

**AAPG Annual Convention  
Salt Lake City, Utah  
May 11-14, 2003**

Eric Flodin<sup>1</sup>, Martha Gerdes<sup>2</sup>, Atilla Aydin<sup>1</sup>, William D. Wiggins<sup>3</sup> (1) Stanford Rock Fracture Project, Stanford, CA (2) ChevronTexaco Exploration and Production Technology Company, San Ramon, CA (3) ChevronTexaco Exploration and Production Technology Company, San Ramon,

### **Petrophysical Properties and Sealing Capacity of Fault Rock from Sheared-Joint Based Faults in Sandstone**

The incorporation of shale into fault zones is widely recognized to increase the sealing capacity of a fault on both exploration and production time-scales. In contrast, the hydrodynamic behavior of sand-dominated fault zones is less well-understood and therefore not routinely considered as part of fault seal and flow prediction. In order to refine flow models for sand-dominated fault rock, we present petrophysical data (porosity, permeability, grain-size, and capillary pressure) of host and fault rock samples from aeolian Aztec sandstone, Valley of Fire State Park, Nevada, that was deformed by strike-slip faults formed by progressive shearing along joint zones. Three sample localities with different average shear strains were investigated. Fault rock permeabilities are one to three orders of magnitude less than median host rock permeability. Porosity reductions are less pronounced and show considerable overlap in values between damaged and undamaged rock. Median grain sizes show up to two orders of magnitude reduction from host rock median grain size, and there appears to be a lower limit of median grain size of 3 microns for fault rock samples. Fault rock breakthrough pressures range from one to two orders of magnitude higher than host rock equivalent. These petrophysical data show that faults formed by shearing of joints in high permeability sand-prone systems will act as significant barriers to fluid flow during reservoir production and might be capable of sealing small to moderate hydrocarbon columns on an exploration time-scale as well, assuming adequate continuity of the fault rock over large areas of the fault.