



October 15, 2013

Project No. 113-79503-24

Bennie Barnes
Pacific Gas & Electric (PG&E)
6121 Bollinger Canyon Road
San Ramon, CA 94583

RE: PRELIMINARY SITE ASSESSMENT – MP 1.80 EROSION SITE - PG&E LINE 147, SAN MATEO COUNTY, CALIFORNIA

Dear Bennie:

This letter summarizes the findings of the Golder Associates Inc. (Golder) preliminary site assessment of the erosion site located at approximate milepost (MP) 1.80 MP on the Line 147 natural gas pipeline that is owned and operated by Pacific Gas & Electric's (PG&E). The site referred to as the MP 1.80 erosion site is an approximately 100-foot-long section of the Line 147 right-of-way (ROW) where the side wall of the pipeline is exposed (no cover soil). The site is located at approximate [Redacted]

[Redacted] The closest street address to the site is [Redacted]
[Redacted]

It is our understanding that the erosion site was identified by PG&E, and in 2006-2007 the geotechnical engineering firm of Cotton, Shires & Associates (CSA), under contract to PG&E, completed a geologic reconnaissance and development of mitigation options for the site (CSA 2007a) and provided a draft mitigation design package (CSA 2007b). Based on the recommendations by CSA, PG&E performed some limited mitigation at the site in 2007 to stabilize fill soil along a portion of the pipe trench and to control surface erosion at the site.

The purposes of Golder's preliminary site assessment were to: 1) evaluate whether the exposed pipe and erosion conditions identified previously by PG&E are related to any possible landslide on the slope that could affect Line 147; and, 2) evaluate if additional trench fill movement and erosion have occurred since the limited site mitigation that was implemented in 2007. This preliminary assessment does not represent a third-party review of CSA's geotechnical characterization, mitigation options, and mitigation design plans.

1.0 SCOPE OF WORK

The following scope items were completed for this preliminary assessment.

- * Ground-based reconnaissance conducted on October 10, 2013 by an engineering geologist from the Golder Redmond, WA office. The Golder geologist was accompanied by a PG&E engineer who was familiar with the site.
- * Review of available geologic maps and landslide databases to identify if there are mapped landslides located near the MP 1.80 erosion site area.
- * Review of reports and mitigation recommendations for the MP 1.80 erosion site prepared by Cotton, Shires & Associates (CSA) in 2007.
- * Review of site photos taken by PG&E following the 2007 mitigation work.

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Golder Associates Inc.
18300 NE Union Hill Road, Suite 200
Redmond, WA 98052 USA
Tel: (425) 883-0777 Fax: (425) 882-5498 www.golder.com



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- * Review of geodetic survey data of the Line 147 pipe location where it passes through the MP 1.80 erosion site. The geodetic information was collected on October 10, 2013 by the civil surveying firm of Towill, Inc. of Concord, CA.

2.0 SITE CONDITIONS

Line 147 is a 24-inch-diameter, steel natural gas pipeline. It is our understanding that Line 147 was constructed in 1947 using standard trenching methods. In the vicinity of the MP 1.80 site, Line 147 descends a steep (20 degrees) wooded slope. Generally the pipeline is located on the nose of a broad ridgeline that slopes generally to the northeast; however an approximately 100-foot-long section of the pipe was constructed on a steep side slope of the ridge. The side slope of the pipeline right-of-way in this approximate 100-foot-long section slopes at about 30 to 40 degrees to the southeast. Erosion has occurred along an approximately 100-foot-long section of the pipe that does not have cover soil along the downslope side of the pipe. The ground downslope of the pipe extends steeply to the southeast for about 10 to 40 feet and then becomes gentler where the ridge meets a gentle bowl-shaped drainage area.

At the time of our site visit, the 24-inch pipe had about 2½ to 3 feet of soil cover along top of the pipe, however there was about a 10-foot-long section of the pipe that had about 1 foot of soil cover. The thinner section of soil cover over the pipe appeared to be the result of surface erosion that occurred after the pipe was installed.

During Golder's site visit, we observed the mitigation features that were installed by PG&E at the site in 2007 that included an 8-foot-long, 3-foot-high wood retaining wall along the downslope edge of the pipe, sand bags placed under an approximate 8-foot-long section of the pipe that was slightly undermined by erosion (CSA 2007a), and shallow (0.5 to 10 feet deep) drainage channels with sand bag check dams that had been installed to slow, and/or intercept and direct surface water away from the pipeline.

