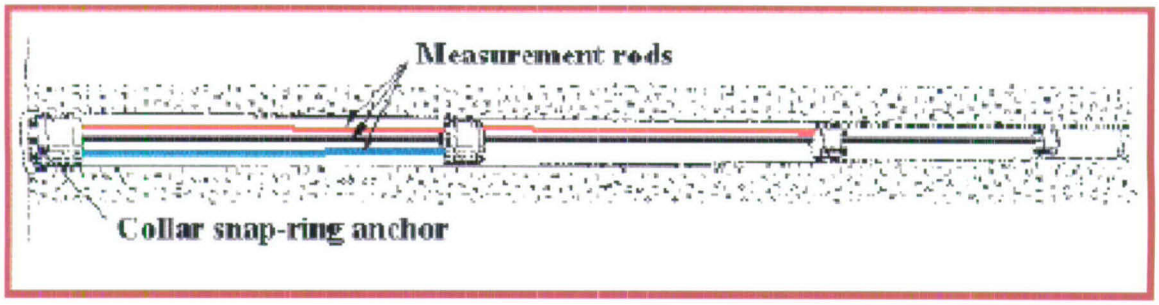


Figure 7-1. Multiple-Point Borehole Extensometer (MPBX)

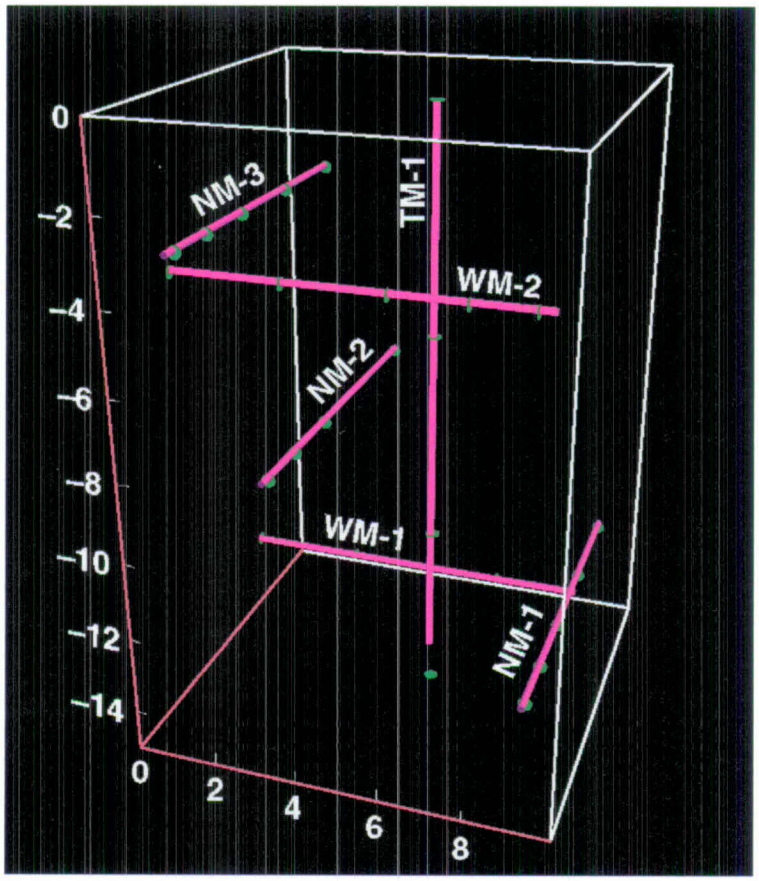


Figure 7-2. MPBX Borehole Locations, Viewed from the South Face

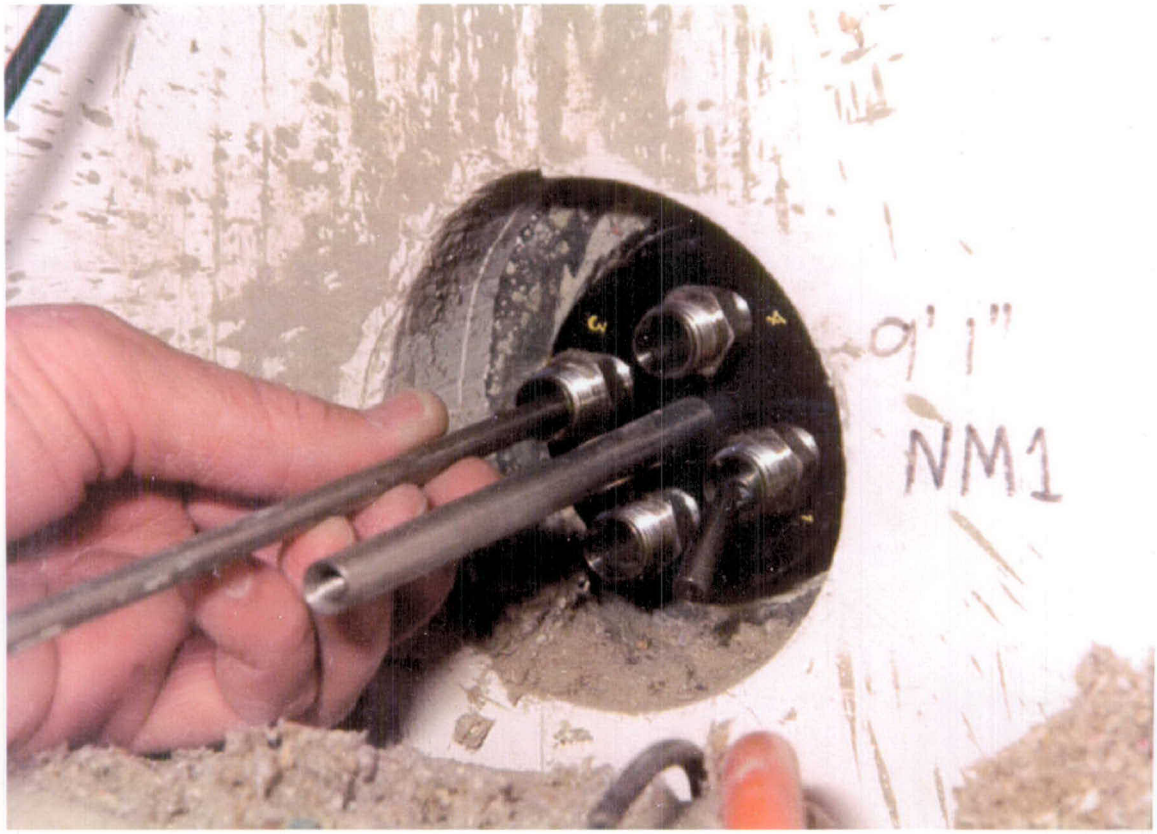


Figure 7-3. Extensometer NM-1 Collar and Invar Rod Installation

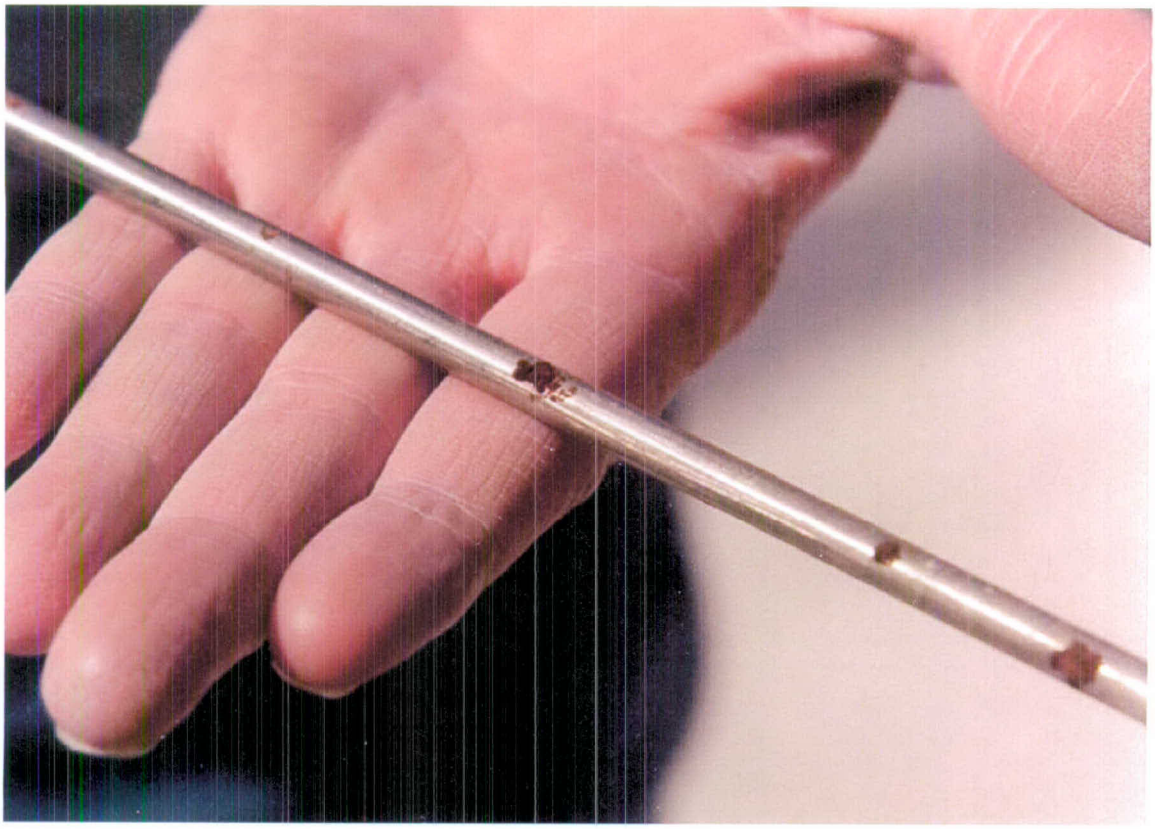
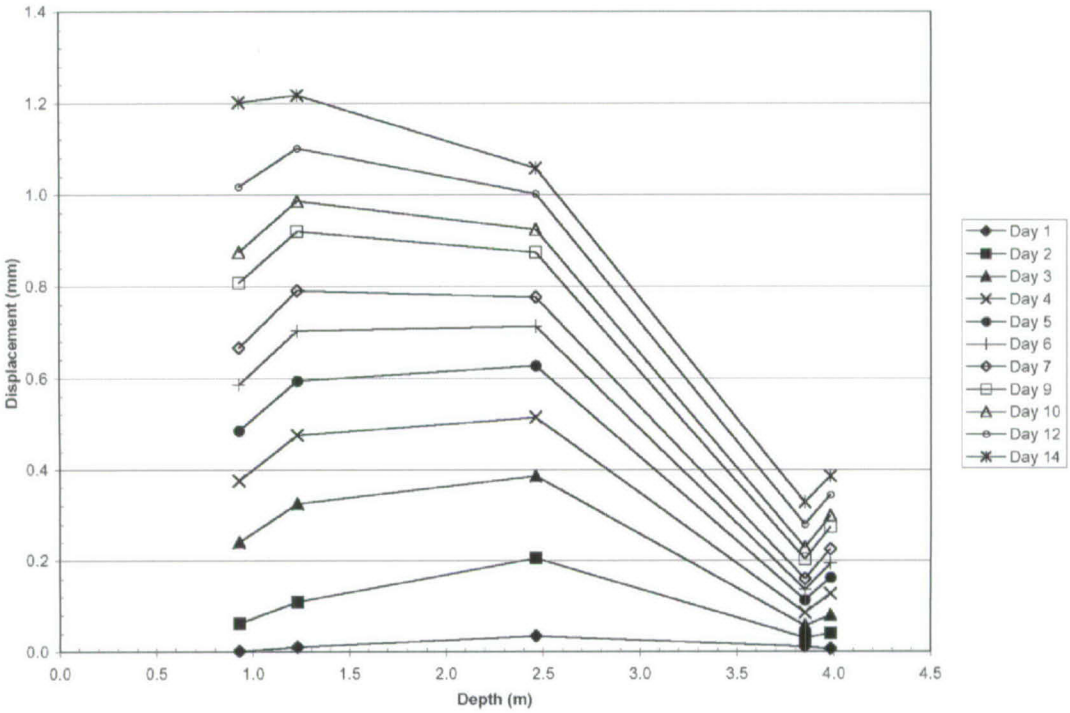
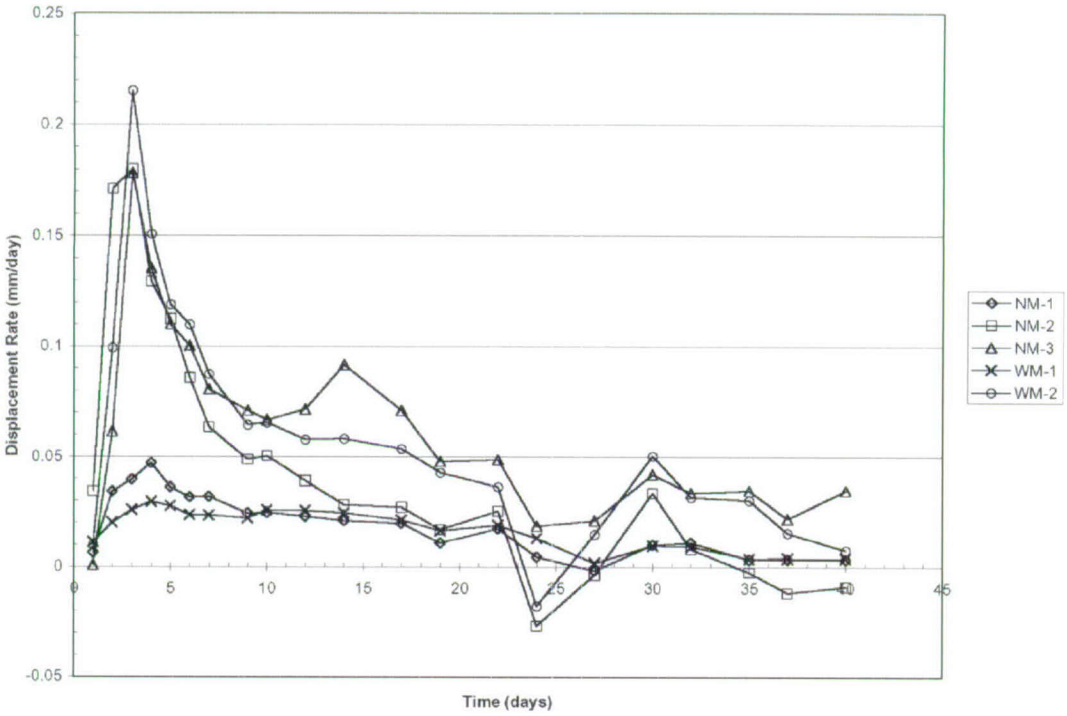


Figure 7-4. Invar Rod Corrosion



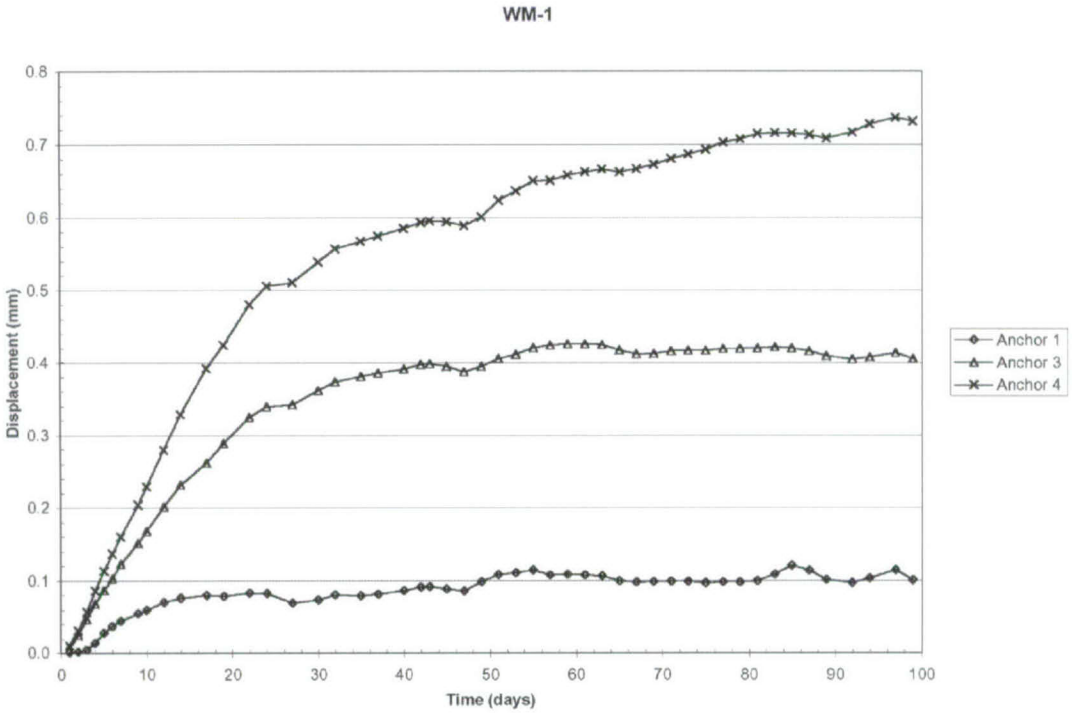
NOTE: Extensometers are oriented north-south (NM-1, NM-2, NM-3) or east-west (WM-1, WM-2). NM-2 is located slightly above the heater plane. Although NM-2 was in the hottest portion of the block, the upper extensometers show greater displacements by the second week of the test.

Figure 7-5. Horizontal Displacements During the First Two Weeks of the Large Block Test



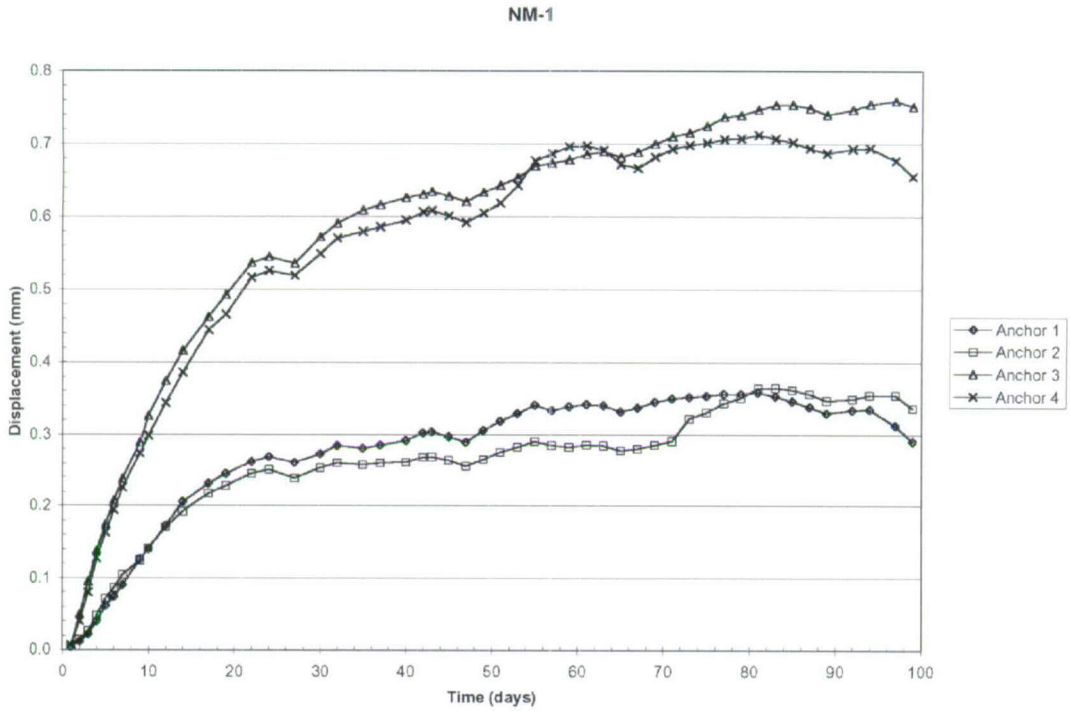
NOTE: The central and upper extensometers extended at a rapid rate during the first week of the test.

Figure 7-6. Displacement Rates for the Horizontal Extensometers During the First 40 Days of the LBT



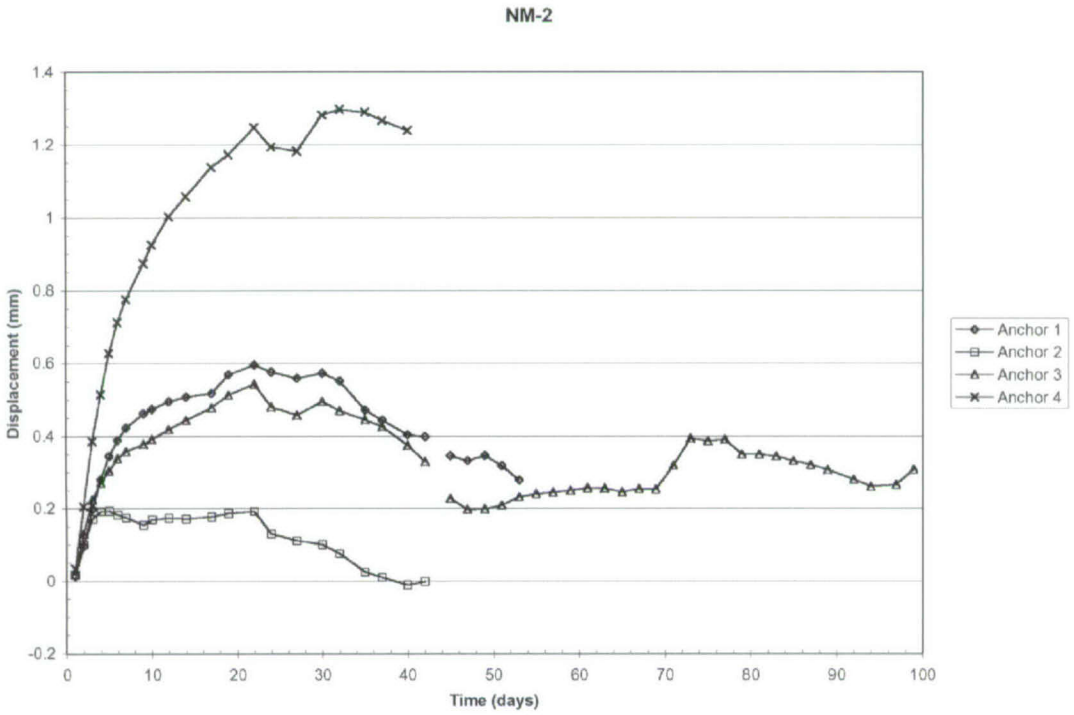
NOTE: Located near the north face at a depth of 3.98 m. Only three anchors were installed.

Figure 7-7. East-West Anchor Displacements During the First 100 Days for WM-1



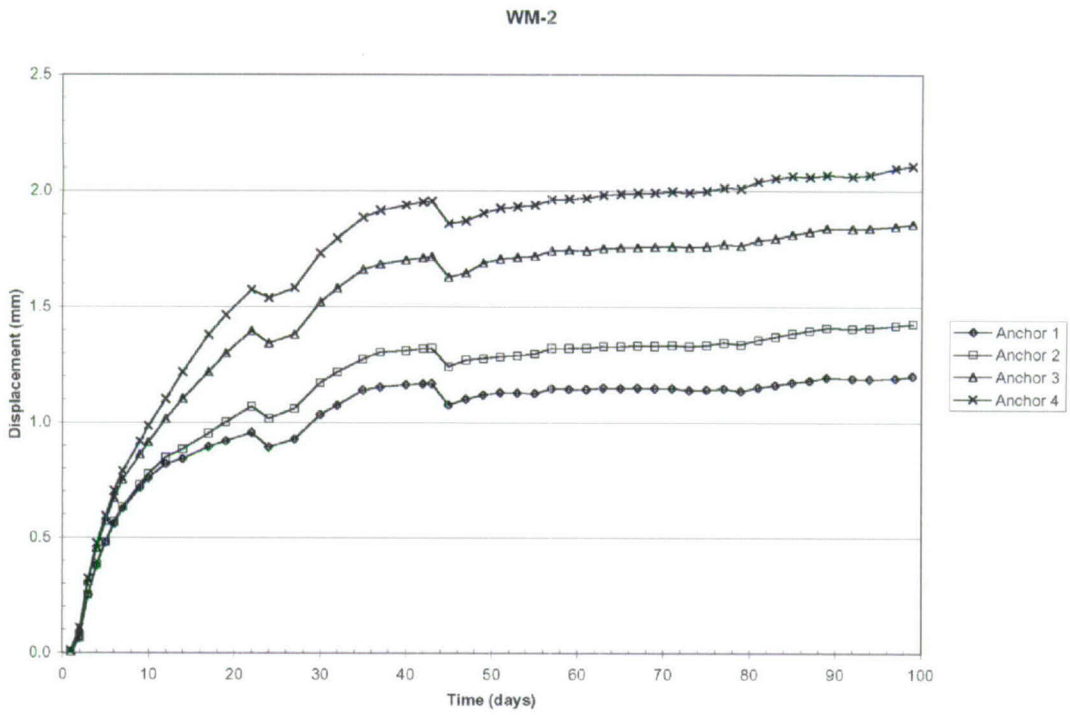
NOTE: Located near the east face at a depth of 3.85 m.

Figure 7-8. North-South Anchor Displacements During the First 100 Days for NM-1



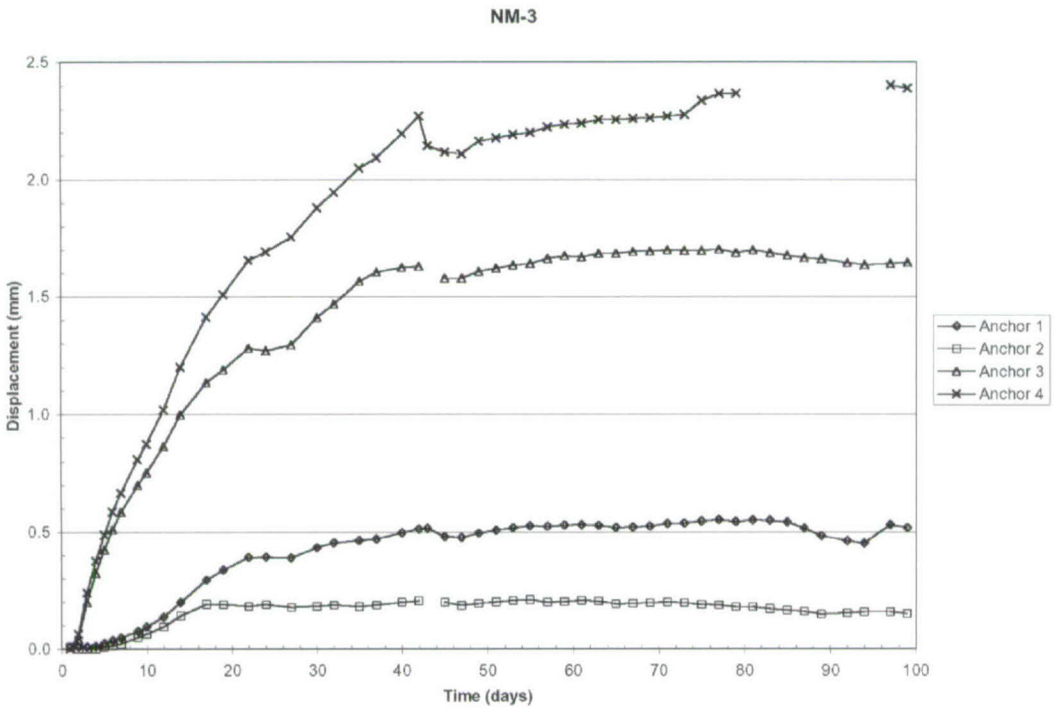
NOTE: Located at a depth of 2.47 m, slightly above the heater plane.

