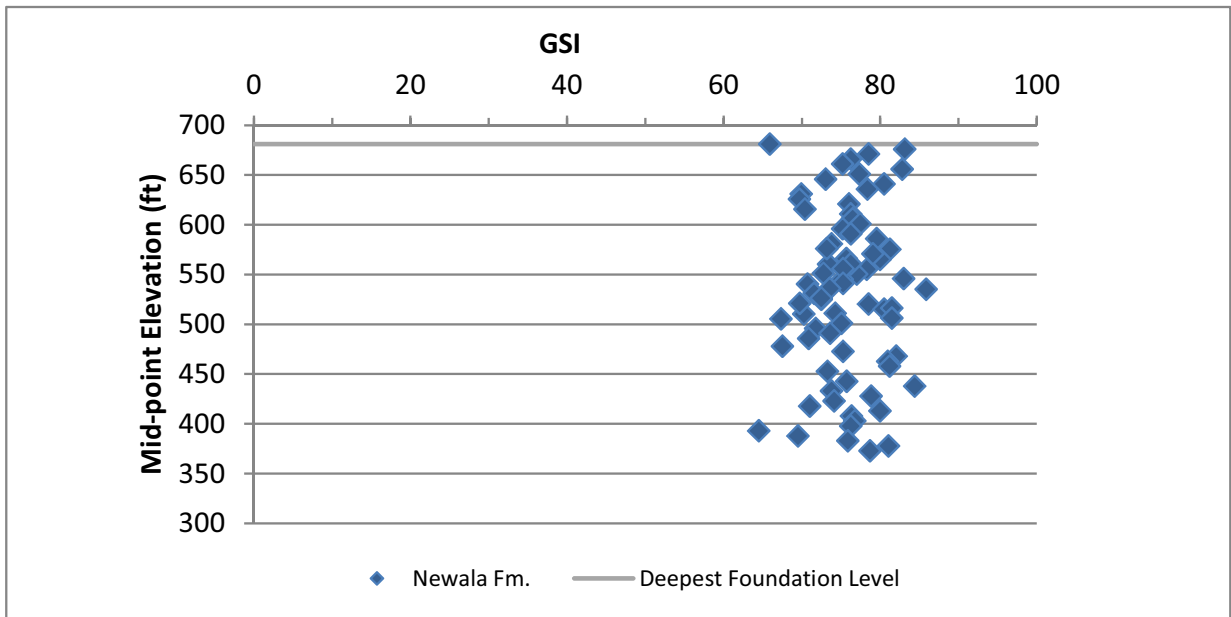
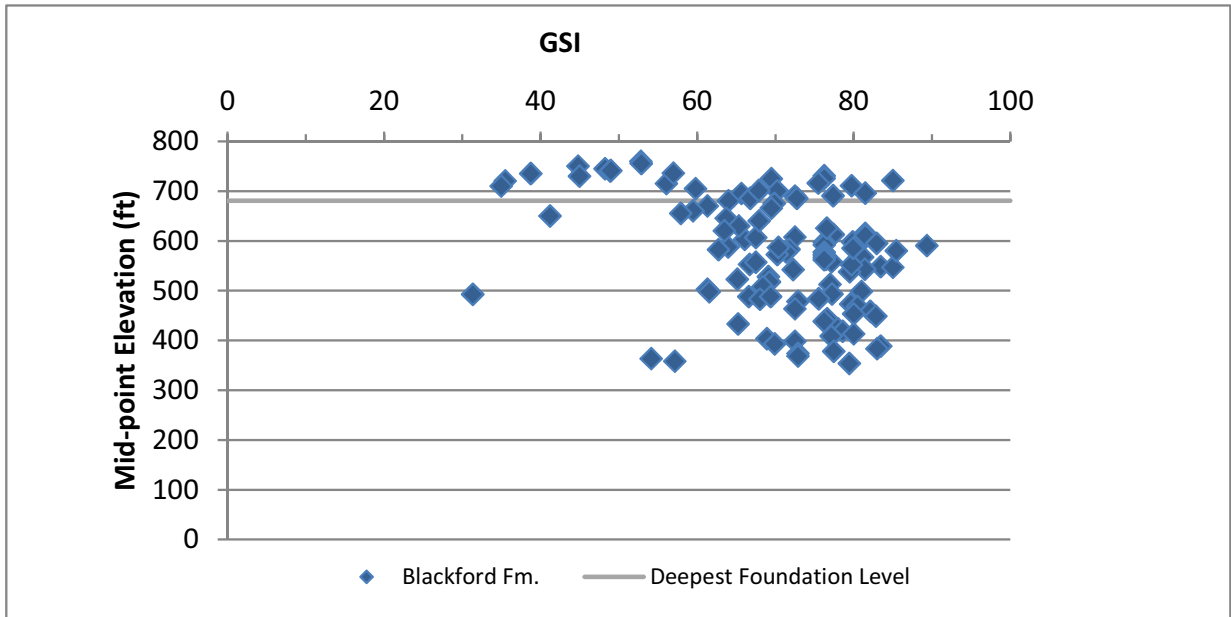
