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SoCalGas SDG&E Workshop Reply Comments

Additional submitted attachment is included below.

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October 2, 2018

California Energy Commission
Docket Unit, MS-4
Re: Docket No. 19-ERDD-01
1516 Ninth Street, MS 43
Sacramento, CA 95814-5512

Re: Docket No: 19-ERDD-01
Natural Gas Infrastructure Seismic Risk Assessment and Enhanced Training Tools - Scoping Workshop

To the California Energy Commission Staff:

SoCalGas and SDG&E submit these reply comments in support of the proposed research of seismic risk assessment and management of natural gas infrastructure.

Does the scope of the seismic risk assessment cover the key technical area that should be included in the risk assessment? Are there other that should be included?

SoCalGas and SDG&E agree that more research is needed to improve existing tools and technologies to advance seismic risk assessment and to determine mitigation methods for underground natural gas pipelines. In addition, SoCalGas and SDG&E recommend expanding the scope of this research to include risk assessment for liquefaction-induced lateral spreading, landslides, and rock fall geohazard risks for existing and new facilities. The development of design guidelines for these additional geohazards should be added to the scope of this project.

Seismic design guidelines for fault crossings were developed by the Pipeline Research Council International (PRCI) based on research conducted by Cornell University, State University of New York at Buffalo, and others in the 1980s and 1990s;[1] however, since that work was completed, numerous advancements relative to seismic threat for underground natural gas pipelines have been made. For example, non-linear finite element, performance-based design, and new material technologies have been more recently developed. A majority of recent research performed has only focused on water and waste

[1] J. Isenberg, E. Richardson, T.D. O'Rourke, March 1989, Experiment on Performance of Buried Pipelines Across San Andreas Fault.

water pipelines.[2] Therefore, SoCalGas and SDG&E highly recommend additional research on seismic risk assessment and development of design guidelines for natural gas pipelines based on new technologies and tools.

What are the specific recommendations you can provide to improve the description of the solicitation outlined in this request for comments that would better improve the solution to be developed?

1. **Develop seismic design guidelines and mitigation options specifically for natural gas pipelines.**

Research could be performed to develop natural gas pipeline design guidelines for the application of advanced design and materials to help mitigate the earthquake threat at fault crossings and other seismic threats. Currently there are no guidelines to design or mitigate against the hazard for natural gas pipelines during a rock fall or for liquefaction-induced lateral spreading events during earthquakes. We recommend conducting a comprehensive literature review to provide sufficient technical basis for future guidelines on how to design natural gas pipelines against these geohazards.

Horizontal natural gas pipelines cannot use the same materials that are sometimes used for other pipeline applications (such as flexible connections in water pipelines), due to design constraints for high pressure gas applications. Best practices could be developed for fault crossing pipeline designs using advanced techniques, such as the determination of proper angles for different crossings and types of faults, use of nonlinear finite element analysis and performance-based design, use of modern backfill material options, and/or special trench designs to help mitigate the effect of seismic displacement.

2. **Develop seismic fault rupture displacement models for critical natural gas pipelines that cross active faults within the State of California.**

Historically, deterministic analysis has been used to calculate anticipated seismic displacement. However, aboveground infrastructures such as buildings, bridges, etc. are typically designed based on anticipated seismic accelerations and/or seismic ground motion, using a probabilistic analysis. Since seismic displacement forecasts include a certain degree of uncertainty, research to improve on the parameters for probabilistic analysis is also an area of study recommended for research. For example, a better slip rate measurement could benefit the oil and gas industry.

3. **Identify locations within the State of California where natural gas pipelines have an increased threat for liquefaction-induced lateral spreading, landslides, or the falling of rocks during seismic events.**

Currently, most utility companies use State landslide maps provided by the California Geologic Study (CGS) or United States Geological Survey(USGS). We recommend that landslide maps be reviewed and updated based on new information and conditions caused by recent events such as the California wildfires, which may elevate threats in affected areas for years after a wildfire occurs. This recommended effort will help to identify locations with potentials for major landslides and rock fall due to seismic events within the State of California.

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[2] O'Rourke, T D., S - Jeon, S. Toprak, M. Cubrinovski, M. Hughes, S. van Ballegooy, D Bouziou. 2014. "Earthquake Response of Underground Pipeline Networks in Christchurch, NZ." EARTHQUAKE SPECTRA 30 (1): 183-204. O'Rourke, Thomas Denis. 2010. "Geohazards and Large Geographically Distributed Systems." Geotechnique 60 (7): 503-543. O'Rourke, Thomas Denis, N. A. Jezerski, T. Olson, A. L. Bonneau, M. C. Palmer, H. E. Stewart, M. J. O'Rourke, T. Abdoun. 2008. "Geotechnics of Pipeline System Response to Earthquakes." Paper presented at Geotechnical Earthquake Engineering and Soil Dynamics IV (GEESD).

In addition, California has not mapped areas with a threat of liquefaction-induced lateral spreading. We recommend establishing a new map for this geohazard.

Are there concerns on confidentiality of the data or test site since the final products will be released to the public? If so, what approach can you suggest to validate the tools?

Critical facility information and maps are confidential. Acts of sabotage at these critical facilities could interrupt on-going gas delivery as well as impact the environment and public safety to the area surrounding the facility. Further, the engineering design values of critical infrastructure could potentially be used to determine the criticality of a gas facility and identify vulnerabilities of the gas delivery network. The value can be used to identify the volume of gas present in an area and ascertain the relative potential consequences of intentional acts against the gas transportation and distribution network. This type of confidential information should not be made public.

SoCalGas and SDG&E appreciates the opportunity to provide comments regarding the proposed scope of this research.

Sincerely,

Michael Bermel
Director – Gas Engineering