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1155 North State Street, Suite 609, Bellingham, WA 98225 **Phone** 360-543-5686 **Fax** 360-543-0978 http://pipelinesafetytrust.org

Dockets Operations
U.S. Department of Transportation
M-30, West Building Ground Floor, Room W12-140
1200 New Jersey Avenue, SE
Washington, DC 20590

February 20, 2009

RE: Docket No. PHMSA-2008-0285

To Whom It May Concern:

We appreciate this opportunity to comment on the special permit application for the Keystone XL Pipeline. Providing a company the prospect of operating a new pipeline at a higher maximum operating pressure (MOP) provides a valuable opportunity to both save natural resources and energy in the manufacture of the pipe as well as millions of dollars in costs. Because of this large cost saving we believe that a company granted such a special permit should be willing and required to meet additional safeguards to ensure the safety of the communities and environment that the pipeline traverses at these higher pressures.

It is our understanding of the federal pipeline safety laws that a pipeline operator may request PHMSA to waive compliance with any part of the federal pipeline safety regulations, and that such a waiver may be granted by PHMSA in the form of a special permit as long as such a waiver is not inconsistent with pipeline safety. It is our further understanding that as a condition of granting such a special permit that PHMSA can impose additional terms to be met by the pipeline company, and that such terms are not limited to only the section of regulation the company has asked waiver from.

The Pipeline Safety Trust contracted with a very qualified engineering firm to review all the documents associated with this proposed special permit. That review is attached. Below are the areas we specifically ask PHMSA to include as conditions of this special permit.

Reporting of Over-pressurization Events – One of the clearest measurements of whether a pipeline company has good control of their pipeline system is the number of times that they allow their pipeline to exceed the maximum operating pressure plus some permitted accumulation pressure. Unfortunately the vast majority of these events are not required to be reported to PHMSA because of the exemptions from reporting contained in 49 CFR 195.55 (b), so neither PHMSA nor the public can use this indicator to determine whether the pipeline company is causing unwarranted stress on their pipeline and therefore needs greater scrutiny.

If a special permit is granted to operate this pipeline at 80% of the MOP than the traditional safety factor between the normal operating pressure and the MOP is less. We believe that if such a special permit is granted all exceedances of 110% of MOP as described in 49 CFR 195.55 (a) (4) should be required to be reported to PHMSA as required in 49 CFR 195.56 without exception. We ask that you make this a part of the final permit.

In the 1980's when it was decided to provide an exemption to reporting most of these important over-pressure events the reasoning was that the reporting would be extremely time intensive and costly for the industry, and PHMSA (then RSPA) had no database that would handle the data in a way that would be valuable for the agency. Twenty years ago email, the internet, and integrated databases were a vague dream. That has all changed, so the arguments used against the collection of this valuable information no longer apply. Furthermore, with increased capabilities in control room technology, remote communications, and integrity management the number of over-pressurization events should be very low so reporting them is no longer a burden.

Elimination of over-pressure failure possibility caused by SCADA operator –
Current federal regulations do not require that a pipeline operator prove that their pipeline system can not be put in a dangerous over-pressure situation by a SCADA operator. To ensure added protection at these increased operating pressures we ask that TransCanada be required as part of this special permit to provide an analysis to PHMSA that shows that under their operating plans their SCADA operators will not have the ability to take actions that would cause the pipeline to exceed the allowed pressure ~~as~~ defined in 49 CFR 195.406.

Require 100% of the girth welds to be inspected with nondestructive methods –
49 CFR 195.234 does not require 100% inspection of girth welds by nondestructive methods in many important areas such as valuable agricultural lands or potentially affected aquifers. Many companies installing new pipelines are now employing 100% inspection of girth welds, and it appears from TransCanada's special permit application they intend to do this on the Keystone XL pipeline. To ensure added protection at these increased operating pressures we ask that 100% nondestructive inspection of girth welds be required as part of this special permit, and that the inspection records be required to be kept during the life of the pipeline.