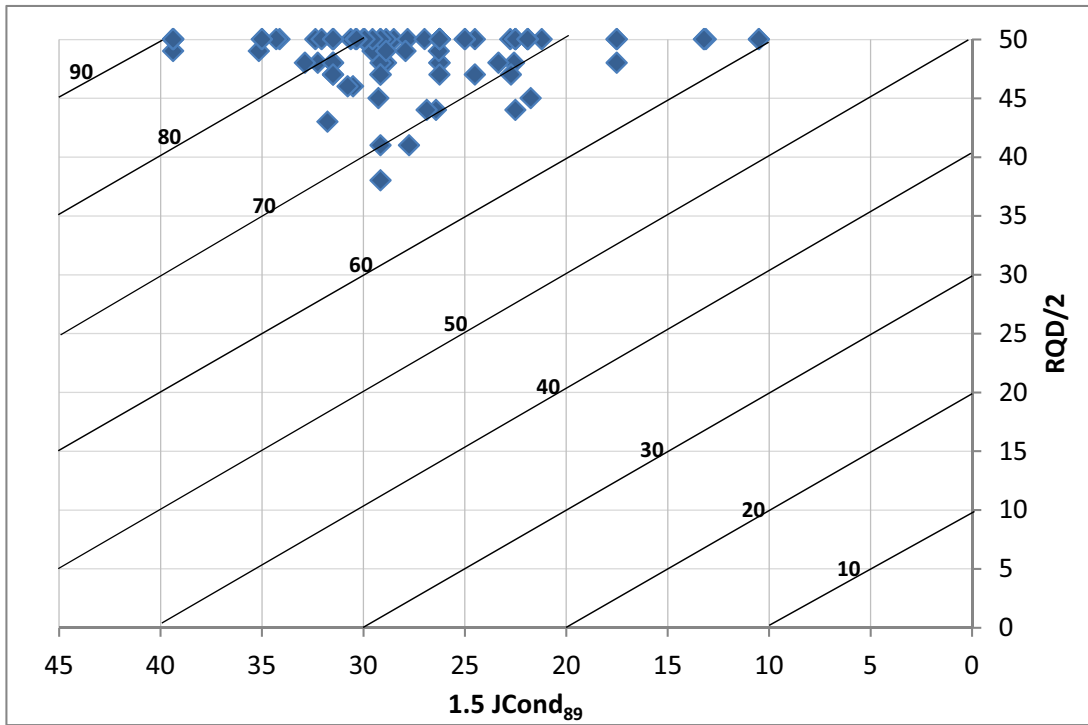
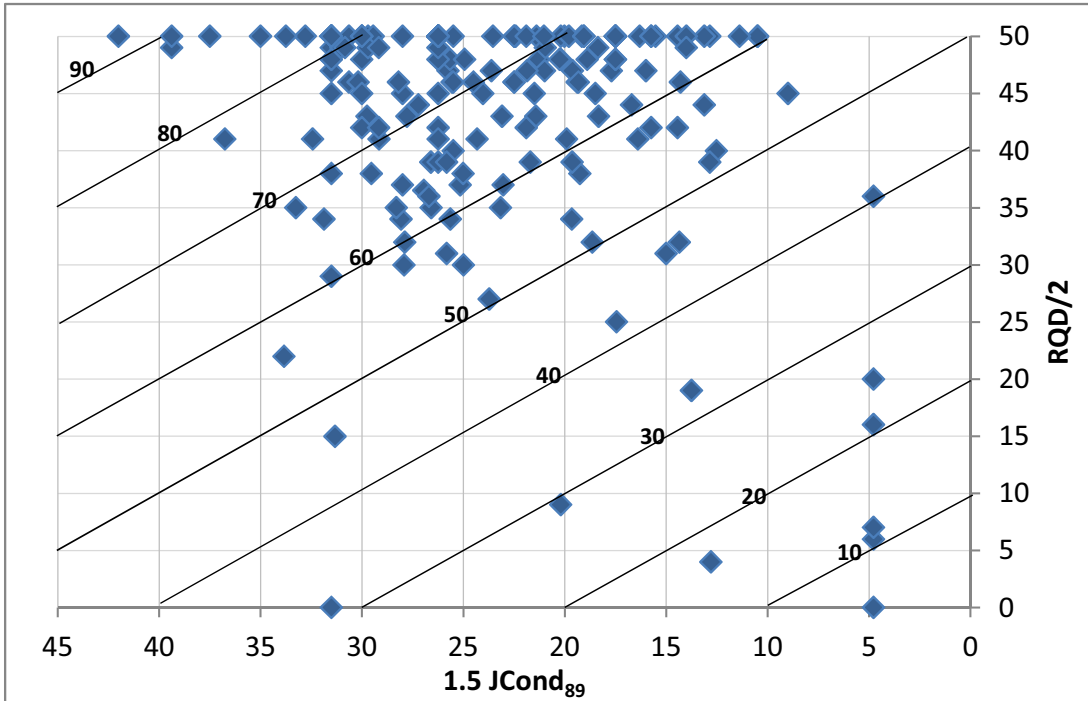


