BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE APPLICATION BY TRANSCANADA KEYSTONE PIPELINE, LP FOR A PERMIT UNDER THE SOUTH DAKOTA ENERGY CONVERSION AND TRANSMISSION FACILITIES ACT TO CONSTRUCT THE KEYSTONE XL PIPELINE PROJECT	))))))	HP 09-001 **UPDATED DIRECT TESTIMONY OF MEERA KOTHARI**

1. Please state your name and address for the record.

Answer: My name is Meera Kothari. My address is 450 1st Street SW, Calgary Alberta T2P 5H1 Canada.

2. What is your role with the Keystone XL Pipeline Project?

Answer: My role is that of technical advisor.

3. Please state your position with Keystone and provide a description of your areas of responsibility for the Keystone XL Project.

Answer: I am a project engineer with Keystone; I am responsible for pipeline design and integrity management.

4. Please state your professional qualifications and experience with pipeline operations.

Answer: I am a registered professional engineer in Alberta. I have seven years of pipeline experience focusing on the design, construction technologies, and integrity management of liquid and natural gas pipelines in North and South America.

5. Have you provided a resume?

Answer: Yes, my resume is attached as Exhibit A of my testimony.

6. Are you responsible for portions of the application which Keystone is filing with the South Dakota Public Utilities Commission seeking a permit under the Energy Conversion and Transmission Facilities Act?

Answer: Yes, I am individually or jointly responsible for the information provided in the following sections:

- Section 2.2 – Engineering Design;
- Section 2.2.1 – Pipeline;
- Section 2.2.2 – Pump Stations;
- Section 2.2.3 – Mainline Valves;
- Section 2.3 – Operation and Maintenance;
- Section 2.3.1 – Normal Operations and Routine Maintenance;
- Table 6 – Impact Summary Table;
- Section 6.5.2 – Protection of Human Health and Safety; and
- Section 7.1 – Monitoring Impacts (Operations).

7. Could you briefly summarize the information that you are responsible for in Sections 2.2, 2.2.1, 2.2.2 and 2.2.3?

Answer: Section 2.2 explains that the pipeline will be designed, constructed, tested, and operated in accordance with all applicable requirements, including but not limited to US Department of Transportation (USDOT) regulations at 49 CFR Part 195. These regulations, administered by the Pipeline Hazardous Materials and Safety Administration (PHMSA), are intended to ensure adequate protection for the public and the environment and to prevent crude oil pipeline accidents and failure. In addition,

Keystone will have a quality control and quality assurance (QA/QC) plan in place to ensure compliance with federal regulations.

In Section 2.2.1, approximately 313 miles are located in South Dakota. No lateral lines will be constructed in South Dakota. The pipeline will be fully capable of inspection by internal inspection devices and will be constructed using high strength steel. Section 2.2.1 explains that the pipeline will generally operate at a maximum pressure 1,440 pounds per square inch. Approximately four percent of the pipeline length in South Dakota will consists of low elevation segments where the MOP will be 1,600 psig. These areas are shown in Table 2. Pipeline segments with a MOP of 1,600 psig will have a design factor of 0.72 and pipe wall thickness of 0.572 (X-70) or 0.500 inch (X-80).

Section 2.2.2 explains that there are seven pump stations, located in Harding (2), Meade, Haakon, Jones, and Tripp (2) counties. The stations are required to pump the crude oil through the pipeline and will be electrically driven.

Section 2.2.3, Keystone plans to install 16 mainline valves in South Dakota, consisting of 7 mainline valves located at pump stations, 7 intermediate valves capable of remote operation, and 2 manually operated mainline valves with check valves. In the event of an emergency, these valves will isolate sections of the pipeline to minimize environmental effects.

8. Could you briefly summarize the information that you are responsible for in Section 2.3 – Operations and Maintenance?

Answer: Section 2.3 indicates that Keystone will operate and maintain the Project's facilities in accordance with 49 CFR Parts 194 and 195.

9. Could you please summarize the information in Section 2.3.1 – Normal Operations and Routine Maintenance for which you are responsible?