Proper Surge Pressure Analysis and Protections –
If a pipeline is already operating at a higher pressure the potential for surge pressure to increase cyclical stress of the pipe, cause the pipeline to exceed permitted pressures, or even fail is increased. For these reasons we ask that before the pipeline is allowed to operate at these higher pressures PHMSA is provided a comprehensive surge pressure analysis to review to ensure that surge has been properly engineered for and that protections are well designed and placed. This analysis needs to be done on the final system design.

Internal Corrosion Program –
It has become increasingly apparent from recent failures of pipelines on the North Slope in Alaska that the internal corrosion requirements of 49 CFR 195.579 may not be sufficient. To ensure added protection at these increased operating pressures we ask that PHMSA as part of this special permit require the use of cleaning pigs at regular intervals, (to be determined by PHMSA), with proper analysis of the material removed by the cleaning pigs, be added to the pipeline's overall corrosion protection program.

Incorporation of Additional Safeties –

In their application for this special permit TransCanada describes many safety programs for the design, construction, operation, maintenance, and testing of the Keystone XL pipeline. Some of these go beyond the current federal pipeline safety regulation included in 49 CFR 195. We ask that all of these additional safety items that go beyond current regulatory requirements, which PHMSA finds to be consistent with pipeline safety, be incorporated as requirements of this special permit.

Pipelines and Informed Planning Alliance (PIPA) Recommended Practices

As a major new green field pipeline in this country we feel it is imperative that TransCanada does as much as is possible to develop good working relationships with the local communities it will be passing through. For the past year the large multi-stakeholder effort known as the PIPA has worked diligently to draft recommended practices that will help ensure good working relationships while improving pipeline safety, especially where local land use efforts and regulations intersect with pipelines. Every pipeline is required under 49 CFR 195.440 to provide a public education effort. Currently, that effort is defined by the API recommended practice 1162. Because of the nature of this pipeline and the substantial savings this special permit represents, we ask that PHMSA require TransCanada to incorporate the final recommended practices from the PIPA that apply to pipeline operators into their public education program, and that measurement of the use of these practices be incorporated into the measurement requirements of their 1162 program.

We thank you again for this opportunity to comment, and if you have any questions please contact me at the above address or phone number.

Sincerely,

Carl Weimer
Executive Director

Increasing MOP on the Proposed Keystone XL 36-Inch Liquid Transmission Pipeline

Prepared for the

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http://www.pstrust.org/

by
Richard B. Kuprewicz
President, Accufacts Inc.
kuprewicz@comcast.net
February 6, 2009

Accufacts Inc.

"Clear Knowledge in the Over Information Age"

This report is developed from information clearly and readily available in the public domain.

Scope and Task Summary

Accufacts Inc. was asked by the Pipeline Safety Trust to review the special permit application for the Keystone XL Pipeline related to increasing the design factor to 0.80 on most of the pipeline, and address four specific questions identified in this paper.[1] The Keystone XL project is a proposed, approximately 1,980 mile 36-inch crude oil pipeline, incorporating part of the 30-inch Keystone pipeline, to move tar sand based crude oil (synthetic crude oil and blended bitumen crude oil) from Hardisty, Alberta, Canada to U.S Texas gulf coast refineries. The project is estimated to cost approximately $12 billion.[2] This special permit application, if approved, would permit much of the proposed new 36-inch liquid pipeline to be designed, constructed, and operated with thinner pipe than that permitted under existing pipelines regulations or AMSE B31.4 code for liquid transportation pipeline systems that presently establish a maximum design factor of 0.72 for liquid pipelines.[3, 4] A higher design factor allows a pipeline to operate at higher pressures for a specific pipe thickness. A higher design factor also saves considerable cost in pipeline steel and associated pipe thickness related construction activities (e.g., welding) for this proposed new multi-billon dollar project.

1) Should the permit be granted?

