EA01-005

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NEB File 3400-P097-1 & 2620-D-4-7

March 20, 2002

National Energy Board
444 7th Avenue S.W.
Calgary, Alberta
T2P 0X8

Attention: Mr. Michel Mantha

Dear Sir;

Re: Paramount Transmission Ltd. Cameron Hills Pipeline and Fuel Gas Pipeline, Order XO-P097-02-2002; Conditions 14: Corrosion Inhibition Program

The following is Paramount Transmission Ltd.'s (PTL) response to the request for additional information regarding PTL's corrosion inhibition program by the National Energy Board (NEB) on March 18, 2002. In general, as stated in previous submissions by PTL, the corrosion inhibition program proposed for the Cameron Hills Pipeline is similar and comparable to the program being used in Paramount Resources Ltd.'s Bistcho Gas Gathering System. The programs are comparable because the production fluid compositions, corrosion inhibition chemicals, and the pipeline flow characteristics in both areas are also comparable.

The NEB's request for additional information has been reiterated in italics for reference and PTL's response follows immediately after it.

1. The flow regime and the chemistry of the water in the Bistcho Lake field;

Response: The Bistcho Gas Gathering System is comprised of pipelines which vary in outside diameters from 88.9 mm to 273.1 mm. Their flow regimes range from mist to stratified to slug flow. The Cameron Hills Pipeline is predicted to have a stratified flow in the pipeline.

The water chemistry for the Cameron Hills Pipeline will be similar to the Bistcho Gas Gathering System since the Cameron Hills production will be from similar zones of production as in Bistcho Lake area. Therefore the water analysis submitted to the NEB previously can also be used for the Bistcho Gas Gathering System.

2. Indicate as to whether PTL intends to use inhibited methanol in its system and a description of the effect of methanol on the corrosion inhibitor film;

Response: The Bistcho Gas Gathering System does not use inhibited methanol due to the low proportion of methanol flowrates in relation to production rates and corrosion inhibition injection rates. It is expected that the Cameron Hills methanol useage will be similar since the production will have similar fluid properties and operating conditions. Therefore, PTL does not plan to use inhibited methanol initially.

If the methanol flowrates are excessive, then the methanol will tend to wash the corrosion inhibition film off the inside of the pipe and the oxygen introduced by the methanol will contribute to the corrosion. The corrosion, however, will be detected by analysing for iron and manganese in the water samples and also by the evidence of pitting on the corrosion coupons.

If corrosion is detected, PTL will adjust its inhibition program by either using inhibited methanol or increasing the inhibition chemical injection rate.

3. The effect of the water chemistry on the corrosion inhibitor water dispersibility;

Response: The Cameron Hills corrosion inhibition program utilizes a batch inhibitor, which is oil soluable but has limited water dispersibility, and a continuously injected inhibitor, which is water soluable and mitigates corrosion especially in the water phase. The batch inhibitor creates a protective film on the inside of the pipe and the continuous injected inhibitor further mitigates against corrosion by inhibiting the water phase.

4. Demonstrate whether pigging the line, which has two different IDs,will be effective;

Response: The Cameron Hills Pipeline will be pigged to prevent the accumulation of stagnant liquids in the pipeline, which may cause corrosion, and also reduce the effects of slugging into the Bistcho Gathering System, which may cause upsets at the Paramount Bistcho Gas Plant.

The pigs that will be used will comprise of a series of cups with a diameter larger than the biggest inside diameter of the pipe and are made from a neoprene material along a centreline rod made of the same material. This material is flexible and will conform to varying thicknesses of pipe and will form a seal within the pipe to push the liquids ahead.

This type of pig is commonly used in the oil and gas industry and is currently being used effectively at the Bistcho Lake field.

5. The location and orientation of the coupons; and

Response: The corrosion coupons will be located on the branch connections at the pig sender and the pig receiver at each end of the pipeline. These coupons are not installed in the main line because of the possible interference to the pig or the possible damage of the coupon during a pigging operation.

The coupons will be orientated in the 6 o'clock or bottom location of the pipe since the potentially corrosive liquids will also be accumulating on the bottom of the pipe.

6. The rationale for using coupons rather than corrosion monitoring spools.

Response: Corrosion monitoring spools have the following disadvantages:

- They are less accurate to weigh to measure the corrosion rate due to their size and external effects (e.g. paint);
- They are more cumbersome to remove to inspect because of their weight and size (i.e. a crane would be required); and
- A shutdown of the production is required to remove and inspect the spools.

PTL would like to reiterate that the fluid compositions and operating conditions are comparable between the Cameron Hills field and the Bistcho Lake field, which allows the use of comparable corrosion inhibition programs. The Bistcho Lake corrosion inhibition program has proven to successful in its mitigation against corrosion. Since the operating conditions and fluid composition within gathering systems are seldom constant but are dynamic, PTL's corrosion monitoring programs will ensure that the Cameron Hills Pipeline will be optimally protected by adjusting the program to changes in the operating conditions of the pipeline.

If you require any further clarifications then please contact the undersigned at (403) 290-3696 or by e-mail, tom.hong@paramountres.com. Since the Leave to Open will imminently be submitted, your approval of PTL's corrosion inhibition program at your earliest convenience would be a greatly appreciated.

Yours truly,

PARAMOUNT TRANSMISSION LTD.

Tom Hong, P.Eng.
Project Manager

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