SEISMIC AND SURFACE GEOLOGIC CONSTRAINTS ON A STRUCTURAL REINTERPRETATION OF BUCK MOUNTAIN, NEVADA

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A Digest Presented to the Faculty of the Graduate School
of Saint Louis University in Partial Fulfillment of
the Requirements for the Degree of
Master of Science (Research)

1998

DIGEST

Buck Mountain, located in east-central Nevada, lies within the Late Jurassic to Early Cretaceous Eureka fold-and-thrust belt which deformed Cambrian to Cretaceous aged strata. Previous cross sections through this Mesozoic fold-and-thrust belt strictly follow the rules of balancing, assuming constant bedding thickness, plane strain, and kink-style folds. However, recently recognized lateral facies and thickness data indicate that these assumptions need to be modified when balancing cross sections through the Eureka belt. These thickness variations are mainly restricted to upper Paleozoic units and reflect a dynamic basin evolution and eastward migration of the Antler forebulge.

The objectives of this study are to reinterpret the subsurface structure and kinematics of the Buck Mountain region, incorporating recent stratigraphic, well log, and seismic data. To meet these objectives, field studies were conducted and an east-west high resolution seismic reflection line was analyzed. These data were used to develop: (1) a detailed geologic map; (2) a regional geologic map that is a compilation of new field data, Placer Dome mine data, unpublished data, and regional theses; and (3) three east-west balanced cross sections.

The structural style of this region is characterized by thrust faulting,

folding, and normal faulting. The thrust faulting and folding are interpreted to be the result of Eureka-aged compression because deformation from the Late Devonian - Early Mississippian Antler orogeny has not been documented this far east. Cross-cutting relationships and dating of regional volcanics suggest that Tertiary normal faulting occurred both prior to Oligocene volcanism and during the younger late Miocene to Recent phases of extension of the Basin and Range. Major normal faults have listric geometries that sole at depth into an older basal thrust fault that places Cambrian over Devonian strata. Minor normal faults within individual units display more planar geometries.

It is known that the mechanical properties of a stratigraphic section influence how the units will deform and the location and geometry of faults. A structural lithic unit is composed of strata that acts as one structural package during deformation that develops fold wavelengths determined by a dominant member. Seismic data and deformational characterization suggest that at the scale of the study area, three structural lithic units exist in the subsurface below Buck Mountain. At the regional scale, two structural lithic units best characterize the deformation. The boundary zone between the lower and middle units at Buck Mountain, and between the two regional units is located in the Chainman Shale.

This study concludes that lateral stratigraphic thickness variations, mechanical stratigraphy, and listric normal fault geometries should be considered when constructing subsurface interpretations through the Eureka fold-and-thrust belt. Future work should investigate the importance of three dimensional strain

and fault inversion.

The kinematic interpretation for deformation at Buck Mountain is: (1) folding and thrusting during the Late Jurassic - Early Cretaceous Eureka compressional event; (2) normal faulting during the Oligocene phase of extension prior to deposition of the Tertiary volcanics; (3) erosion after deposition of the volcanics into Tertiary valleys that now lie above the present valley floors; and (4) continued normal faulting during the modern Basin and Range extensional episode that is producing the north-south trending ranges.