Answer: The pipeline will be inspected aerially 26 times per year, at intervals not to exceed three weeks, in accordance with Federal regulations (49 CFR Part 195). The ROW will be maintained in an herbaceous state extending a minimum of 10-15 feet on either side of the pipeline centerline to allow for visibility to aerial surveys and for accessibility. Cultivated crops and grass will be allowed to grow on the permanent ROW. Keystone will continually monitor the pipeline to identify any potential integrity concerns. Keystone will maintain operation and maintenance records in accordance with PHMSA regulations. A Supervisory Control and Data Acquisition (SCADA) system will be used to monitor the pipeline at all times, as discussed in the testimony of Witness Donald Scott.

10. Could you briefly summarize the information that you are responsible for in Table 6 – Impact Summary Table?

Answer: I am responsible for the reference to PHMSA pipeline design and operational requirements in the Public Health and Safety category of Table 6.

11. Could you briefly summarize the information that you are responsible for in Section 6.5.2 – Protection of Human Health and Safety?

Answer: I am responsible for the references to PHMSA regulations governing pipeline design standards. As this section explains, Keystone will adopt industry best practices to prevent and minimize impacts from a potential pipeline release including materials selection, engineering, and pre-operational testing.

The overall objective of the IMP is to establish and maintain acceptable levels of integrity and having regard to the environment, public and employee safety, regulatory requirements, delivery reliability, and life cycle cost. The IMP incorporates advanced in-line inspection and mitigation technologies applied with a comprehensive risk-based methodology, which initiates appropriate inspection and mitigation activities. TransCanada's exemplary record of pipeline safety and reliability is directly attributable to its IMP.

12. Could you please describe the Special Permit granted to Keystone by PHMSA?

Answer: Yes, Keystone has already applied and received a Special Permit from PHMSA to design the Keystone Pipeline using a 0.8 design factor, rather than current pipeline code design factor of 0.72. While this resulted in a reduced pipe wall thickness, a number of other additional conditions ensure an equivalent (or higher) level of safety than pipe designed without the Special Permit. Keystone Pipeline's application for the Special Permit included measures Keystone would implement above and beyond those required by regulations to ensure the safety of the pipeline. The Special Permit specified more than 50 conditions for the design and operation of Keystone that also are above and

beyond the normal requirements for a pipeline. In granting the permit, PHMSA found that these measures "provide a level of safety equal to, or greater than, that which would be provided if the pipelines were operated under existing regulations." Keystone has submitted an application to PHMSA to expand the existing Keystone Pipeline Special Permit to include the Keystone XL Project. If approved, it is expected that the Keystone XL Project will be subject to the same terms and conditions of the Keystone Pipeline, thus ensuring pipeline safety.

13. Why did Keystone apply for the Special Permit?

Answer: Keystone applied for the Special Permit for several reasons. The Canadian portion of the Keystone Pipeline (approximately 760 miles) is designed to operate at 0.8 design factor in accordance with CSA-Z662-07 Canadian pipeline code, unifying the design of the Project. Second, the US pipeline industry and the USDOT has moved to adopt this design factor into Federal law for new and existing US natural gas pipelines as of December 2008. Finally, there is a significant economic benefit in reduced steel costs to the Project which is passed on to the shippers and ultimately the consumer as Keystone is a regulated utility. As a new crude oil pipeline operating under this Special Permit, Keystone will meet or exceed all design and safety requirements for hazardous liquid pipelines.

14. Does the Special Permit allow Keystone to operate at a higher pressure?

Answer: No. The Special Permit allows Keystone to design sections of the pipeline that will have a maximum operating pressure (MOP) of 1,440 psig using a 0.8 design factor. The portion of pipe that will operate at a MOP of 1,600 psig

(Section 2.2.1) are not covered by the Special Permit. Those areas are covered by the 0.72 design factor.

15. Does thinner wall pipe make it unsafe?

Answer: No. The pipeline safety factor does not decrease as a result of the 0.8 design factor due manufacturing, design, and operational requirements. In order to issue a Special Permit, PHMSA made a finding that the issuance of a waiver is not inconsistent with pipeline safety and that waiver will provide a level of safety equal to or greater than that which would be provided if the pipeline were operated under the otherwise applicable regulations.

16. Does the Special Permit apply to all areas of the pipeline?

Answer: No. The Special Permit excludes pipeline segments operating in (i) PHMSA-defined HCA described as high population areas and commercially navigable waterways in 49 CFR Section 195.450; (ii) pipeline segments operating at highway, railroad, and road crossings; (iii) piping located within pump stations, mainline valve assemblies, pigging facilities, and measurement facilities; and (iv) areas where the MOP is greater than 1,440 psig.

