This is the first of hopefully many short articles of geologic interest to the San Diego geologic community. Our goal is to publish one article in each of the monthly newsletters. The only requirements are that the subject be relevant to southern California geologists and that the articles be no more than three pages in length including photographs and maps. The topic should be of interest to SDAG members and be about a project that you have either recently worked on or one that involves your original research. So think about some of the interesting projects you have worked on; sit down and write one!

The Muirlands Fault Revisited

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The Muirlands fault, as depicted on the geologic map of the La Jolla quadrangle (Kennedy,1975) extends from Forward Street in the Bird Rock area northwesterly to the vicinity of Pearl Street; a distance of less than two miles. For half of that distance the fault is mapped as concealed by either the Late Pleistocene Bay Point Formation or the Plio-Pleistocene Lindavista Formation. Where exposed in bedrock on the western slopes of Mount Soledad, the fault is depicted as juxtaposing Eocene rocks of either the Ardath Shale or Mount Soledad Formation with the Cretaceous Cabrillo Formation. Although the fault is shown on the La Jolla quadrangle as buried by Pleistocene sediments, the City of San Diego has included the full length of the fault, including those portions shown concealed or buried beneath Pleistocene units, in Geologic Hazard Category 12, a zone that denotes "Potentially Active" faults (defined on the City Seismic Safety Study's Geologic Hazards and Faults maps as a fault that is inactive, presumed inactive, or activity unknown). As a practical matter this designation has meant that Category 12 faults include all mapped faults in the City, except for "Active" faults that have been included in state of California delineated Alquist-Priolo Earthquake fault zones (A-P Zones).

The Muirlands fault is shown as concealed beneath early Pleistocene units so it does not fit the A-P Act's definition of a "Potentially Active" fault. There is, of course, uncertainty in the relationship of the fault to the Pleistocene deposits because the original mapping was not aided by a subsurface investigation that would have provided more definitive age relationships. This fact likely influenced the City's decision to include even those portions of faults shown as buried or concealed by the Bay Point and Lindavista Formations in Geologic Hazard Category 12. This situation has concerned the author (and others) for some time since it is believed that trenching for a fault whose nearest bedrock exposure lies thousands of feet from the site to be studied was bound to be fruitless and frustrating as well as a waste of money. It is the intent of this brief study to examine one of these poorly documented faults, the Muirlands fault, and to show that there is no geologic evidence for the existence of this fault for over half of its mapped trace. This will be accomplished by showing that the "fault" at its northernmost exposure is actually a steeply dipping depositional contact.

This conclusion is possible as the result of reexamining a critical exposure of the "fault" that was utilized as evidence for the original mapping nearly 50 years ago. This exposure has now been improved by a half century of erosion and a degree of manual labor. The outcrop is located approximately 150 ft. south of the eastern terminus of Bonaire Street in La Jolla near the top of a 10 ft. high cut slope on the east side of a paved hiking trail. At his location the "fault" is shown juxtaposing Ardath Shale and the conglomerate member of the Cabrillo Formation.

It is noted that there have been several trenching studies performed in the last 15 or so years along the trace of the fault where it is mapped on the Nestor Terrace in La Jolla. One of these studies by Evans (1998) was for a site on Sea Lane. Evans indicated that he encountered a minor fault in the Bay Point Formation and concluded that it might be related to the Muirlands fault but displayed a vertical offset of only 4 inches and had a N53W strike compared to the average N30W strike of the Muirlands fault. For these reasons Evans did not consider the fault to be the Muirlands fault. Further subsurface investigation of this minor fault was performed by Hart (2003) for a site located approximately 100 feet north of the property trenched by Evans on Sea Lane. The trenches for Hart's study were on strike with the fault reported by Evans, however, faulting was not found and it was concluded the fault likely died out in the Bay Point Formation.

Today, the best and most accessible outcrop of the Muirlands fault, as originally mapped, is located in the previously described 10 ft. high road cut near the east end of Bonaire Street (Figures 1-3). At this locality the Muirlands fault is mapped as juxtaposing Ardath Shale with the conglomerate member of the Cabrillo Formation. Reevaluation of this exposure indicates that the Ardath Shale lies disconformably on the Cabrillo Formation with no evidence of faulting. At this location the contact dips approximately 30 to 34 degrees northeast with a strike of N42 to 60W (Figure 2). If faulting is not present here then there is no geologic evidence of any faulting for over half of the fault's mapped trace since the next fault outcrop shown on the geologic map of the La Jolla Quadrangle is over 1,500 feet south of Bonaire Street where the fault is shown juxtaposing the Mount Soledad and Cabrillo Formations. South of that exposure, which is no longer readily accessible, there are only two other locations where the fault is mapped with a solid line. A third fault exposure south of the Muirlands fault proper, has a more northwesterly strike and is not connected to the Muirlands fault. It is concluded that while the Muirlands fault may exist in the Eocene and Cretaceous bedrock south of Muirlands Vista Way (see Figure 1) there is no evidence that the fault exists as mapped across the extensive marine terrace north of Bonaire Street.