Figure 2.5.1-56. (Sheet 3 of 3) Scatter Plots of Geological Strength Index per Bedrock Unit



Benbolt Formation



Rockdell Formation

Note: JCond₈₉ = Joint Condition Rating; GSI = Geological Strength Index; RQD = Rock Quality Designation
Figure 2.5.1-57. (Sheet 1 of 3) Portion of GSI Chart Showing 1.5 JCond₈₉ Against RQD/2 and GSI per Bedrock Unit (Extended to Show RQD/2 > 40)

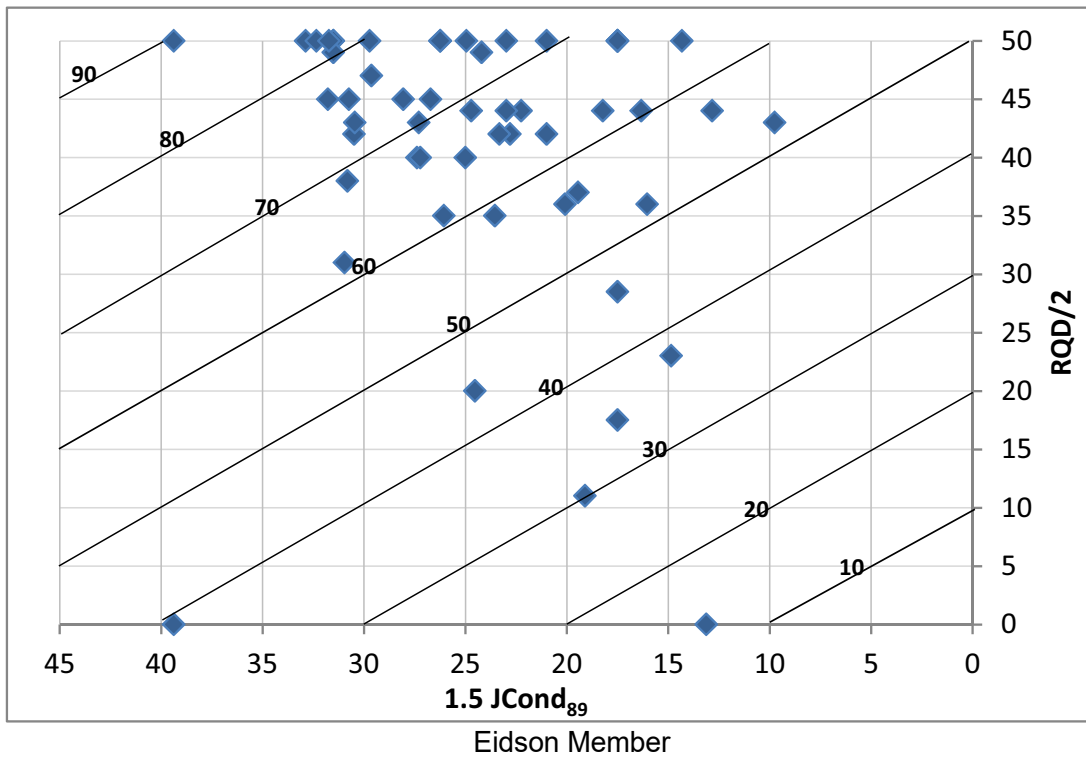
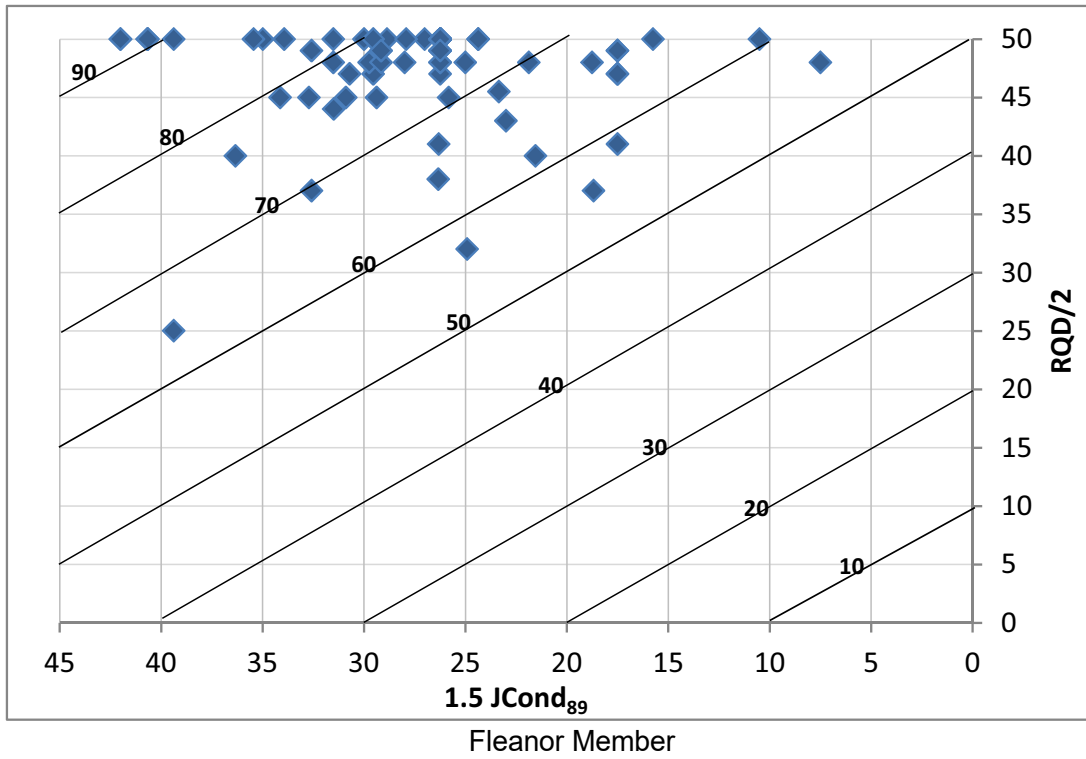