17. Does TransCanada currently operate any pipelines with the same 0.8 design factor?

Answer: TransCanada currently operates about 11,000 miles of natural gas pipeline at this design factor.

18. Could you briefly summarize the information that you are responsible for in Section 7.1 – Monitoring of Impacts?

Answer: I am responsible for the reference to post-construction visual surveillance of the construction ROW.

19. Could you briefly summarize the information that you are responsible for in Exhibit 3?

Answer: Exhibit 3 is a mechanical flow diagram of for the Steele City Segment of the Project in the US.

20. Could you briefly summarize the information that you are responsible for in Exhibit 4?

Answer: This exhibit is a typical pump station layout.

21. How many known miles of hydrocarbon pipeline are there in South Dakota?

Answer: According to PHMSA, there are 4,912 miles of pipelines currently operating in South Dakota. Of these 500 miles are hazardous liquid pipelines, with the remainder consisting of natural gas pipelines. Currently, there are no interstate crude oil transmission pipelines currently operating in South Dakota, though the Keystone Pipeline has been permitted and is currently under construction.

22. Has TransCanada adopted safeguards and measures to protect against threats to the integrity of the pipeline?

Answer: Yes, Keystone conducted a pipeline threat analysis as part of the requirements for the NEPA process, using the pipeline industry published list of threats

under ASME B31.8S and PHMSA to determine the applicable threats to the Project. Keystone then developed safeguards to protect against these potential threats.

The potential threats to this pipeline are:

- Manufacturing Defects – flaws in the seam of the pipeline created during the manufacturing process
- Construction Damage – flaws such as dents, cracks, nicks in the coating that are as a result of transport, or construction
- Corrosion – internal and external – defects that develop over time during operation
- Mechanical Damage – contact with the pipeline
- Hydraulic Event – overpressure of the pipeline.

23. Has Keystone reacted to this analysis?

Answer: Yes it has. Keystone has developed safeguards for this specific pipeline project.

24. What best management practices have been developed and put in place specifically for this pipeline to mitigate manufacturing defects?

Answer: Best management practices have been implemented during design, and will be implemented during construction and operations of the pipeline. Steel suppliers, mills and coating plants are pre-qualified using a formal qualification process consistent with ISO standards. The pipe is engineered with stringent chemistry for such compounds as carbon to ensure weldability during construction. Each batch of pipe is mechanically tested to prove strength, fracture control and fracture propagation properties. The pipe is hydrostatically tested. The pipe seams are visually and manually inspected and also inspected using ultrasonic instruments. Each piece of pipe is traceable; each pipe joint is traceable to the steel supplier and pipe mill shift during production. The coating is

inspected in the plant with stringent tolerances on roundness, nominal wall thickness. A formal quality surveillance program is in place at the steel mill and coating plant.

25. What construction damage safeguards are in place specifically for this pipeline?

Answer: Construction damage can consist of flaws such as dents, cracks, nicks in the coating which are as a result of transport, or construction. Pipe joints which are susceptible to transportation fatigue (joints that stacked on the bottom) are examined for cracks in the seam, using ultrasonic inspection, once it is offloaded from rail cars prior to transport to the stock pile site. All pipe welds are examined 100% of the circumference using non-destructive testing, such as ultrasonic or radiographic inspection. The coating is inspected and repaired if required prior to lowering into the trench. After construction, the pipeline is hydrostatically tested in the field to 125% of its MOP. After the hydrostatic test, a caliper tool is run to check for dents and ovality. Abnormalities are evaluated and repaired.

26. What safeguards are in place specifically for this pipeline to mitigate corrosion damage?

Answer: Corrosion can be both internal and external. Corrosion defects are defects which develop over time during operation. Fusion bonded epoxy (FBE) is a protective coating that is applied to external surface of the pipe to prevent corrosion. In addition, a cathodic protection system is installed, comprised of engineered metal alloys or anodes, which are connected to the pipeline. A low voltage direct current is applied to the pipeline and the process corrodes the anodes rather than the pipeline. The two combined processes mitigate external corrosion.

