7.0 POTENTIAL FOR SECONDARY FAULT DEFORMATION

The Central segment of the Shoreline fault zone is 600 m from the power block and 300 m from the cooling water intake. Given this proximity of the fault zone to the DCPP site, a deterministic approach is needed to evaluate the potential for secondary fault deformation. The Progress Report (PG&E, 2010a) used a probabilistic approach based on the geology known at the time. The results of that calculation demonstrated the low probability of any secondary rupture of the auxiliary salt water (ASW) pipes based on the existing geologic mapping at the plant site. Additional mapping of the site geology done for the Shoreline fault zone investigations in 2009 and 2010 shows that the critical components of the ASW pipes lie outside the zone of potential deformation (a zone of weaker rock referred to in the Progress Report as T_{ofc}), and therefore the probabilistic analysis is not needed.

Detailed studies were performed to characterize the location and width of faulting along the offshore Shoreline fault zone and to assess the potential for secondary fault rupture or related surface deformation that might project onshore east of the fault zone through the DCPP site. These studies included detailed analysis of bathymetric data, seismic-reflection and LiDAR data, gravity and magnetic potential-field data, and onshore and near-shore geologic mapping; as well as review of the site investigations carried out for the DCPP FSAR (PG&E, 2010b, Section 2.5.1.2.5). The results of these investigations accurately document not only the location of the Shoreline fault zone 300 m west of the Intake structure, but also the absence of either primary or secondary faulting through the DCPP site area.

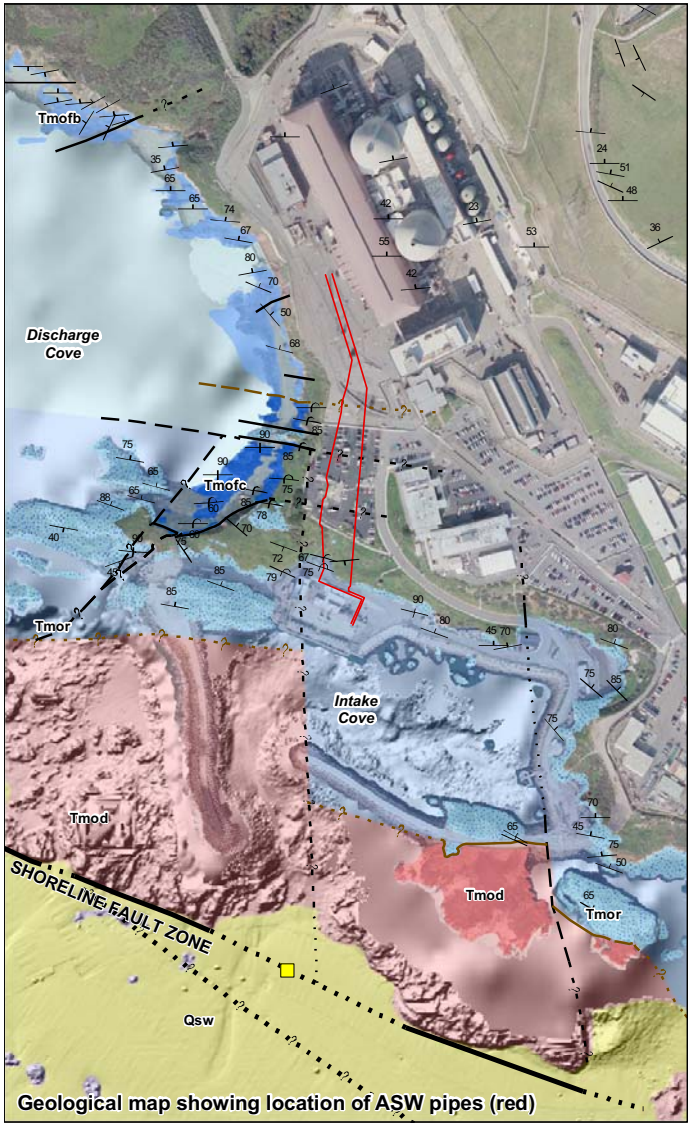
Four independent lines of evidence support these conclusions:

1. **Location of the Shoreline fault zone.** Interpretation of recently acquired bathymetric data clearly show a geomorphically and structurally well-defined fault trace 300 m west of the intake structure (Plate 1 and Figures 4-10 and 7-1). At this location, the fault trace is linear and does not exhibit significant geometric complexity (i.e., there are no fault bends or steps) within the 250 m wide fault zone that could lead to a broad zone of secondary deformation. In addition, the bathymetric data show the absence of lineaments or zones of bedrock shearing that could splay from the primary fault trace and project toward the site.
2. **Detailed mapping of onshore marine terraces.** The DCPP site is located on a sequence of emergent marine terraces ranging in age from 120,000 to 214,000 years old (PG&E, 1988; Hanson et al., 1994). Detailed mapping of the wave-cut platforms and shoreline angles associated with these marine terraces for the original LTSP (PG&E, 1988) documents the absence of faulting, folding, or tilting that could have displaced these terraces across the DCPP site area, confirming the lack of late Quaternary secondary fault deformation at the site.
3. **Detailed geologic mapping.** The geologic conditions of the DCPP site are well exposed along the sea cliff directly southwest of the site (Figure7-1). During the current investigations for the Shoreline fault zone, detailed mapping of the geologic stratigraphy and structure was performed along the sea cliff and on the modern wave-cut platform during low tide from near Lion Rock on the north, to south of the Intake Cove on the south. Potential bedrock faults were identified and characterized. None of the bedrock faults show evidence of late Quaternary tectonic activity (e.g., fissures filled with soil,

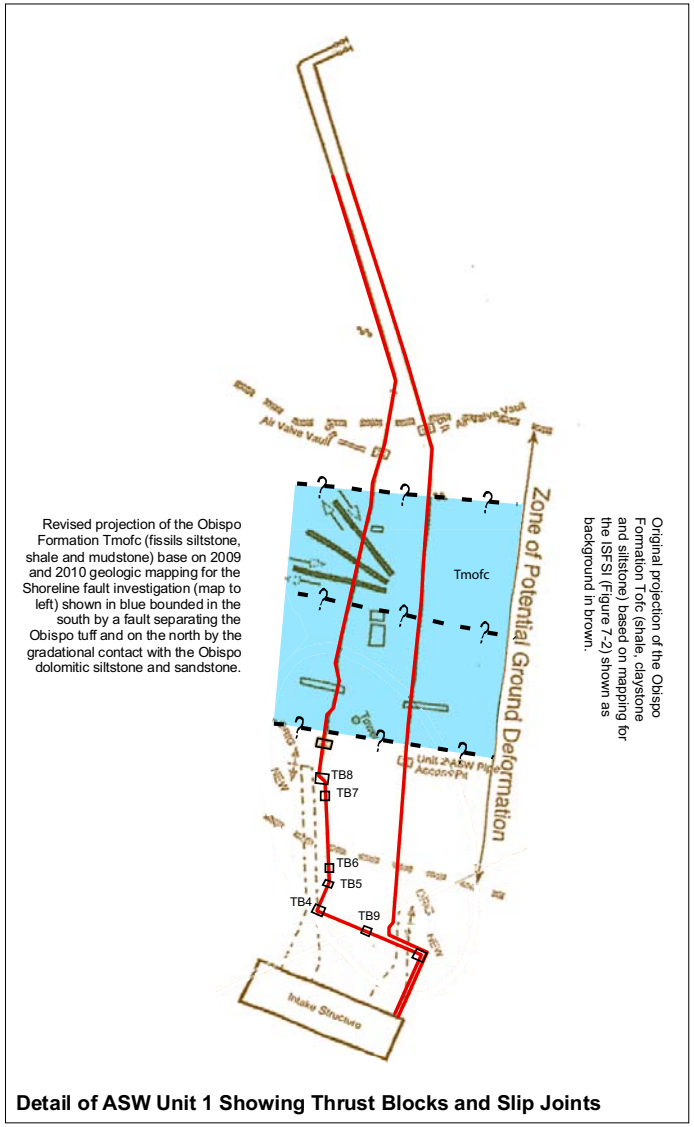
open fractures, fragile shear fabric); they appear to have formed during the Tertiary related to development of the Pismo syncline. Thus these faults can be associated with a well-known period of preexisting Miocene and Pliocene tectonic deformation.