Figure 7-9. North-South Anchor Displacements During the First 100 Days for NM-2



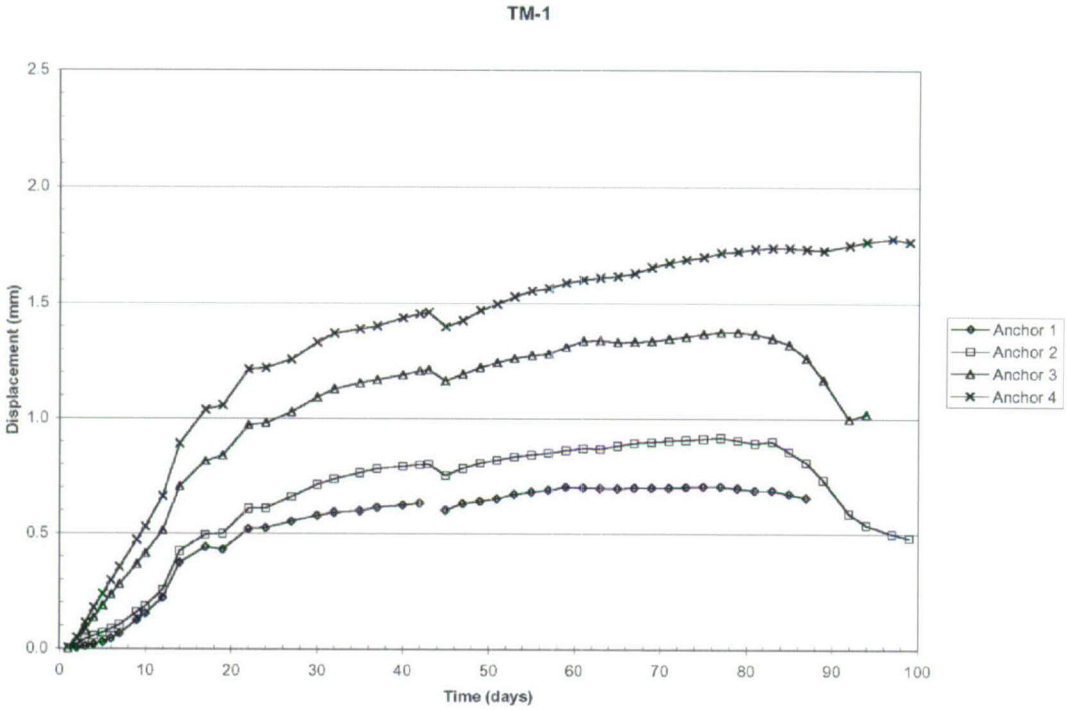
NOTE: Located near the south face at a depth of 1.23 m

Figure 7-10. East-West Anchor Displacements During the First 100 Days for WM-2



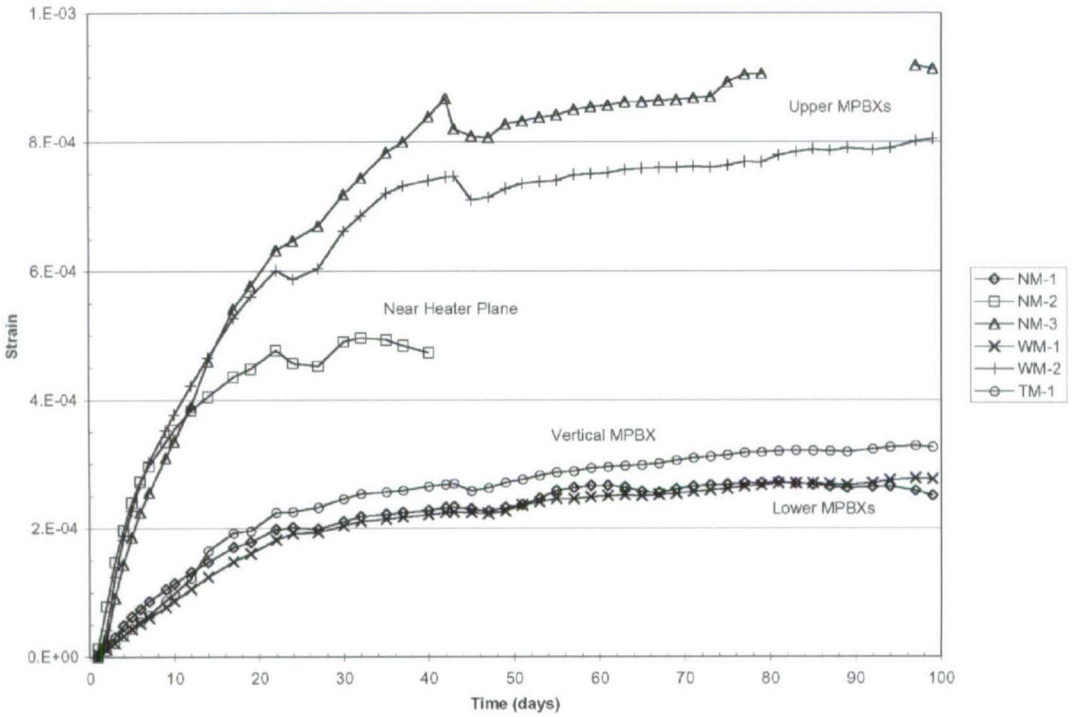
NOTE: Located near the west face at a depth of 0.93 m

Figure 7-11. North-South Anchor Displacements During the First 100 Days for NM-3



NOTE: Located near the center of the large block

Figure 7-12. Vertical Anchor Displacements During the First 100 Days for TM-1



NOTE: The upper extensometers extended far more than the lower extensometers. The vertical strain was comparable to horizontal strains near the base of the block.

Figure 7-13. Anchor 4 Strains for Each Extensometer During the First 100 Days

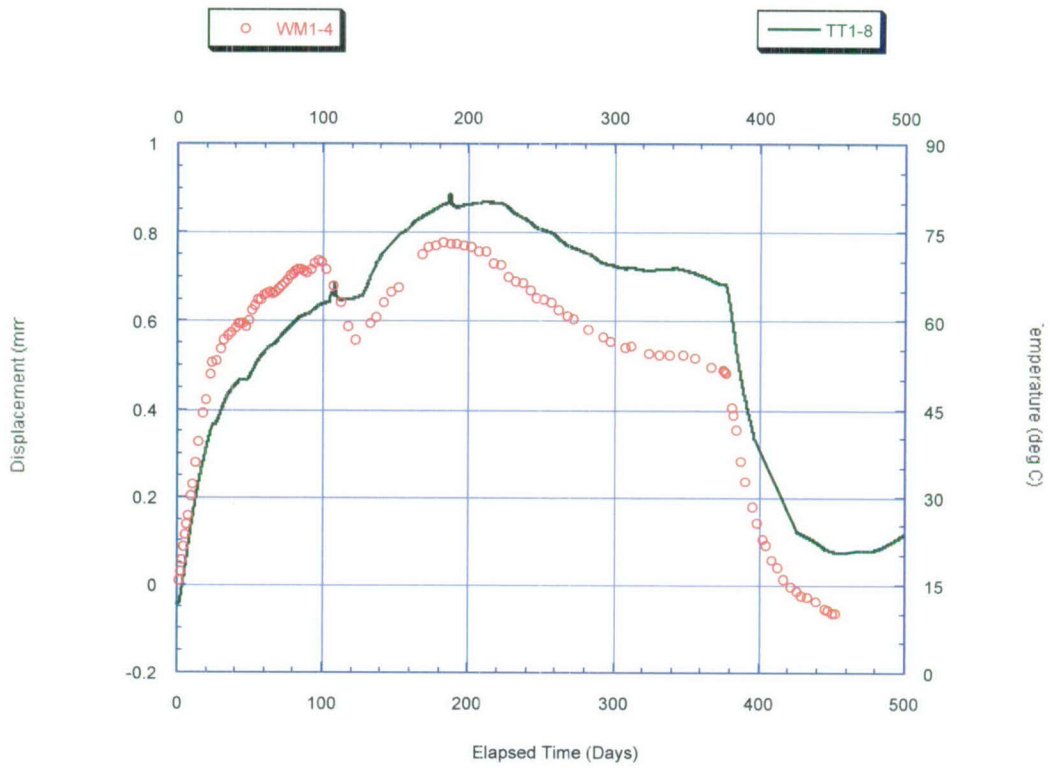


Figure 7-14. East-West Displacement for WM-1 Anchor 4 and Temperature at 4-m Depth

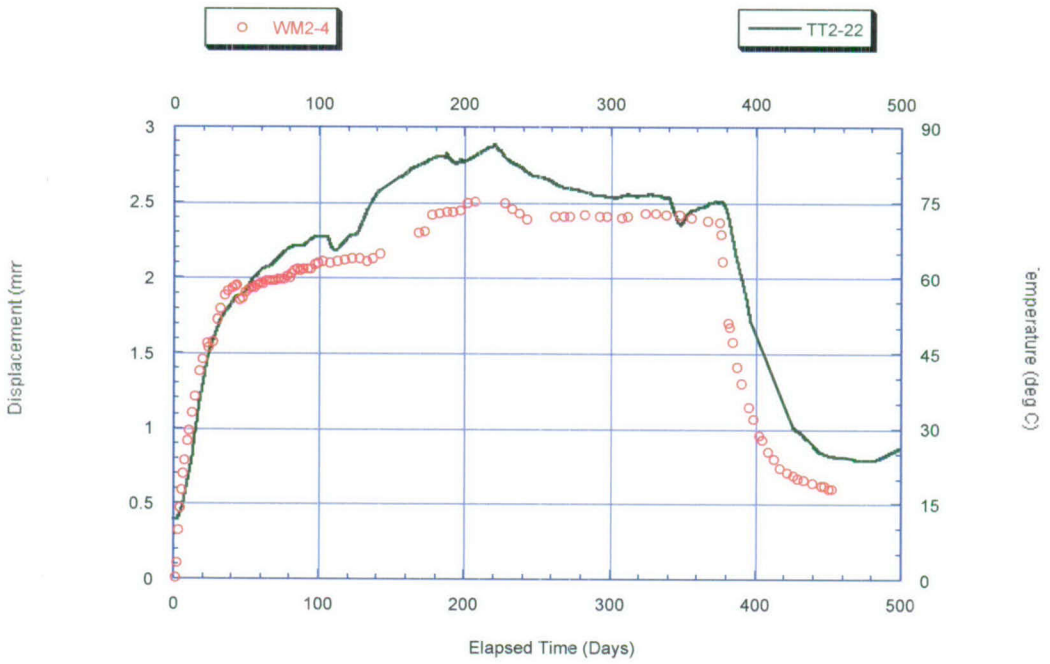


Figure 7-15. East-West Displacement for WM-2 Anchor 4 and Temperature at 1.2-m Depth

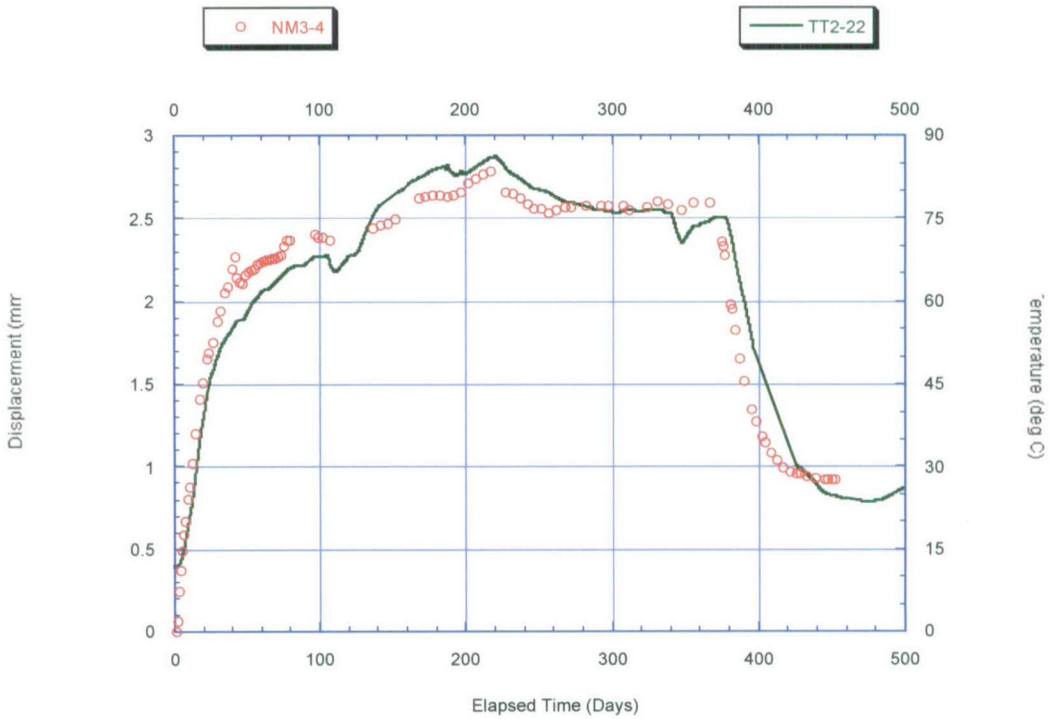
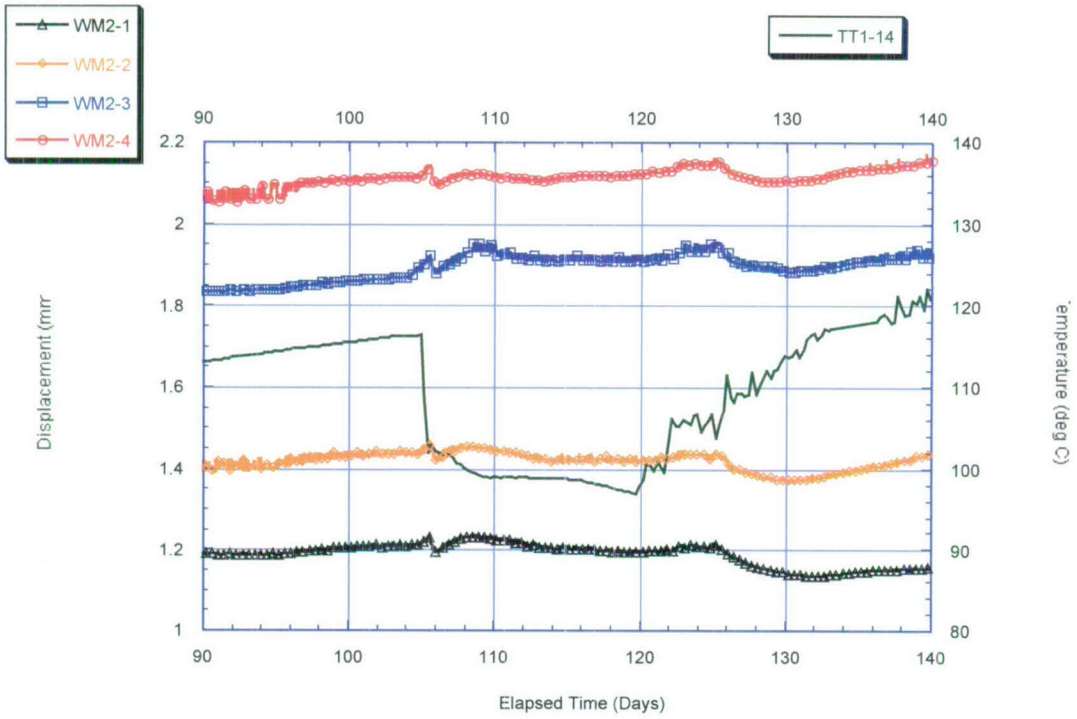


Figure 7-16. North-South Displacement for NM-3 Anchor 4 and Temperature in 1.2-m Depth



NOTE: Small, transient displacements for each anchor coincide with the sudden drop in temperature at the heater plane on Day 105.

Figure 7-17. WM-2 Anchor Displacements and Borehole TT1 Temperature Near the Heater Plane

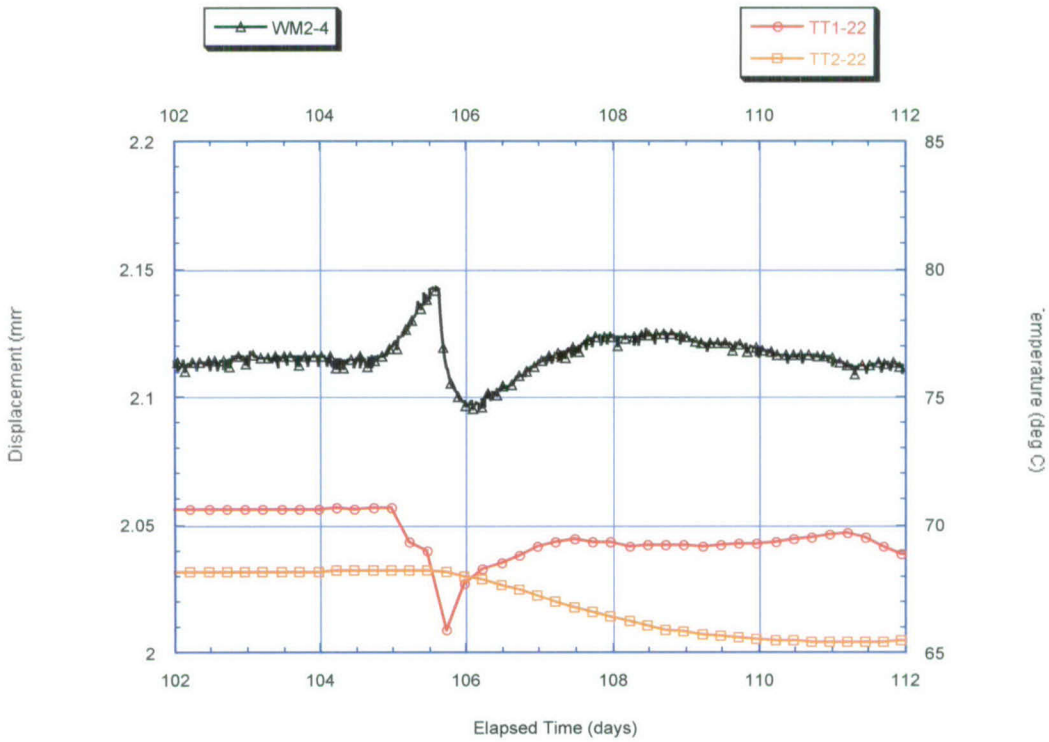
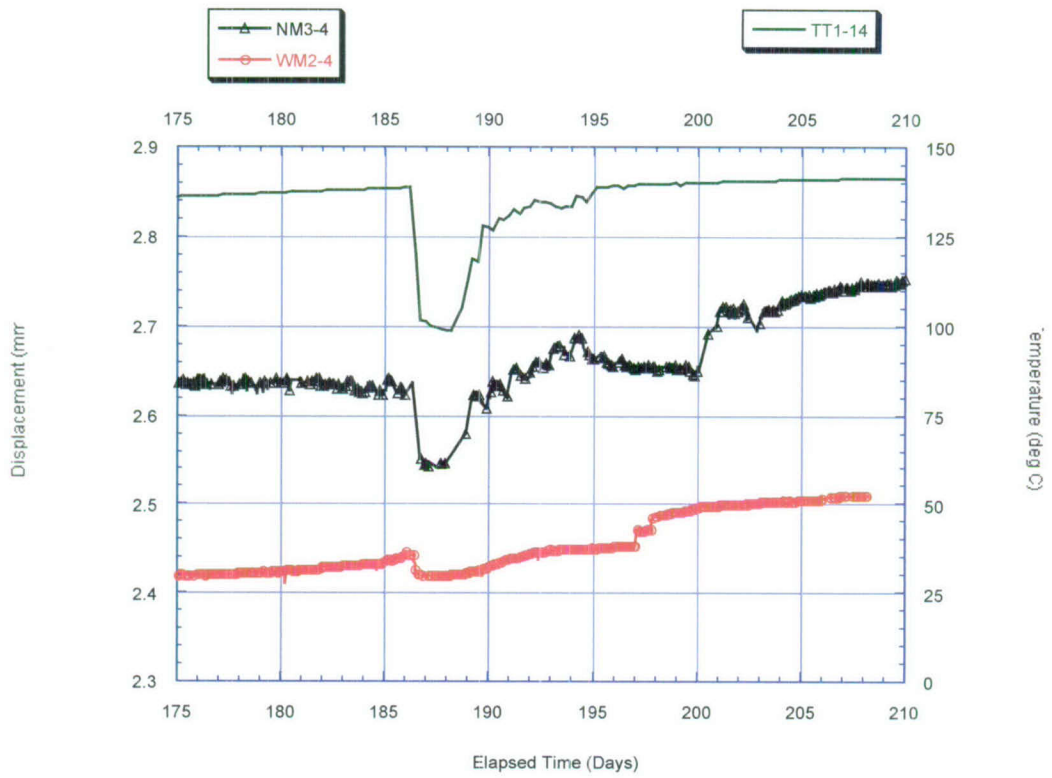
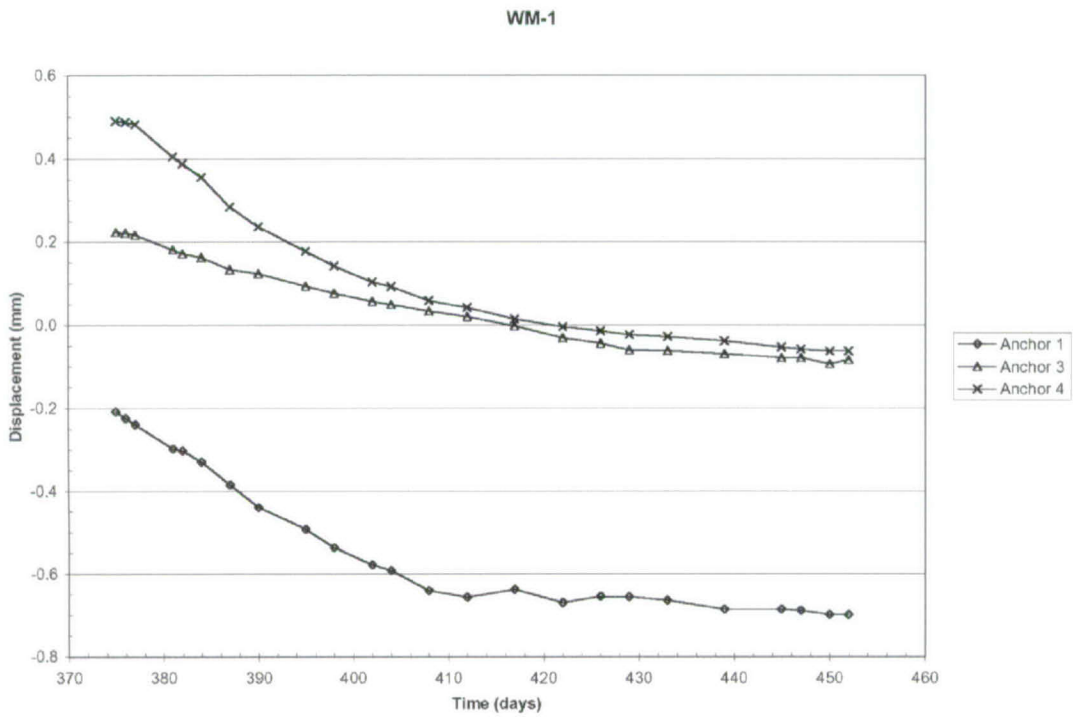


Figure 7-18. WM-2 Anchor 4 Displacements and Temperatures at 1.2 m Depth Around Day 105



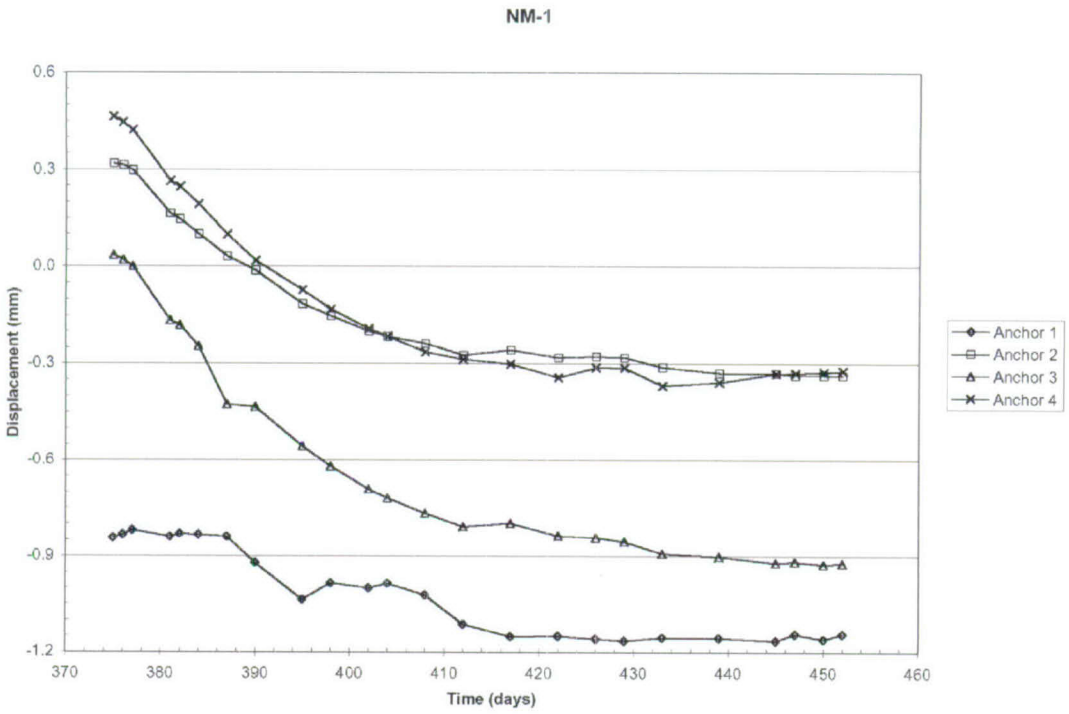
NOTE: A rainstorm at the Nevada Test Site preceded the sudden drop in temperature on Day 186. The cooling episode was accompanied by contractions in the two upper extensometers.

