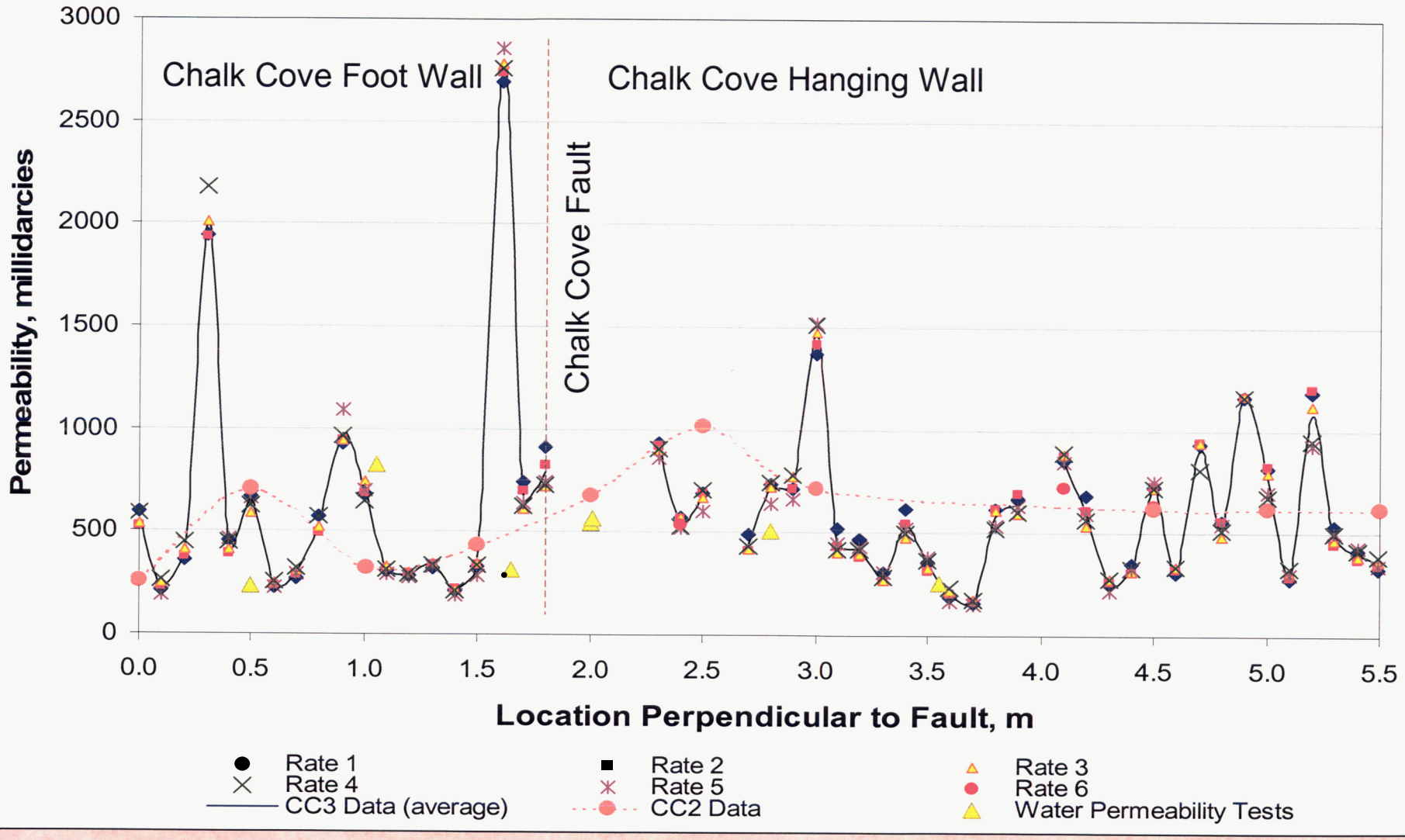
