BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

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HP 14-001

IN THE MATTER OF THE PETITION OF TRANSCANADA KEYSTONE PIPELINE, LP FOR ORDER ACCEPTING CERTIFICATION OF PERMIT ISSUED IN DOCKET HP09-001 TO CONSTRUCT THE KEYSTONE XL PIPELINE

REBUTTAL TESTIMONY OF MEERA KOTHARI

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Pursuant to the Commission's Order Granting Motion to Define Issues and Setting Procedural Schedule, Petitioner TransCanada Keystone Pipeline, LP, offers the following rebuttal testimony of Meera Kothari.

1. Please state your name and occupation.

Answer: Meera Kothari

2. Did you provide direct testimony in this proceeding?

Answer: Yes.

3. To whose direct testimony are you responding in your rebuttal testimony?

Answer: I am responding to the direct testimonies of Richard Kuprewicz, Ian Goodman, and Dr. Arden Davis.

EXHIBIT tabbies 2011

4. Mr. Kuprewicz's testimony states "The proposed routing in South Dakota is in areas of steep elevation changes." Do you agree with this statement?

Answer: No. The alignment through South Dakota totals approximately 315 miles in length. The vast majority of this alignment has generally flat (i.e., low sloping) to moderate topographic relief, with some buttes and badlands. The State Department's Final Supplemental January 2014 Environmental Impact Statement defines areas of incline greater than 20% as "steep." A desktop review was performed at my direction by independent engineering experts in this field using aerial photographs, video documentation of the alignment, publicly available topographic information, and LiDAR data, based on the most conservative assumptions. The review concluded that a maximum of approximately 18 miles or 5% of the alignment could traverse terrain with slopes greater than 20%.

Percent Slope	Approximate Distance (miles)
20-25%	13
25-30%	3
30-35%	1
>35%	1

Areas of steep slopes are located in isolated areas along the entire alignment and are generally more prevalent in the vicinity of the larger river crossings. I would note that a 20% slope does not present significant construction challenges in light of the mitigation measures and techniques discussed in the response to Question 7.

5. Can you comment on the USGS map that is attached as Exhibit 4 to Ian Goodman's testimony?

Answer: The USGS Landslide Overview Map of the Conterminous United States was published in 1982 at a scale of 1:7,500,000 in the USGS Professional Paper 1183 (USGS 1982), and then subsequently updated in digital format in 1997 in the USGS Open-File Report 97-289 (USGS 1997). The map depicts potential landslide hazard areas across a wide area of South Dakota. This map is intended for geographic display and analysis at the national level and for reviewing possible hazards at large regional scales. This map was used initially as publicly available data in the early phases of planning and design for the KXL project. Subsequent project routing review, design work and field visits were completed to refine and optimize the alignment, in particular at targeted, steeper topographic areas and at larger river crossings, such as the Cheyenne River (MP 430), the Bad River (MP 486), and the White River (MP 541).

6. Is that map appropriate for identification of landslide risk on a site specific basis?

Answer: No, it is not appropriate given the scale of the map (1:7,000,000). As cited on the USGS website for the landslide map (http://landslides.usgs.gov/hazards/nationalmap/) "because the map is highly generalized, owing to the small scale and the scarcity of precise landslide information for much of the country, it is unsuitable for local planning or actual site selection."

7. Mr. Kuprewicz's testifies that "geo-hazard risk cannot be appropriately mitigated by pipeline design or construction techniques." Do you agree with that statement?

Answer: No, this statement is not accurate. Pipelines are routinely constructed and operated in challenging terrain throughout North America, as well as internationally in similar terrain and geologic conditions. In particular, the standard of practice for pipeline construction and the practice of geotechnical engineering and geologic hazards assessment and mitigation specifically addressing landslide hazards are well understood and applicable to the kinds of

terrain, topography, and geologic conditions encountered along the KXL alignment through South Dakota.

Geo-hazard risk is addressed through routing, pipeline design and mitigative construction techniques. To the extent necessary and practicable during the routing process, Keystone avoided areas of potential geo-hazard risk. Beyond that, mitigation addressing landslide hazards may include one or more design and construction measures including, but not limited to, the following, many of which are included in the Project's construction plans and Construction and Mitigation Reclamation Plan (CMRP):

- Installing the pipeline beneath landslide (deep burial)
- Engineering of the backfill around or within landslide areas
- Installation of engineered structures to protect the pipeline
- Installation of strain gauges on the pipeline to monitor and track potential strain accumulation in the pipeline
- Installation of geodetic monitoring stations to track potential changes in ground movement
- Installation of other below ground monitoring to track potential changes in ground conditions
- Removal of the landslide through excavation
- Targeted site management and diversion of surface water around landslide sites
- Mitigation of surface erosion by armoring or otherwise stabilizing surface soils
- Targeted site management of sources of water along the trench excavation
- Targeted mitigation of seeps, springs, or other subsurface water encountered along the disturbed ROW
- Reduction in surcharge on landslide areas
- Installation of deformable backfill around the pipeline
- Special in-line monitoring of pipeline parameters
- Completion of regular visual monitoring of site to observe and identify potential changes.