Figure 2.5.1-57. (Sheet 2 of 3) Portion of GSI Chart Showing $1.5 JCond_{89}$ Against $RQD/2$ and GSI per Bedrock Unit (Extended to Show $RQD/2 > 40$)

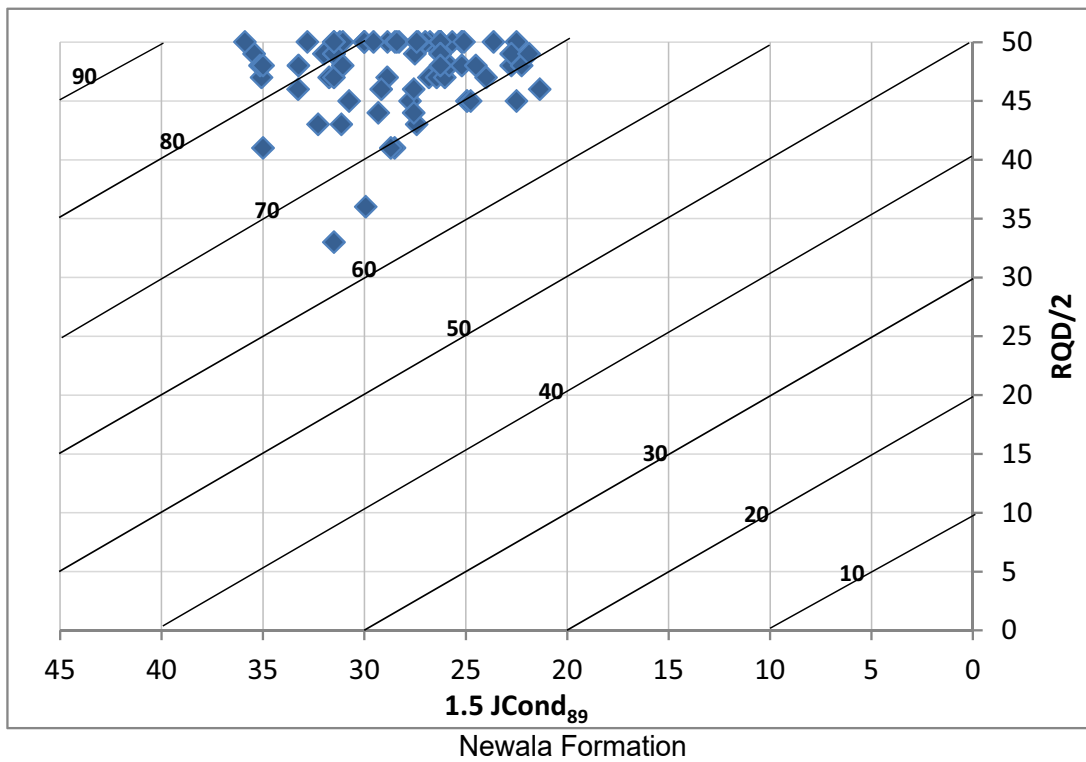
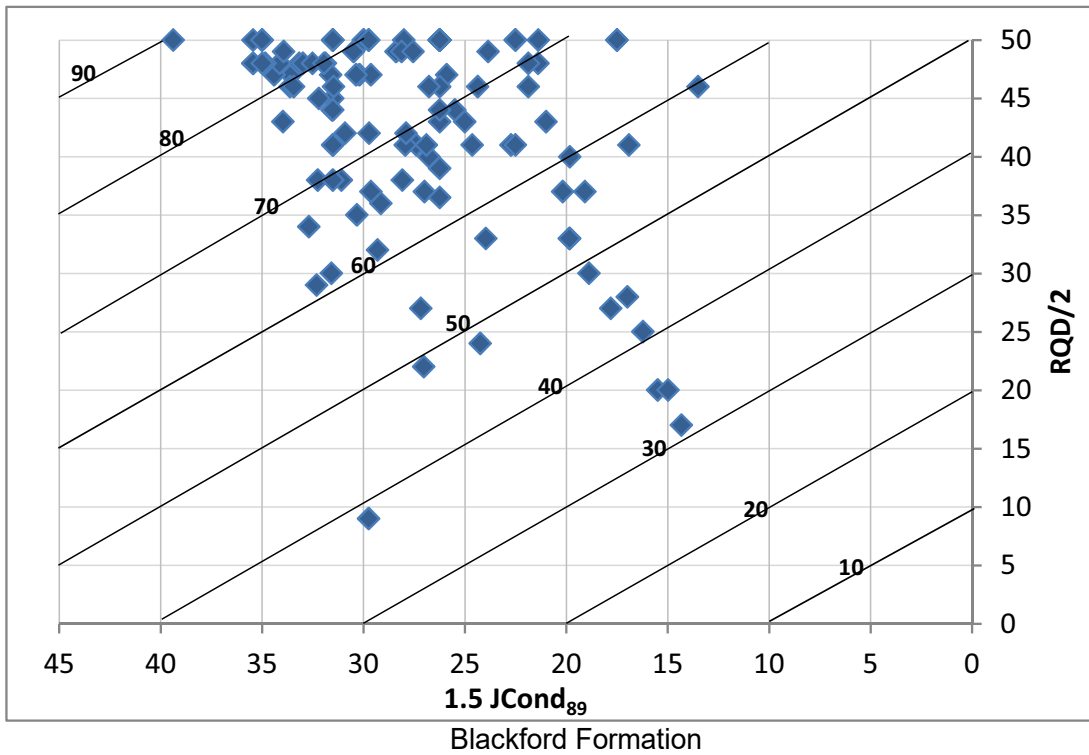
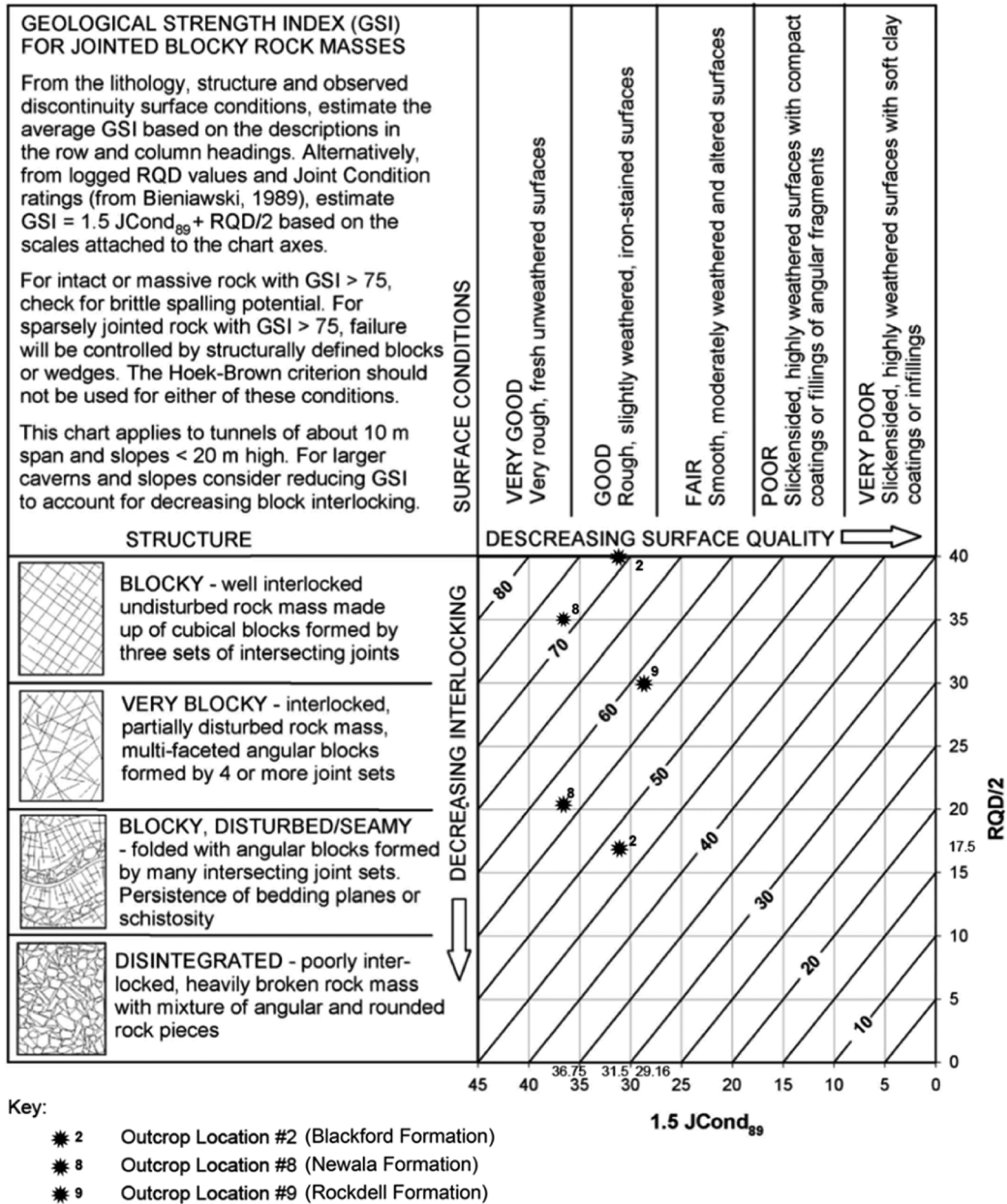


Figure 2.5.1-57. (Sheet 3 of 3) Portion of GSI Chart Showing $1.5 JCond_{89}$ Against $RQD/2$ and GSI per Bedrock Unit (Extended to Show $RQD/2 > 40$)

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Note: $JCond_{89}$ = Joint Condition Rating; RQD = Rock Quality Designation
Source: [Reference 2.5.1-265](#)

Figure 2.5.1-58. Estimates of Geological Strength Index at Outcrop Locations 2, 8, and 9