Accufacts believes the higher 0.80 design factor and associated increased maximum operating pressure (MOP) should be granted under the special permit process provided certain additional requirements that include and go beyond those adopted for gas transmission pipeline maximum allowable operating pressure (MAOP) increases, recently codified into federal pipeline safety regulation, are clearly incorporated into the special permit conditions for the Keystone XL project (we will call this total package "Combined Special Conditions").[5] While there are many technical similarities among gas and liquid transmission systems, the additional conditions identified below, supplementing the gas transmission MAOP increase requirements, address differential lifecycle risks associated with liquid transmission pipelines operating at a 0.80 design factor. Accufacts believes that these requirements will result in a crude oil pipeline that can operate at lower risks of failure compared to those for pipelines operating under current federal pipeline safety regulatory requirements and ASME B31.4 code of a maximum 0.72 design factor in the U.S. This lower risk determination is associated with the considerable advances in technology associated with pipe material, manufacture, welding, quality control, construction, testing, inspection, operation, and maintenance of pipelines that decide to prudently incorporate these modern technical advances into their project through the entire lifecycle of the pipeline. The potential to save many hundreds of millions of dollars, possibly exceeding a billion dollars, on this project provides a considerable incentive for the operator to take advantage of these

[1] Review of Keystone XL documents at public website www.regulations.gov, Docket # PHMSA-2008-0285.
[2] TransCanada website for Proposed Keystone Gulf Coast Expansion Project (Keystone XL) at http://www.transcanada.com/keystone/kxl.html
[3] Pipeline segments related to certain high populated areas, some navigable waterways, railroad and highway crossings, and pump stations as outlined in the Keystone XL correction application of 12/1/08, would still be limited to the 0.72 design factor codified in regulation.
[4] ASME is the American Society of Mechanical Engineers.
[5] 49CFR Part 192, "Pipeline Safety Standards for Increasing the Maximum Allowable Operating Pressure for Gas Transmission Pipelines; Final Rule," October 17, 2008.

many technical advances as well as build from prudent pipeline experience in other countries[6].

2) What additional information should be needed to make a sound decision about this pipeline?

The final rule in 49CFR192 for increasing the MAOP on gas transmission pipelines codifies many prudent requirements that also apply to liquid transmission pipelines.[7] There are a few obvious sections of this gas regulation that don't apply to liquid pipelines and it is beyond the scope of this brief paper to identify those gas sections that are not applicable.[8] Liquid pipelines, however, definitely have additional risks by the nature of their product that can increase the risk of pipeline failure if not properly addressed. These additional liquid pipeline risks can be properly dealt with by incorporating certain requirements to address the liquid pipeline risks associated with girth weld failure, surge, over-pressure, pressure cycling, and internal corrosion, beyond that specified in increasing gas transmission MAOP regulation. In addition, appropriate oil spill response considerations are also warranted since many liquid pipelines fall under state jurisdictions as well as federal requirements, especially for sensitive areas, and the final specific pipeline route has yet to be determined for this project. Given the operating dynamics of liquid pipelines, special care should be taken that the addition of a particular safety to reduce oil spill potential, such as the addition of a remote operated valve to reduce spill size from pipeline rupture or to cover a sensitive area, does not incorporate poor design that could actually increase the risk from over-pressure rupture from surge, for example.

3) What additional requirements should be considered to ensure safety?

a) **Require 100% of girth welds be non-destructively inspected**[9]
The final rule for increasing gas transmission MAOP calls for the nondestructive testing of 95% of all girth welds.[10] Because a girth weld failure will manifest itself as a rupture failure on a pipeline, 100% of all girth welds should be radiographically or ultrasonically inspected to ensure the soundness and quality of the welds on this new pipeline. Under current federal liquid pipeline safety regulations, an operator could choose to only inspect a minimum of 10% of all girth welds. 100% inspection of all girth welds is becoming a more common practice in many new pipelines, especially those in other countries. All nondestructive inspection records for each girth weld should be maintained for the life of the pipeline.

b) **Proper Surge Analysis and Protection**

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[6] Richard B. Kuprewicz, "General Observations On the Myth of a Best International Pipeline Standard," March 31, 2007, Figure 3 – Typical Maximum Design Factors for Transmission Pipe, page 5.

[7] 49CFR192, "Pipeline Safety Standards for Increasing the Maximum Allowable Operating Pressure for Gas Transmission Pipelines; Final Rule," October 17, 2008.