According to the geologic mapping of Brabb and Pampeyan (1983), the site is underlain by Tertiary-age fine- to coarse-grained sandstone (graywacke) that has interbeds of siltstone and shale. Golder observed exposures of a highly jointed, fine-grained sandstone at a house foundation excavation, located about 20 to 40 feet upslope (southwest) of the MP 1.80 erosion site. The bedrock was mantled by a fine-grained residual soil with a thickness that ranged from 1 to 5 feet.

3.0 SITE OBSERVATIONS AND INTERPRETATIONS

According to the landslide mapping of Brabb and Pampeyan (1972), there are no mapped landslides within at least 500 feet of the MP 1.80 erosion site. Golder did not observe any geomorphic indicators such as uneven/hummocky topography, scarps, or ground cracks in the general area of the site, so there is nothing to suggest that the pipeline was constructed through pre-existing landslide terrain, or that a landslide has developed on the native slopes outside of the right-of-way since pipeline construction in 1947. In addition, according to the October 10, 2013 geodetic survey data collected by Towill, Inc., there is no apparent bend of the Line 147 pipe where it passes through the MP 1.80 erosion site.

Golder observed very subdued slope breaks and lobate ground features on the order of ½ to 1 foot high in the bowl-shaped drainage area that is located downslope (southeast) of the MP 1.80 site. These ground features were located about 10 to 40 feet directly downslope (down gradient) of the 100-foot long section of exposed pipe that represents the MP 1.80 site. We interpret these ground features to be small debris deposits that formed when the fill along the downslope edge of the pipe eroded and flowed a short distance downslope. The ground features were rounded and very subdued suggesting they are older (over ten years old to several decades old). According to the nearby property owner interviewed by CSA (2007a) the existing slope conditions in the vicinity of the 100-foot-long section of exposed pipe had not changed significantly since the property owner purchased the property in 1979. Based on this statement by the property owner, and the apparent old appearance of the erosion debris deposits observed by Golder, we interpret that the erosion that exposed the toe of the 100-foot-long section pipe occurred many years ago.

4.0 SUMMARY

Based on a review of available geologic maps and a site reconnaissance, there is no evidence to suggest that Line 147 was constructed through pre-existing landslide terrain, or that a landslide has developed on the native slopes outside of the right-of-way, or across the pipe since pipeline construction in 1947. It appears that the fill that was placed along the steep downslope edge of the right-of-way during pipeline construction in 1947 eroded away from the pipe, but due to the measured apparent lack of bend in the pipe, this removal of fill away from the pipe did not likely stress the pipe. Based on the old appearance of the downslope erosion deposition of the fill material, combined with the statement by the property owner that no significant changes have occurred at the site since 1979, it appears that the fill erosion along the downslope edge of the pipe occurred many years ago, and that no additional significant erosion has occurred since 2007. Golder did not observe site evidence that would suggest that site conditions have changed significantly since the limited site mitigation had occurred in 2007.

GOLDER ASSOCIATES INC.

Redacted

Senior Project Geologist

Engineering Geologist and Program Leader

cc:

Redacted Golder Associates Inc., Redmond WA

JDLC/DOW/AHR/sb

REFERENCES

- Brabb, E. E. and E. H. Pampeyan. 1972. Preliminary map of landslide deposits in San Mateo County, California: U.S. Geol. Survey Misc. Field Studies Map MF-344, scale 1:62,500.
- Brabb, E. E. and E. H. Pampeyan. 1983. Geologic map of San Mateo County, California: US Geological Survey Miscellaneous Investigations Series Map I-1257-A, scale 1:62,500.
- Cotton, Shires & Associates Inc. 2007a. Letter to PG &E regarding Geotechnical Reconnaissance Findings PG&E Gas Transmission Line 147, San Mateo County, CA; dated February 28.
- Cotton, Shires & Associates Inc. 2007b. Drawings from Corrosion Protection Backfill Plan, Drawing C-1 Notes, Technical Specification List of Sheets; Drawing C-2 Site Plan, Section A-A and Design Details.