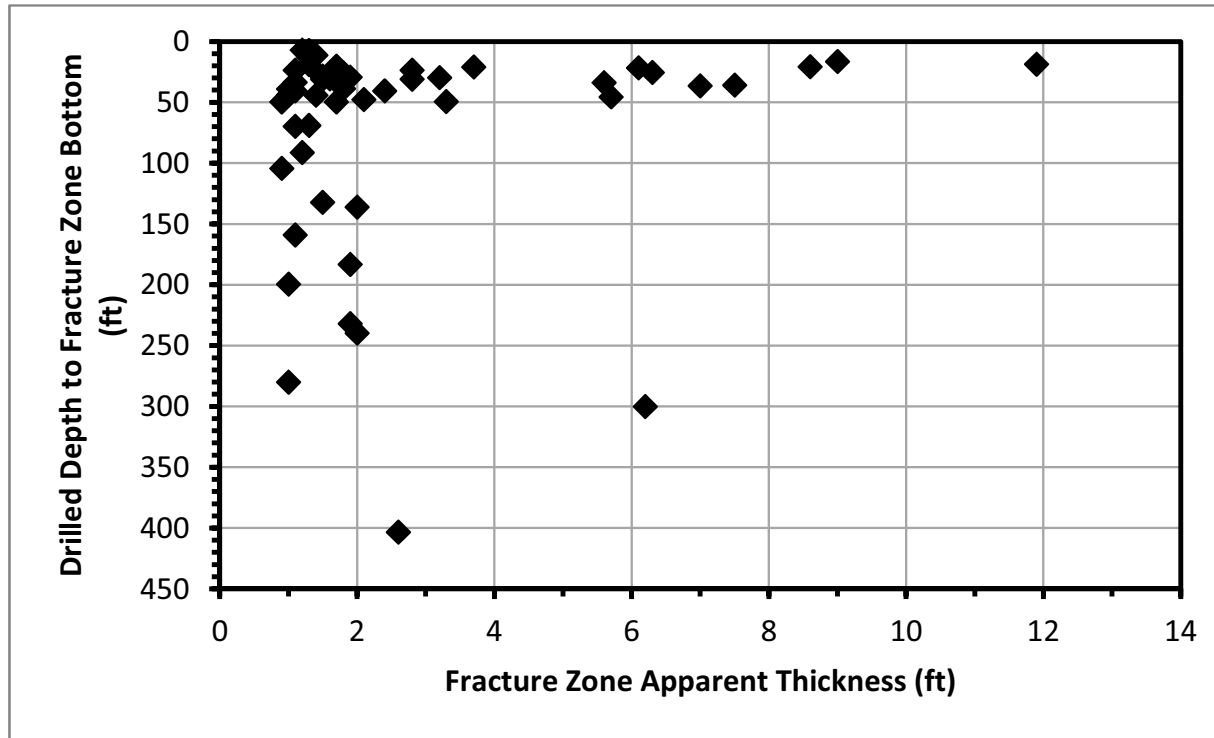


Figure 2.5.1-59. (Sheet 1 of 2) Scatter Plot of Fracture Zone Apparent Thickness—Against Drilled Depth to Fracture Zone Bottom (Using the 100- and 200-Series Borings)

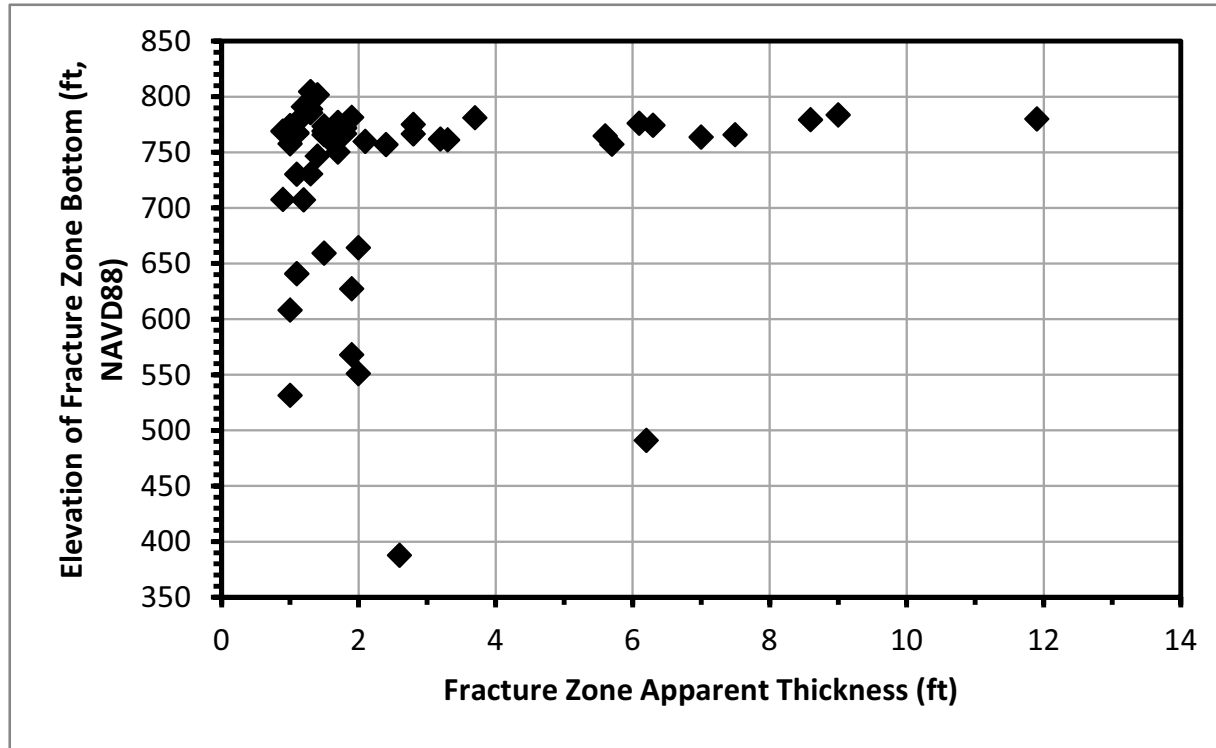


Figure 2.5.1-59. (Sheet 2 of 2) Scatter Plot of Fracture Zone Apparent Thickness—Against Elevation of Fracture Zone Bottom (Using the 100- and 200-Series Borings)

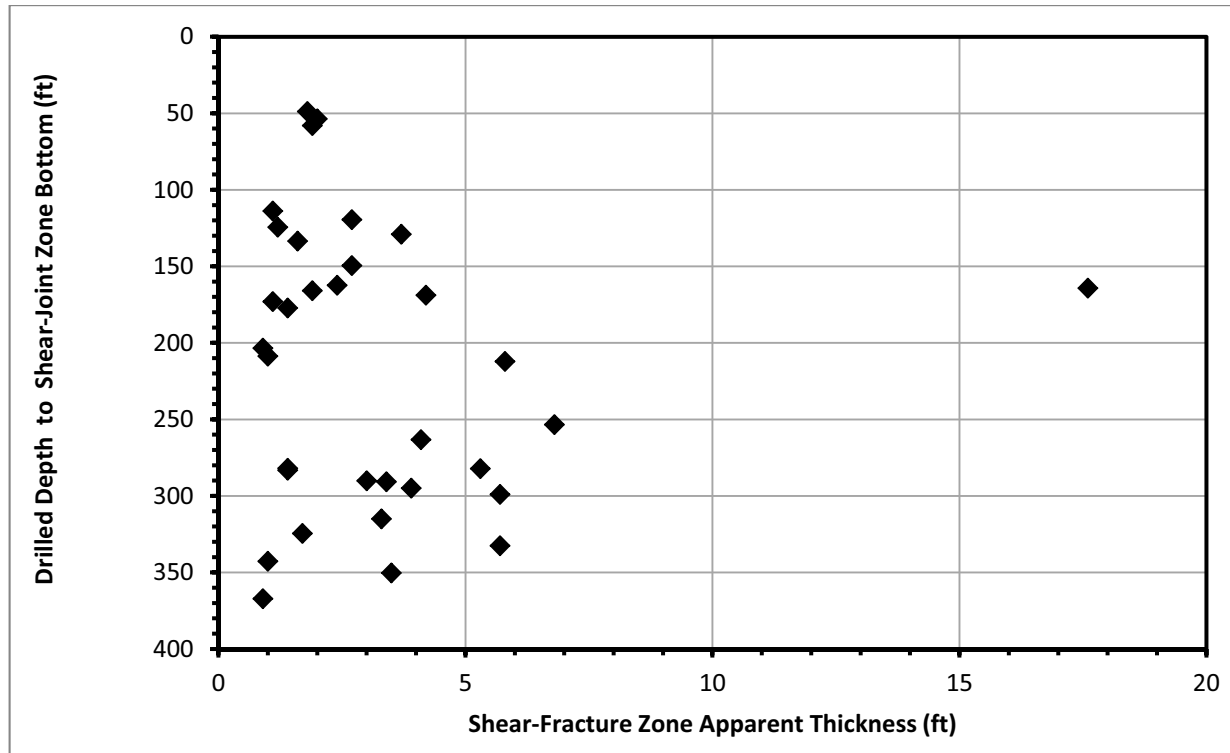


Figure 2.5.1-60. (Sheet 1 of 2) Scatter Plot of Shear-Fracture Zone Apparent Thickness—Against Drilled Depth to Shear-Fracture Zone Bottom (Using 100- and 200-Series Borings)

