PLAINS MIDSTREAM CANADA

15 November 2011

Sent via Facsimile and Courier

Anne-Marie Erickson
Secretary of the Board
National Energy Board
444 Seventh Avenue SW
Calgary, AB T2P 0X8

Dear Ms. Erickson,

RE: ORDER SO-P384-004-2011
PLAINS MIDSTREAM CANADA ULC (PLAINS)
16.46 KM 273MM (NPS 10) MILK RIVER CRUDE OIL MAINLINE
172.90 KM 323MM (NPS 12) WASCANA CRUDE OIL MAINLINE

In accordance with item #6 of the Fitness-for-Service Milestones and Deliverables Schedule, as approved by the Board on 4 November 2011, please find attached the proposed Terms of Reference for the Fitness-for-Service Assessment.

Should you have any questions, please do not hesitate to contact myself directly at (403) 450-1221.

Yours truly,

PLAINS MIDSTREAM CANADA ULC

Michelle Stepp

Regulatory Specialist

Cc: Nadia McCarthy, Engineer – Integrity Management, National Energy Board, Nadia.Mccarthy@neb-one.gc.ca
Joshwa Minhas, Engineer – Integrity Management, National Energy Board, Joshwa.Minhas@neb-one.gc.ca

Enclosures: Proposal for: 10in Milk River Crude Oil Pipeline, 12in Wascana Crude Oil Pipeline Fitness for Service Assessment

Suite 1400, 607 - 8th Avenue S.W. Calgary, AB, Canada T2P 0A7
Telephone: 403-298-2100 Fax: 403-233-0399

DET NORSKE VERITAS

Proposal for:
10in Milk River Crude Oil Pipeline
12in Wascana Crude Oil Pipeline
Fitness for Service Assessment

Plains Midstream Canada

November 14th, 2011

Proposal title: Milk River & Wascana Pipelines Fitness for Service Assessment	DET NORSKE VERITAS (CANADA) LTD. DNV Energy Canada 2340 Pegasus Way, NE, Suite 123 Calgary, Alberta T2E8M5 Canada Tel: (403) 250-9041 Fax: (403) 250-9141 http://www.dnv.com http://www.dnvcalgary.com

Customer:	Plains Midstream Canada
Customer Address:	Suite 1400, 607 8th Avenue SW, Calgary, AB, T2P 0A7
Customer Reference:	
Contact Person:	Minh Ho
DNV Reference:	
Date of Issue:	November 14th, 2011
Validity of Tender:	3 months from date of issue
Terms and Conditions:	

Prepared by/Contact Person: Richard Fletcher,	*Position:* Principal Consultant Integrity Solutions	
Approved by: Burke Delanty	*Position:* Director Integrity Solutions	*Signature:*

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1 INTRODUCTION

1.1 General

Plains Midstream Canada (Plains) is the owner of the 16.46km x 273mm (10in) Milk River and 172.90km x 323mm (12in) Wascana crude oil pipelines. The pipelines were the subjects of Order SO-P384-004-2001 issued by the National Energy Board (NEB) on October 20th, 2011 as a result of potential pipeline defects identified by in-line inspections performed in 2010 and 2008 respectively. The Order imposed pressure restrictions above and beyond those previously implemented on the pipelines and required that a fitness-for-service (FFS) assessment be performed to address all potential threats with the objective of developing a series of short-term and long-term mitigative and preventative measures. Plains has requested the assistance of DNV Canada Ltd (DNV) in the execution of the FFS assessment. This proposal outlines the scope and technical approach for the assessment.

1.2 Objectives

The objectives of the assessment are:

1. To identify the range of potential threats to the pipelines' integrity.

2. To assess the severity of each threat based on the available information, with priority given to populated and environmentally sensitive areas. (Or to identify additional data requirements where insufficient information exists for a conclusive assessment to be made).

3. To identify any necessary mitigative actions needed to reduce current threats to an acceptable level.

4. To develop a plan of actions to monitor and control identified threats for the future operation of the pipelines.

2 CURRENT SITUATION

2.1 Milk River Pipeline

The 16.46km x 273mm (10in) Milk River Pipeline was constructed in 1992 and was acquired by Plains in 2001. It transports 'heavy Hardisty' crude oil from Milk River, Alberta to the Cenex Santa Rita Pipeline in Montana. The pipeline coating is 'yellow-jacket'.