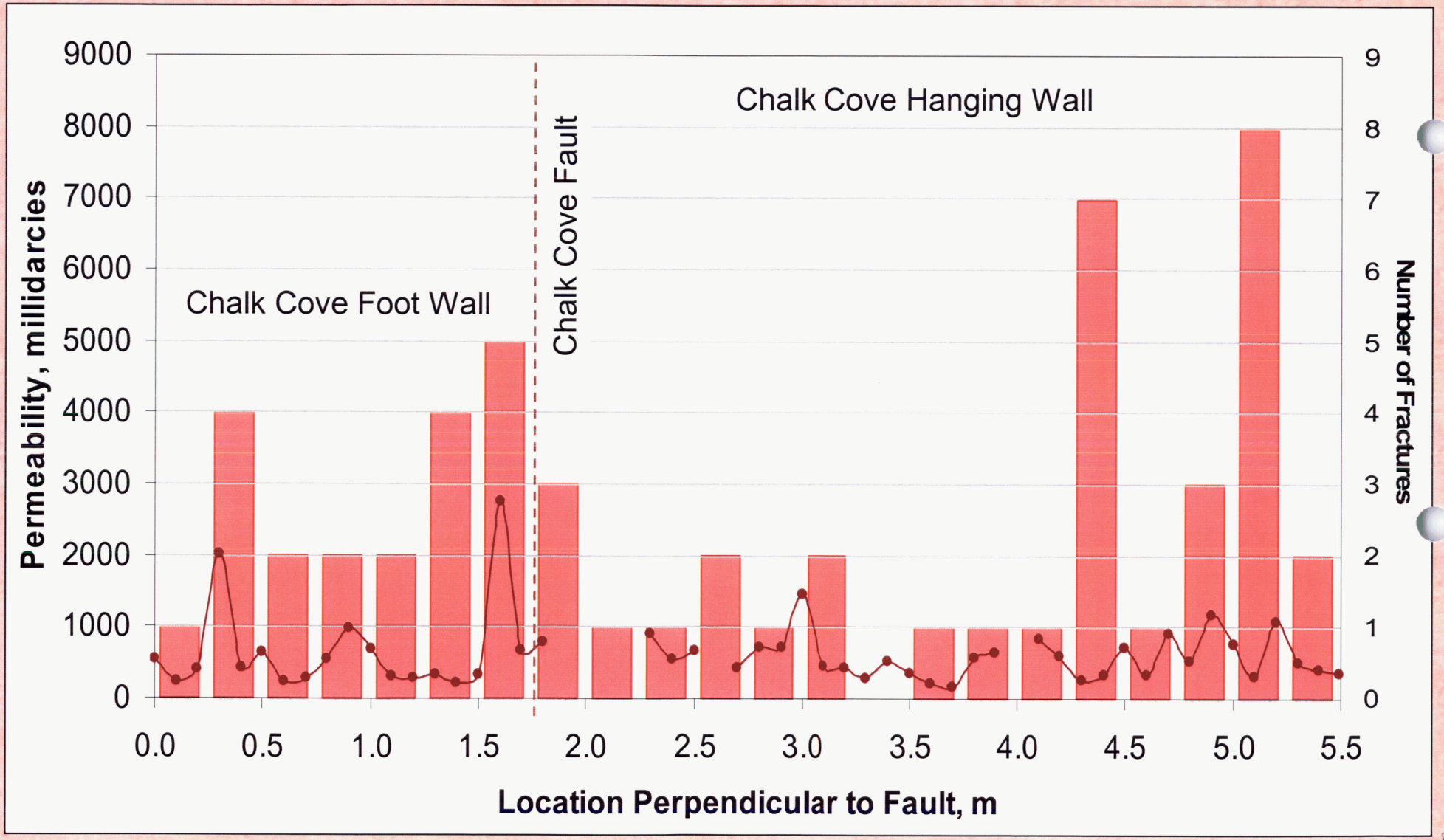
Chalk Cove Fault