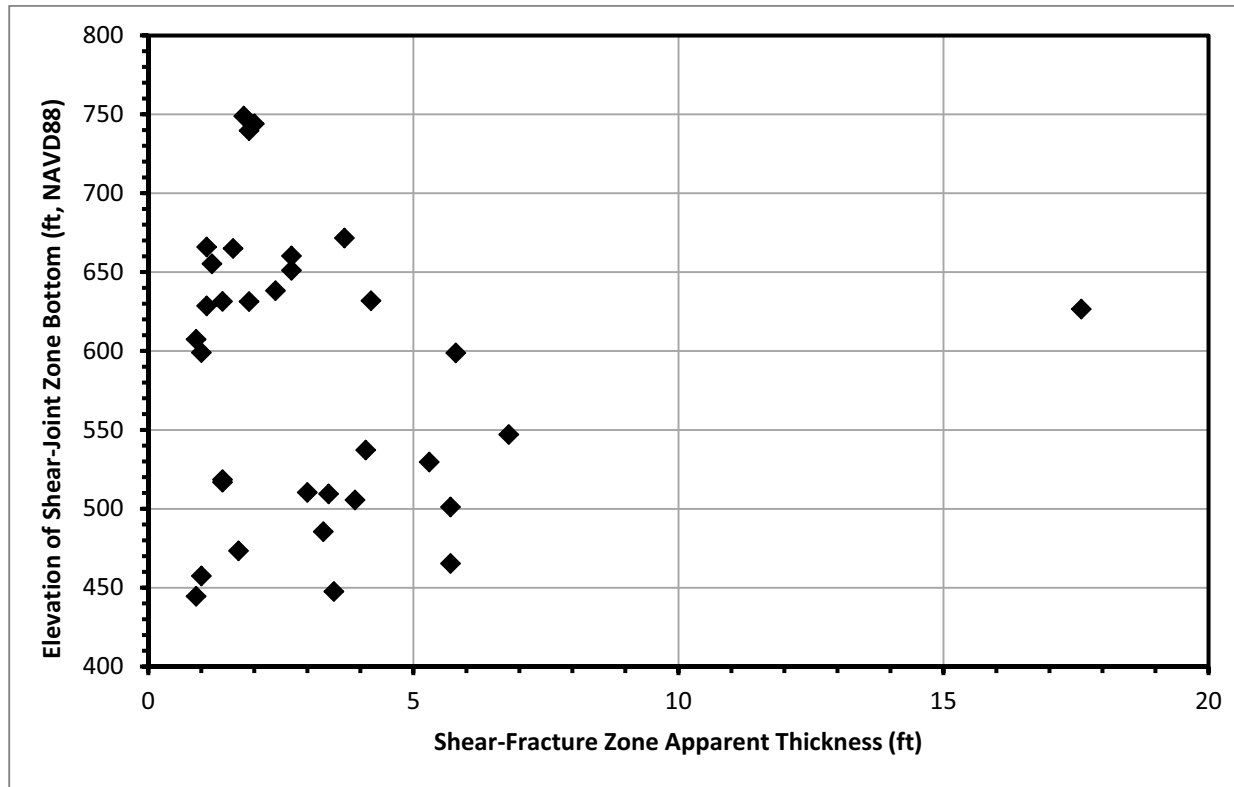
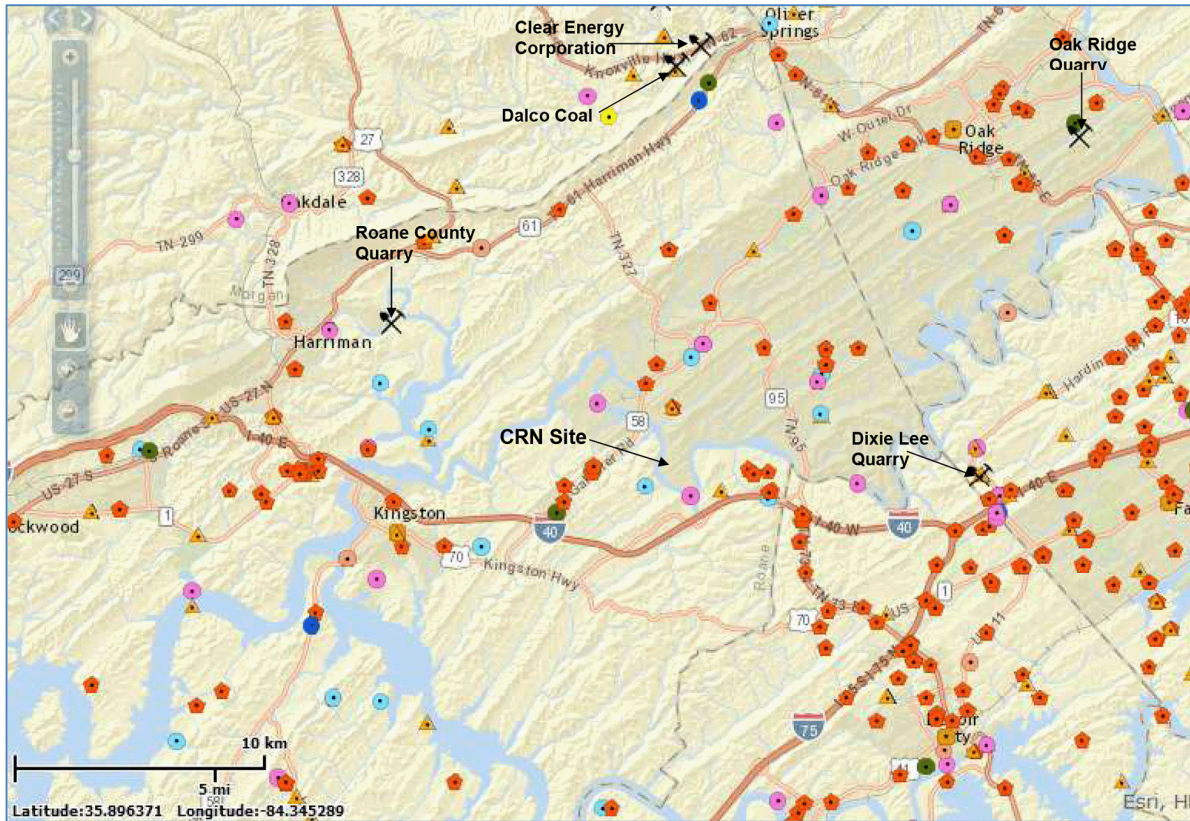


Figure 2.5.1-60. (Sheet 2 of 2) Scatter Plot of Shear-Fracture Zone Apparent Thickness—Against Elevation of Shear-Fracture Zone Bottom (Using 100- and 200-Series Borings)


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Notes:

Source: Reference 2.5.1-273.