A tariff specification of 0.5% solids and water by volume is contained in Keystone's transportation agreement with its shippers. This specification is lower than the industry standard of 1% to minimize the potential for internal corrosion. The pipeline is designed to operate in turbulent flow to minimize water drop out, which is also a potential cause of internal corrosion. During operations, the pipeline is cleaned using in-line maintenance tools (cleaning pigs). The pipeline is inspected with a smart in-line inspection tool, which measures and records internal and external metal losses including losses from internal or external corrosion. Keystone will repair areas of pipeline corrosion as specified by federal regulations.

27. What is TransCanada's experience with the pipe, coating, and corrosion protections that will be used in the Project?

Answer: TransCanada has thousands of miles of this particular grade of pipeline steel installed and in operation. TransCanada pioneered the use of FBE, which has been in use on our system for over 29 years. There have been no leaks on this type of pipe installed by TransCanada with the FBE coating and cathodic protection system during that time. When TransCanada has excavated pipe to validate FBE coating performance, there has been no evidence of external corrosion.

28. What safeguards are in place specifically for this pipeline to mitigate mechanical damage?

Answer: Mechanical damage is damage caused by contact with the pipeline. The Project's pipeline will be buried with four feet of cover. This reduces the likelihood of mechanical damage, according to pipeline industry research, by 80% in undeveloped

areas and 41% in developed areas. The steel specified for the pipeline is high strength steel with engineered puncture resistance of approximately 51 tons of force. According to pipeline industry research, 99% of excavators in the United States do not have a digging force capable of exceeding 40 tons. Aerial patrols, TransCanada's public awareness programs, pipeline marker signage and participation in the State's One Call program are all additional safeguards against mechanical damage.

29. What safeguards are in place specifically for this pipeline to mitigate against hydraulic damage?

Answer: A Hydraulic Event is characterized by overpressure of the pipeline. This is avoided by the systems in place to monitor the pipeline, known as the SCADA system. The SCADA system is the subject of other testimony. Keystone will also rely on operator training - operators are trained using a transient model which emulates the pipeline operation this will occur prior to the pipeline being in service. This allows for simulation of a number of operational conditions to train the operator. Operators must train periodically in accordance with US DOT and industry recommended practices.

30. Are there any provisions made when crossing foreign pipelines?

Answer: Federal pipeline regulations require pipelines to have a minimum clearance of 12 inches from foreign utilities. Typical industry practice is to under cross an existing utility.

31. Do you adopt the portions of the application referenced above as your own testimony in this matter?

Answer: Yes, with the caveat that I am jointly responsible for certain portions of the application with additional witnesses.

32. Does this conclude your prepared direct testimony?

Answer: Yes it does.

Dated this 16 day of October, 2009.

Meera Kothari

Exhibit A

Resume for Meera Kothari

Meera Kothari P.Eng.
450 1st Street SW Calgary Alberta T2P5H1
403.920.6038,meera_kothari@transcanada.com

Employment History

Project Engineer, Crude Oil Pipeline Project

3465 km large diameter transmission pipeline project

October 2, 2005 – Present, TransCanada PipeLines Ltd, Calgary, Alberta

Technical Responsibilities

- Engineering and Integrity assessment for conversion of 864 km gas pipeline to crude oil service in Canada
- Engineering for the design, construction and operation of 2215 km crude pipeline at 80%SMYS in the USA
- Plan, review and ensure timely completion of regulatory baseline data collection, permit application preparation and submittal in Canada (NEB Section 74, Section 52, Section 58) and the US (NEPA, PHMSA and North Dakota, South Dakota and Illinois State filings)
- Preparation and analysis of project system design, budgets & expansion cases
- Generation of terms, conditions, scope, analysis and award of project RFP for major materials and services
- Development and review of DBM, FEED, detail design, specifications, standards, procedures for new construction, pipeline change of service conversion and above ground facilities in accordance with applicable industry codes and standards (Canada & USA)
- Pipeline route planning, facility interface design, HCA analysis, integrity management planning, spill analysis and construction technical support (welding, coating, NDE, foreign utility issues)
- Applicant Witness at North Dakota PSC and South Dakota PUC permit hearings
- Technical spokesperson at public consultation project open houses