Permeability along Transects CC2 & CC3



Chalk Cove Fault

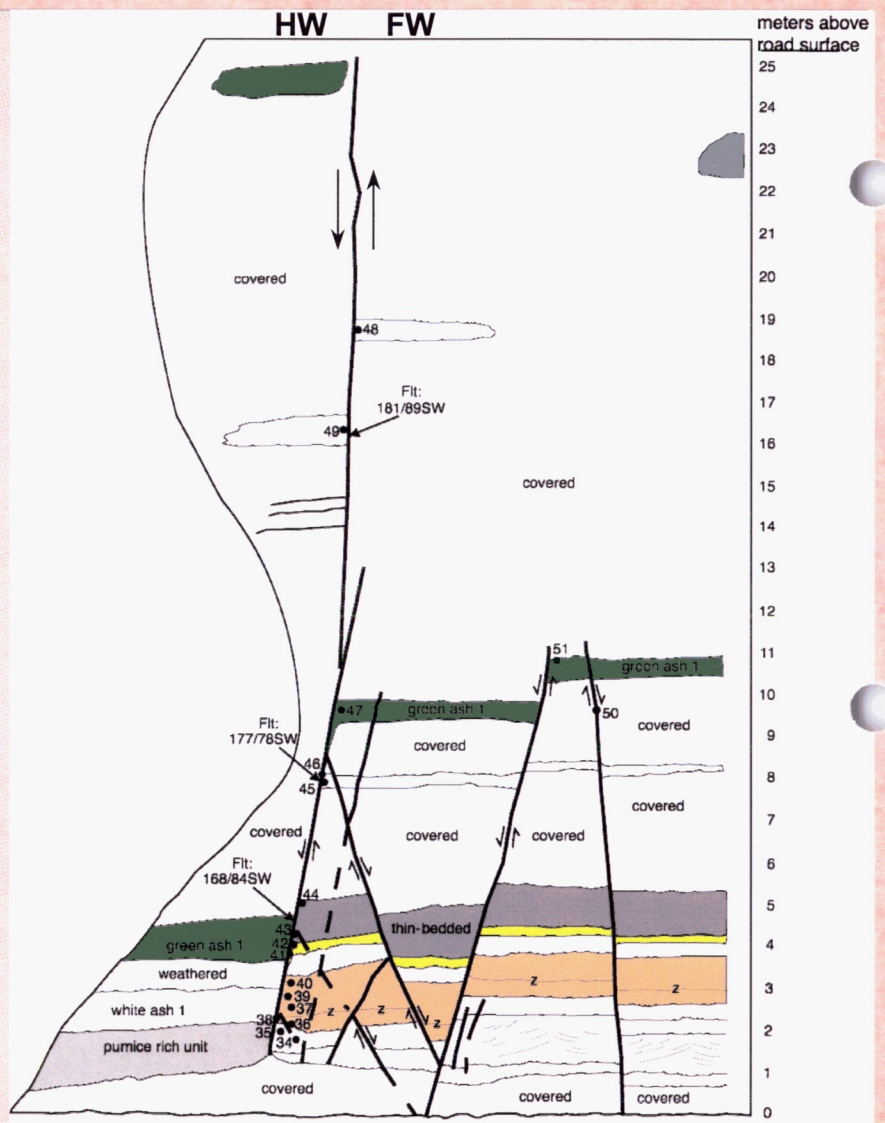
Fracture Intensity and Permeability



Crucifix/Crossing Faults

Site Description

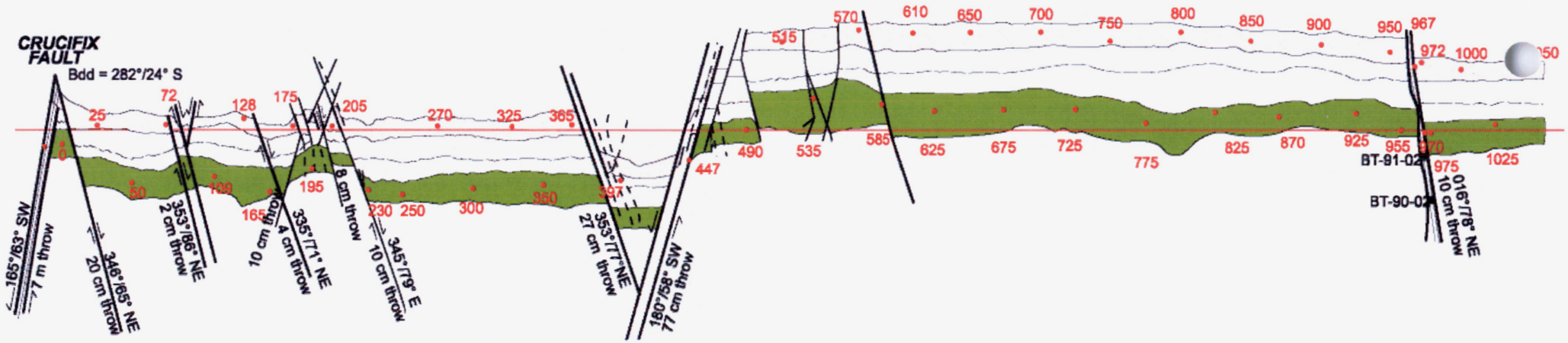
NE-dipping normal fault with 7 m displacement. Fault exposed within nonwelded, finely laminated fall-out tephras and basal surge deposits. Fault has a narrow and mildly deformed hanging wall damage zone with an intensely deformed footwall damage zone.



Crucifix/Crossing Faults

Fracture and Sample Map

W E



25 minipermeameter test hole (distance in cm)