4. **Detailed site investigations for the FSAR** (PG&E, 2010b). Investigations for the FSAR included detailed mapping of the site and extensive trenching to evaluate the potential for surface fault rupture through the site. The initial investigations for the power plant, the investigations for the ISFSI, and the current mapping document the absence of Quaternary primary or secondary fault deformation through the site area. The power block excavation was logged prior to construction; and nearly 5,000 linear feet of trenches to depths of 10–40 feet were excavated, evaluated, and logged for the power plant for the FSAR. The trenches and other exposures showed that faults within bedrock appear to be generally laterally discontinuous older structures, and that these faults do not offset either the 120,000 and 214,000 marine wave-cut platforms (i.e., the bedrock-soil interface) or the overlying marine terrace deposits. The marine terrace deposits, in turn, are overlain by both fluvial and colluvial deposits that also are not deformed. Observations from the trench investigation, therefore, provide direct evidence documenting the absence of primary and secondary fault deformation for the areas trenched and mapped in detail, including the coastal cliffs bordering the DCPP site.

The investigations described above extend over the entire 750 m wide control zone east of the Shoreline fault zone, including the entire DCPP site. These investigations document Tertiary-age geologic structures and the absence of late Quaternary surface faulting (primary or secondary) or other forms of late Quaternary tectonic deformation (e.g., tilting, folding, subsidence) through the DCPP site that may be associated with a conservative characteristic earthquake of magnitude 6.4 (Section 6.4.1) on the nearby Shoreline fault zone.



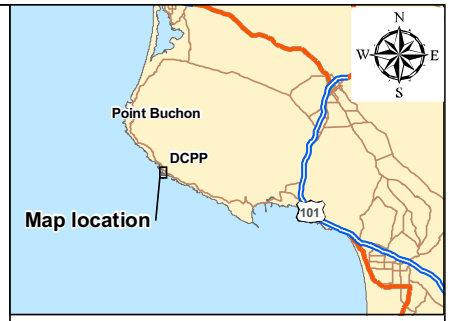
Geological map showing location of ASW pipes (red)



Revised projection of the Obispo Formation Tmofc (fissils siltstone, shale and mudstone) base on 2009 and 2010 geologic mapping for the Shoreline fault investigation (map to left) shown in blue bounded in the south by a fault separating the Obispo tuff and on the north by the gradational contact with the Obispo dolomitic siltstone and sandstone.

Original projection of the Obispo Formation Tofc (shale, claystone and siltstone) based on mapping for the ISFSI (Figure 7-2) shown as background in brown.

Detail of ASW Unit 1 Showing Thrust Blocks and Slip Joints



LEGEND

Qsw Quaternary marine deposits and sand waves

Obispo Formation sub-units

Tmofb Dolomitic siltstone and sandstone

Tmofc Fissile siltstone, shale, and mudstone

Tmor Resistent, tuffaceous sandstone

Tmod Diabase

Notes: See Plate 1 for the description of other geologic units and symbols.

Dresser coupling

Data sources from 2009 and 2010 field mapping and from the ISFSI (PG&E 2002) and the FSAR (PG&E 2010b).

Map scale: 1:4,800

Map projection: NAD 1983, UTM Zone 10 North

0 500 1,000 Feet

Meters 0 100 200

Detailed geology in the vicinity of the ASW pipes

SHORELINE FAULT ZONE STUDY

Pacific Gas and Electric Company | Figure **7-1**

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