Figure 7-19. WM-2 and NM-3 Anchor Displacements and Borehole TT1 Temperature Near the Heater Plane



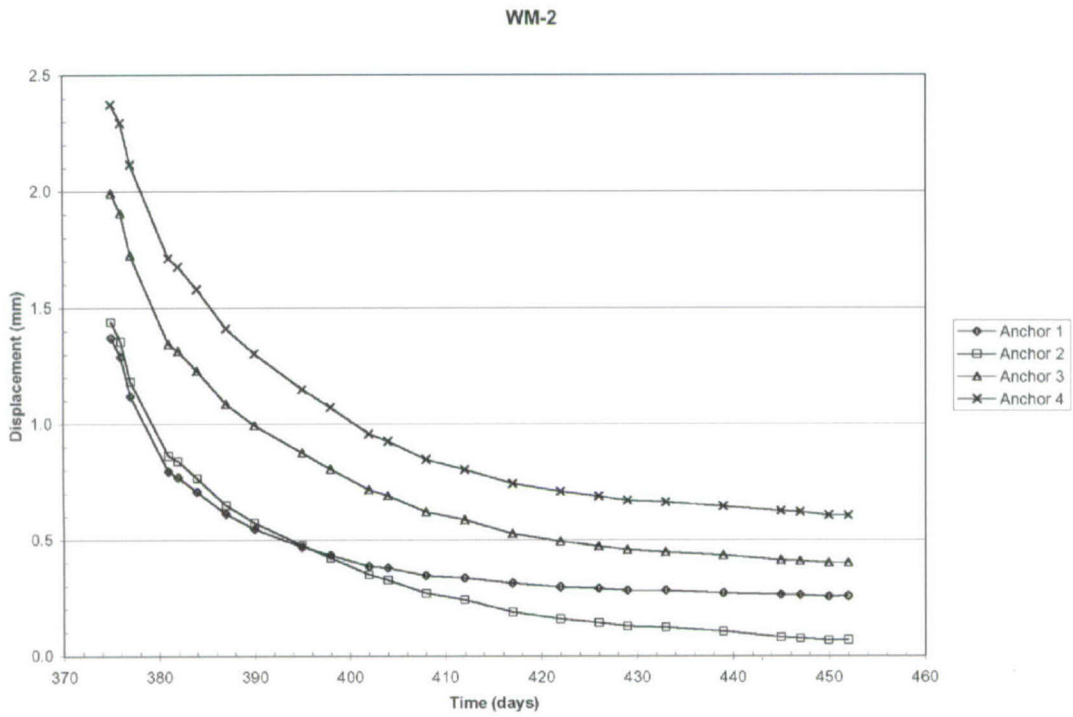
NOTE: Located near the north face at a depth of 3.98 m. Only three anchors were installed.

Figure 7-20. WM-1 East-West Anchor Displacements During Cool-Down



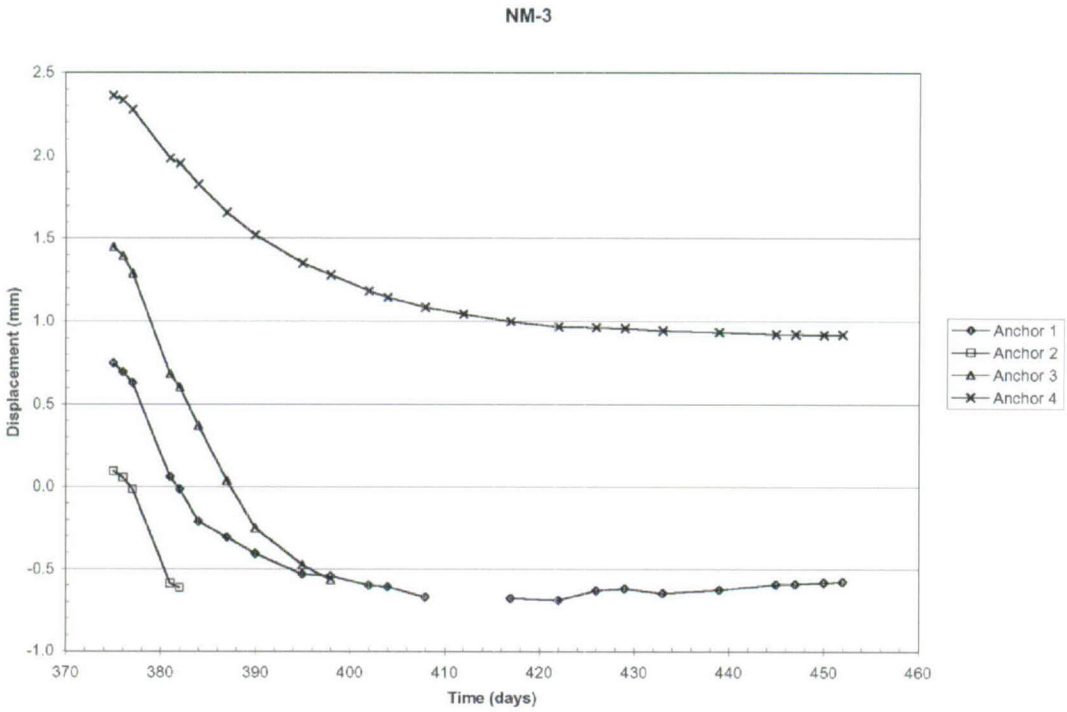
NOTE: Located near the east face at a depth of 3.85 m

Figure 7-21. NM-1 North-South Anchor Displacements During Cool Down



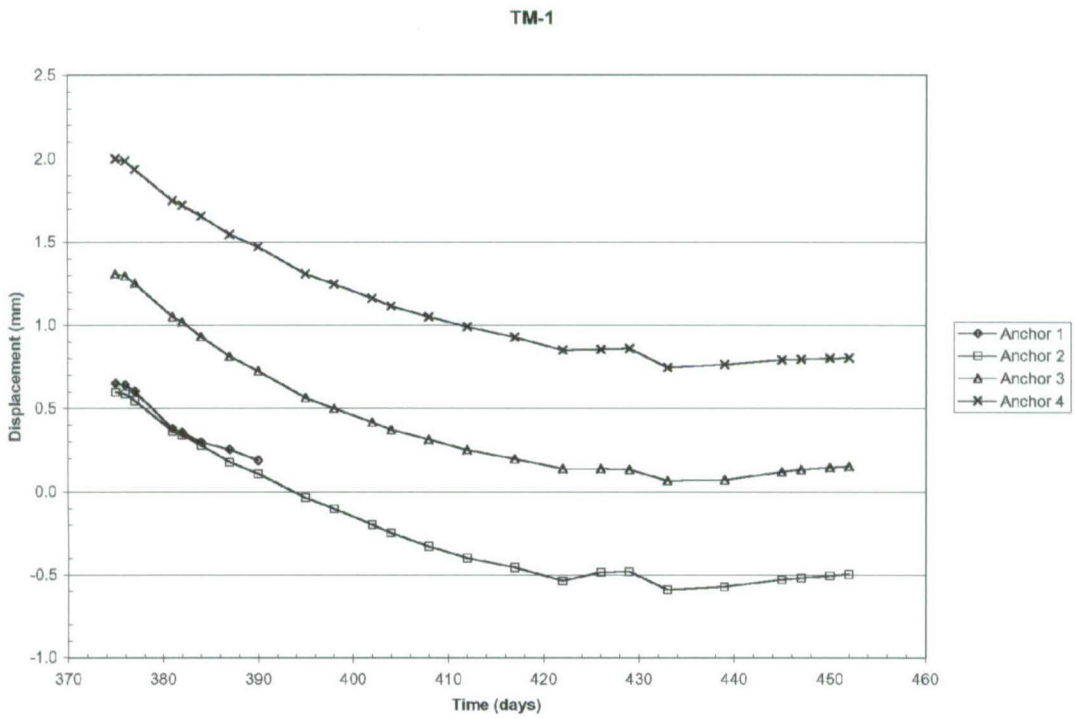
NOTE: Located near the south face at a depth of 1.23 m

Figure 7-22. WM-2 East-West Anchor Displacements During Cool-Down



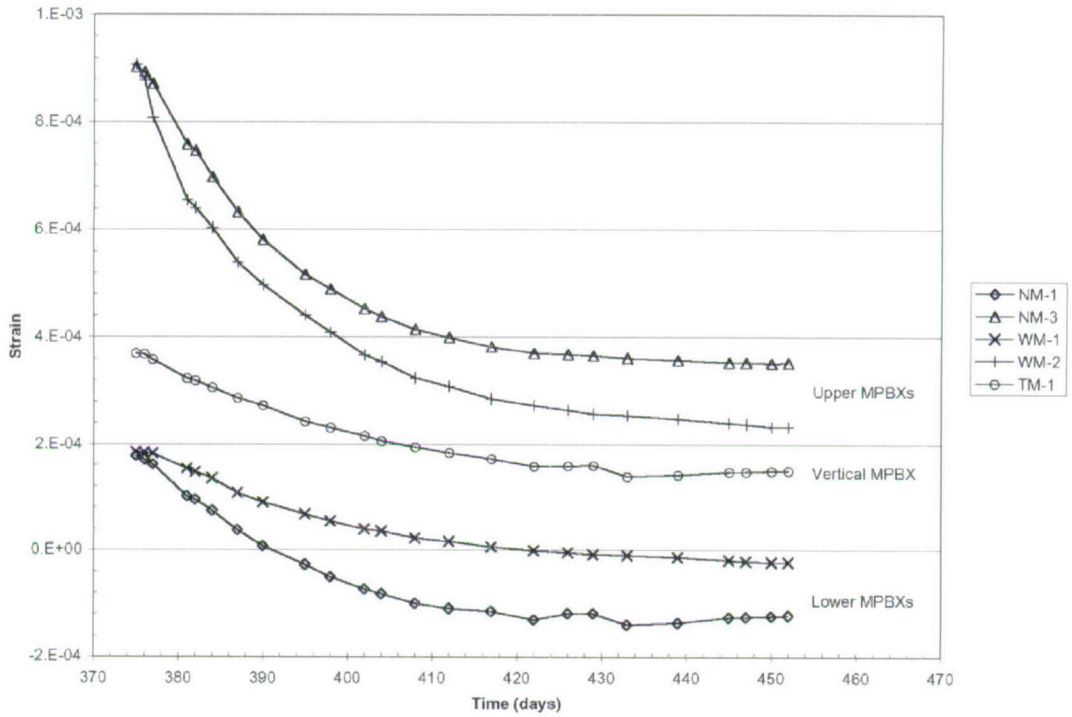
NOTE: Located near the west face at a depth of 0.93 m

Figure 7-23. NM-3 North-South Anchor Displacements During Cool-Down



NOTE: Located Near the Center of the Large Block

Figure 7-24. TM-1 Vertical Anchor Displacements During Cool-Down



NOTE: No data are available for NM-2, which failed early in the test. The upper extensometers, which had extended more during the heating phase, contracted more on cool-down than the lower extensometers.

Figure 7-25. Anchor 4 Strains During Cool-Down

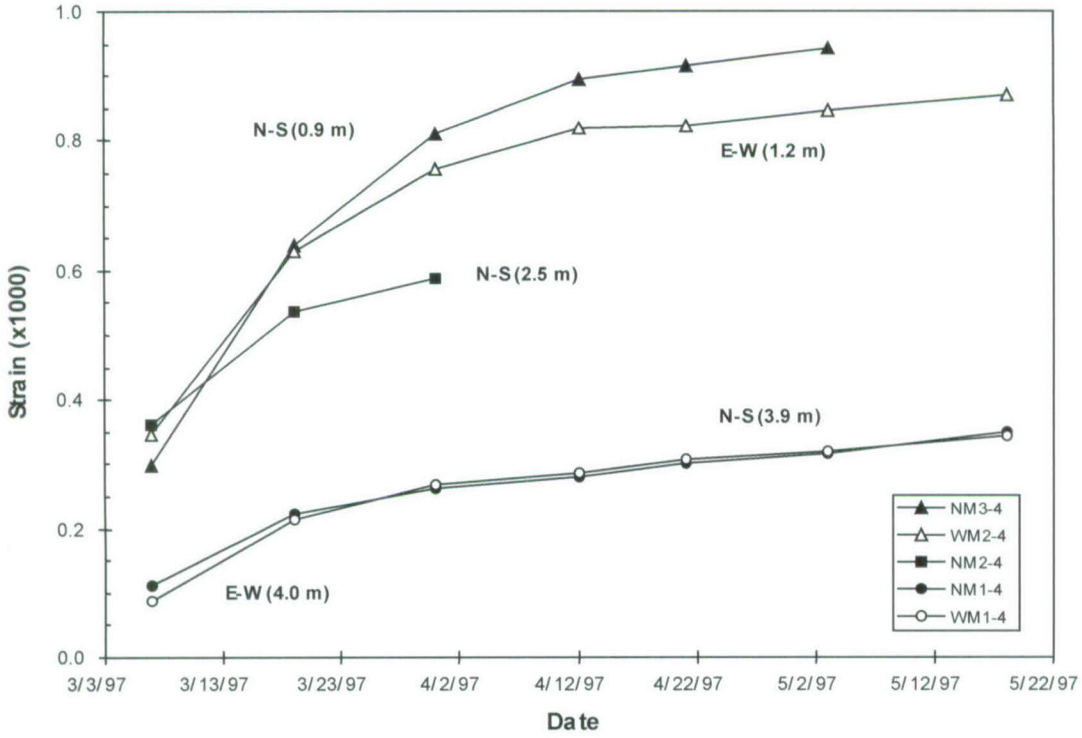
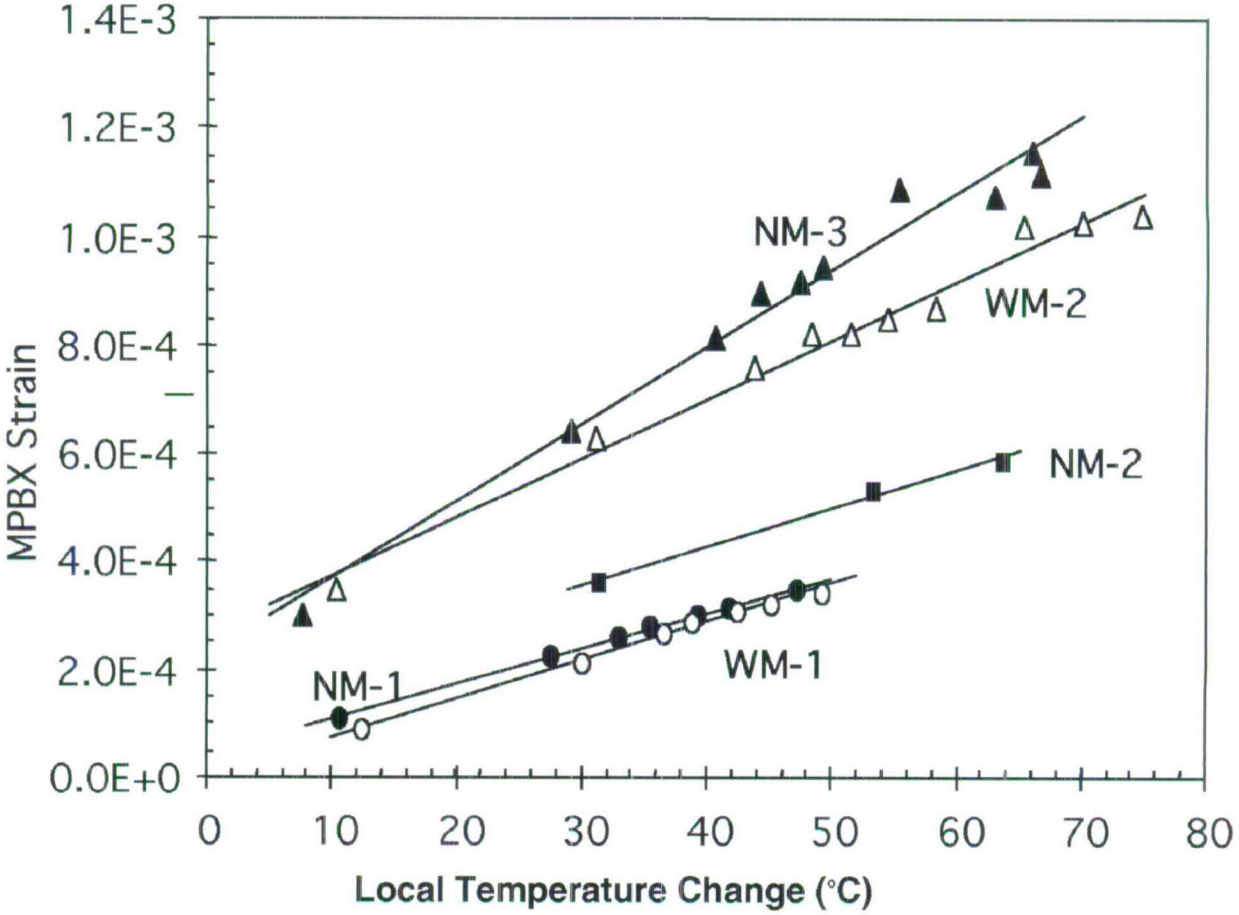


Figure 7-26. Strain Histories for Horizontal Extensometers



NOTE: The slopes of the fitted lines provide estimates of the rock mass thermal expansion coefficient.

Figure 7-27. Strains, Calculated from MPBX Displacements, Regressed Against Temperature Changes

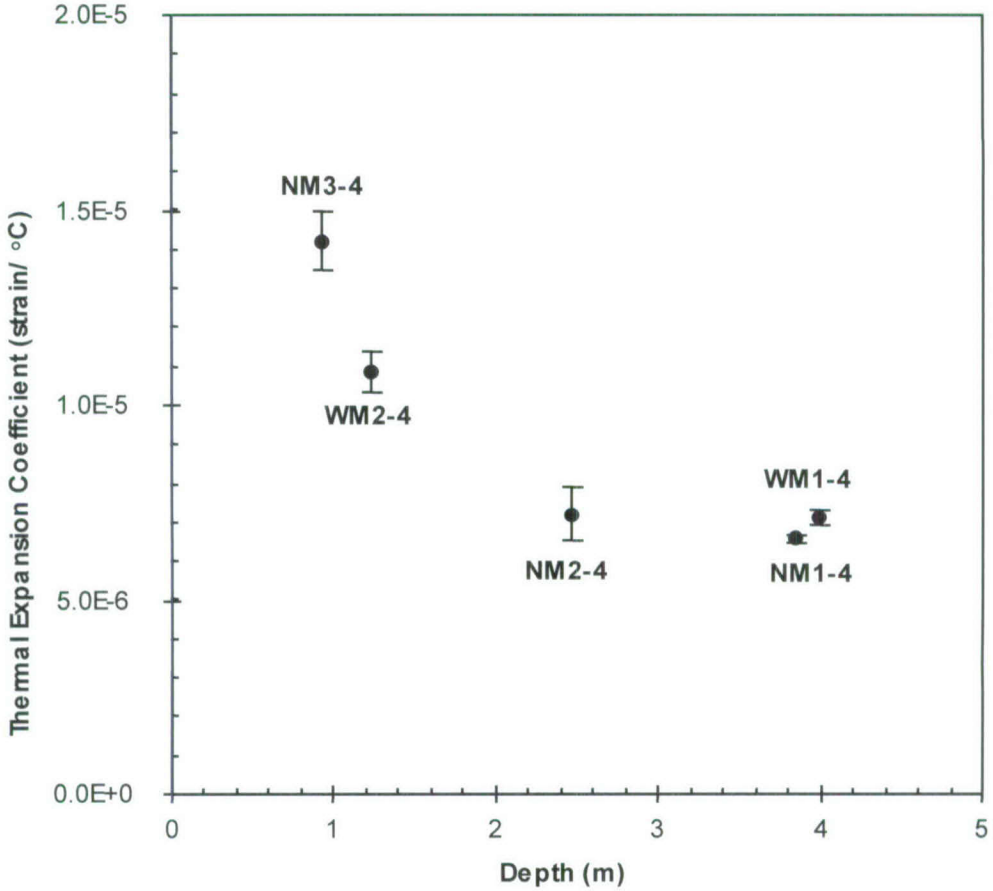


Figure 7-28. Linear Coefficients of Thermal Expansion with Depth into the Large Block