Transect CF1: light gray ash bed

Transect CF2: greenish-brown silty be

0 50 cm
No Vertical Exaggeration

DRAFT

CF transect

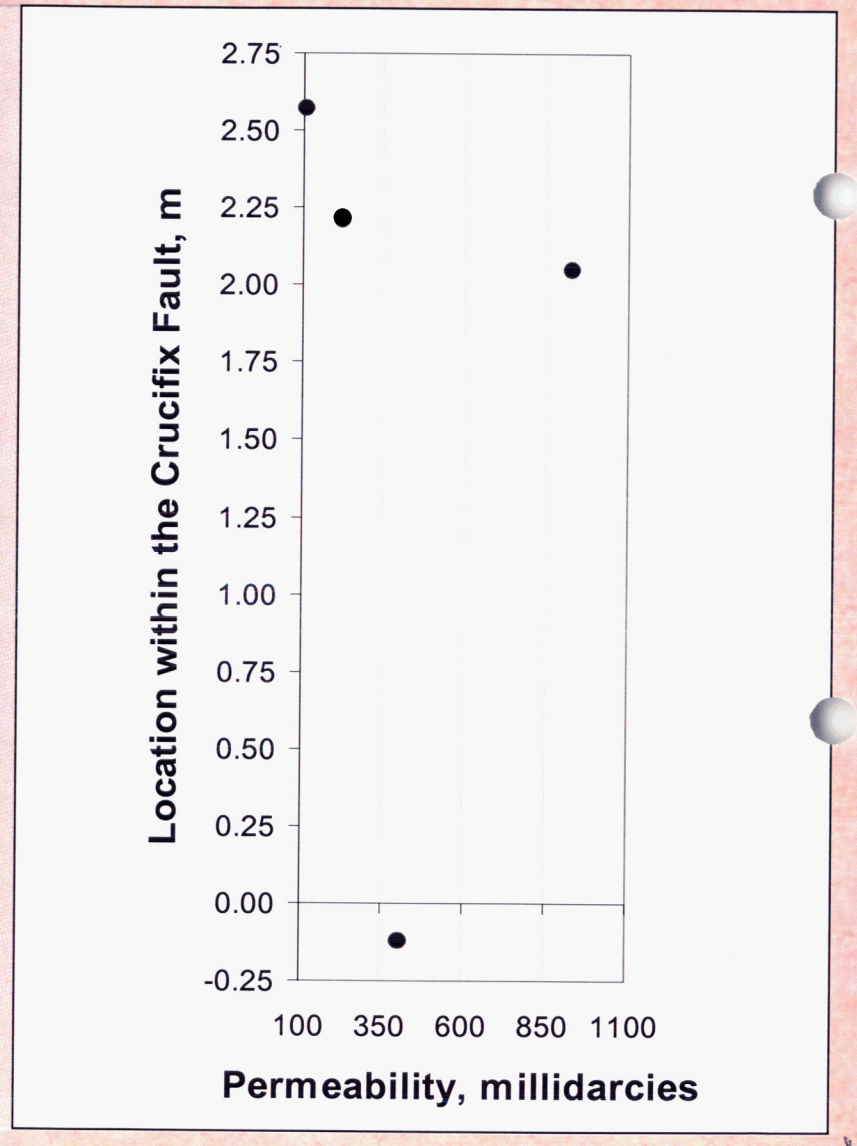
25 September 2001

25/33

Prepared by:
Kelly Keighley Bradbury

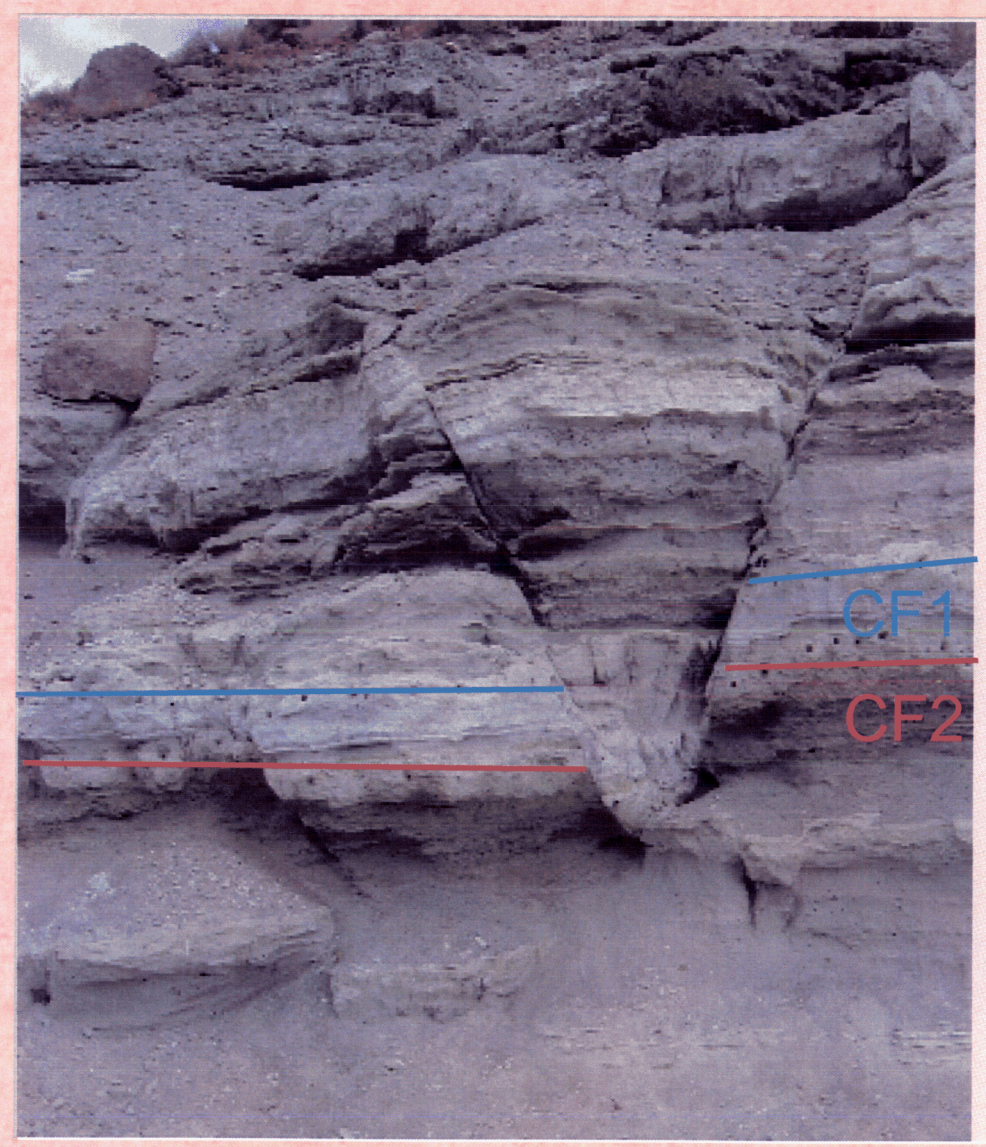
Crucifix/Crossing Faults

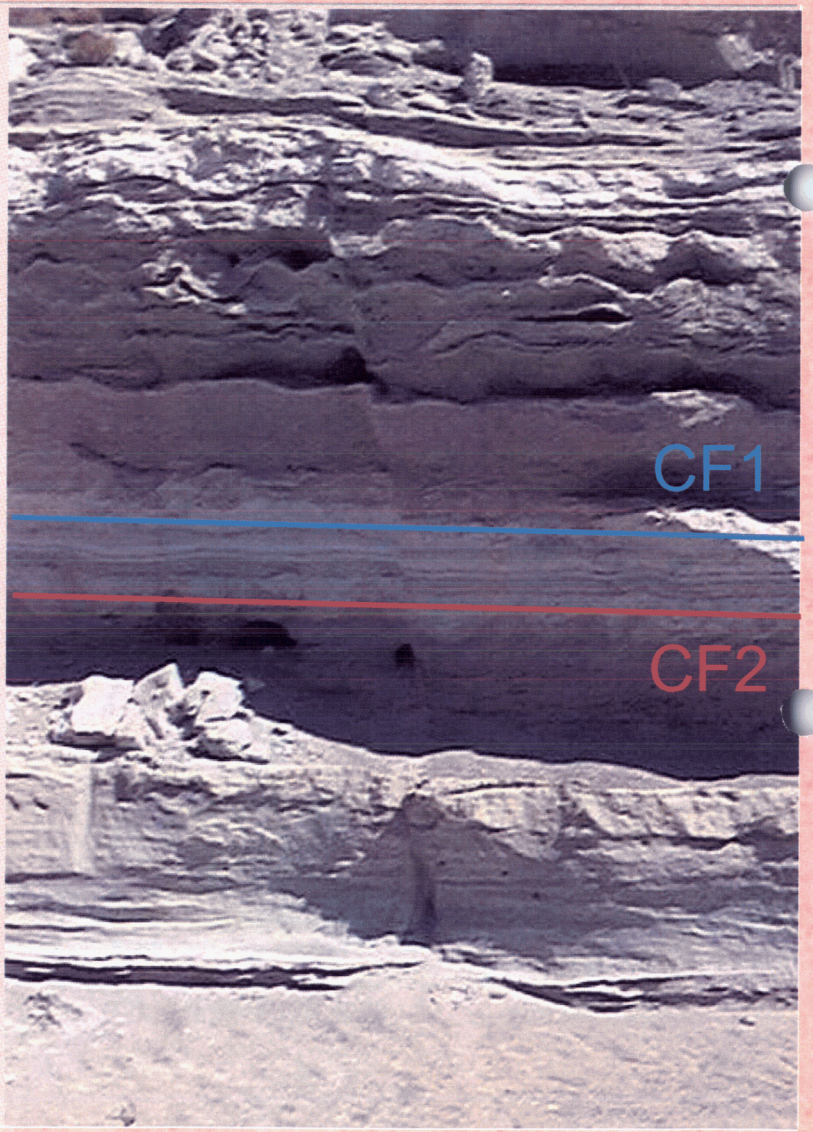
Crucifix Fault Permeability Profile CF3



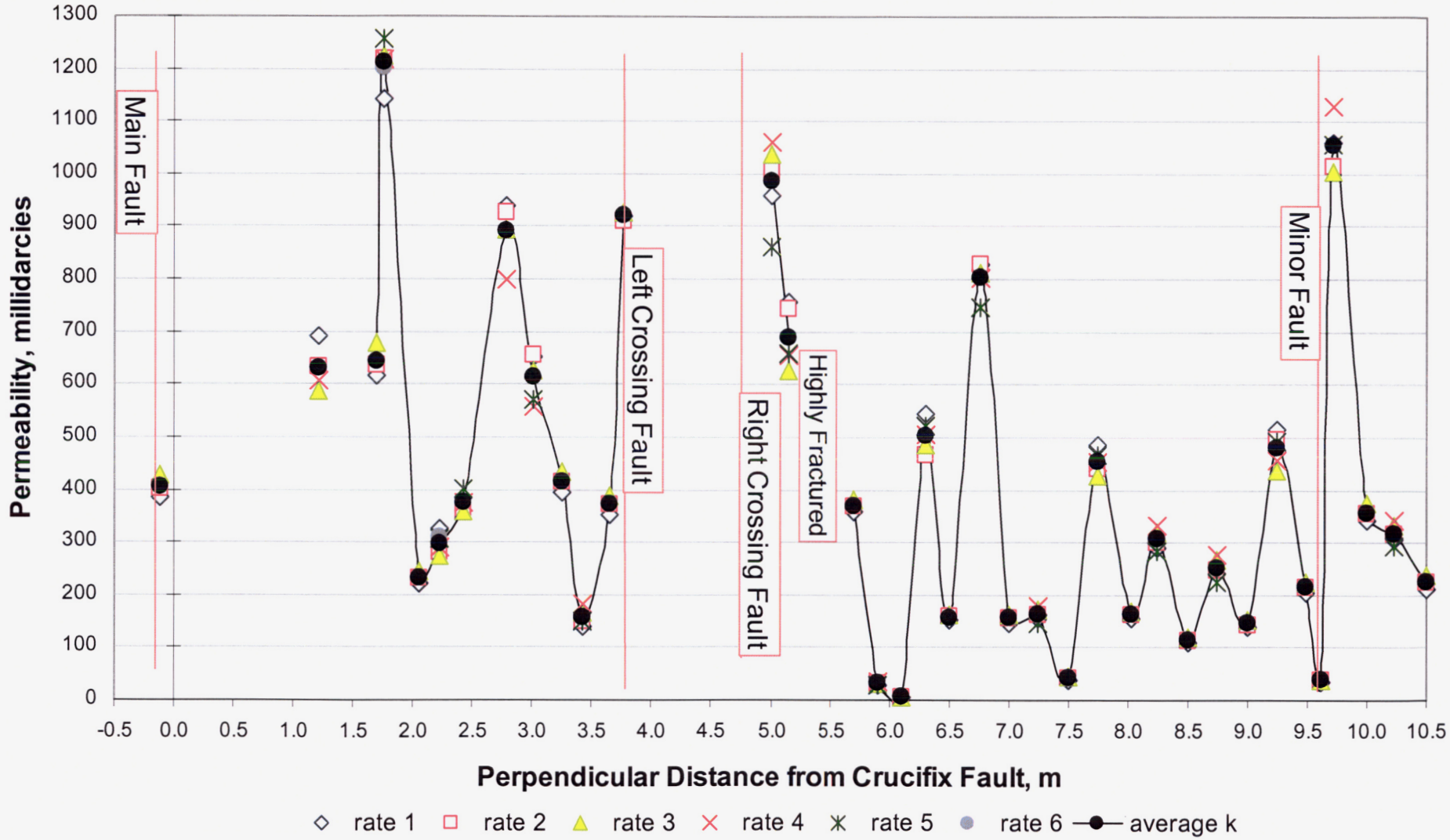
Crucifix/Crossing Faults

Crossing Conjugate and Minor Faults

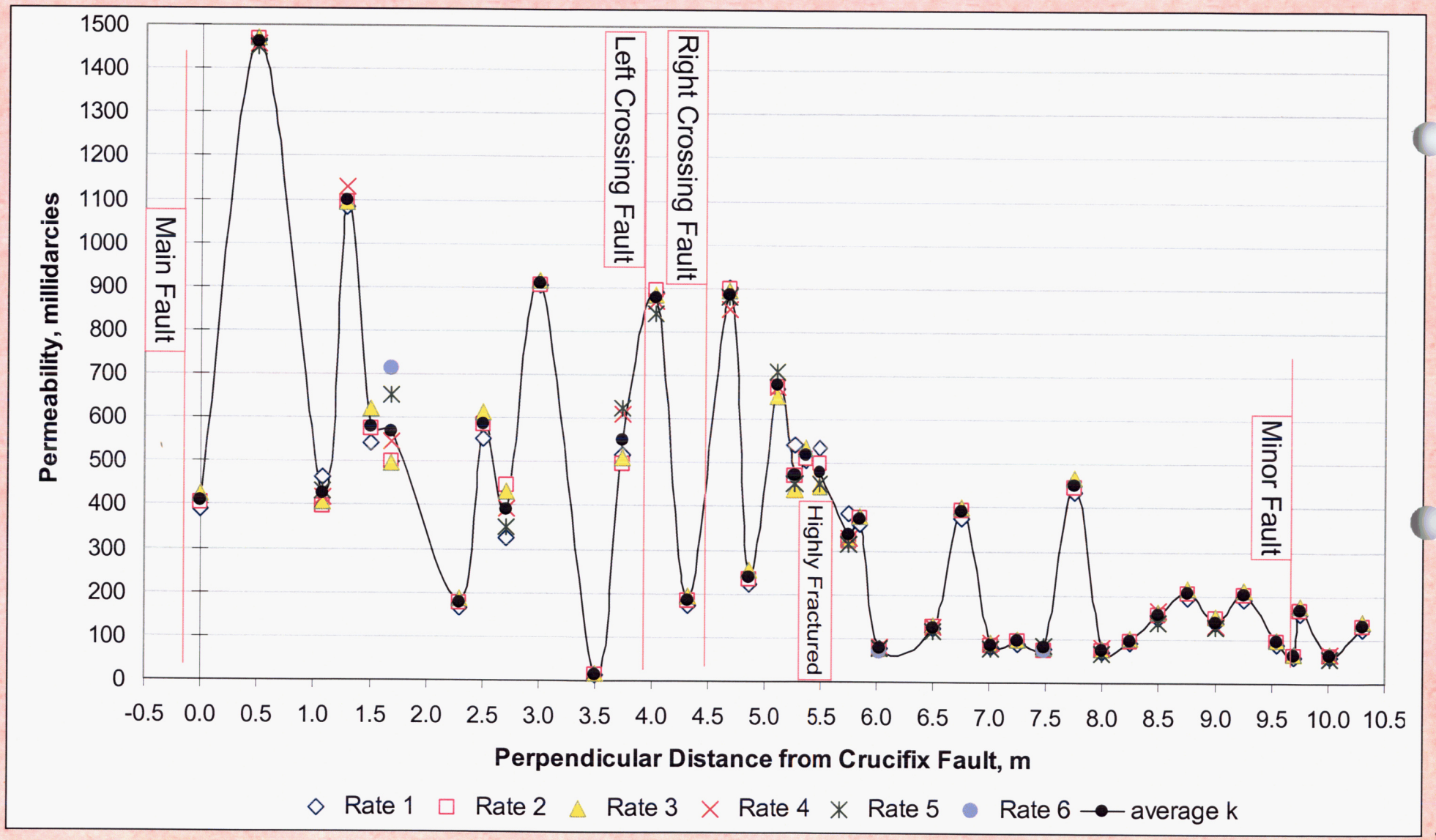