The symbols shown on this map represent water resource permits for various applications such as construction, water treatment plants, individual wells, hydrostatic purposes etc. See the legend to this figure on the next sheet.

Mine locations are shown as  and include the following on the map:

Roane County Quarry: Crushed and Broken Limestone

Dixie Lee Quarry: Crushed and Broken Limestone

Oak Ridge Quarry: Crushed and Broken Limestone

Clear Energy Corporation (formerly Dalco of Tennessee LLC.): Bituminous Coal and Lignite, Surface.

Dalco Coal of Tennessee, LLC.: Bituminous Coal and Lignite, Underground.

Figure 2.5.1-61. (Sheet 1 of 2) Map showing the Water Resource Permit Application Sites Within Approximately 10 Miles of the Clinch River Nuclear Site



Notes:
Source: [Reference 2.5.1-273](#).

Figure 2.5.1-61. (Sheet 2 of 2) Map Showing the Water Resource Permit Application Sites Within Approximately 10 Miles of the Clinch River Nuclear Site

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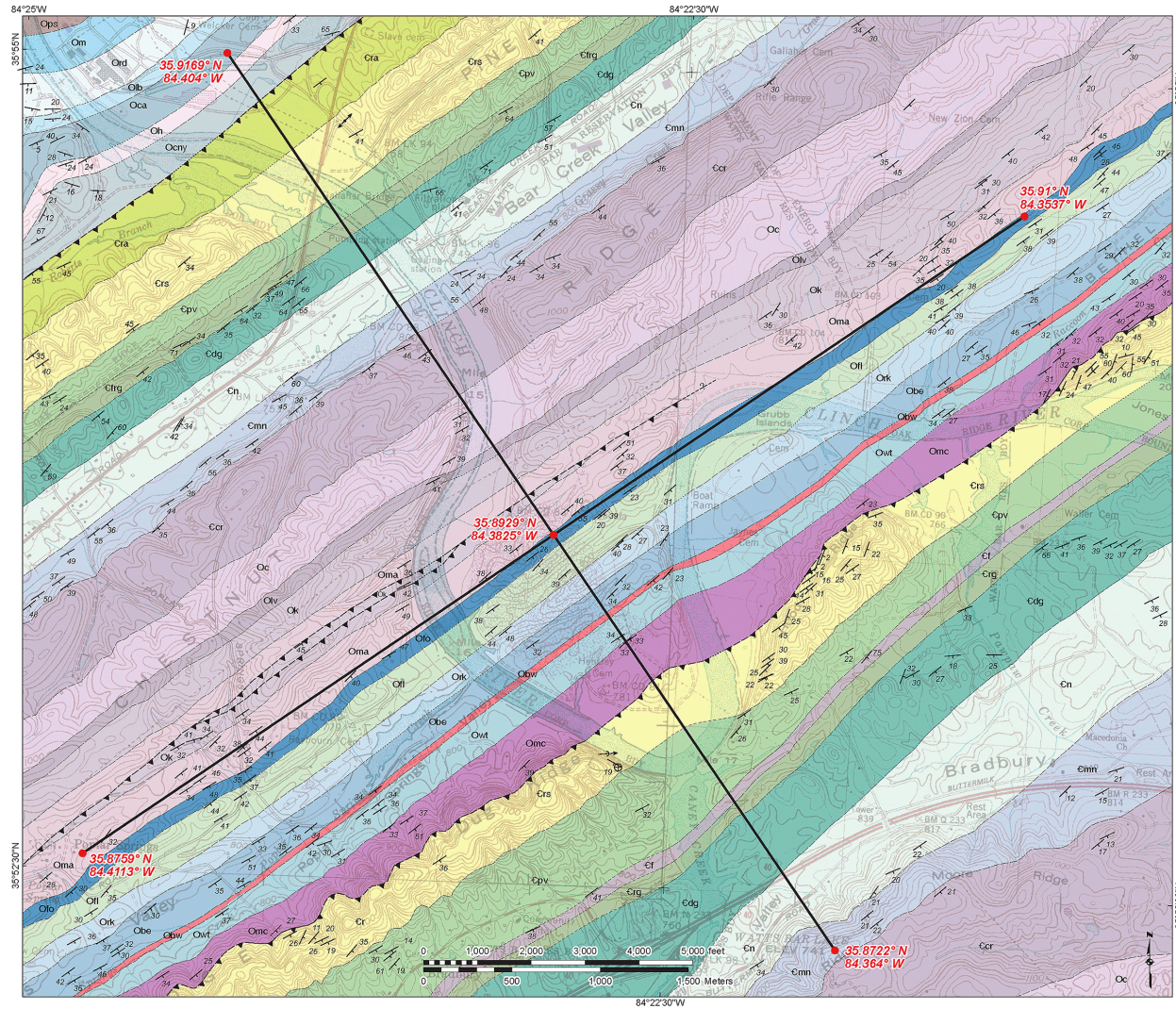
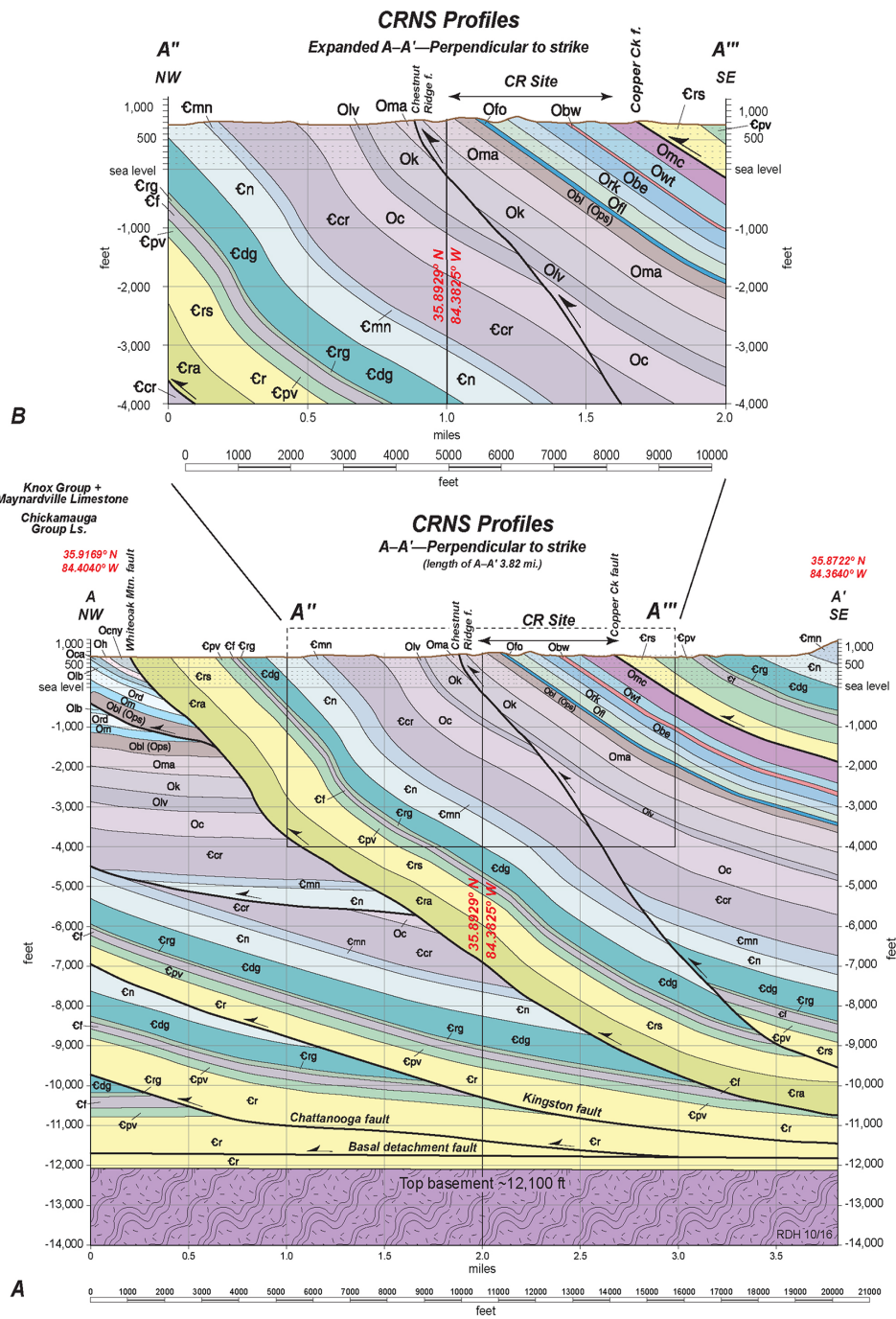