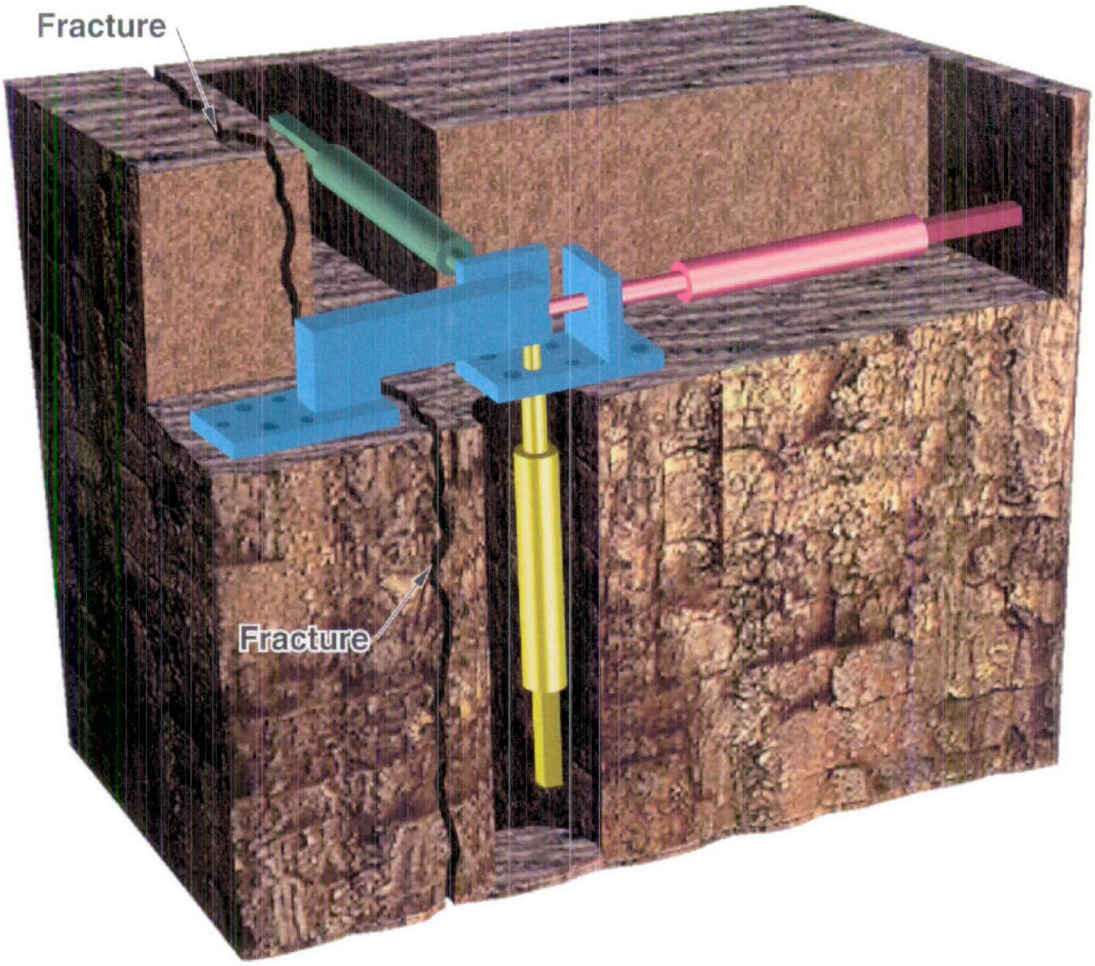


Figure 7-29. Cutaway View of LBT Surface Fracture Monitors

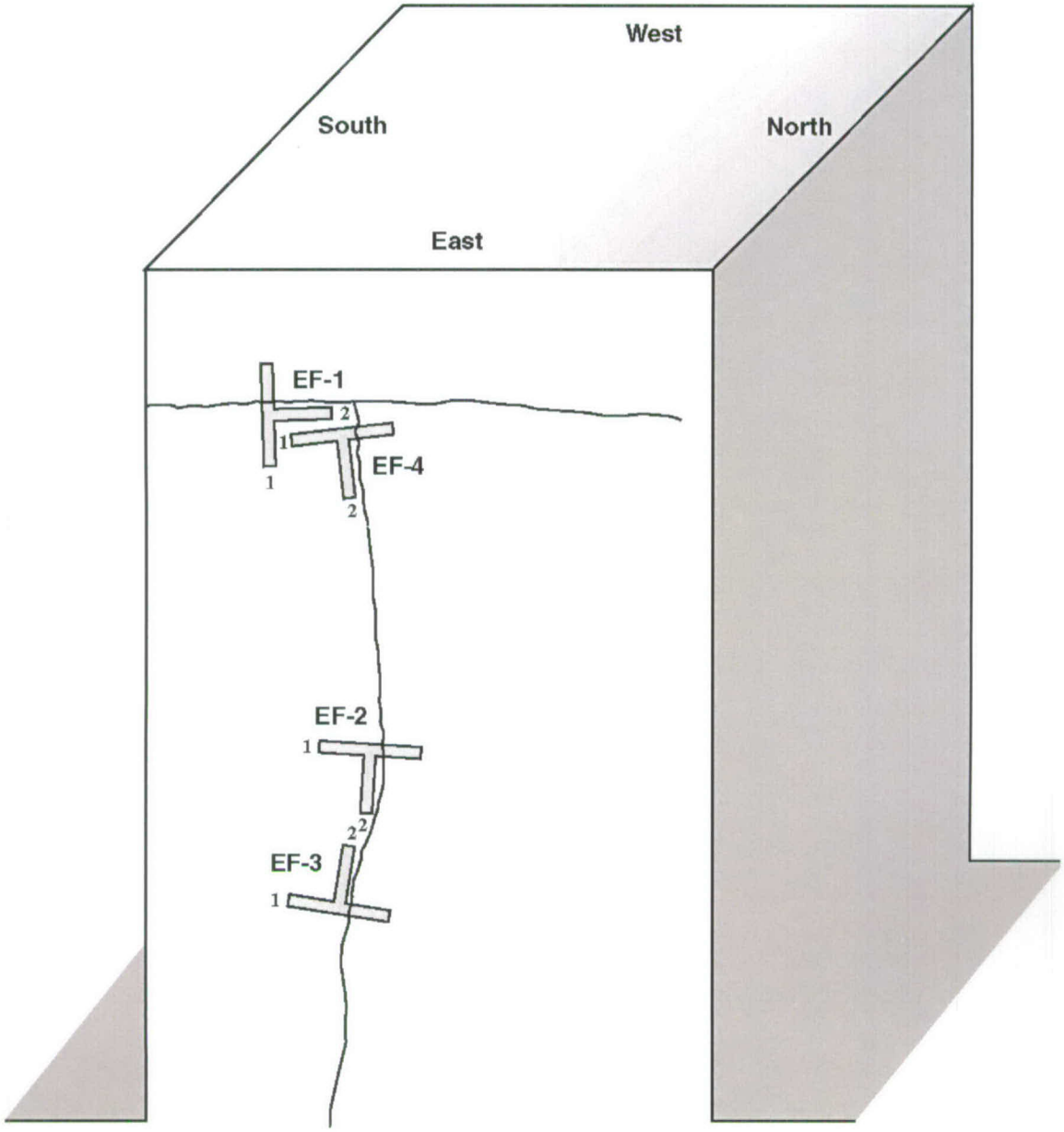


Figure 7-30. Fracture Monitor Locations on the East Side of the Large Block

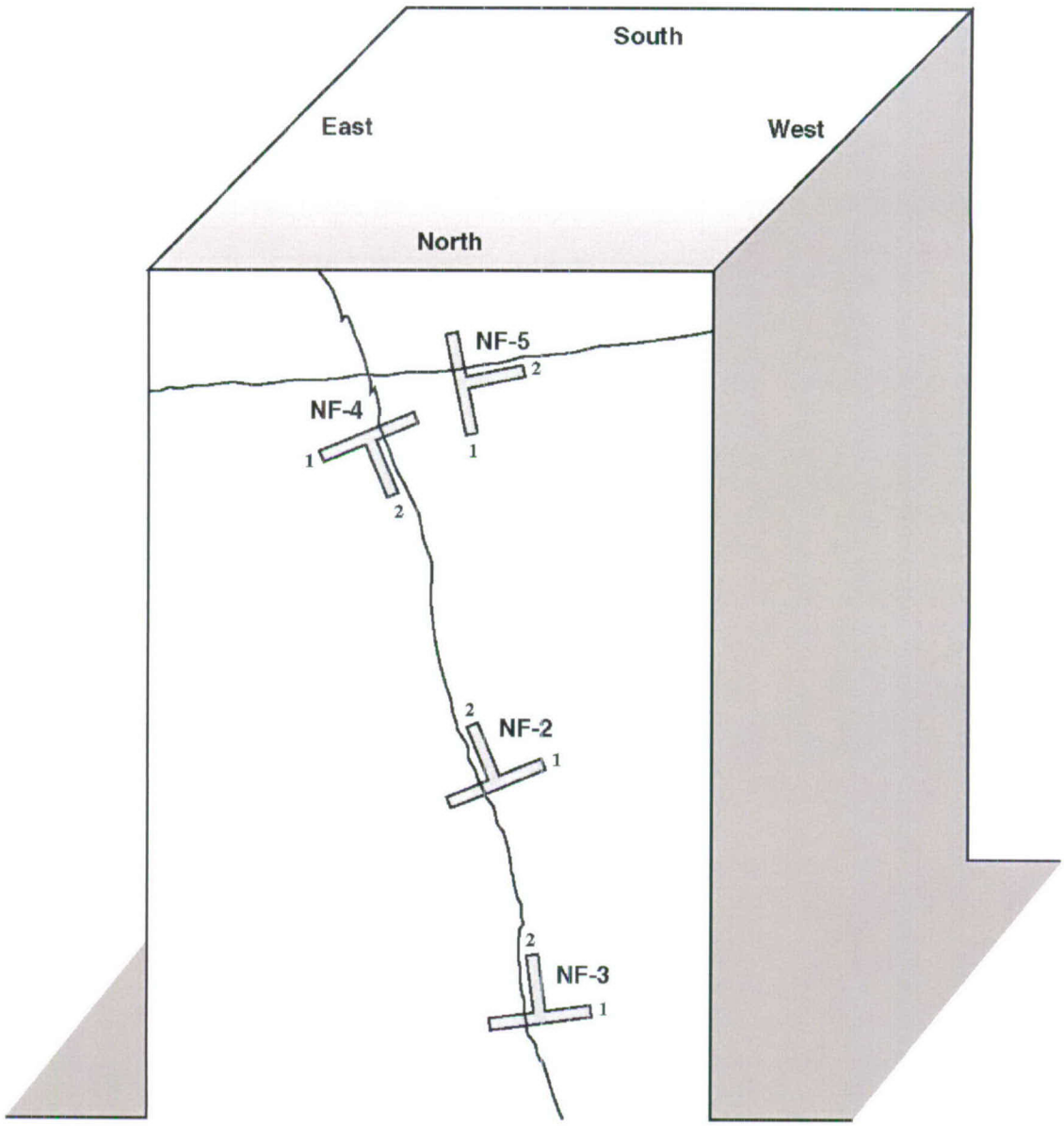


Figure 7-31. Fracture Monitor Locations on the North Side of the Large Block

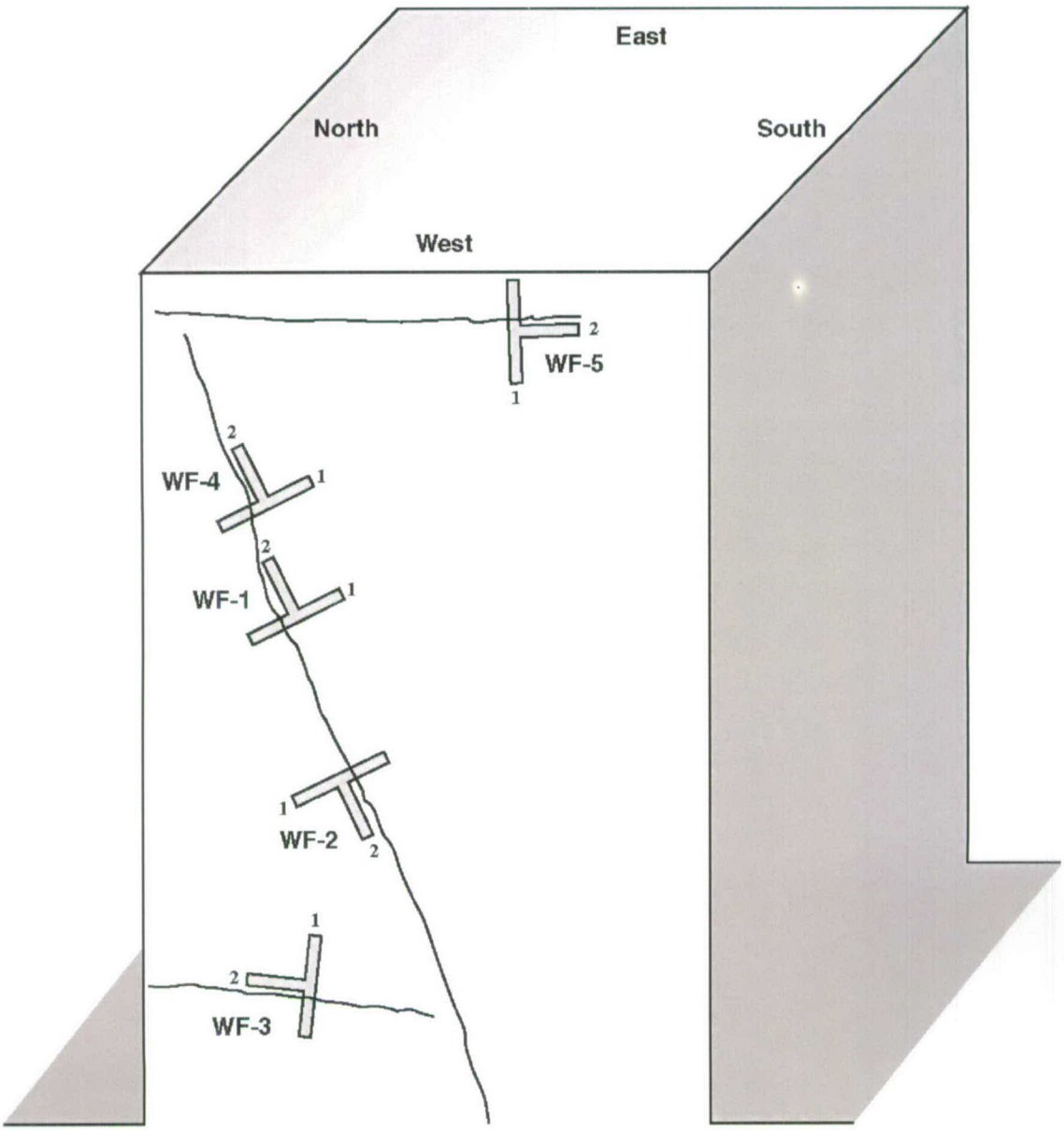


Figure 7-32. Fracture Monitor Locations on the West Side of the Large Block

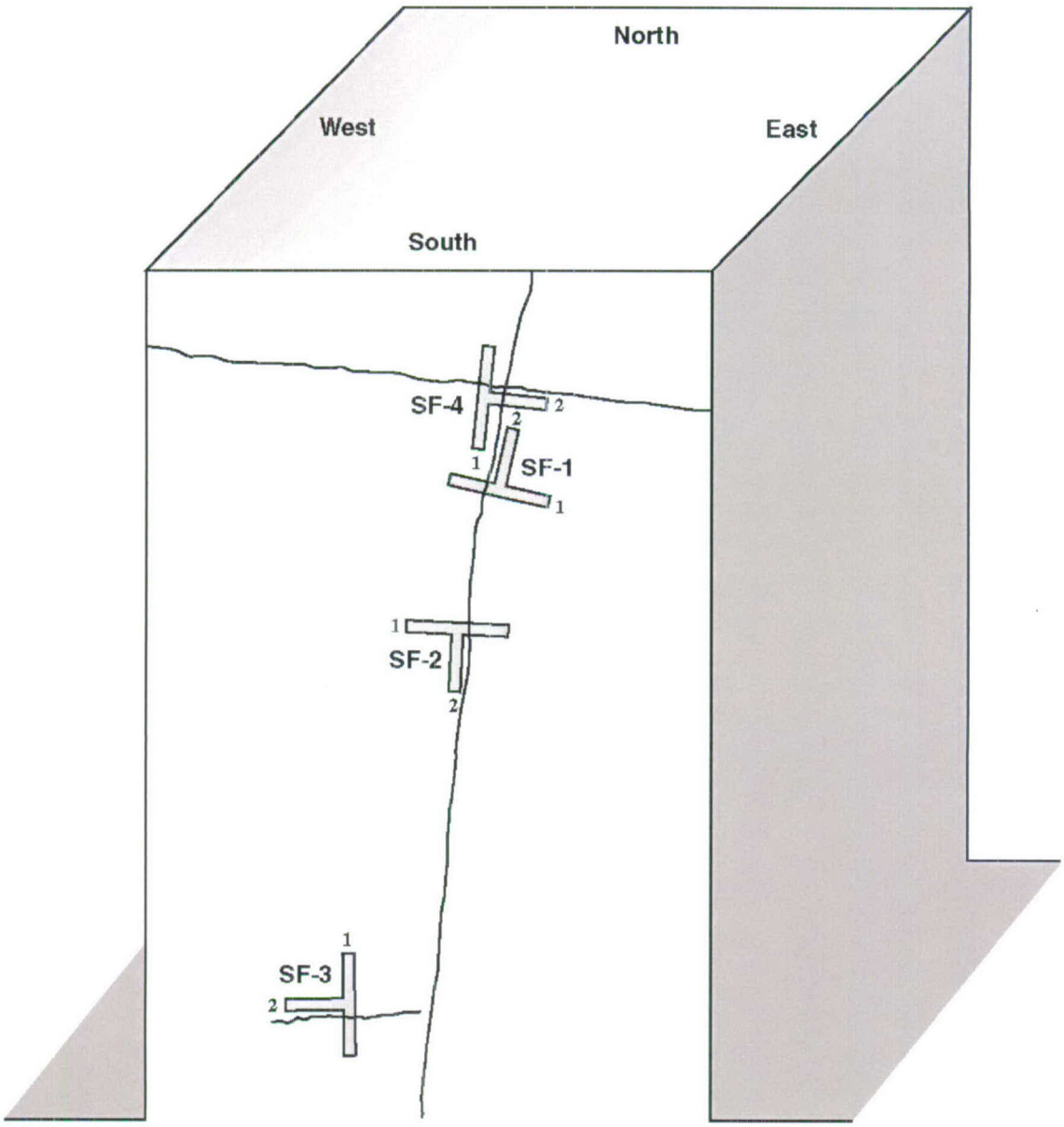


Figure 7-33. Fracture Monitor Locations on the South Side of the Large Block

Figure 7-34. Photo of LBT with Fracture Monitor Grooves

Figure 7-35. Photo of Installed Fracture Monitor

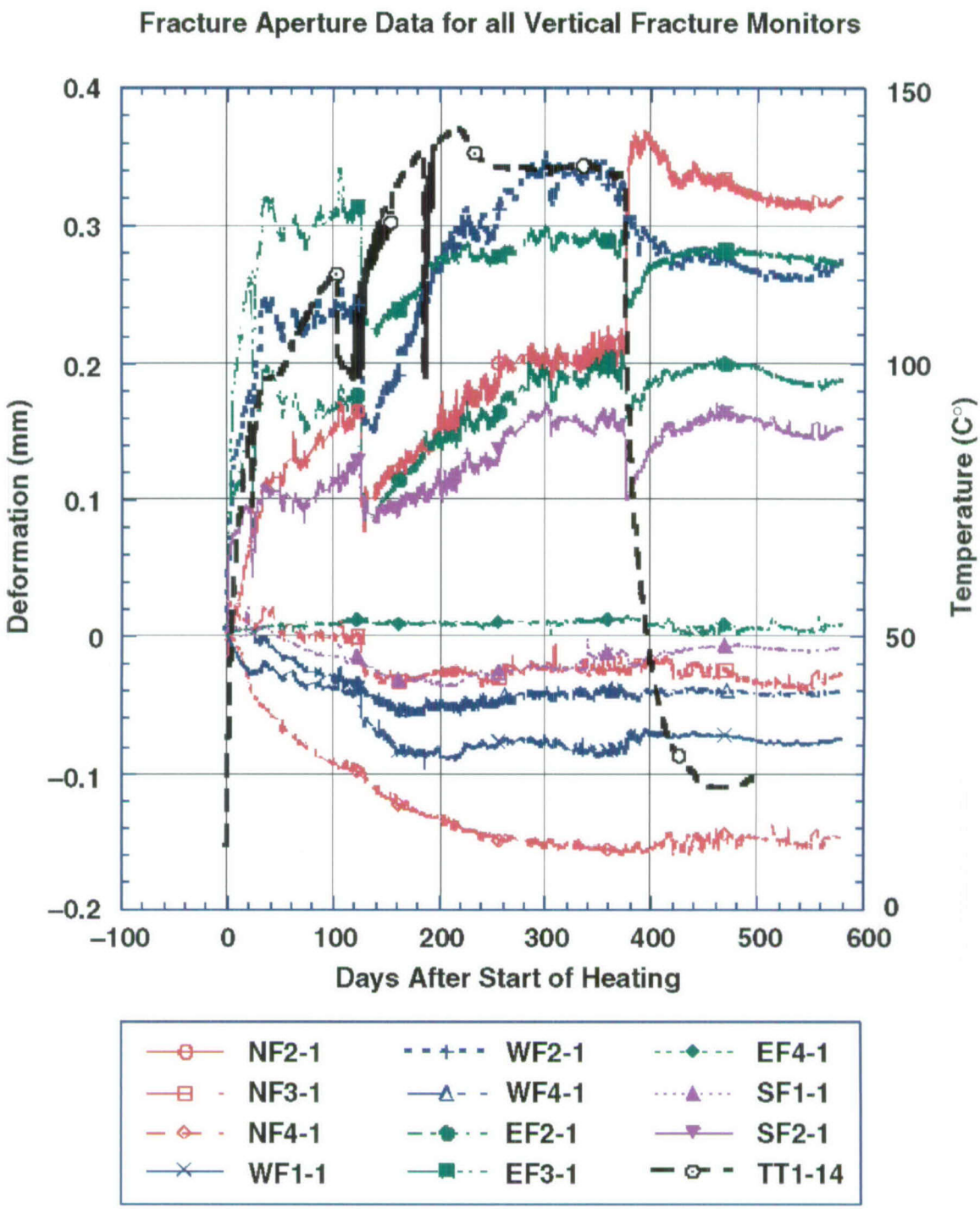


Figure 7-36. Fracture Aperture Data for All Vertical Fracture Monitors and Temperature Near the Heater Plane

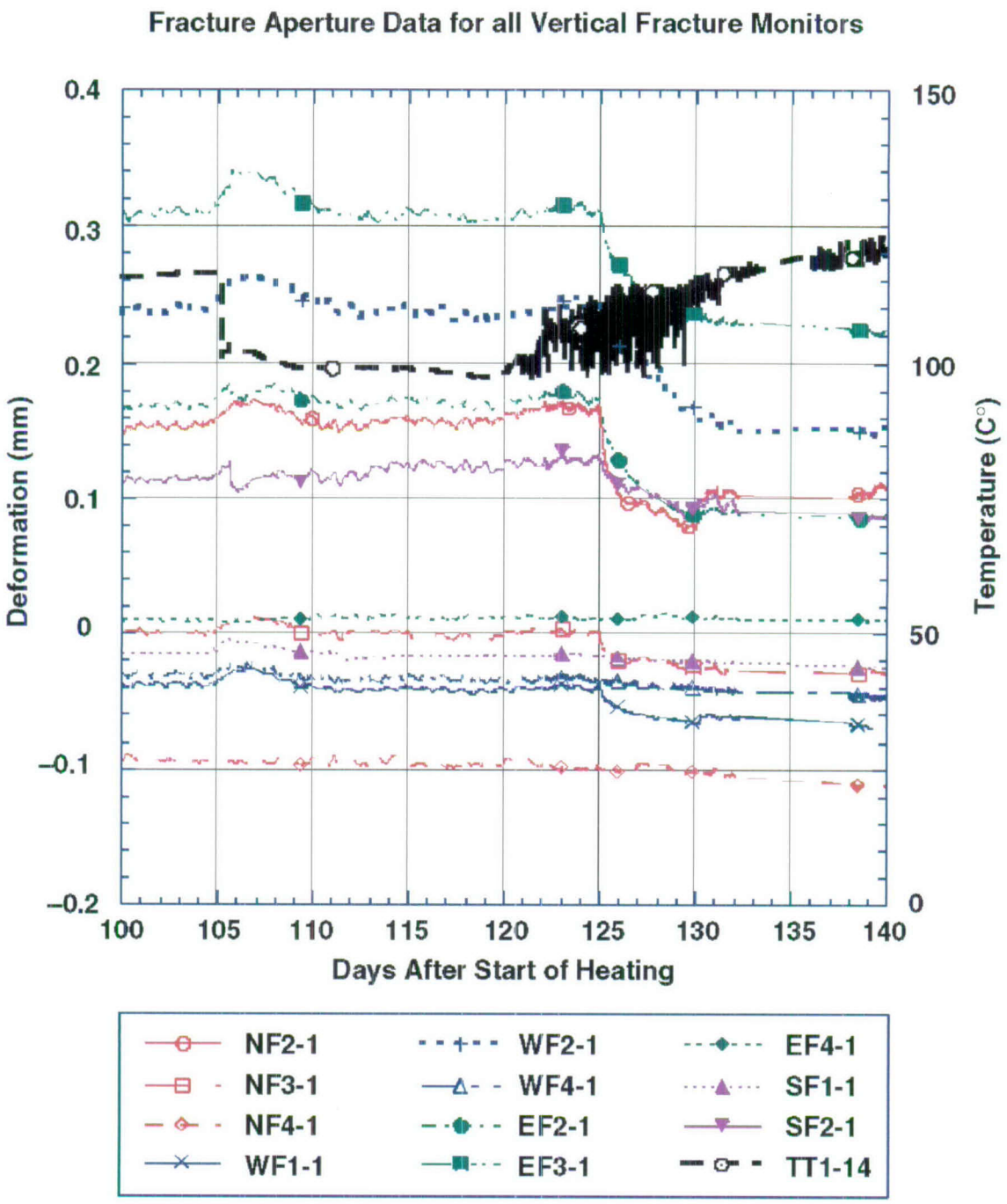


Figure 7-37. Fracture Aperture Data Between Days 100 and 140 for All Vertical Fracture Monitors and Temperature Near the Heater Plane

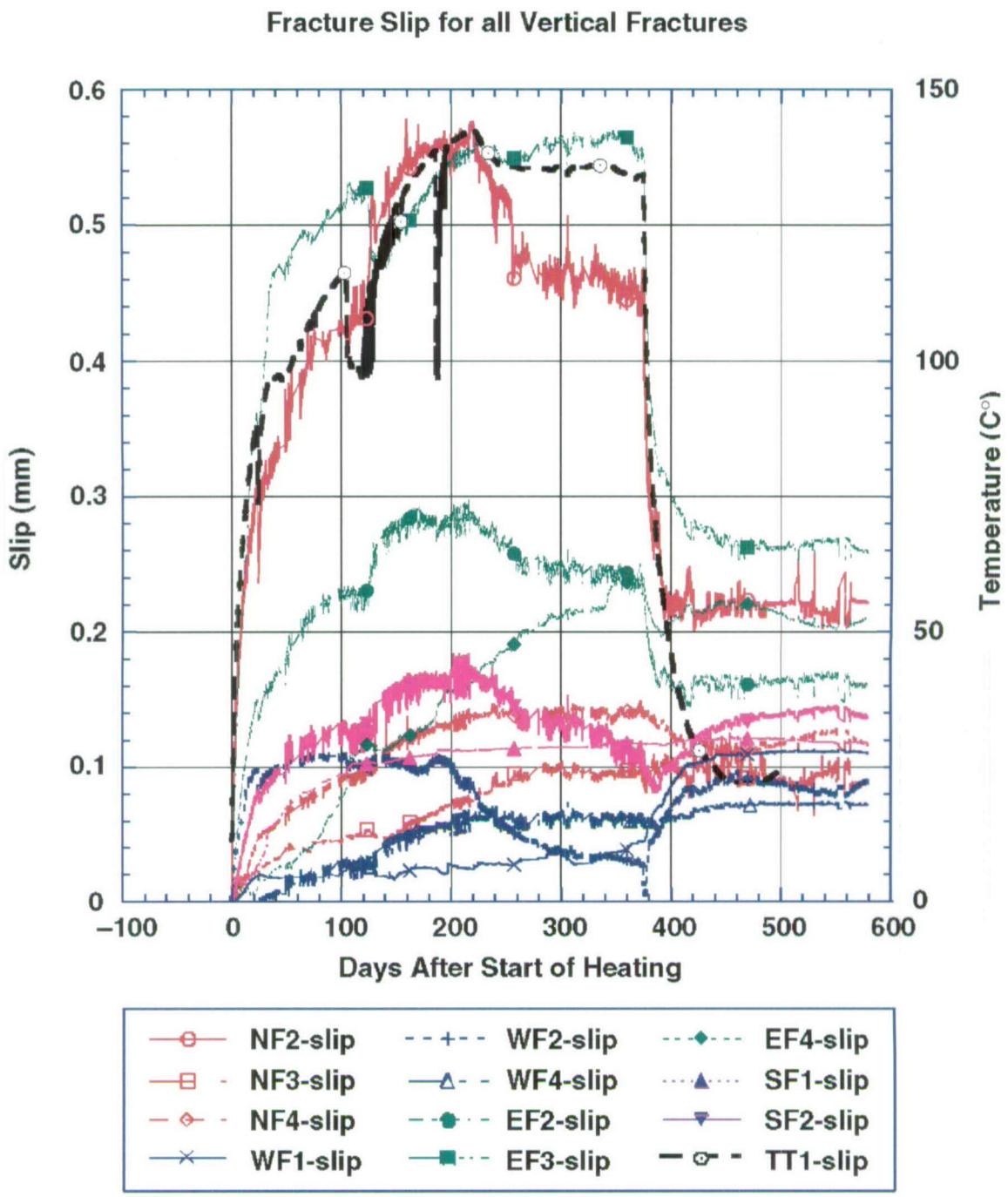


Figure 7-38. Fracture Slip for All Vertical Fractures and Temperature Near the Heater Plane