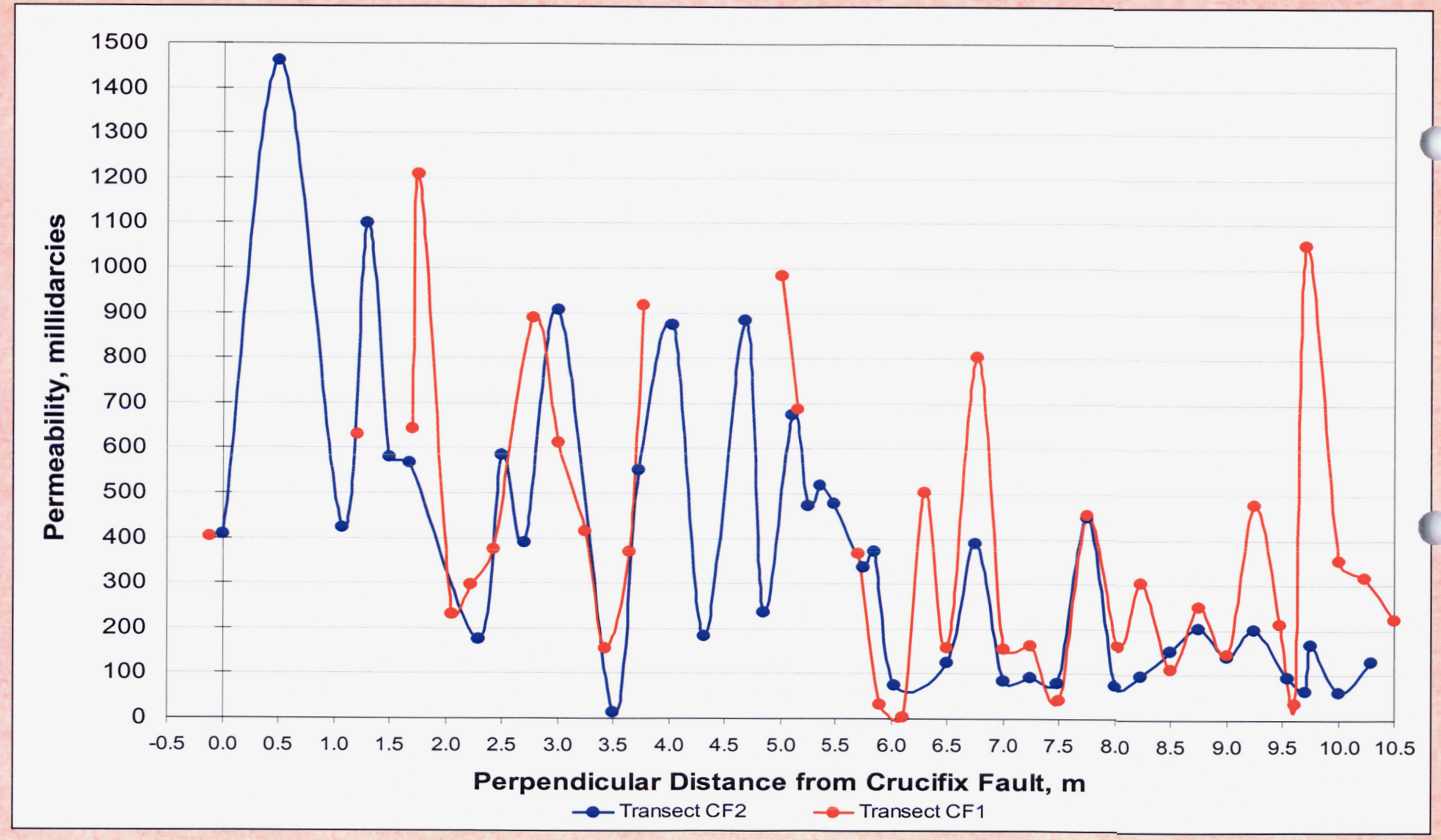
Crucifix/Crossing Faults:
Permeability along Transect CF1



Crucifix/Crossing Faults:
Permeability along Transect CF2



Crucifix/Crossing Faults:
The Effect of Secondary Discontinuities



Summary

- Host rock appears to be very homogeneous (100-300 millidarcies)
- Permeability magnitude within the studied fault damage zones may increase by one to two orders of magnitude above that of the nondeformed host rock.
- Data collected within the Crucifix Fault gouge alone varied by one order of magnitude.
