“Last Chance” Interpretation of the Permian Last Chance Thrust, East-central California

Calvin H. Stevens1 and Paul Stone2

1Department of Geology, San Jose State University, San Jose, California 95192, USA

2U.S. Geological Survey, 345 Middlefield Road, Menlo Park, California 94025, USA

The regionally extensive Last Chance Thrust (LCT) in east-central California is thought to have developed in response to Early Permian compression along a rapidly evolving continental margin. Several models for emplacement of the thrust have been proposed, but none of them completely explains all of the relevant structural and sedimentary features in the region. One model that has not been considered previously involves the clockwise rotation of the Last Chance Allochthon (LCA). We here propose the allochthon to have been pinned in the west-central Inyo Mountains where a fault ramp within the LCT impinged upon a major Mississippian fault. Such a model has the advantage over all existing models in explaining the presence of two similar and aligned Mississippian facies belts, one characterized by olistoliths of both quartzite and carbonate rocks, which are present in both the allochthon and the autochthon of the LCT. In this model a rotation of ~50⁰ is required to explain the regional distribution of rocks of the allochthon. Displacement on the LCT, therefore, would increase from zero at the point of rotation to as much as 90km at the latitude of the northern White Mountains where the distinctive sedimentary units of the Last Chance allochthon come to an end.

The western margin of the LCA is inferred to be at the western margin of the Morrison Block in the Sierra Nevada, which is considered to represent the western part of the LCA. We here propose that this block was being truncated on the west simultaneously with emplacement of the LCA along a fault associated with a late Paleozoic continental truncational event. In this context, we interpret the LCT to have resulted from transpressional forces generated along that boundary prior to the development of a subducting convergent margin in Late Permian to Mesozoic time.