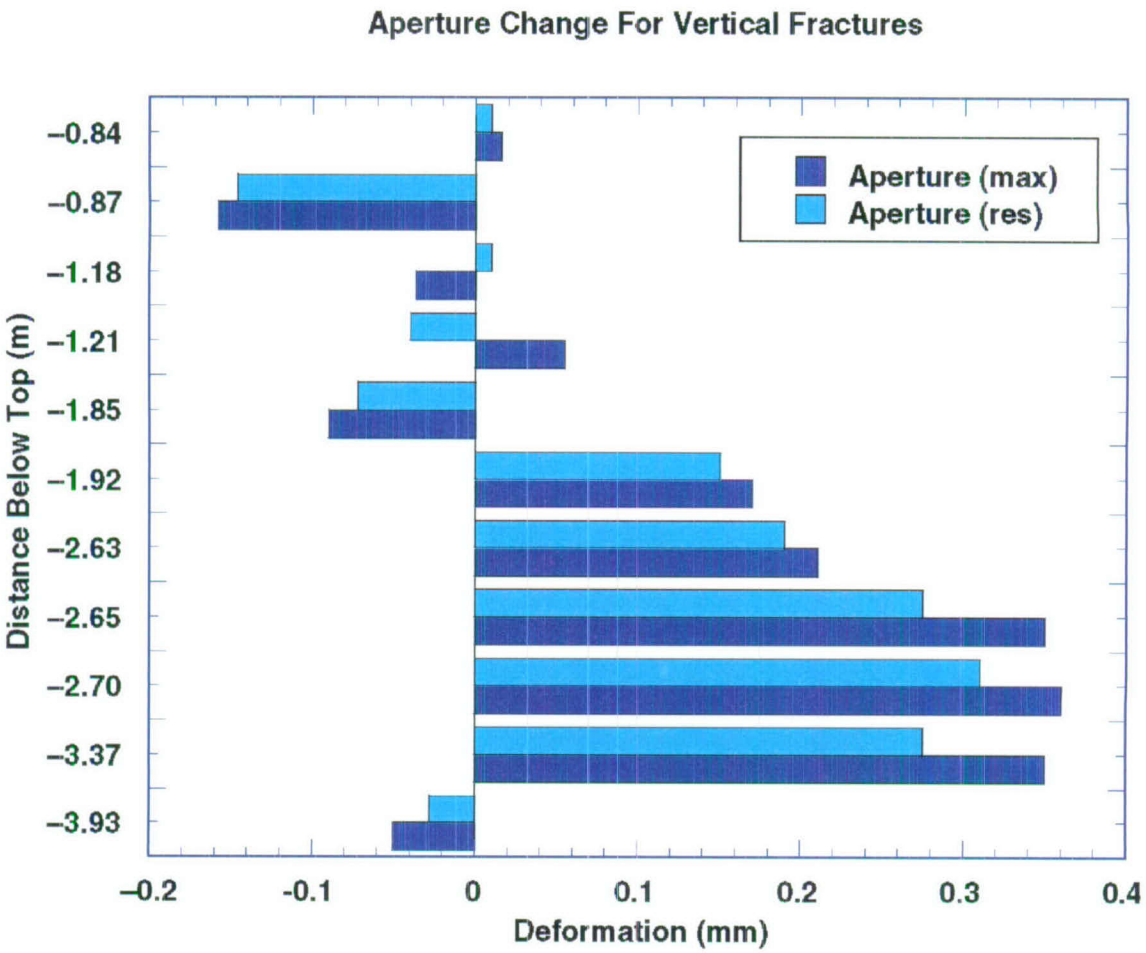


Figure 7-39. Aperture Change for Vertical Fractures

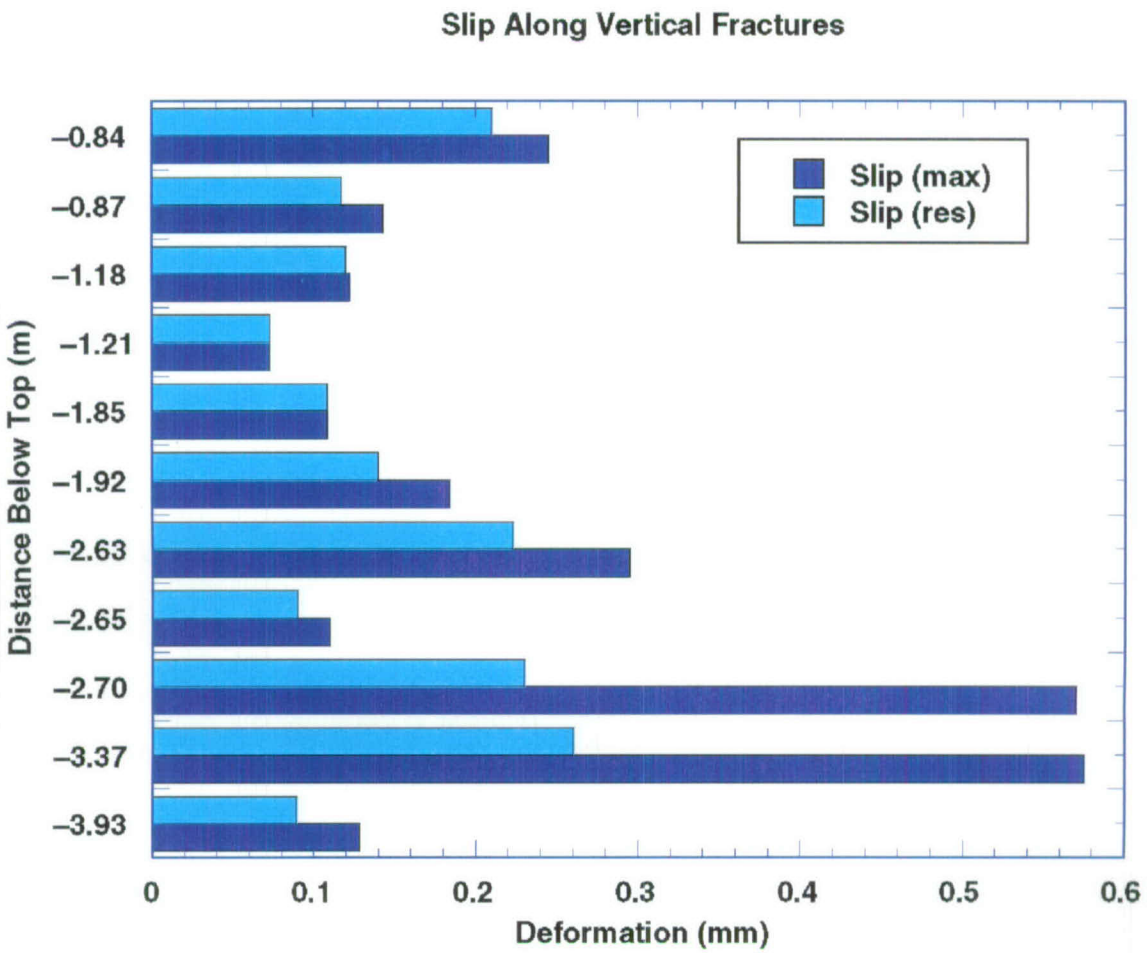


Figure 7-40. Slip Along Vertical Fractures

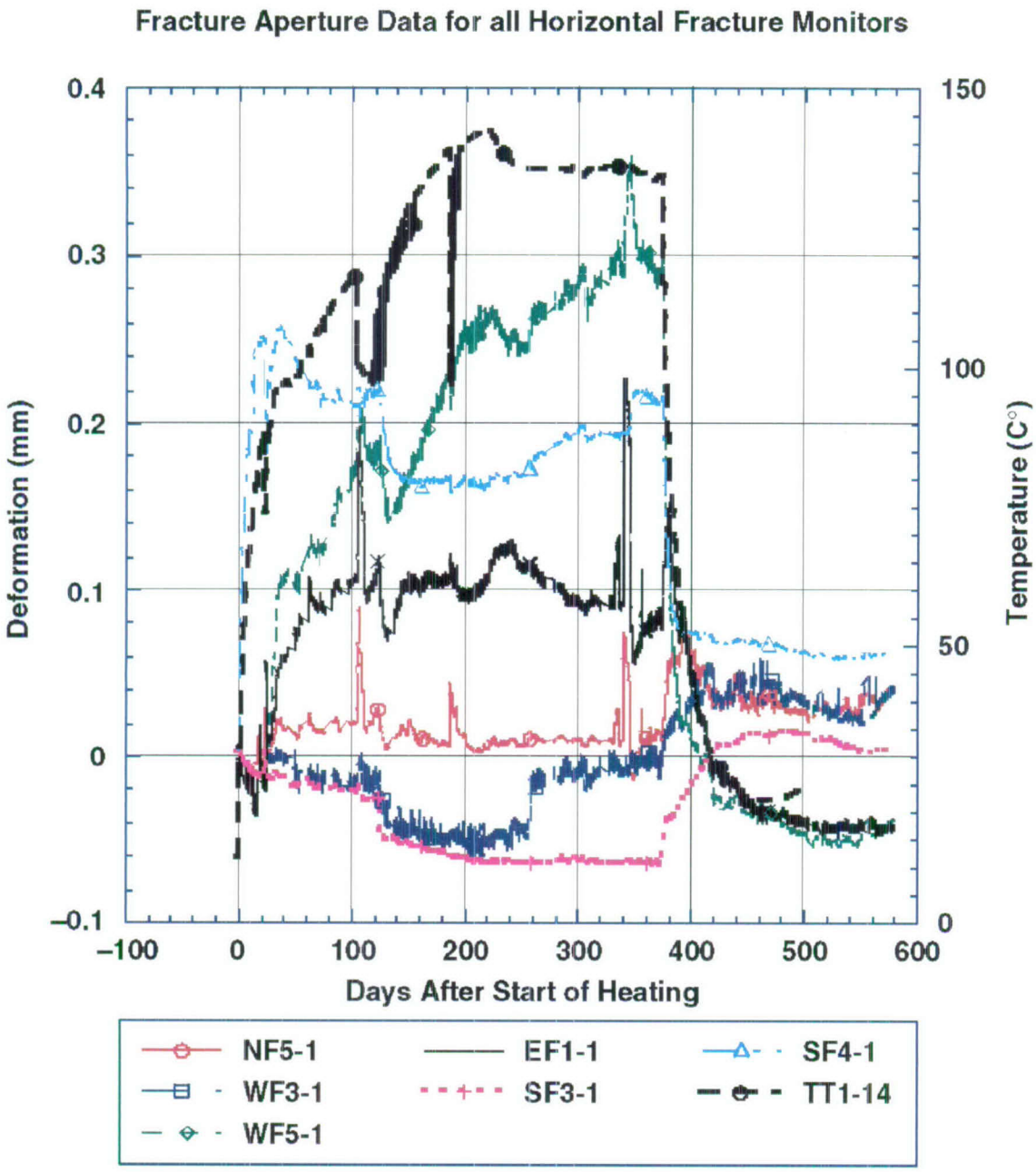


Figure 7-41. Fracture Aperture Data for All Horizontal Fracture Monitors and Temperature Near the Heater Plane

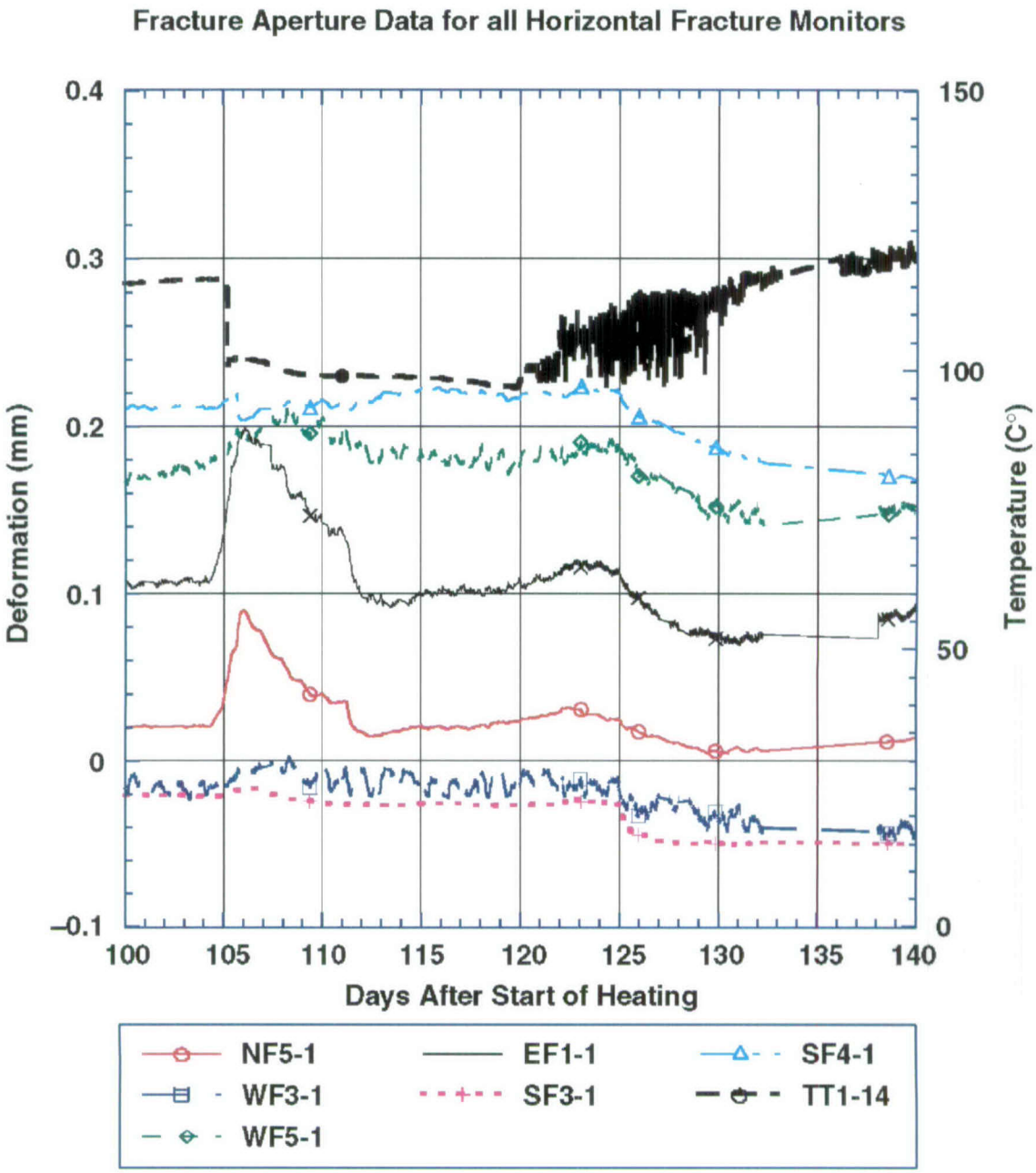


Figure 7-42. Temperature and Fracture Aperture Data for All Horizontal Fracture Monitors Between Day 100 and Day 140

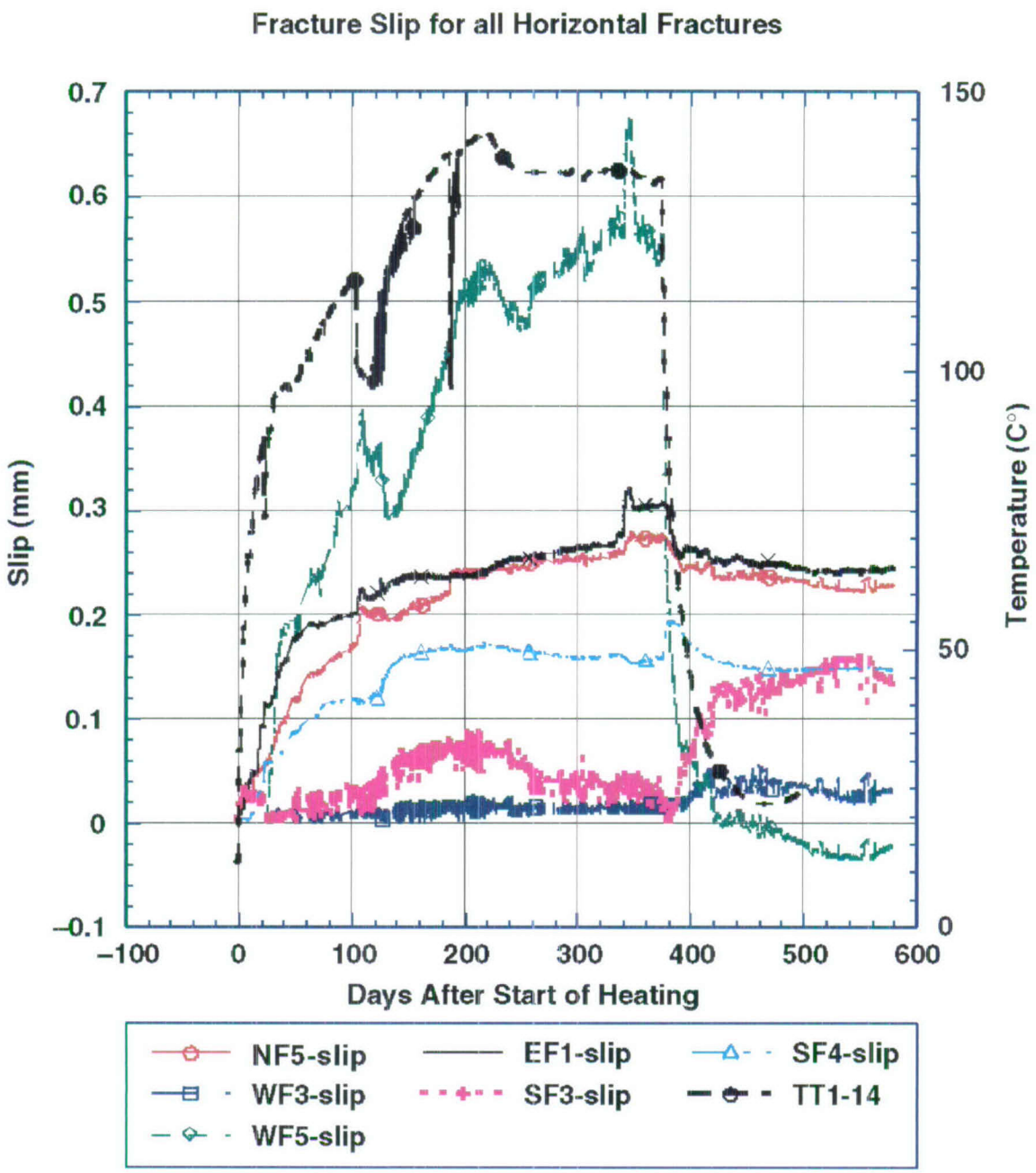


Figure 7-43. Fracture Slip for All Horizontal Fractures and Temperature Near the Heater Plane

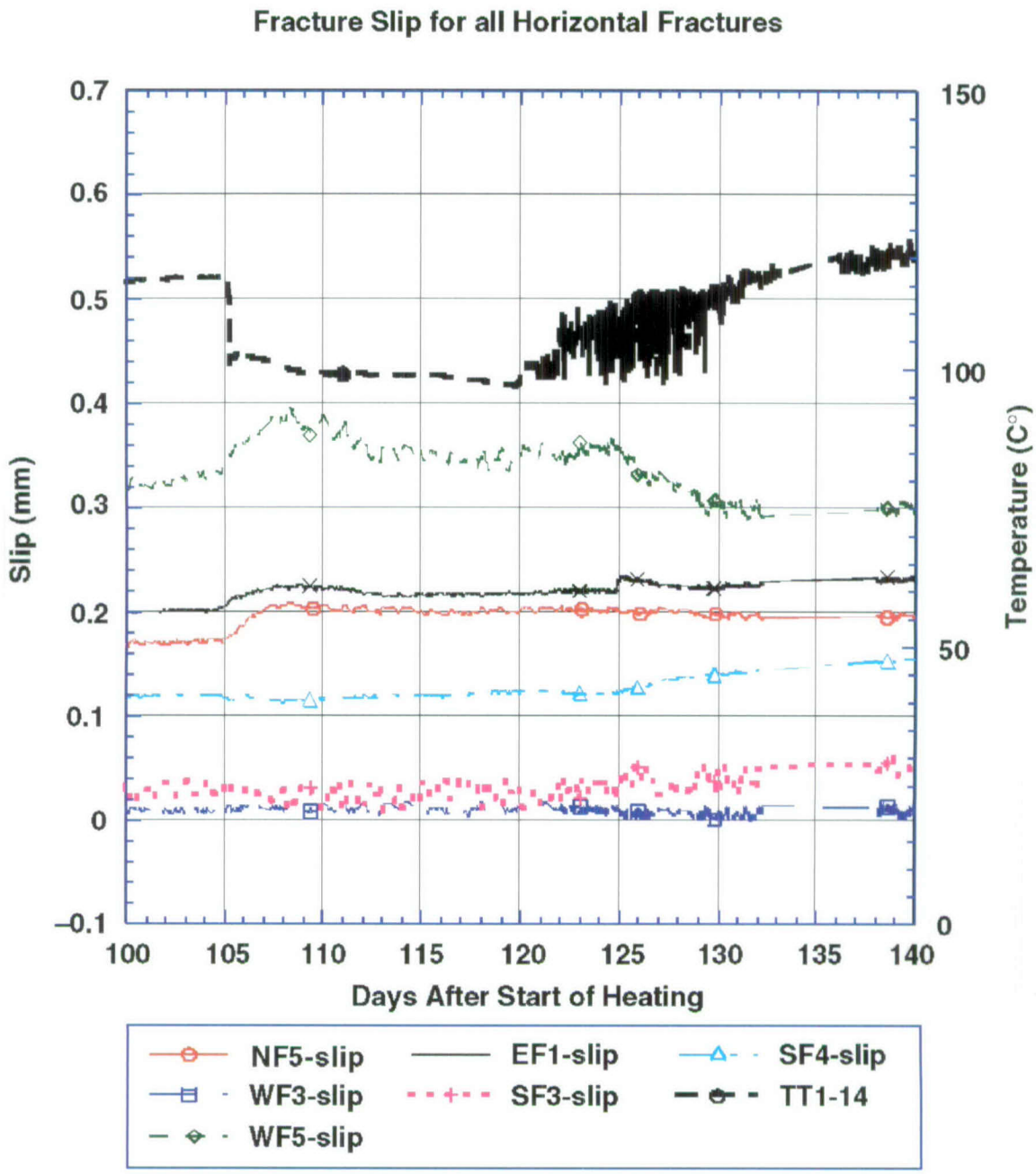


Figure 7-44. Fracture Slip for All Horizontal Fractures and Temperature Near the Heater Plane, Day 100 to Day 140

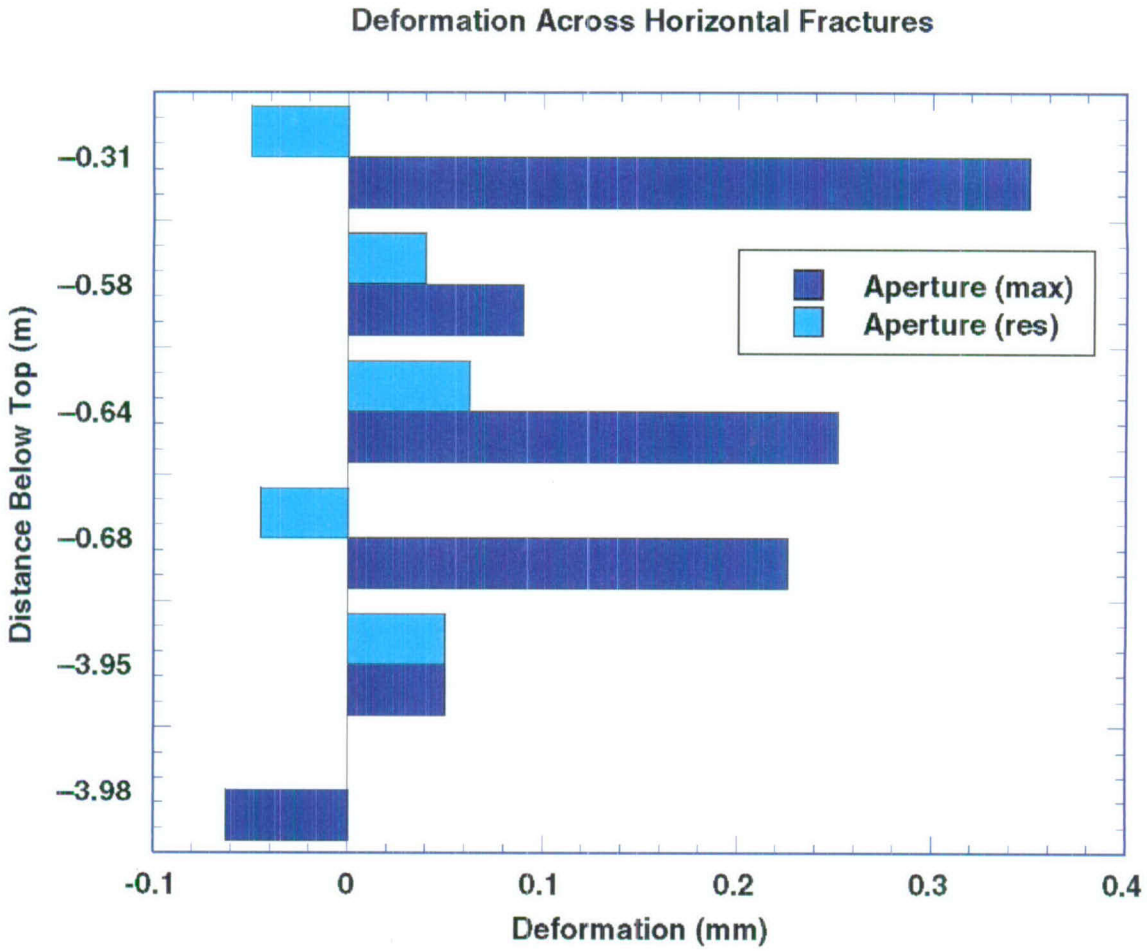


Figure 7-45. Deformation Across Horizontal Fractures

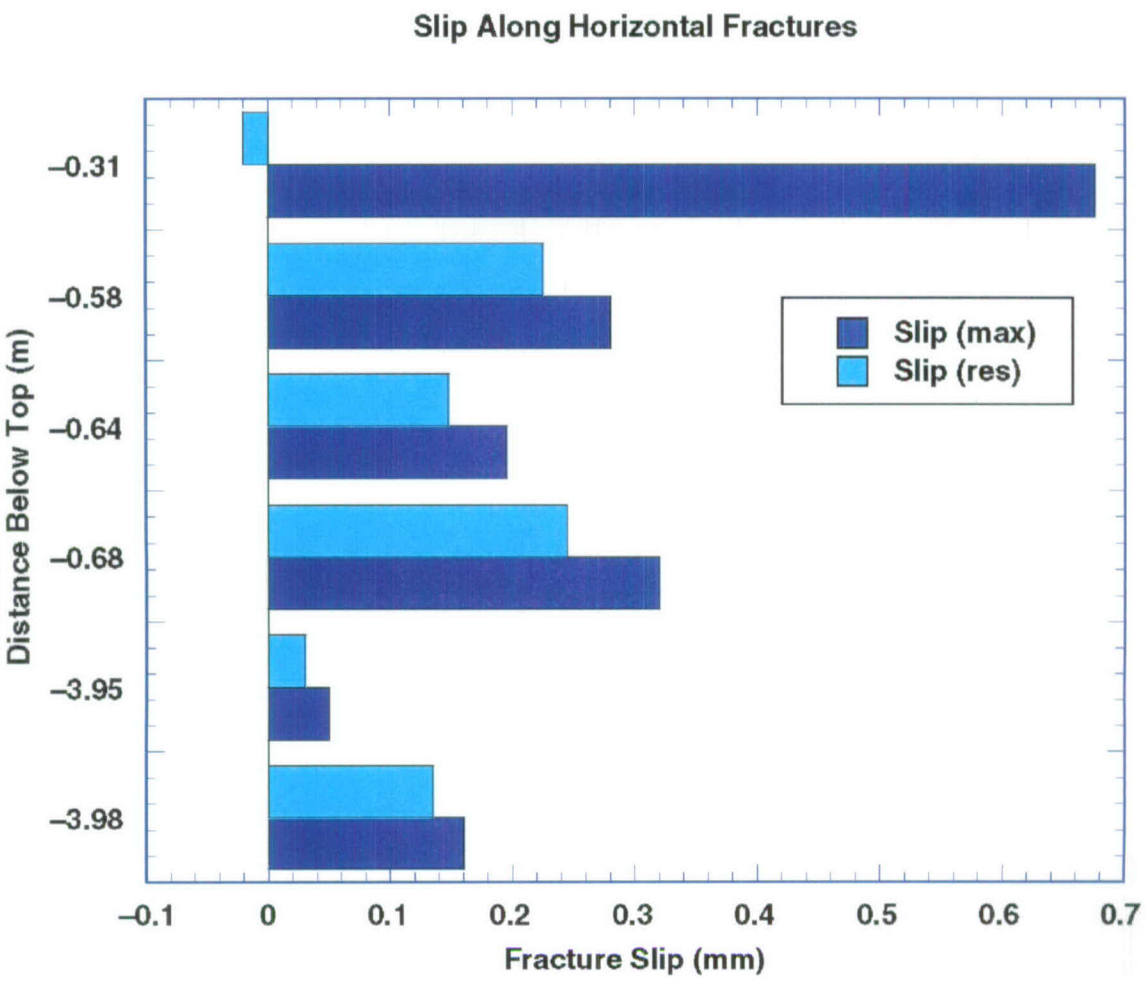
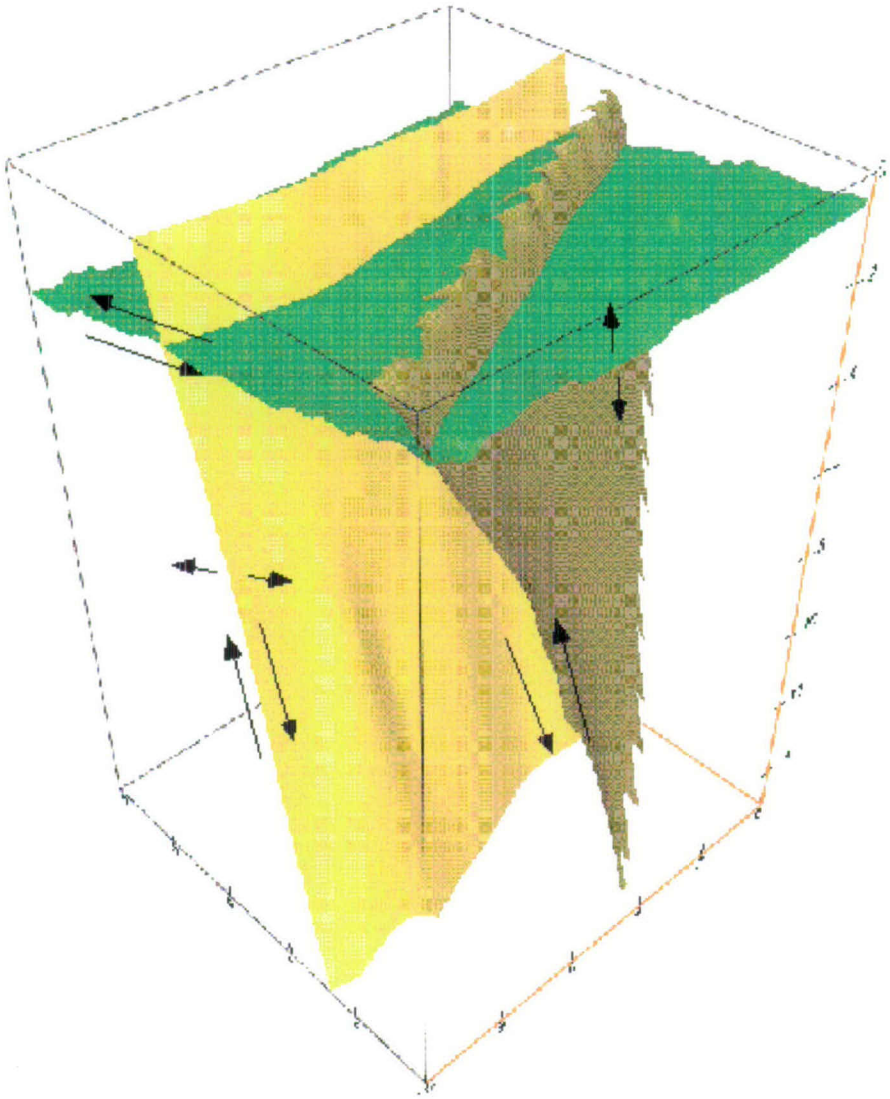