- Gas permeability datasets collected within two different beds traversing the footwall damage zone of the Crucifix Fault clearly track each other, indicating secondary heterogeneity attributable only to fault-induced discontinuities.

Summary

- The new probe eliminates the need to extract friable samples for laboratory analyses
- Potential exists for making measurements at multiple depths below the outcrop surface.
- Recent fieldwork demonstrates that the probe is a practical field instrument for measuring apparent permeability in nonwelded tuffs

References

Dinwiddie, C.L. *A new small drillhole minipermeameter probe for* in situ *permeability measurement: Design, theoretical analysis, operation, and performance characteristics*. Ph.D. dissertation, Department of Environmental Engineering & Science, Clemson University. Clemson, South Carolina. 2001.

Fedors, R.W., J.P. Evans, D. Or, C.B. Forster, J. Heath, and K.K. Bradbury. "Unsaturated Flow Through Fractured and Unfractured Nonwelded Tuffs." Presentation at American Geophysical Union Fall Meeting, San Francisco, California, December 10-14, 2001. *EOS Transactions Supplement.* American Geophysical Union. Vol. 82, No. 47. pp. F501. 2001.

Molz, F.J., L.C. Murdoch, C.L. Dinwiddie, and J.W. Castle. *Small drill-hole, gas mini-permeameter probe*. U.S. Statutory Invention Registration H2052 H. U.S. Patent and Trademark Office: Washington D.C. December 03, 2002. http://www.uspto.gov/patft/

1.00 m = 3.28 ft 1.00 cm = 0.39 in 1.000 m^2 = 1.013×10^{12} Darcies