References

Evans, J.R., 1998, Fault investigation and geologic reconnaissance, 536 Sea Lane, La Jolla, California, pp. 1-3.

Hart, M.W., 2003, Marine Street Condominiums, La Jolla, California, a proprietary report for a property at 525 Marine St., La Jolla, CA.

Kennedy, M.P., 1975, Geology of the San Diego Metropolitan Area, California; Calif. Div. Mines and Geology, Bull. 200.

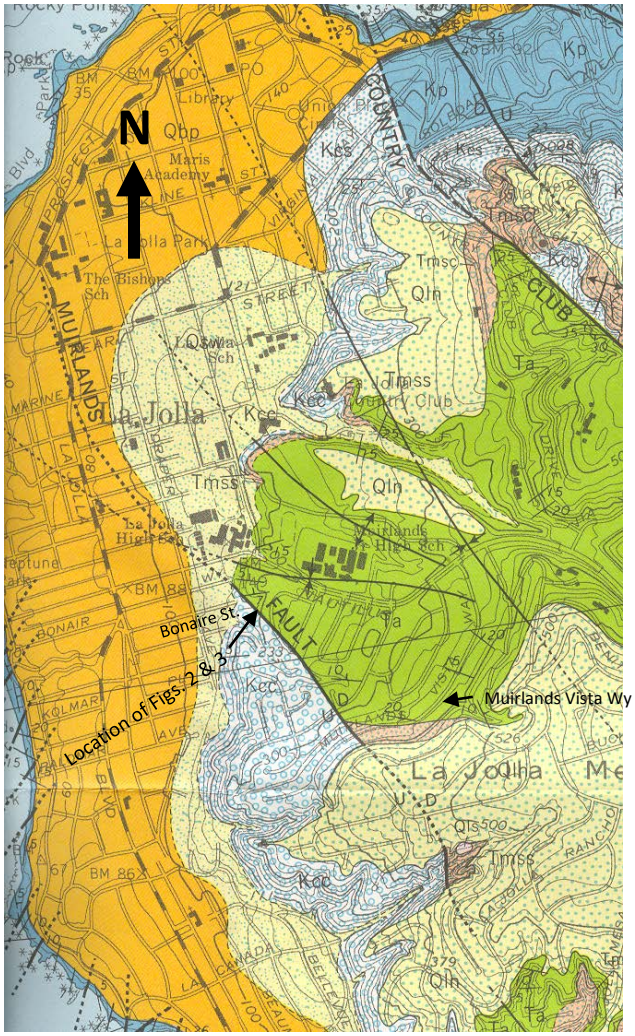
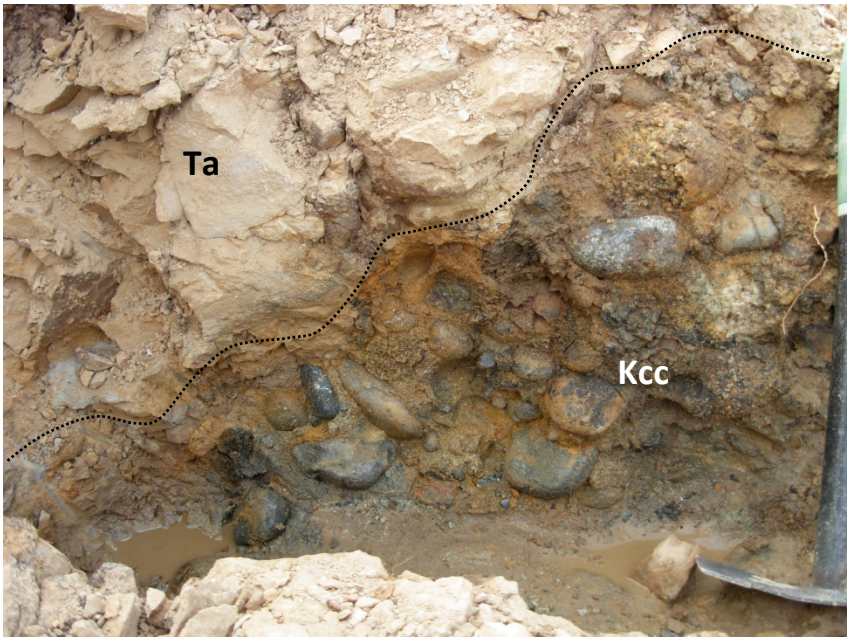


Figure 1. Geologic Map of La Jolla area

Qbp: Bay Point Formation
Qln: Lindavista Formation
Ta: Ardath Shale
Tmss: Mount Soledad Formation (sandstone)
Kcc: Cabrillo Formation (conglomerate

From Kennedy, 1975

Figure 2. Ardath Shale overlying Cabrillo Fm. Conglomerate, attitude of contact is N42-60W, 30-34 NE. Location of Figure 3 is out of view to right.



Figue 3. Disconformable contact between Ardath Shale and Cabrillo Fm.