Figure 7-46. Slip Along Horizontal Fractures



Simplified Representation of Motions Observed on the Large Block

Figure 7-47. General Block Movement

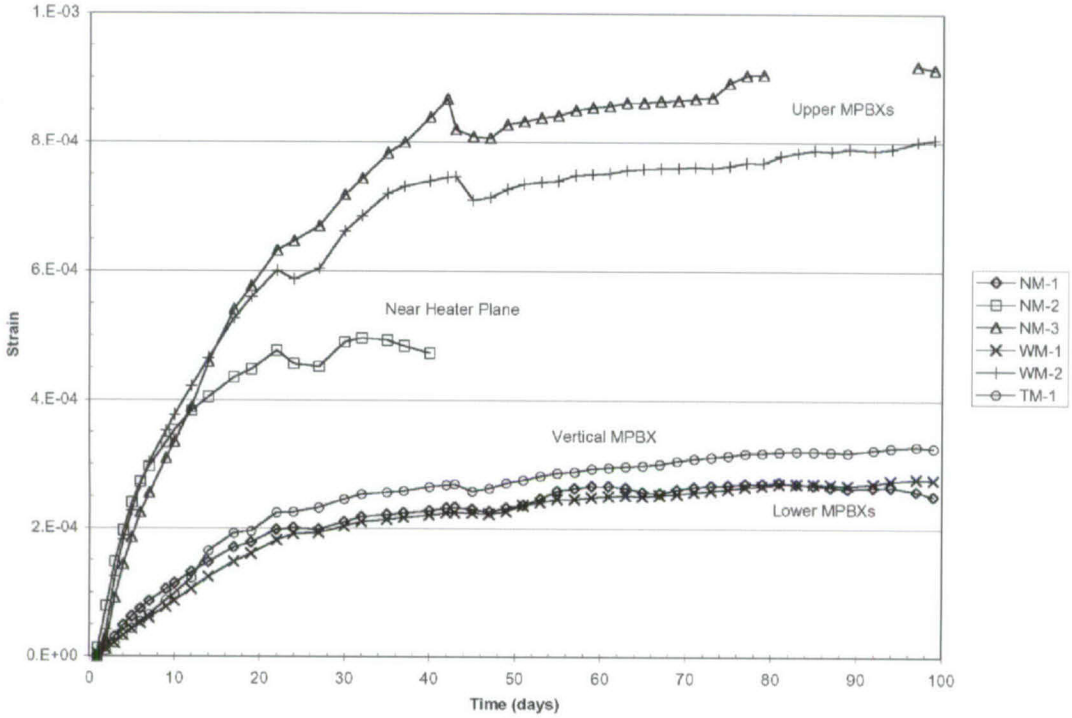


Figure 7-48. Anchor 4 Strains for Each Extensometer During the First 100 Days

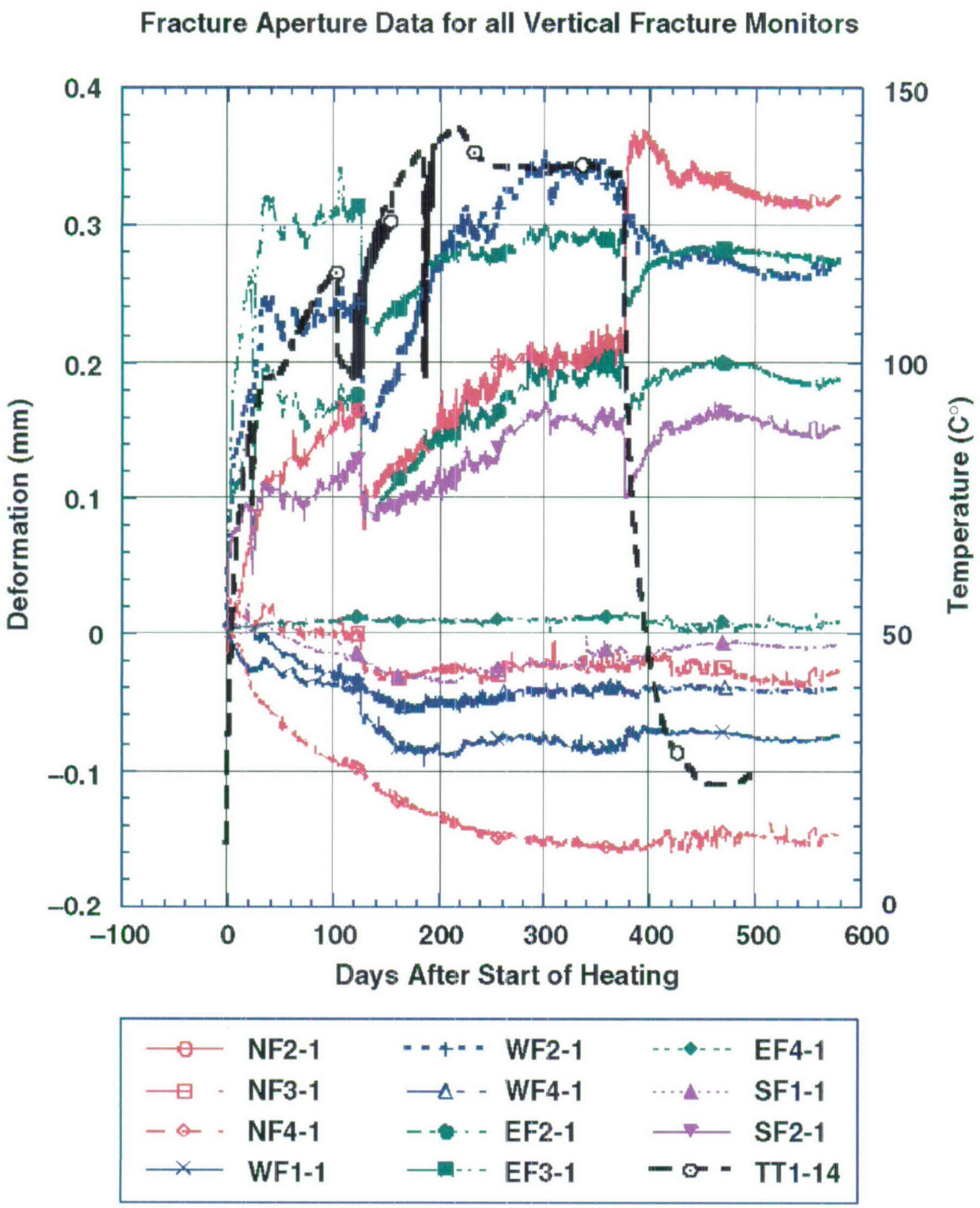


Figure 7-49. Fracture Aperture Data for All Vertical Fracture Monitors

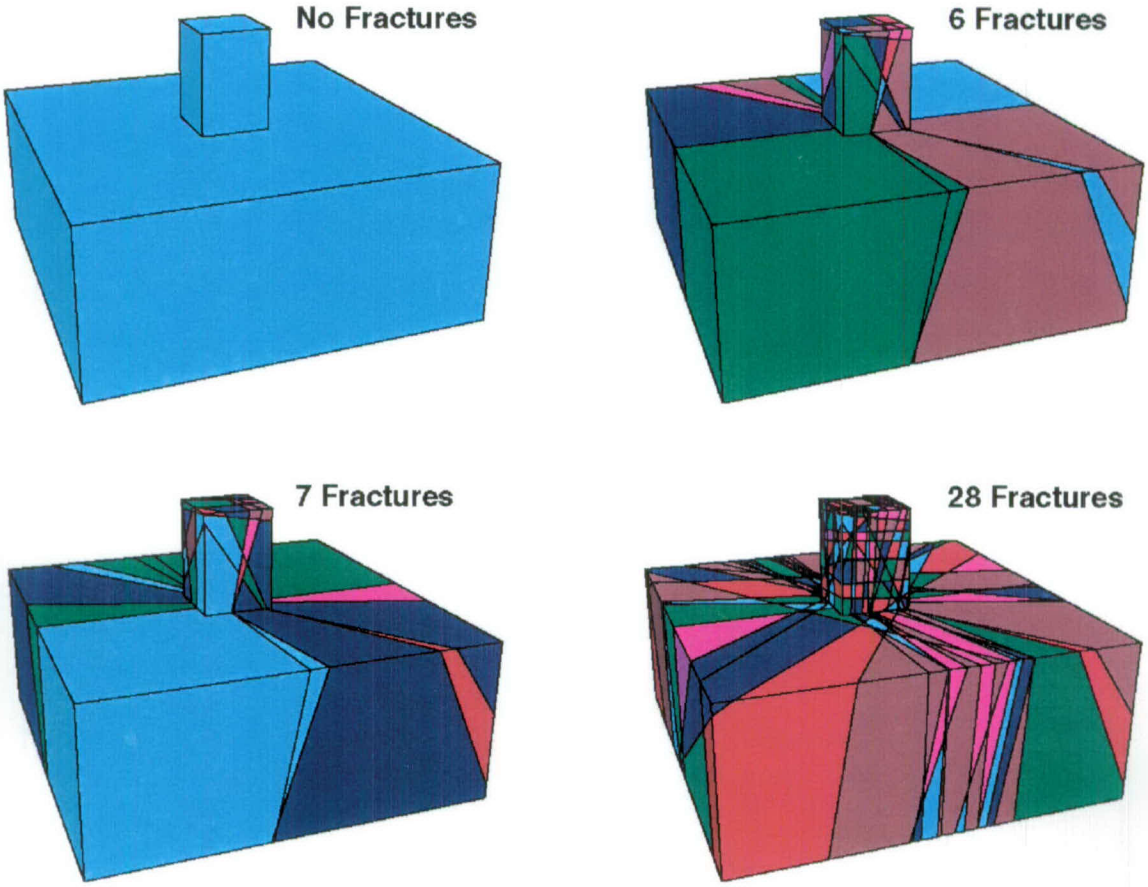


Figure 7-50. Large Block Test TM Model Domains

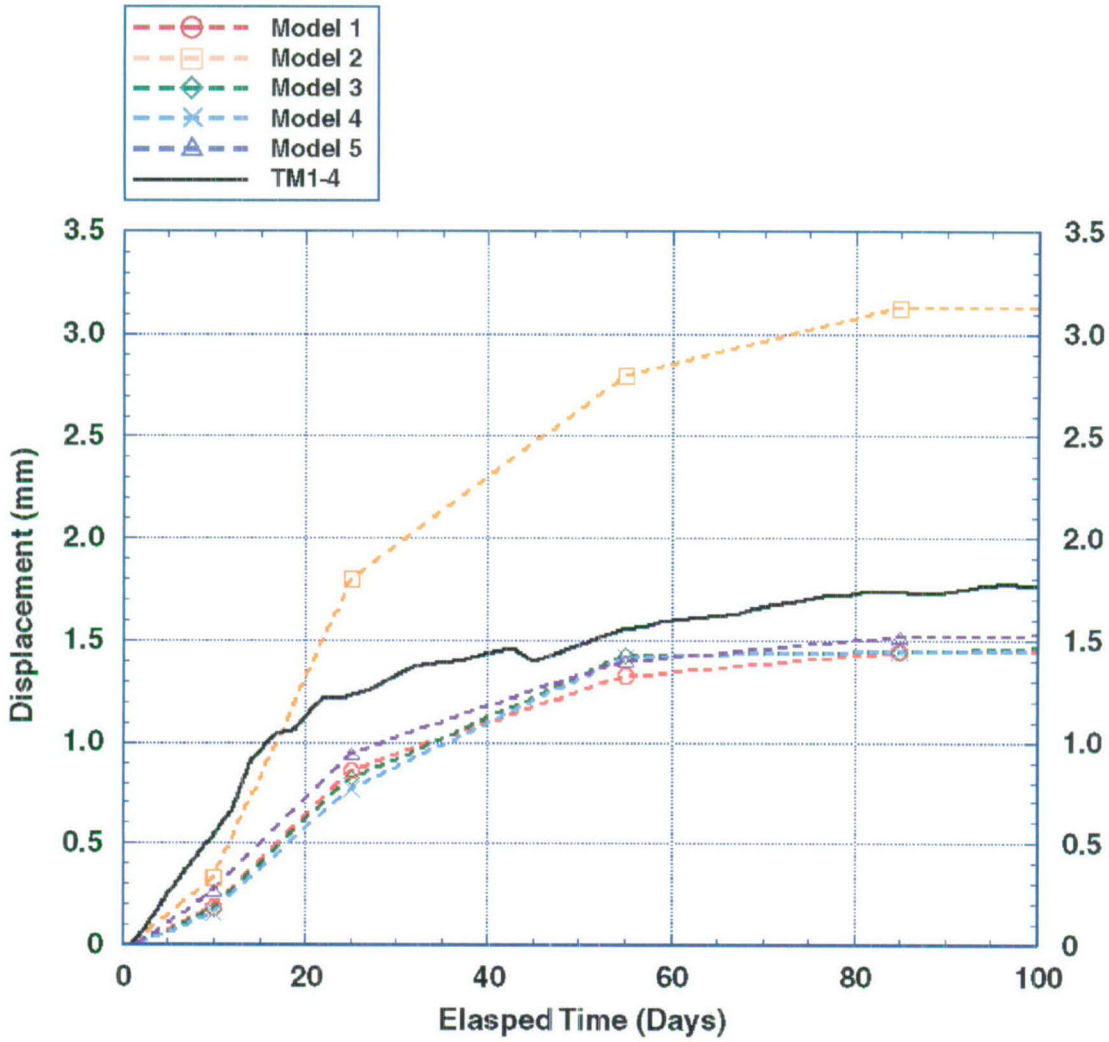


Figure 7-51. TM1 Anchor 4 Displacements and Model Results for the First 100 Days

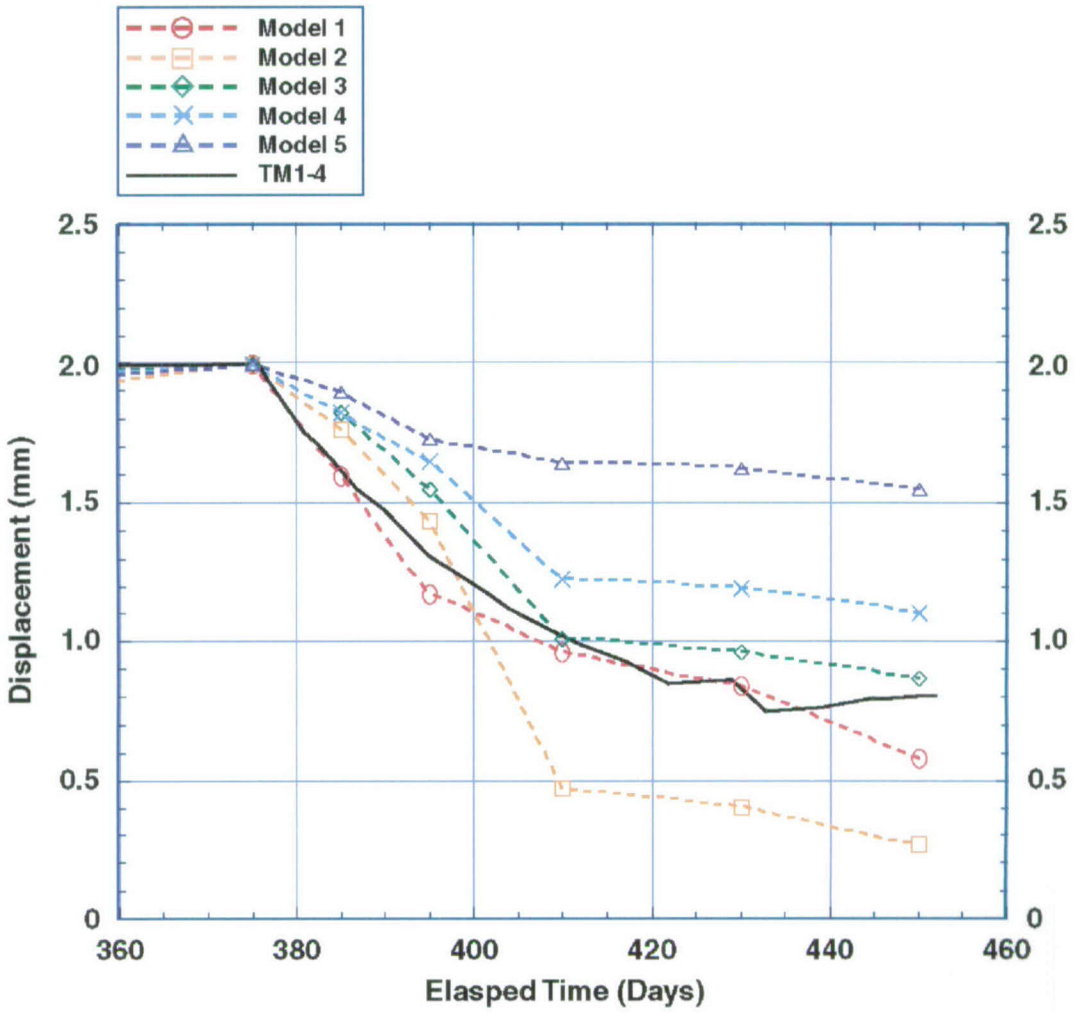


Figure 7-52. TM1 Anchor 4 Displacements and Model Results for the Cool-Down

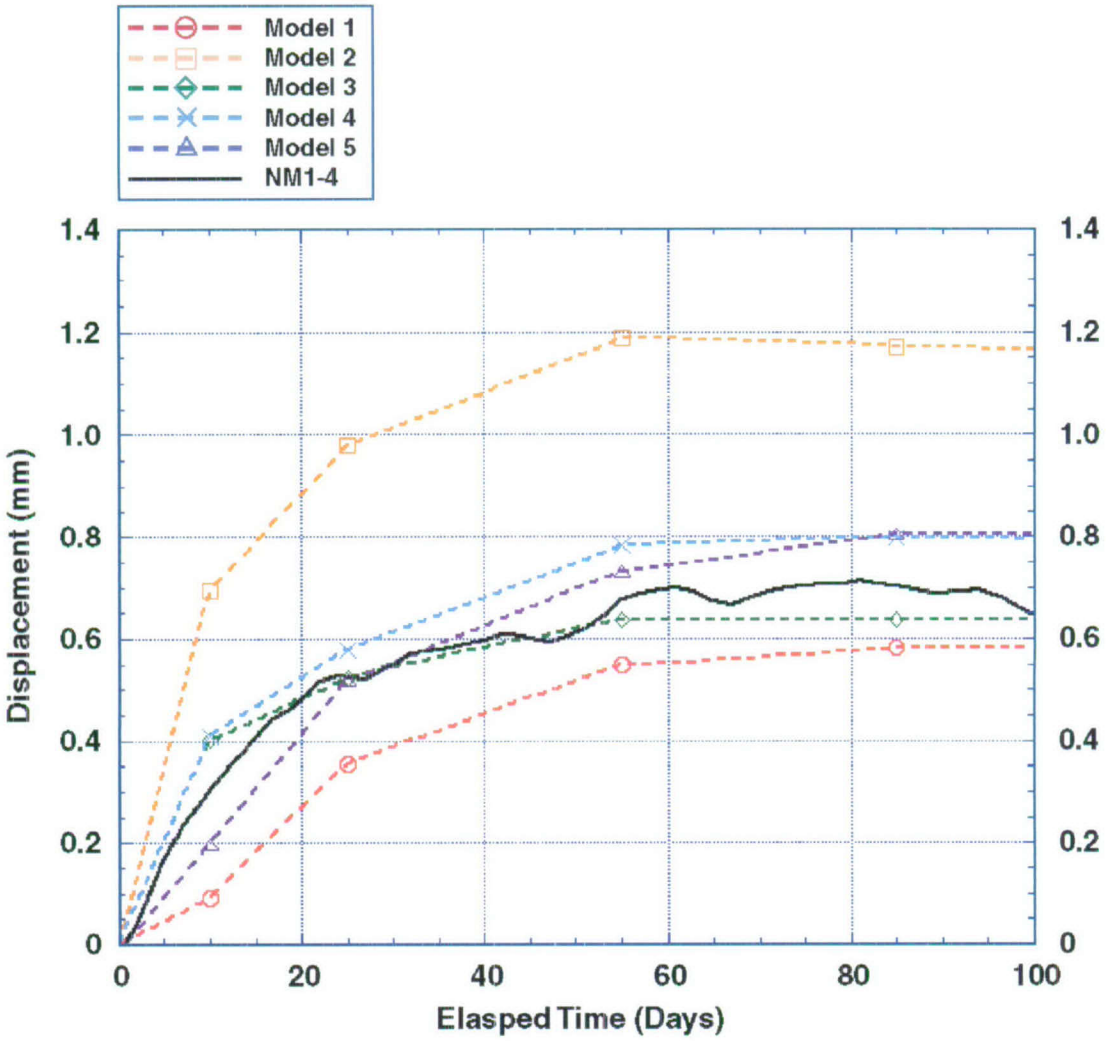


Figure 7-53. NM1 Anchor 4 Displacements and Model Results for the First 100 Days

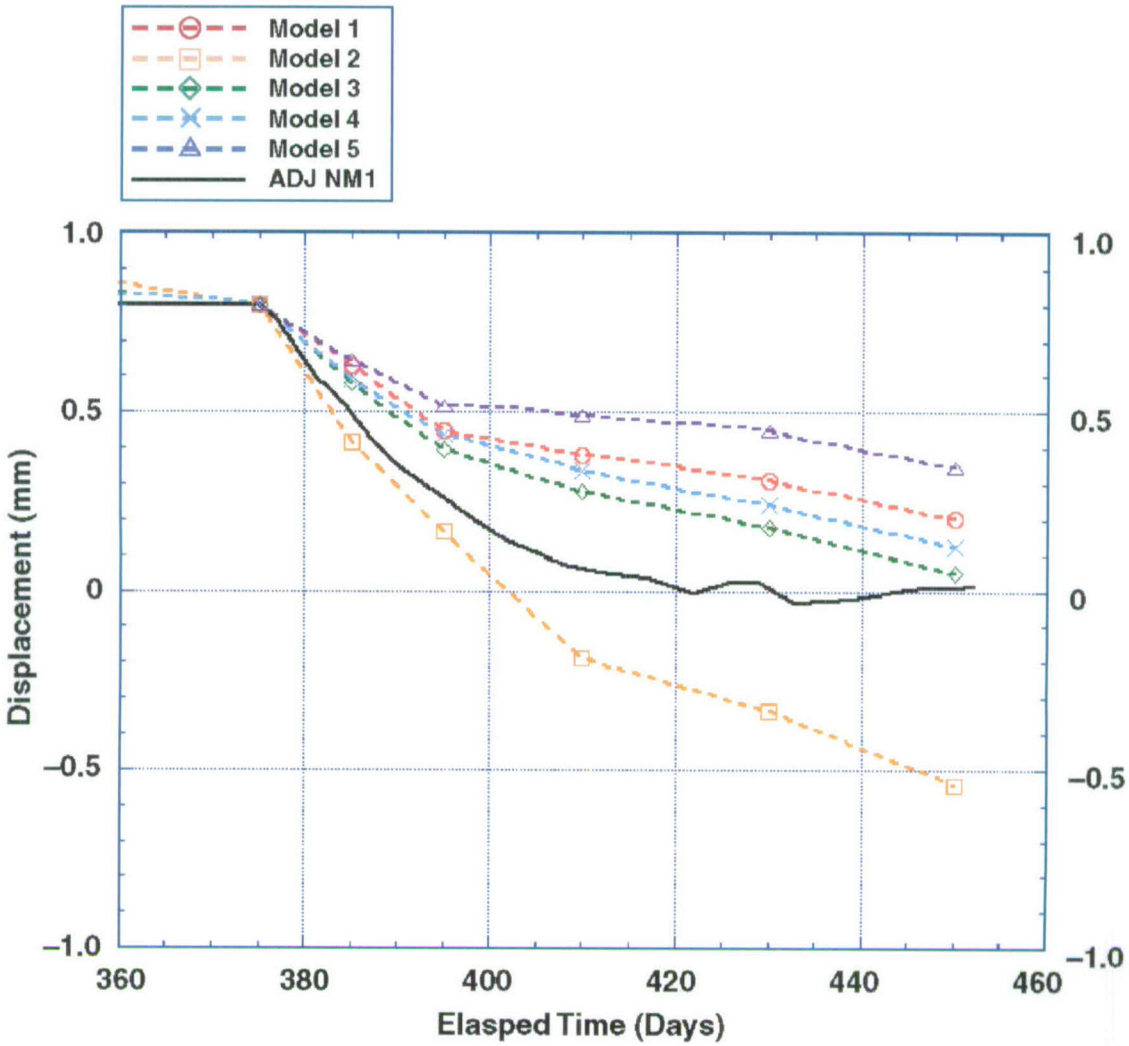


Figure 7-54. NM1 Anchor 4 Displacements and Model Results for the Cool-Down

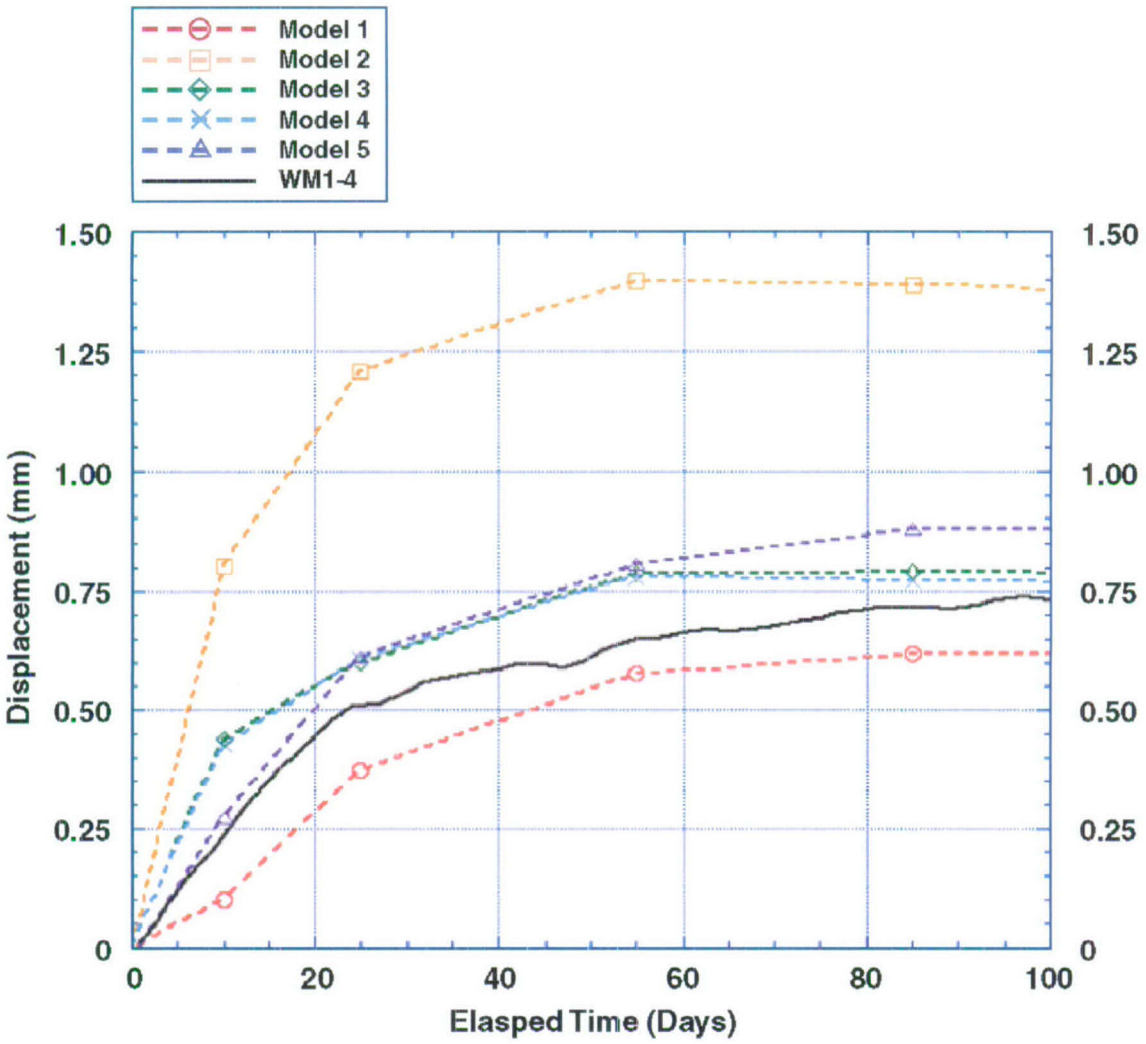