The pipeline design pressure was 9769kPa (72% SMYS). It is scheduled for replacement in 2012 or 2013.

The primary integrity threat is internal corrosion from sediments deposited by the transported crude oil, which is currently mitigated by regular cleaning pig runs. MFL inspections in 2005 and 2010 showed significant and increasing levels of corrosion to a maximum depth of approximately 40% of the wall thickness. A pressure restriction is in place as excavations and repairs are made at the locations of the most severe reported defects.

2.2 Wascana Pipeline

The 172.9km x 323mm (12in) Wascana Pipeline was constructed in 1972 and was acquired by Plains in 2001. It transports crude oil from Regina, SK via the Ceylon Pump Station to the Bridger Pipeline in Montana. The pipeline is tape coated.

The line has not been operated at the design pressure. The Regina to Ceylon section was limited to 7200kPa (68% SMYS). (The Ceylon to the US border section was limited to 6900kPa (65% SMYS).

The pipeline has been out of service since 2009. Since then, the Regina to Ceylon section has been used as a crude oil storage facility. The Ceylon to the US border section is filled with dry nitrogen. Previous inspections have shown some deep external corrosion. Some suspected dents were also reported.

Plains plans to restart the line, operating in the opposite direction (south to north). They will perform an in-line inspection (ILI) and necessary pipeline repairs followed by an engineering assessment to confirm the fitness for service of the line prior to the restart.

The main integrity threat is considered to be external corrosion beneath the tape coating. Mechanical damage based on the earlier ILI results and SCC based on the coating and operating stress are also potential concerns.

3 SCOPE OF WORK

The NEB has requested that a comprehensive fitness for service assessment be performed to address all potential integrity threats (CSA Z662 Annex H is referenced). They state "The risk-based proposed mitigative, preventative and monitoring measures shall include, but not be limited to, additional repairs, ILI interval frequency, corrosion growth reduction and testing, and pipeline system modifications. Furthermore, populated areas (e.g. Regina) and environmentally-sensitive areas shall be prioritized in the implementation of those measures."

The work will include the following key stages:

- Identification of all potential threats to pipeline integrity based on the categories listed in CSA Z662 Annex H.
- Based on the available information, identify the credible threat types that can be shown be of potential significance.
- Specify any additional information requirements required to complete the assessment. Specify the type of testing, inspection or other methods recommended to acquire the information.
- For each integrity threat, the following steps will be taken:
    - Determination of the current impact of the threat on the capability of the pipeline to continue to operate at the required operating pressure.
    - Estimation of future rates of degradation or defect growth and their impact on the future operating pressure of the pipeline.
    - Specification of immediate repair requirements
    - Specification of preventative measures and monitoring strategies to ensure ongoing integrity.

The technical basis for the assessment of all integrity threats that are considered to be of potential concern will be developed following the review of the available information on their design, history and condition.

3.1 General Threat Assessment

A review of the significance of all potential integrity threats listed in CSA Z662 Annex H for the Milk River and Wascana pipelines will be performed using the available information. This will include pipeline design records, alignment sheets, operational records, inspection and repair records, previous survey reports and other pertinent sources of information. Land use information for the areas in proximity to the pipeline rights of way will be used to identify areas of elevated sensitivity to pipeline-related risk.

For the Milk River Pipeline, account will be taken of the limited scheduled remaining period of operation of the line in the identification of credible threats. The line was scheduled for replacement by approx. 2013 prior to the commencement of this study.

For the Wascana Pipeline, the proposed new operating configuration with the product running from south to north, will be used for the assessment of future integrity threats. The prior history, approx. 37 years running north to south and approx. 2 years as a static storage facility, will be considered in the review of the potential degradation mechanisms to date.

Based on this general review, a shortlist of threat categories that require detailed assessment will be drafted. The justification for the selection of the threat types for further assessment will be documented.

3.2 Review of Plains' Threat Mitigation Actions to Date

A review and comment will be made on the steps taken by Plains to mitigate the risks associated with defects in the pipelines. These steps include the imposition of voluntary pressure restrictions and targeted excavations and repairs at the sites of the most critical defects identified in the in-line inspection reports.