8. Mr. Kuprewicz testifies that Keystone should have determined worst case discharge based on a capacity of 922,000 B/SD. Can you comment on that assertion?

Answer: As required by federal regulation at 49 CFR 194.105, operators must use the maximum capacity to complete worst case discharge calculations. Keystone used the

maximum pipeline throughput capacity of 1,000,000 barrels per day in determining worst case discharge.

9. Mr. Kuprewicz's testifies that "(r)eliability can be improved only if proper transient dynamics have been incorporated into a rupture detection alarming system, and procedures are in place that require shutdown and isolation of pipeline segments along the system where a rupture may be suspected." Has a transient analysis been performed and incorporated into the procedures required to shut down and isolate the pipeline?

Answer: Yes, a transient analysis has been performed and incorporated in the design of the pipeline and Computational Pipeline Monitoring (CPM) leak detection system in accordance with PHMSA Special Condition 27 and API 1130.

10. Mr. Kuprewicz's testifies that "further information is warranted to clarify how much of this terrain identified as High Landslide Hazard Area is really at risk to such massive abnormal loading forces." What is the total mileage of high risk landslide hazard along the pipeline route in South Dakota?

Answer: Based on Keystone's detailed engineering analysis approximately 0.5% of the alignment intersects potential landslide hazards. This number may further decrease with site reconnaissance to finalize the Project's construction plans. Taking a more conservative perspective, and looking for potential landslide hazards that may occur within approximately 200 feet (to either side) of the alignment but that do not actually intersect the alignment, the area of additional potential landslide risk only increases by approximately an additional 1.5%. These additional areas of potential landslides identified along the alignment may or may not pose a hazard to the pipeline (e.g., depending on direction of movement, activity level, depth of landslide, etc.); thus, this additional approximately 1.5% is a conservative estimate intended to

capture the full potential landslide hazard, and will likely decrease in actual number once the Project's construction plans are finalized. The combined potential of landslide hazards that intersect, or are within approximately 200 feet of, the alignment through South Dakota that were identified did not appear to have the potential to generate "massive abnormal loading" conditions, and can be mitigated through standard pipeline design and construction practices or through the use of targeted mitigation measures.

11. Kuprewicz (p. 6) claims that the proposed Keystone "valving is seriously inadequate...in a location of considerable elevation changes." Please comment on this assertion.

Answer: A two-year independent review of Keystone XL's design and the 2009 Keystone XL Risk Assessment was conducted by Battelle Memorial Institute (Battelle) and E^{x}ponent Inc. (E^{x}ponent) under the direction of the US Department of State (DOS), Pipeline and Hazardous Materials Safety Administration (PHMSA), and the US Environmental Protection Agency (USEPA) to address concerns raised by the USEPA in the NEPA review of the Project. With respect to Keystone's valve placement, Battelle concluded that "*[t]he model and the process that were used to ensure that valves are placed to minimize the total outflow from a break appear to be correct and should be continued to be used*" (Battelle 2013).

12. Dr. Davis' testimony (p. 4) discusses concerns involving the stability of steep slopes where Pierre Shale or other expansive clays, such as bentonite, can "absorb large amounts of water during wet periods, leading to instability and potential failure," and subsequent surface water contamination. How will Keystone address these concerns?

Answer: Ground movement, including landslides, seismic events and subsidence, and heavy rains and flooding, account for a very small percentage (1.08%) of pipeline incidents

(PHMSA 2008). To prevent pipeline damage, Keystone considered slope stability during the routing and design process. Once the pipeline is operating, Keystone will conduct aerial patrols to monitor the pipeline right-of-way for signs of slope instability as well as other threats to pipeline integrity. This surveillance is required by Federal Regulation at 49 CFR 195.412. Keystone continually evaluates slope stability over the life of the pipeline. If Keystone suspected damage to the pipeline's integrity, Keystone would inspect the pipeline as required by PHMSA Special Condition 53c.

Dated this 25 day of June, 2015.

Meera Kothari

CERTIFICATE OF SERVICE

I hereby certify that on the 26th day of June, 2015, I sent by United States first-class mail, postage prepaid, or e-mail transmission, a true and correct copy of the foregoing Rebuttal Testimony of Meera Kothari, to the following:

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