Figure 7-55. WM1 Anchor 4 Displacements and Model Results for the First 100 Days

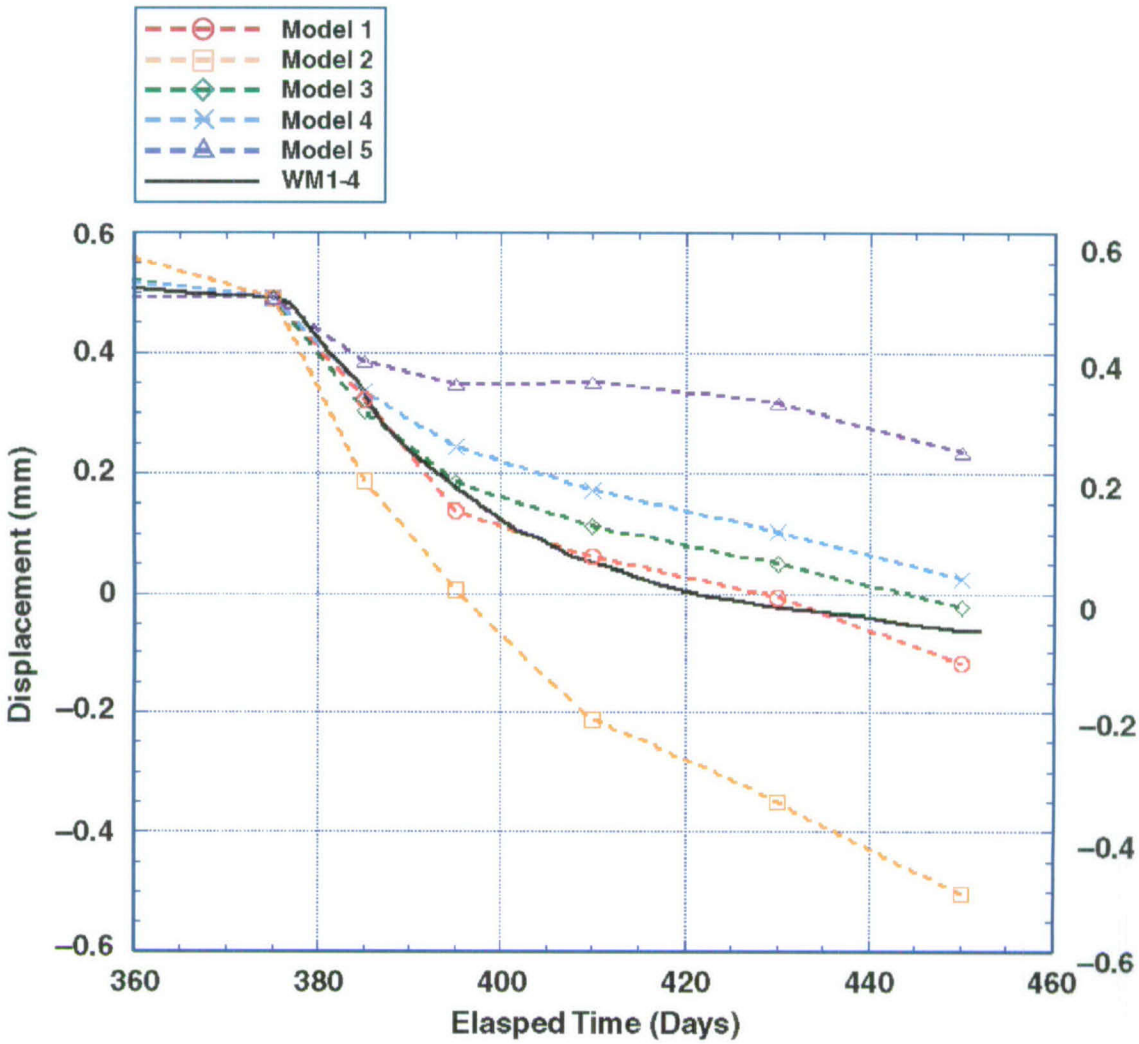


Figure 7-56. WM1 Anchor 4 Displacements and Model Results for the Cool-Down

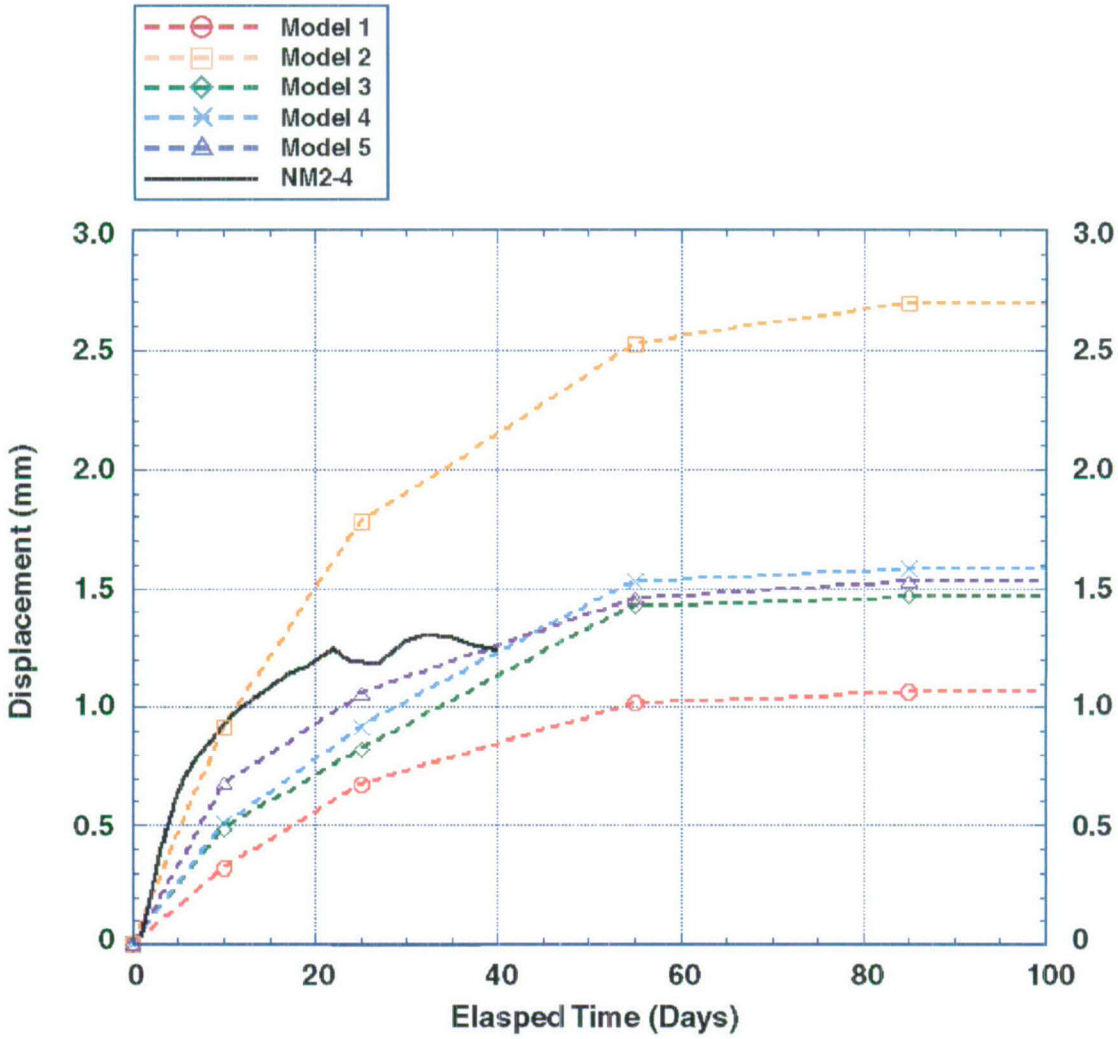


Figure 7-57. NM2 Anchor 4 Displacements and Model Results for the First 100 Days

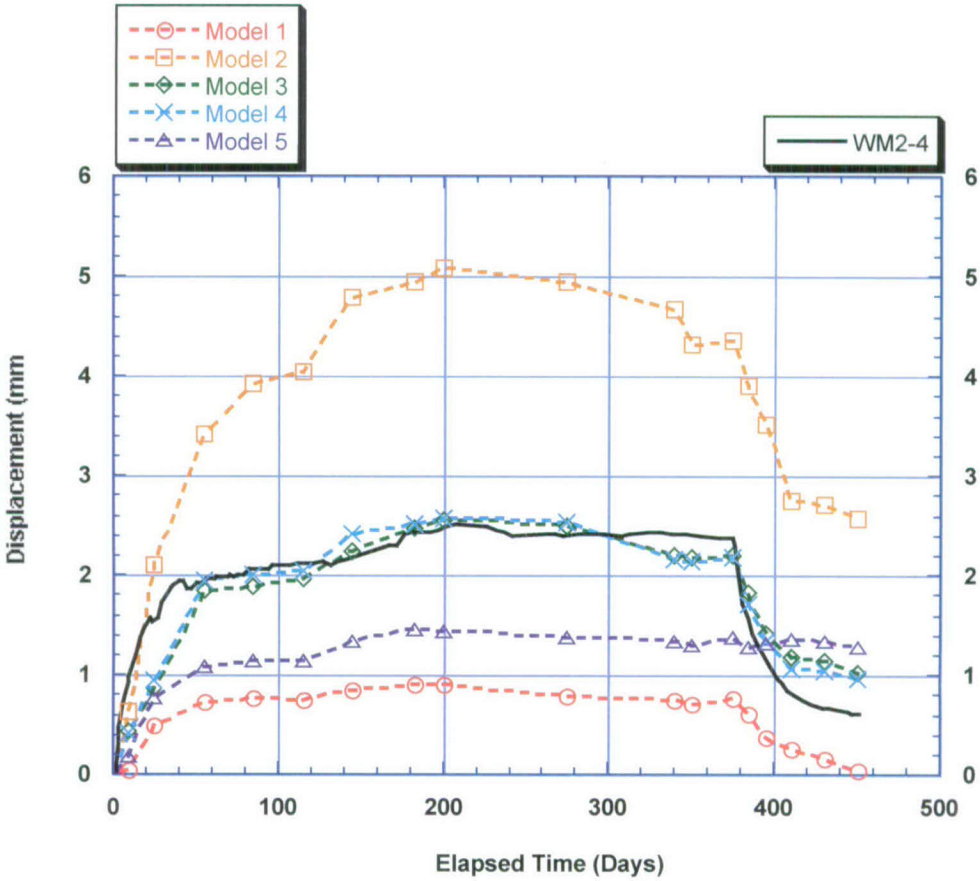


Figure 7-58. WM2 Anchor 4 Displacements and Model Results for the Entire Test

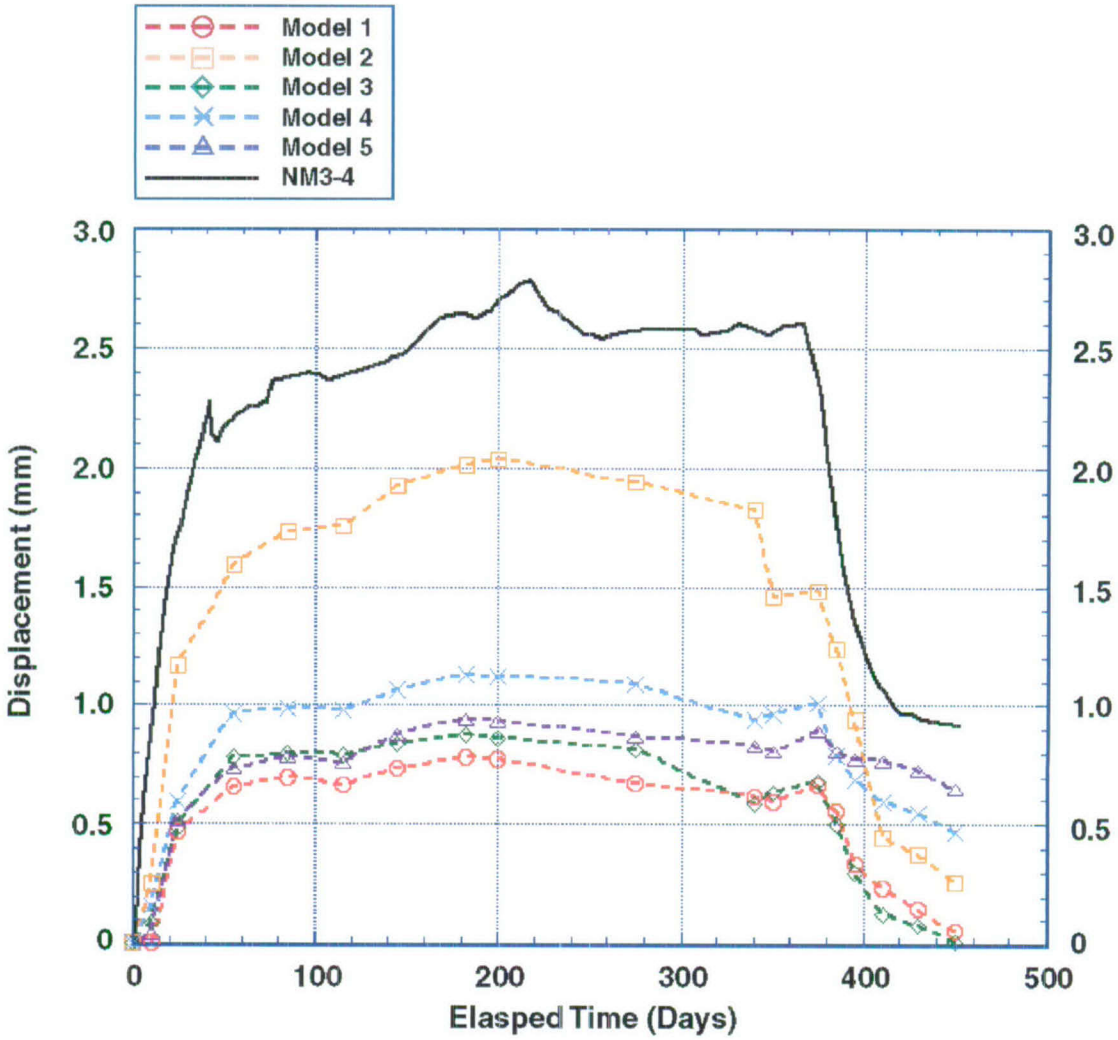


Figure 7-59. NM3 Anchor 4 Displacements and Model Results for the Entire Test

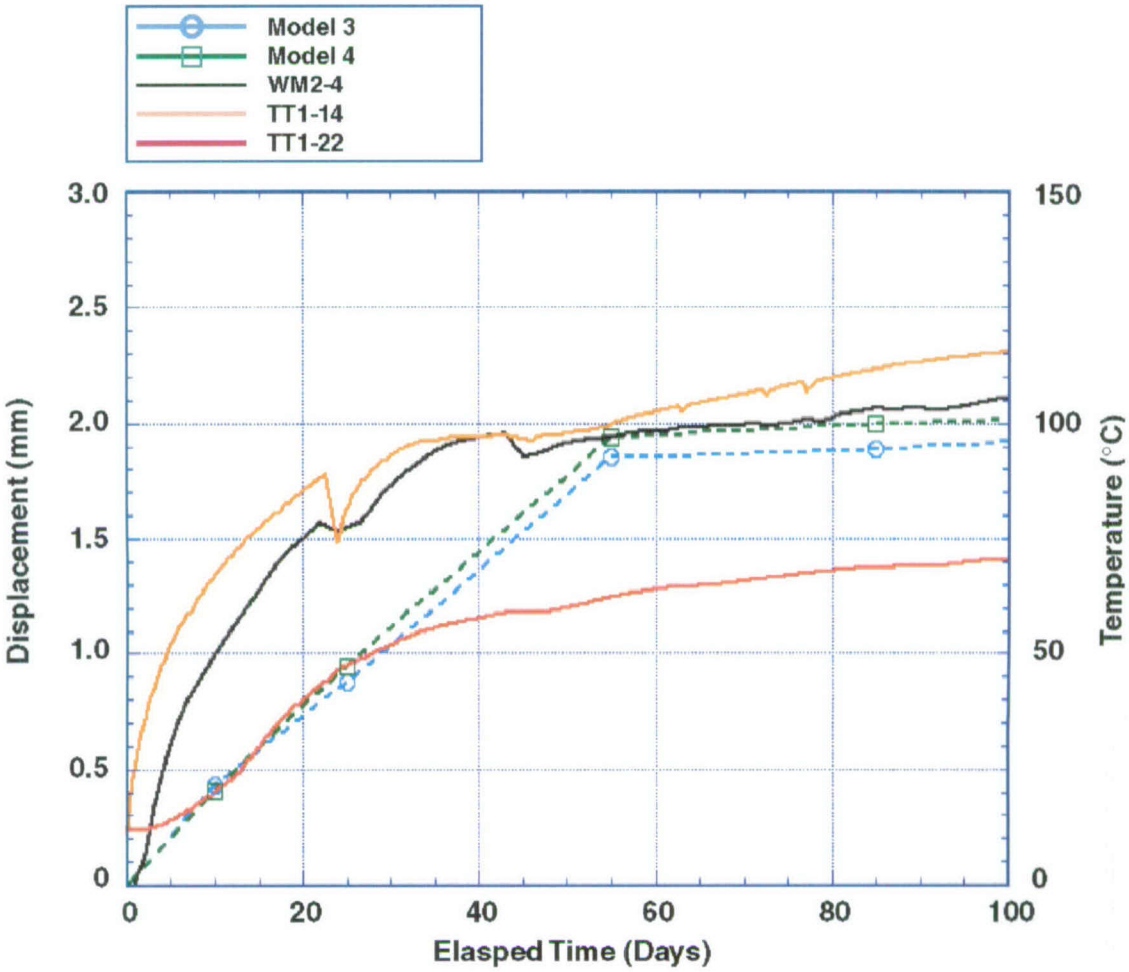


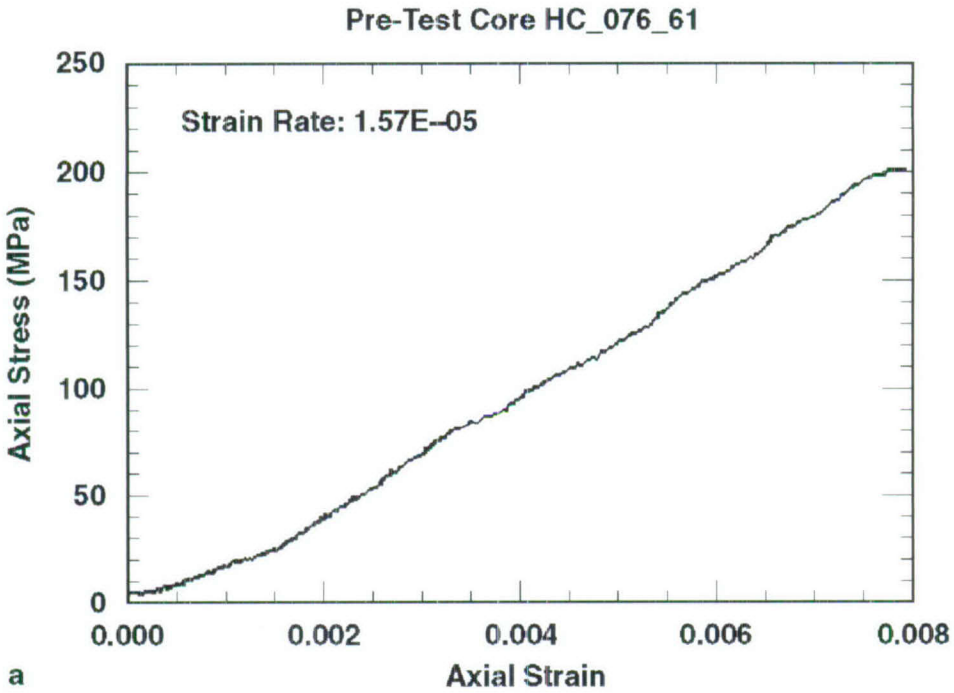
Figure 7-60. WM2 Anchor 4 Displacements, Heater Plane (TT1-14) and WM2-Level (TT1-22) Temperatures and Results of Models 3 and 4 for the First 100 Days

YM-18867 CORE DRILLING ACTIVITIES AT THE LARGE BLOCK TEST, FRAN RIDGE

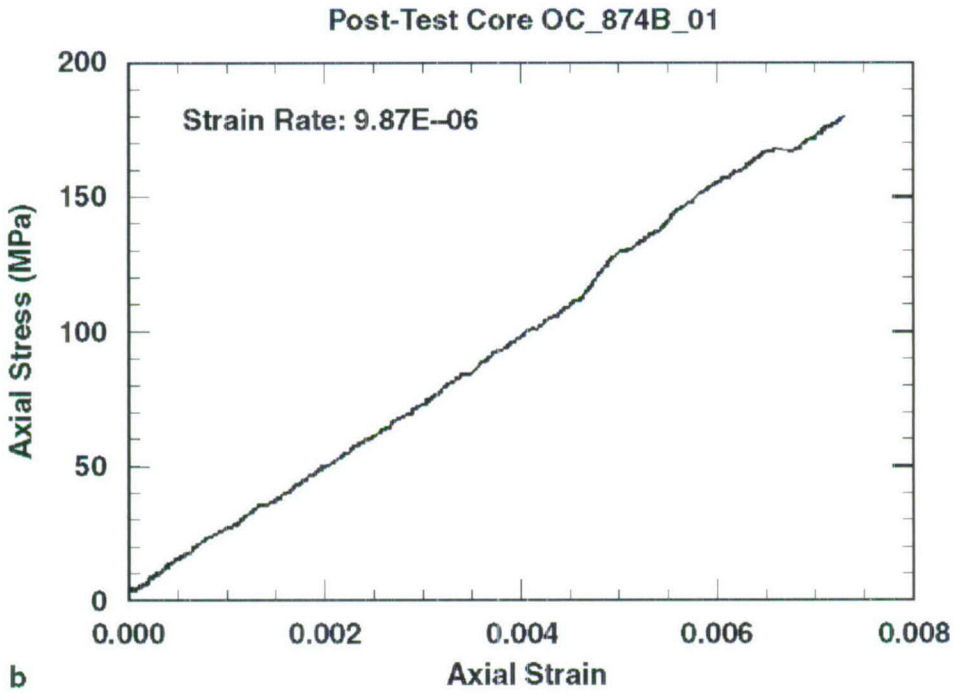
Figure 7-61. Post-Test Core Drilling Activities, Overview