3.3 Detailed Assessment of Identified Threats[1]

3.3.1 General Corrosion (External & Internal)

Both pipelines have been inspected twice with MFL ILI tools, supported by some supplementary excavations. The data from these inspections will be the primary platform for the assessment of the extent, severity and rate of growth of corrosion in the lines.

The assessment will include the following:

- Identification of sites of active corrosion and estimation of corrosion growth rates by comparison of multiple ILI datasets using DNV's 'statistically active corrosion' (SAC) approach.
- Correlation of ILI data to field results (data trending) to quantify the accuracy range in ILI datasets.
- Calculation of minimum safe working pressure for existing corrosion.
- Development of a 'probability of exceedance' model to determine the optimum re-inspection interval.
- Specification of corrosion sites needing repair to ensure the required factor of safety is achieved for the pipeline at the desired operating pressure up to the planned time of the next inspection (or replacement of the pipeline).

[1] This section contains an example of the approach that could be used for the threats that were considered likely to be of potential concern for the Milk River and Wascana Pipelines at the time of preparation of this proposal. It is not a definitive list, and the scope will be modified according to the findings of the preliminary threat assessment.

- Sensitivity study of the effect of the selected maximum operating pressure on the numbers of features that require repair.
- Engineering review of the likely causes of corrosion.
- Recommendation of mitigative actions to reduce future corrosion growth rates.
- Recommendation of ongoing monitoring and re-inspection program.

3.3.1.1 External Corrosion

Specifically to external corrosion, the engineering review will include a review of the pipeline cathodic protection (CP) system, the monitoring procedures employed and the results of any CP surveys that have been performed. The objective will be to identify locations where protection is below the required level, or instances during the sections' operating history where protection has been interrupted.

Indications of coating disbondment or other coating deficiencies will be sought from the ILI and NDE records, and the CP test records.

3.3.1.2 Internal Corrosion

For internal corrosion, the review will include consideration of the following:

- Product quality and specification.
- Chemical and microbiological analyses of any liquids or solids removed from the pipeline.
- Pipeline operating characteristics.
- Pipeline topographical information (assess if corrosion is associated with low points)
- Other inspection data (UT monitoring).
- Corrosion monitoring information (if present – to include upstream and downstream facilities).
- Current mitigation strategies, if applicable, i.e. use of corrosion inhibitor/biocides, frequency of use and type of cleaning pigs.

Previous experience indicates that when trying to understand the issue(s) around internal corrosion in a pipeline, a visit to upstream and downstream locations can be invaluable as information from records and drawings can be rather limited. In particular, visits to discuss pipelines operations with site operators almost always reveals interesting information. A walk through the plant to review process equipment and operations, sampling locations (for possible liquid analysis), pipework topography, pigging facilities (type and frequency of use) and liquid storage, especially tanks, can give an indication of why issues have occurred at a particular location or may occur in the future. For these reasons, a site visit to the Milk River facility is proposed.

Where applicable, recommendations will be made about the future application of corrosion monitoring, inspection and mitigation measures in order to help fully assess the on-going corrosivity of the pipeline system and to maintain internal corrosion to acceptable levels.

3.3.2 Seam Weld Cracking and Environmental Cracking

The possibility of stress corrosion cracking (environmental cracking), seam weld fatigue and other sources of cracking in the pipeline cannot be discounted based on the information available at the current time. The existence of cracking will be assessed based on the ILI and dig data available. For SCC, a susceptibility assessment will be performed taking account of the pipeline coating, local soil conditions and the applied stress levels.

Soils information previously obtained in geotechnical surveys of the pipeline routes will be used in the identification of sites of interest for environmental cracking.

The soils susceptibility data will be aligned and overlaid with other factors that influence the threat of SCC. These include: basic pipeline design info, ILI indications, operating stress, coating type, crossings (road, water etc.), elevation profile). A prioritized list of sites will then be created and compared to the planned list of excavation sites. If necessary some additional excavations will be recommended to establish whether SCC is present.

An inspection procedure designed to identify seam weld fatigue cracking and environmental cracking in the pipe body will be recommended for use on all future digs, including those primarily intended to assess metal loss.

For fatigue and SCC, a crack growth model based on the recorded pressure history and the anticipated future operating conditions will be developed. The model will use a calculated critical flaw size to determine the remaining life of the pipeline.