[8] The author believes a prudent engineering evaluation will demonstrate that fracture control required for gas transmission may be overkill on this liquid pipeline.

[9] Girth welds are the welds joining the pipeline segments together. Depending on the design intent, girth welds and their associated heat affected zone can be stronger or weaker than the parent pipe metal.

[10] 49CFR192.620, "Alternative maximum allowable operating pressure for certain steel pipelines," paragraph (b)(7).

Because hydrocarbon liquids are approximately 100 to 150 times less compressible than natural gas, liquid pipelines are much more susceptible to overpressure from surge or mis-operation than most gas transmission pipelines. Surge is the additional pressure generated in a fluid flowing in a pipeline because of a rapid change in velocity (e.g., valve closure or pump shutoff). Surge is influenced by the bulk modulus, a property of the fluid, the rate of change of fluid velocity, the mass of the fluid (more likely a problem in large diameter and longer liquid pipeline segments).

c) Over-pressure Protection and Reporting

Prudent pipeline operators will design their systems such that the pipeline cannot be placed in an over-pressure event (pressures exceeding MOP plus some permitted accumulation pressure) by a SCADA operator. Under current federal regulation (49CFR195.406(b)) a liquid pipeline operator is not permitted to exceed 110% of MOP. There may be confusion regarding whether a pipeline operator is required to report such an over-pressure event that would flag a possible serious systemic breakdown in the design, construction, maintenance, or operation of a pipeline. Any liquid pipeline 0.80 design factor special permit should be conditioned such that all over-pressure events must be report to PHMSA and state Interstate Agents (where applicable) within 24 hours of such an event for evaluation and confirmation by the agencies that there isn't a systemic problem that could repeat itself.

For increases of design factor to 0.80 a 110% MOP pressure maximum would yield pipeline pressures of 0.88 SMYS that could be very close to a lower value hydrotest minimum of 125% of MOP (0.9 SMYS).[11] If a hydrotest strength test is based on such a lower limit, safety devices and design should be based on a 5% accumulation pressure rather than the historical value of 10%. Many pipeline operators perform initial hydrotest strength test at much higher values than the 125% of MOP minimum defined in regulation. The author will leave it to PHMSA to determine whether a 5% or 10% accumulation pressure over MOP is appropriate on the Keystone XL project, based on the minimum value of a hydrotest initial strength test on a specific pipeline segment.

d) Incorporate pressure cycle frequency analysis into operation

Liquid pipelines, especially batch type liquid operations, such as that associated with synthetic crude or bitumen blends from tar sands, can be much more susceptible to cycle fatigue related anomaly failure introduced by operating pressure cycling, even on newer, tougher pipe steels. An appropriate cycle frequency monitoring program and periodic engineering analysis, capturing actual operation cycling frequency, should be required throughout the operating life of the pipeline. Given many uncertainties in this approach, we would recommend a safety factor of at least 100% be applied in any cycle frequency engineering failure analysis, and see little problem with this risk if such analysis is applied prudently.

e) Require periodic cleaning pigging as part of overall internal corrosion program.

Because of the gravity of the crude oil blend handled by the pipeline, water could become problematic in this pipeline operation as it relates to internal corrosion potential. Requiring the periodic use of cleaning pigs into an overall internal

[11] SYMS stands for Specified Minimum Yield Strength, one of the properties utilized to determine the pressure containing ability of pipe steel.

corrosion program is very rational, and highly cost effective, and will extend the timing between the much more expensive smart pig runs and associated pipe repairs connected with internal corrosion risks.

f) Oil spill response program.

49CFR194 defines the federal minimum oil spill requirements for a liquid pipeline operating in the U.S. In addition, state agencies may have authority to impose further requirements or controls on spill response plans above those imposed by federal agencies, which may not address sensitive environmental areas beyond High Consequence Areas, or HCAs. While a requirement for SCADA monitoring is part of the additional conditions required to allow MAOP increases on gas transmission pipelines, and this requirement should obviously be carried over into the Keystone XL project, an additional concern related to leak detection should also be added to the Combined Special Conditions.[12] 49CFR194 requires an operator to prepare for a worst case release emergency. Worst case should be defined by the release associated for pipeline rupture and recognize the spill potential associated with rational and realistic identification via SCADA, reaction, and response times in a specific terrain. Priority should be given to SCADA capabilities to quickly remotely identify a rupture scenario anywhere along the pipeline.