YM-18858 CORE DRILLING ACTIVITIES AT THE LARGE BLOCK TEST, FRAN RIDGE

Figure 7-62. Post-Test Core Drilling Activities, Detail

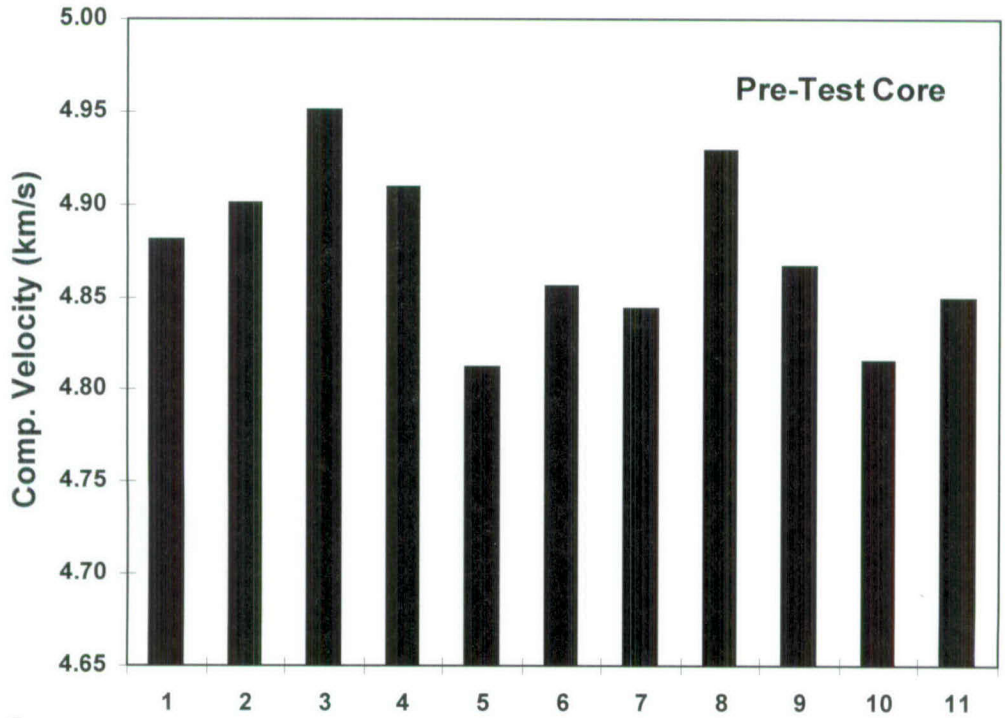


a

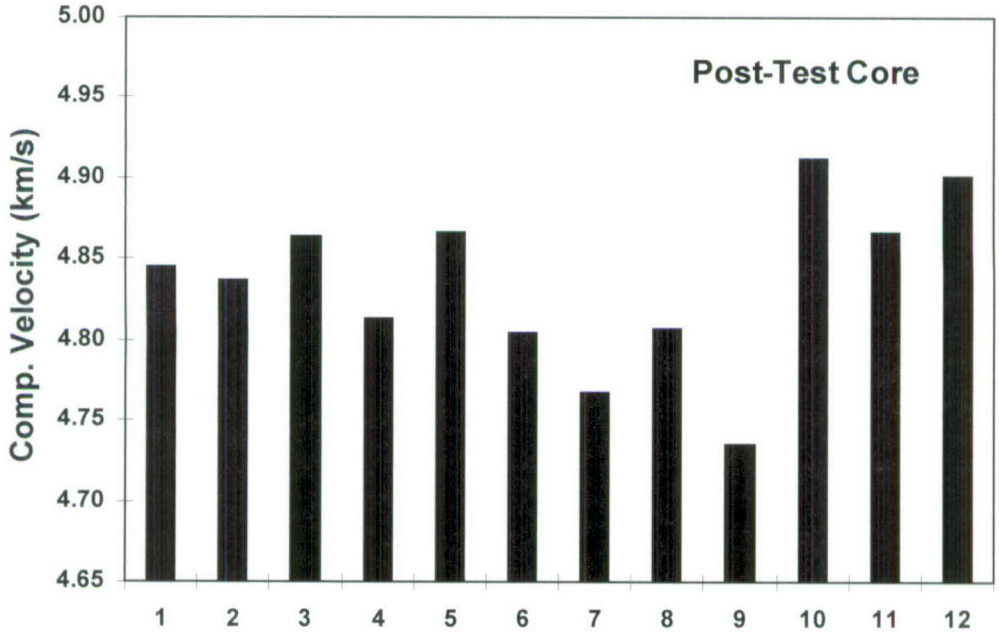


b

Figure 7-63. Representative Stress-Strain Plots for (a) Pre-test Core HC_076_61 and (b) Post-test Core OC_874B_01

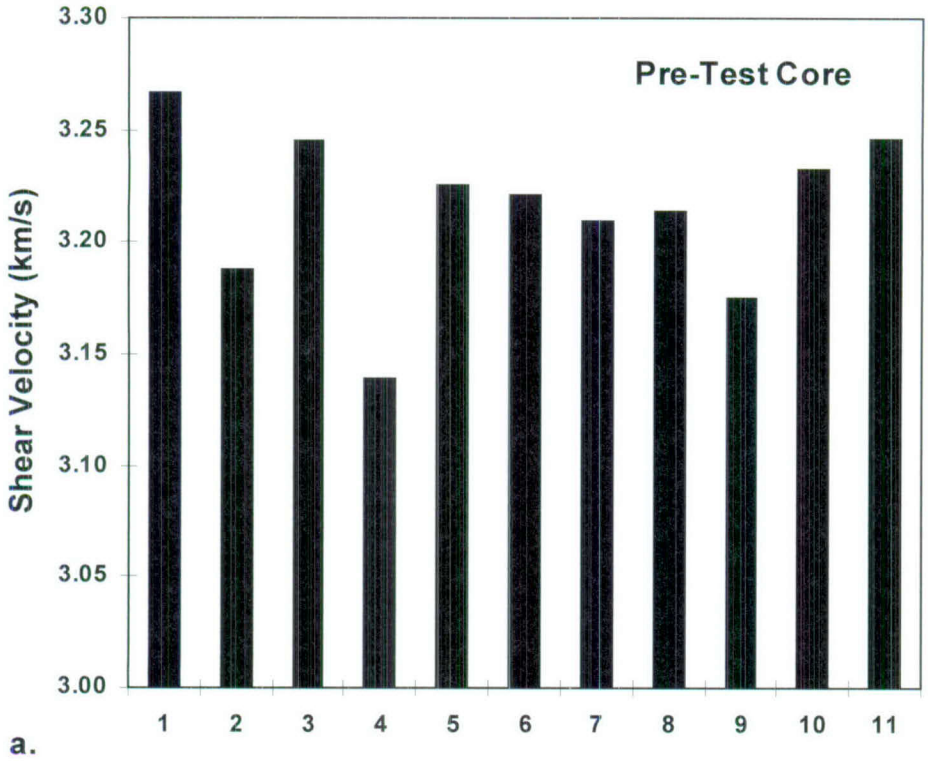


a.



b.

Figure 7-64. Compressional Velocities for (a) Pre-test and (b) Post-test Specimens



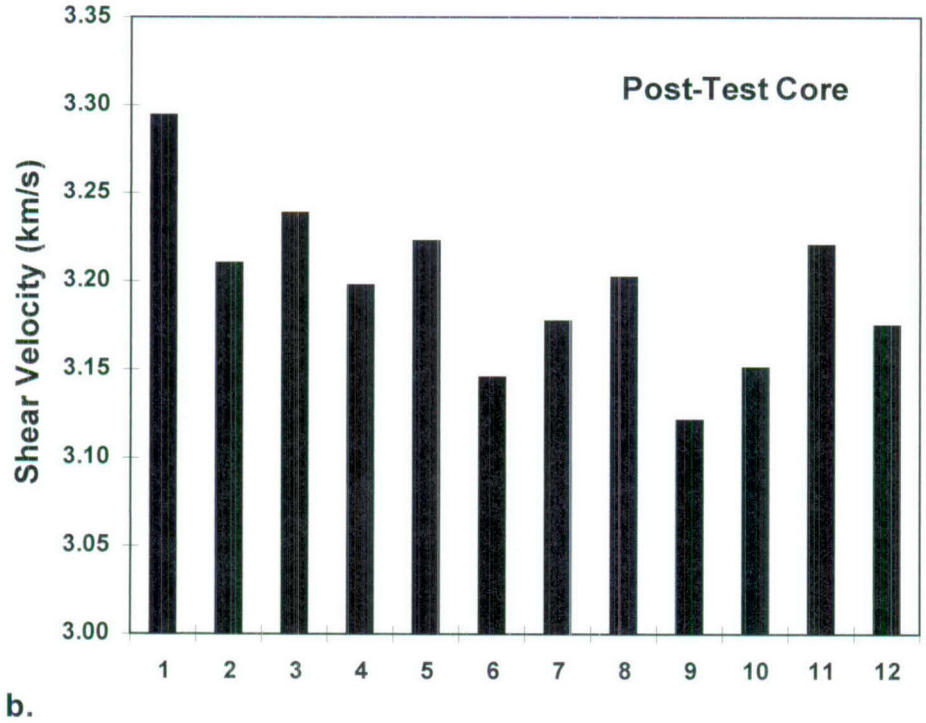
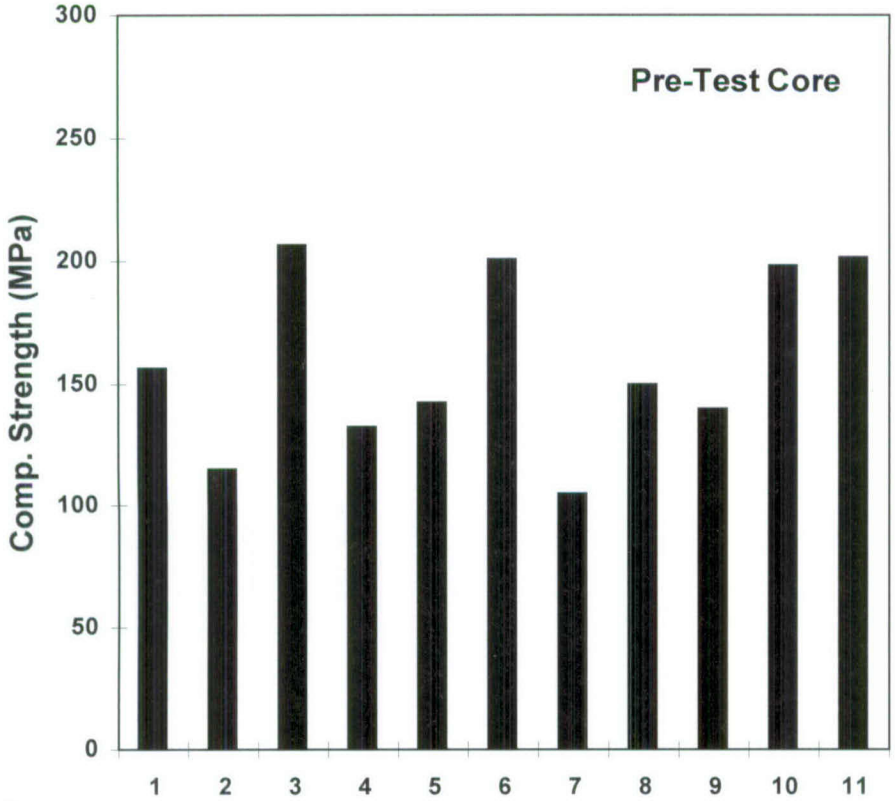
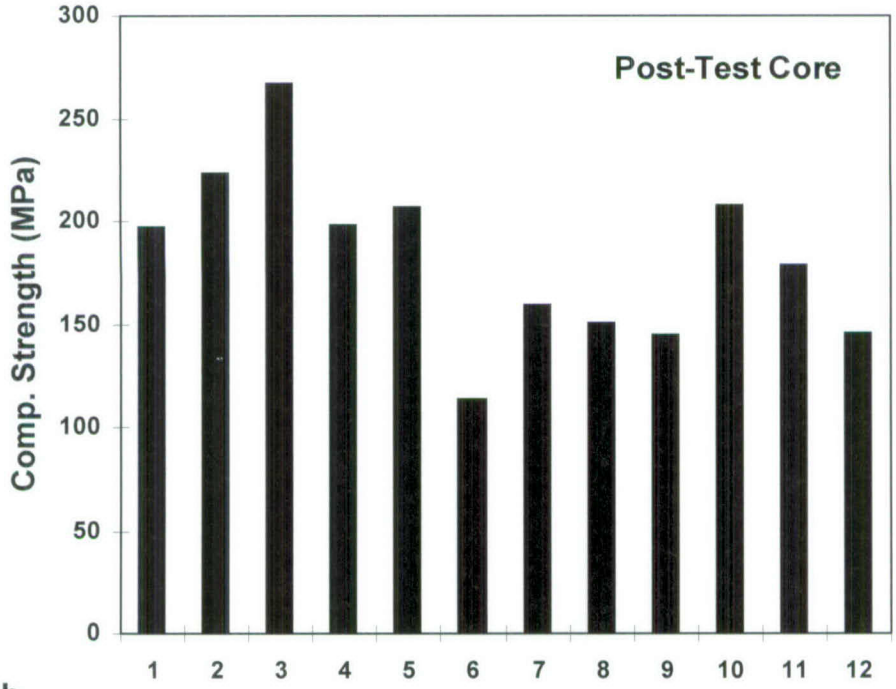


Figure 7-65. Shear Velocities for (a) Pre-test and (b) Post-test Specimens

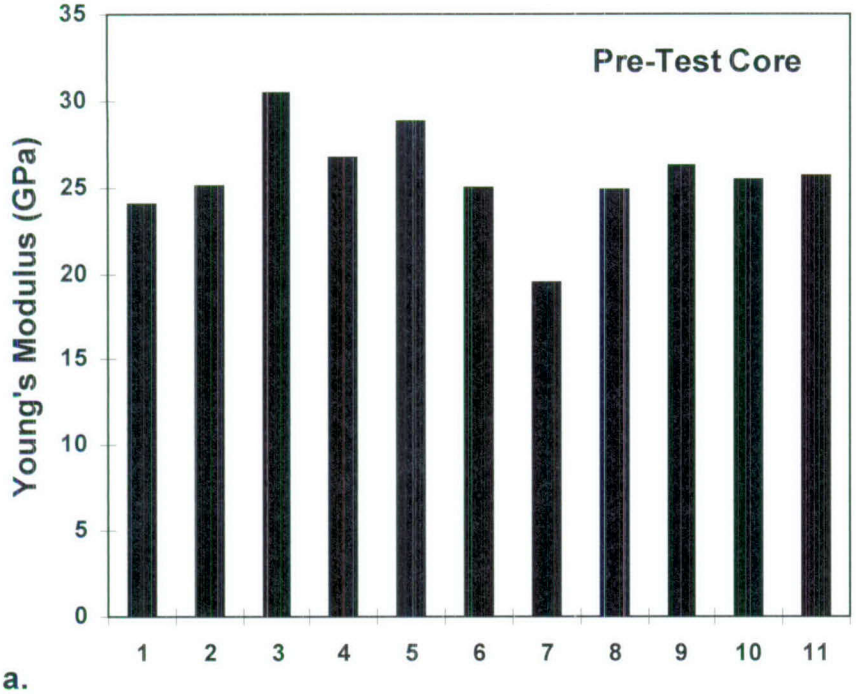


a.



b.

Figure 7-66. Compressive Strength for (a) Pre-test and (b) Post-test Specimens



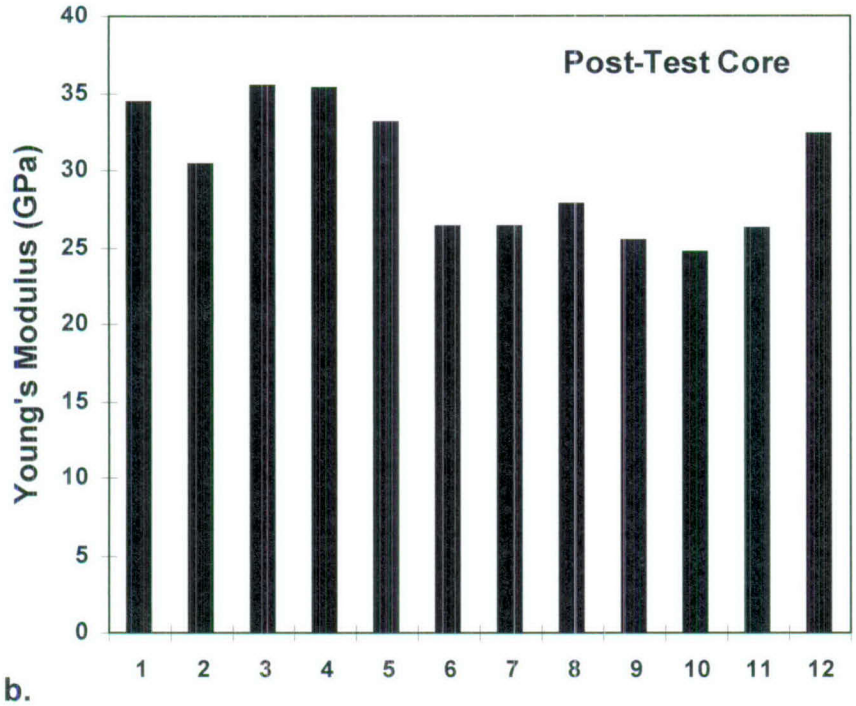
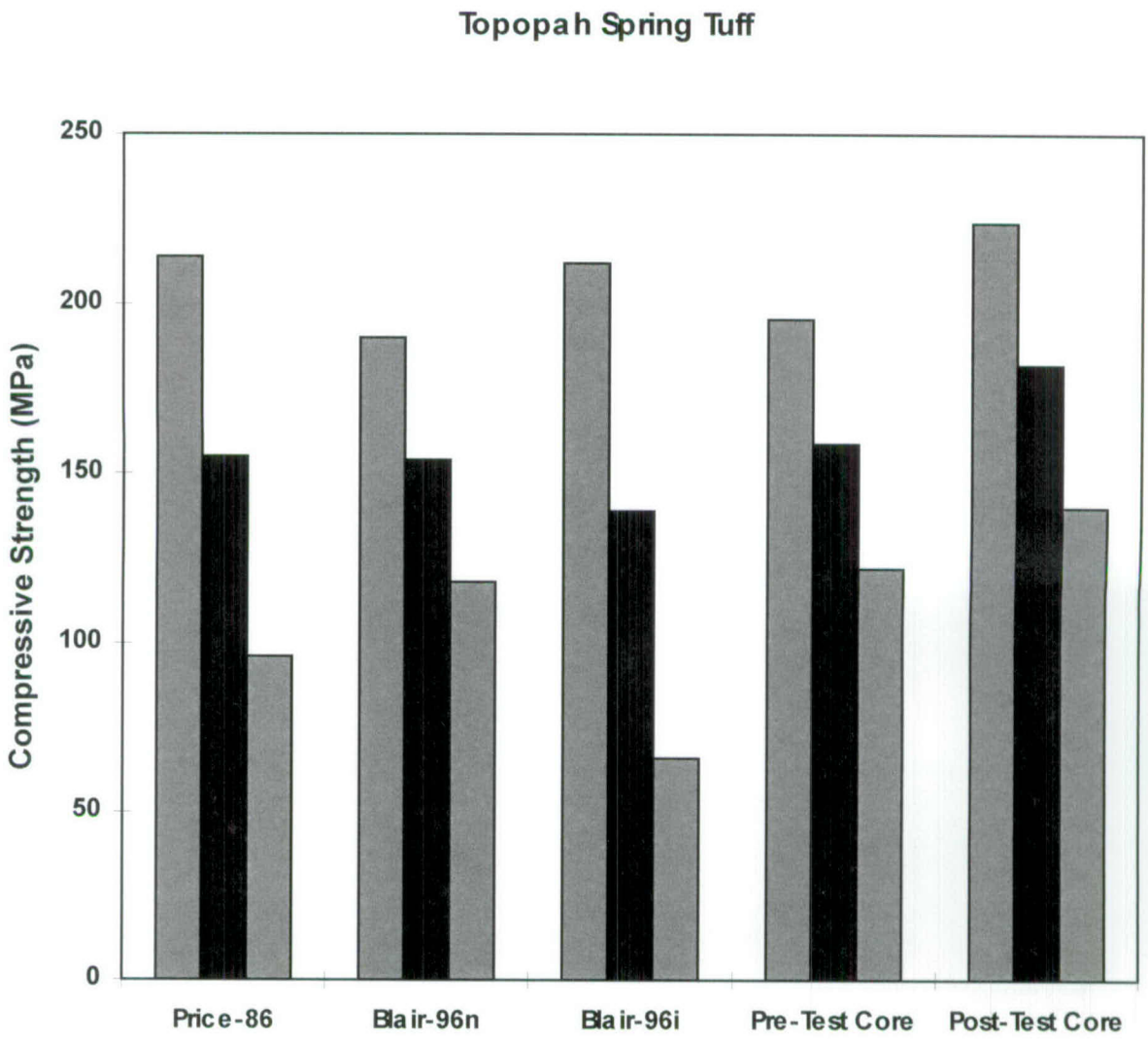
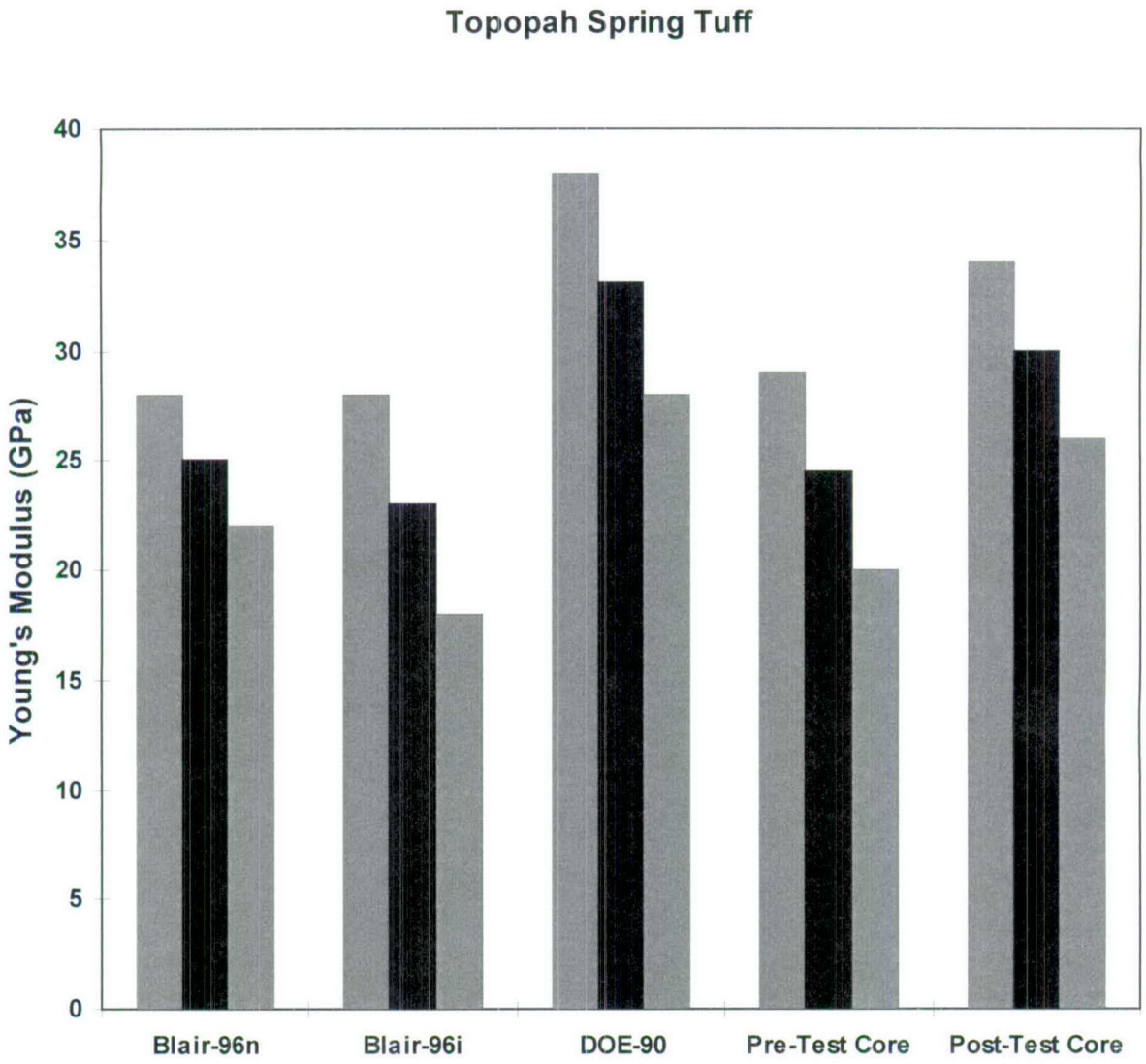


Figure 7-67. Static Young's Modulus for (a) Pre-test and (b) Post-test Specimens



NOTE: Solid columns are mean values; stipled columns are mean values ± one standard deviation. Price-86 data are from Price (1986). Blair-96n (nonirradiated) and Blair-96i (irradiated) data are from Blair, Kelly, et al. (1996).

Figure 7-68. Uniaxial Compressive Strength for Topopah Spring Tuff



NOTE: Solid columns are mean values; stipled columns are mean values ± one standard deviation. DOE-90 data are from Price (1986). Blair-96n (nonirradiated) and Blair,-96i (irradiated) data are from Blair, Kelly, et al. (1996).

Figure 7-69. Static Young's Modulus for Topopah Spring Tuff

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