Project Engineer, Cogeneration Power Plant Project

Project Engineer 500 MW combined cycle power plant

May 1, 2005 – October 1, 2005 TransCanada Energy, Trois Rivières, Québec

Technical Responsibilities

- Development & implementation of inside battery limit plant construction quality plan
- Witness point inspections and audit of equipment fabrication & installation (tanks, boilers, turbines etc)
- Conducted plant hazard assessment recommendation close out
- Validation of work package estimates for outside battery limit pipeline project bid award
- Development hazardous material philosophy
- RFP preparation for gas and chemical supply
- Development of community investment risk matrix
- French guided plant tours for government and technical stakeholders

Project Controls Responsibilities

- Preparation of monthly project status report, management presentations and HS&E statistics
- Analysis and validation of cost and schedule for various work packages
- Development of management operating system compliance tracking report

Operations & Engineering Technical Support & Technology Manager

Pipeline Integrity & Operations

July 1, 2003 – April 30, 2005 TransCanada PipeLines Ltd, Calgary, Alberta

Technical Responsibilities

- Technical specification support for new capital pipeline projects (coating, welding, materials, NDE)
- Engineering critical assessment for pipeline defect assessment, maintenance repair, pipeline pressure derating, unsupported pipe lengths, blasting/explosives, coating systems

- Urban development encroachments, foreign utility, road and vehicle crossing application review focused in the areas of integrity verification, stress analysis, population growth tracking for the purpose of code compliance and conflicts with facilities that may impact the ability to maintain integrity, access for maintenance purposes, emergency response and compatible land uses
- Failure analysis of in service pipe body leaks, pipeline ruptures and hydrostatic test failures
- Research & Development of SCC & MFL In-Line Inspection, NDT techniques, pipeline repair techniques, mainline and joint coating systems, welding of new materials
- Risk analysis for new pipeline construction projects
- Development of engineering & integrity budget and programs for due diligence and acquisitions
- Development of commercial agreements & contracts with Provincial Governments, private developers and construction contracts for pipeline upgrade/rehabilitation project
- Coordination of Facilities Integrity R&D Program reviews and budgeting cycles
- Liaison with Regulators (National Energy Board, Transportation Safety Board and Alberta Energy and Utilities Board) with respect to integrity management issues and incidents
- Providing direction during emergency maintenance activities to various groups within the organization

Pipeline Integrity Program Developer

Pipeline Integrity & Operations

July 1, 2001 – June 30, 2003 TransCanada PipeLines Ltd, Calgary, Alberta

Technical Responsibilities

- Developed annual integrity maintenance program using quantitative risk modeling software
- Coordination of research & development projects for risk management, corrosion and SCC
- Coordination of peer review team for evaluation of projects feasibility and cost management
- Performed value/benefit analysis for integrity projects
- Directing contractors & field technicians to perform technical tasks

Engineering Support Analyst

Information Services

June 1, 1998- June 30, 2001, Petro-Canada Oil & Gas Ltd, Calgary, Alberta

Technical Responsibilities

- Data and Technology architecture development for Bitumen Recovery Scheme, De-sulferization upgrade facility, transportation developments and Natural Gas Liquids (NGL) facilities

Education

University of Calgary Bachelor of Science – Engineering Major: Manufacturing, Minor: Mechanical 09/97 – 06/01

Professional Development Courses (2001-2008)

- US DOT Hazardous Liquid Pipeline Regulation Compliance
- 7 Habits of Highly Effective People
- Pipeline Pump Fundamentals
- ASM Fundamentals of Non Destructive Testing
- Principles of Failure Analysis
- Design of Gas Turbine Combined Cycle & Cogeneration Systems
- Pipeline Design & Construction, Pipeline Pigging, Pipeline Defect Assessment & Repair Methods
- Tools & Techniques of Project Management

Publications & Industry

M. Kothari, S. Tappert, U. Strohmeier, J. Larios and D. Ronsky, "**Validation of EMAT In-Line Inspection Technology for SCC Management**," Proceedings of the International Pipeline Conference, Calgary, 2004.

R. Worthingham, M. Cetiner, M. Kothari, "**Field Trial of Coating Systems for Artic Pipelines**," Proceedings of the International Pipeline Conference, Calgary, 2004.

Chair Person: **In-Line Inspection Session**, Banff Pipeline Integrity Workshop, Banff, 2005