ABSTRACT

An abstract of the thesis of Jake Griffiths for the Master of Science in Geology presented August 9, 2002.

Title: Folding in the Oregon-Idaho graben: relating theory to observation in Malheur County, Oregon

The Oregon-Idaho graben is a north-striking structural depression extending from eastern Oregon into western Idaho. During graben evolution the Oregon-Idaho graben developed a series of sub-basins, separated by north-striking intragraben fault zones. On average, intragraben fault zones have throws greater than 1 km, but are composed of individual faults with throws ranging from 1 to 10 m. Many of the faults are vertical; therefore, throw on these faults produces little shortening or extension normal to their strike. NE-striking faulted-folds are present within these fault zones. One faulted-fold is within the Dry Creek Buttes intragraben fault zone along the north shore of the Dry Creek Arm of Lake Owyhee and is the topic of this thesis.

Geologic features were mapped at 1:3650 and a series of down-plunge views were constructed along strike. At the southern margin of my study area beds have dip changes greater than 35° from the regional dip, mafic sills and dikes in the western part, sharply bent beds in the middle, and relatively constant dip in the eastern part of my study area. These features are geometrically similar to Laramide folds within the Colorado Plateau.
Furthermore, the features (folding and faulting) in my study area are consistent with features expected for deformation above the margins of sill-like intrusions or above two buried faults. However, recognizing consistent NE orientation of geometrically similar folds throughout the Oregon-Idaho graben, high-angle faults, and the structural evolution of the Dry Creek Buttes fault zone, displacement on buried faults is the most likely explanation for the observed features. Numerical modeling and the mapped geometry indicate that a pair of NE-striking en echelon faults is buried beneath the surface. From the numerical model, the fault-blocks are estimated to be 0.24 km to 0.77 km below the surface, and have displacements ranging from 0.225 km to 0.320 km.