



*Structural and geochronological analysis of the Walter-Outalpa
retrograde shear zone in the eastern Weekeroo inlier.
Olary Domain, South Australia.*

Anthony Nicholas Bottrill B. Sc.

Department of Geology and Geophysics
The University of Adelaide

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ABSTRACT

The Walter-Outalpa shear zone is NW trending, and forms a conjugate structure to the more numerous and documented E-ENE and NE trending shear zones of the Olary Domain. The Walter-Outalpa shear zone is 10km long, and bounded to the west by a western margin thrust zone, and to the east by an unconformable contact with the Adelaidean Supergroup.

The geometry of the Walter-Outalpa shear zone is confined to its Delamerian reactivation because of marked overprinting. During the Delamerian, the shear zone was reactivated as a southerly dipping dextral oblique system, with some reverse movement. The shear zone displays both ductile and brittle structures from this reactivation. Compression was approximately N-S, and retrogression of mineral assemblages to greenschist facies occurred.

Structures in the shear zone indicate dextral movement both pre-Adelaidean, and during Delamerian reactivation. Horizontal offset of the Willyama Supergroup units (eg. the Walter-Outalpa Granite) is up to 3,500m. This is much greater than offsets previously reported for the Olary Domain, and much greater than the offset seen at the basement-cover unconformity (between the Willyama and Adelaidean Supergroups). This indicates a long pre-Adelaidean history for the Walter-Outalpa shear zone. The basal conglomerate of the Adelaidean Supergroup however, does show evidence of shearing, and structures and fabrics within the shear zone also indicate reactivation during the Delamerian.

The Walter-Outalpa retrograde shear zone, within the eastern Weekeroo inlier, truncates all Willyama Supergroup lithologies and structures. It does not, however, truncate Adelaidean Supergroup lithologies and is therefore interpreted as a post-Olarian Orogeny, but pre-Adelaidean structure. However, reactivation of the Walter-Outalpa shear zone occurred during the Delamerian deformation. Many fabrics and structures within the shear zone represent this Delamerian overprint, as indicated by Sm-Nd dating of a garnet-chlorite schist which only occurs within the shear zone. A four point isochron, including garnet, chlorite, muscovite, and biotite, gives an age of 509 ± 19 Ma.

ENE trending shear zones show U and REE mineralisation (eg. Radium Hill, Crockers Well), and some shear zones act as structural traps for mineralisation (eg. White Dam deposit). No previous work has studied the geometry, kinematics, and interactions of retrograde shear zones within the Olary Domain. Understanding of the features related to retrograde shear zones may provide valuable information for major Olary Domain mineralisation exploration. The Walter-Outalpa shear zone provides a useful example for analogy with other shear zone studies within the Olary Domain.

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* lens cap is 55mm in diameter; ‘Max’ is 30mm in width.