Differential attention should be paid to the difficulty in remotely identifying leak releases as compared to ruptures, and recognizing that such rapid identification, especially for leak releases that don't come to the surface, may be unrealistic and create serious distractions to SCADA personnel operating the pipeline, manifesting into too many false alarms. A previous white paper related to "leak detection" should prove helpful in not creating the illusion of a safety when requiring or setting leak alarm thresholds for rupture detection vs smaller rate leaks.[13] False alarming could be a real problem for the Keystone XL project as crude oil will move in batches, lowering leak detection sensitivity and increasing the potential for many real time false alarms if thresholds are set too low.

4) Any shortcomings in the special permit process?

"Special permits (formally called waivers) may be issued to individual operators in response to petitions. They waive parts of PHMSA regulations if the petitioner demonstrates and PHMSA agrees that doing so is consistent with pipeline safety. They are usually contingent on specific requirements set forth in the permit."[14]

Special permits allow PHMSA to impose additional safety conditions upon an operator who wishes to apply for a specific permit for a condition or conditions imposed in current regulation. In some cases, such as in the many applications to permit newer gas transmission pipelines to increase the design factors and MAOP of gas transmission pipelines, PHMSA elected to impose significant appropriate conditions on such operators and elected to codify

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[12] 49CFR Part 192, "Pipeline Safety Standards for Increasing the Maximum Allowable Operating Pressure for Gas Transmission Pipelines; Final Rule," October 17, 2008, page 62179, "Responding to an emergency in an area defined as a high consequence area."

[13] Richard B. Kuprewicz, "Observations on Practical Leak Detection for Transmission Pipelines – An Experienced Perspective," August 30, 2007.

[14] PHMSA web site http://www.phmsa.dot.gov/pipeline/regs/special-permits

them into additional pipeline safety regulations.[15] We find that these additional conditions imposed by PHMSA take advantage of technical advances not only in this country, but from lessons learned in other countries that may have advantages in a specific area of pipeline expertise over U.S experience. It is the opinion of this author that PHMSA's regulation pertaining to gas MAOP increase leads the world in this area, and we believe PHMSA has tried to be very open to those willing to take the time to read and understand their technical positions in finalizing such regulation.

In presenting our technical evaluation of the opportunity to increase MAOP on gas transmission pipelines, this author indicated that while there definitely was a large economic incentive to increase MAOP on newer gas transmission pipelines, economic opportunity would be more limited on liquid transmission pipelines to newer larger diameter rather than older smaller diameter liquid pipeline systems.[16] Only time will tell if there are sufficient numbers of future large diameter pipelines in the works that would warrant PHMSA proceeding with a specific final regulatory rule for MOP increases on liquid pipelines similar to that developed for natural gas. We see no shortcomings in the special permit process provided that the process remains readily 1) in the public domain at a central, easy to find, website, 2) provides adequate time for all parties of interest to properly evaluate the information provided at this site and return and post timely feedback, 3) that a feedback loop is available to all parties again in the public domain, and 4) that PHMSA continues to address posted responder concerns, usually answered in the preamble granting a special permit at this website. It is our determination that PHMSA has, to date, been professional and technically sound in its responses when it addresses issues of concern raised in these open public forums and special permits related to MAOP. This process should apply to new liquid transmission pipelines requesting MOP increases that can meet the Combined Special Conditions identified in this paper.

[15] 49CFR Part 192, "Pipeline Safety Standards for Increasing the Maximum Allowable Operating Pressure for Gas Transmission Pipelines; Final Rule," October 17, 2008.
[16] Richard B. Kuprewicz, "Increasing MAOP on U.S. Gas Transmission Pipelines," March 31, 2006, page 4.