Figure 2.5.1-62. Map Showing the Location of Geologic Cross-Section A-A' to Basement

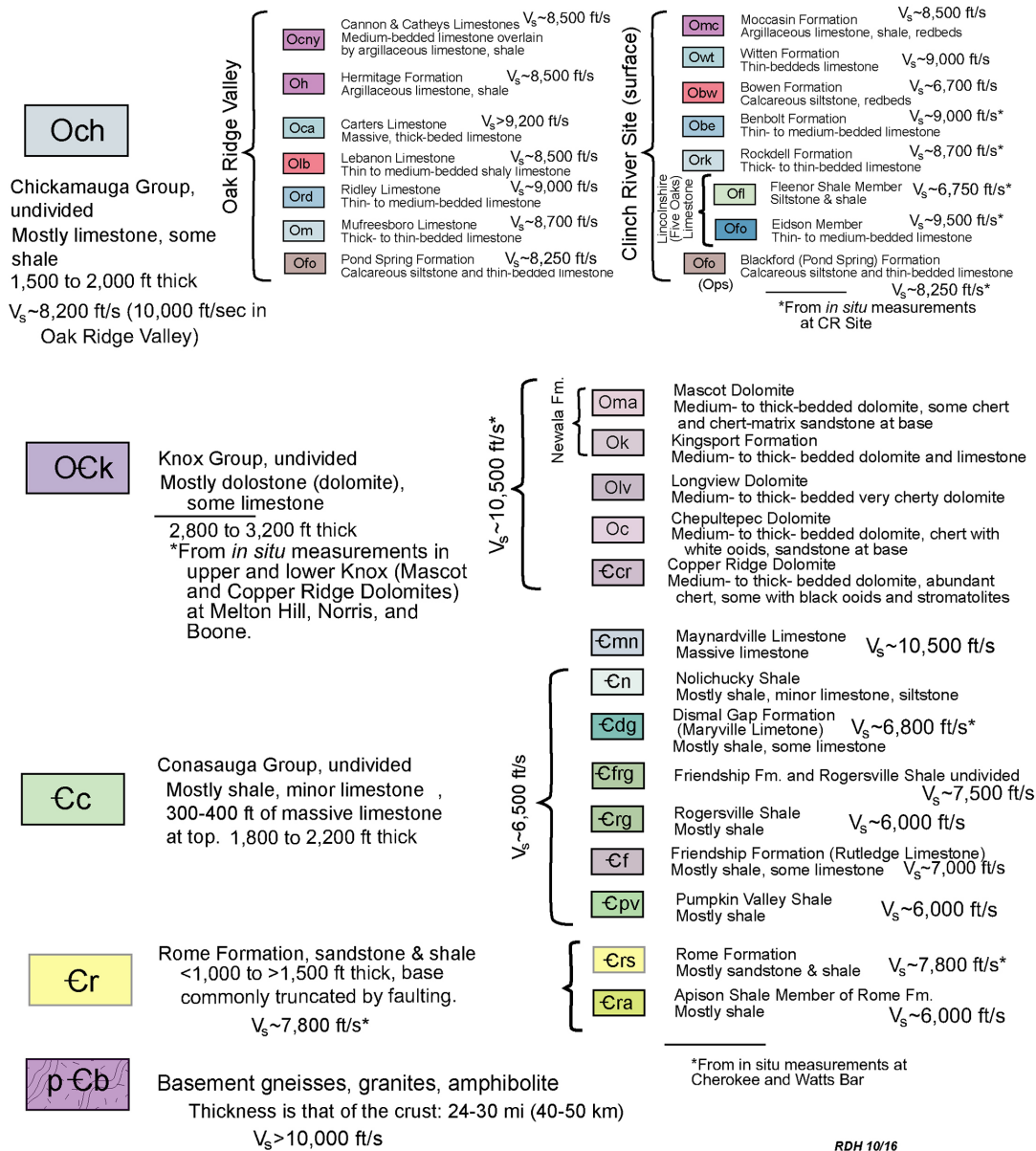
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Note:
 A. Across-strike geologic cross-section A-A' with an expanded section, the location of which is indicated in the rectangle in the center of the diagram.
 B. Upper part of Figure A with additional detail. Location of section line is indicated in the geologic map on Figure 2.5.1-62.

Figure 2.5.1-63. (Sheet 1 of 2) Geologic Cross-Section A-A' Ground Surface to Basement

CRN Cross Sections Explanation



Note: Explanation of symbols used to identify the different geologic units in [Figures 2.5.1-62](#) and [2.5.1-63](#).

Figure 2.5.1-63. (Sheet 2 of 2) Geologic Cross-Section A-A' Ground Surface to Basement