If environmental cracking or fatigue cracks within the seam weld are found to be significant concerns, methods of monitoring and mitigating the risk associated with these mechanisms will be developed.

3.3.3 Geotechnical Hazards

Overstress or damage due to geotechnical factors such as soil instability, loss of cover etc could be a potential threat but work already performed in this area has shown that the level of risk is limited. The results and conclusions of the geotechnical studies on both pipelines will be summarized in the general threat assessment report.

BGC Engineering Inc. performed the geotechnical assessment and developed the ongoing monitoring program for both pipelines. They will prepare the summary report.

3.3.4 Mechanical Damage

ILI records have shown some indications of dents on the Milk River Pipeline. Mechanical damage introduced either at the time of pipeline construction, or as a result of third party actions will be addressed as follows:

- Review of alignment sheets, aerial photographs and other data sources (e.g. findings from aerial patrols) to identify locations at higher risk of third-party interference.
- Review of ILI data to identify sites for excavation and investigation.
- Assessment of acceptability of dents, and other mechanical damage. Dents will be assessed using strain-based acceptance criteria and calculated fatigue lives.
- Recommendation of mitigative actions to reduce the likelihood of further damage in future.

4 DELIVERABLES AND SCHEDULE

4.1 Cost Estimate

The work will be invoiced on a time, material and expense basis in accordance with the rates provided in Appendix A. In that way, Plains will only incur the costs associated with the work required to complete the associated tasks. Thus the actual costs may be less or more than the estimates above depending upon the resources expended.

The estimated pricing for the tasks within this project are as follows:

These estimated prices include the cost of meetings at Plains offices in Calgary. If visits to the pipeline sites are necessary, some additional costs for travel and expenses will be incurred.

4.2 Deliverables

A written report will be issued containing details of the assessments performed, the data and assumptions used and the conclusions and recommendations for management of each integrity threat.

4.3 Timescale

4.4 Payment Schedule

4.5 Variations to Scope

Variations to the proposed scope can be requested by Plains at any time. If the requests are made prior to starting the work, DNV will revise the estimated cost accordingly and approval by Plains will be required before the new scope can be implemented. If requests have been made after the work has started, DNV will perform the additional work according to the rate schedule as previously mentioned.

4.6 Validity

This proposal is valid for three months from the date of issue.

5 CONFIDENTIALITY

All information received in connection with this scope of work will be treated in the strictest confidence unless it is information that is readily available in the public domain.

6 PROJECT TEAM

7 LIMITATIONS AND ASSUMPTIONS

Reports produced under this project are advisory and DNV assumes no liability for actions taken by Plains on the basis of any recommendations made.

8 TERMS AND CONDITIONS

DNV Energy

DNV Energy is a leading professional service provider in safeguarding and improving business performance, assisting energy companies along the entire value chain from concept selection through exploration, production, transportation, refining and distribution. Our broad expertise covers Asset Risk & Operations Management; Enterprise Risk Management; IT Risk Management; Offshore Classification; Safety, Health and Environmental Risk Management; Technology Qualification; and Verification.

DNV Energy Regional Offices:

Asia and Middle East
Det Norske Veritas Sdn Bhd
24th Floor, Menara Weld
Jalan Raja Chulan
50200 Kuala Lumpur
Phone: +603 2050 2888

Europe and North Africa
Det Norske Veritas Ltd
Palace House
3 Cathedral Street
London SE1 9DE
United Kingdom
Phone: +44 20 7357 6080

Cleaner Energy & Utilities
Det Norske Veritas AS
Veritasveien 1
N-1322 Hovik
Norway
Phone: +47 67 57 99 00

Nordic and Eurasia
Det Norske Veritas AS
Veritasveien 1
N-1322 Hovik
Norway
Phone: +47 67 57 99 00

North America
Det Norske Veritas (USA), Inc.
16340 Park Ten Place, Suite 100
Houston, TX 77084
United States of America
Phone: +281-721-6600

Offshore Class and Inspection
Det Norske Veritas AS
Veritasveien 1
N-1322 Hovik
Norway
Phone: +47 67 57 99 00

South America and West Africa
Det Norske Veritas Ltda
Rua Sete de Setembro
111/12 Floor
20050006 Rio de Janeiro Brazil
Phone: +55 21 2517 7232