Paramount resources ltd.

Suite 2800, 421-7th Ave SW Calgary, Alberta, Canada T2P 4K9 www.paramountres.com
tel 403 290 3600

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OROGO
Department of Industry, Tourism and Investment
Government of the Northwest Territories
P.O. Box 1320
Yellowknife NT, X1A 2L9
Canada

Attn: Mr. J. Fulford,
Chief Conservation Officer

Application to Alter the Condition of a Well (ACW-2018-010) Celibeta No.2 H-78 (WID 156)
Information Response No. 1 (IR1)

Please find attached Paramount Resources Ltd.'s (Paramount) response to OROGO's information request No. 1 (IR1) dated December 18, 2018 as follows:

1.1 Interval and Groundwater Isolation

Request:
Please submit an updated well program that identifies which intervals are porous and ensures all porous intervals and the BGWP will be isolated in the wellbore.

Response:
The attached well abandonment program has been revised to clearly identify the porous intervals. During the review one additional porous interval from 195.0-196.0m KB was added to the program. Please note any other intervals for potential SCVF source will be determined from the logging results. Step #53 of the program has been revised as follows:

> Step #53. Depending on where the cement top is located and or the Noise/Temp logging results the following intervals for perforating and cement squeezing may be required:
>
> - 720.5-721.5m KB to isolate the Jean Marie. (Porous Interval isolation)
> - 600 to 601m KB to isolate default BGWP (Default BGWP isolation)
> - 457.8-458.8m KB to isolate Tetcho. (Porous Interval isolation)
> - 195.0-196.0m KB to isolate Kotcho. (Porous Interval isolation).
> - Any SCVF intervals identified by logging.

1.2 Wellhead Pressure, Risk of Comingling Formations and SCVF Repair Contingencies

Request:
Please provide an updated program that identifies proposed contingency steps and rationale for well abandonment steps that address:
• The high risk for commingling of formations due to a possible bridge plug failure at 1154.6 mKB and/or inadequate cementing of the liner; and
• The possibility of additional perforations and cement squeezes needed to repair a surface vent flow and isolate all porous zones and the BGWP open behind the uncemented intermediate casing.

Response:

- The bridge plug set at 1154.6m KB was pressure tested on completion to 8790 Kpa and held pressure. Currently there is no evidence to suggest this bridge plug has failed.
- After cementing the 127mm liner there was no further lost circulation after drilling the 104.8mm open hole. This would indicate isolation of the liner at that point.
- The Watt Mountain interval is described in the geological report as 0.46m shale/mudstone. It is not considered reservoir quality.
- Step #46 in the attached revised well abandonment program provides that unless previous cement squeeze(s) meet or exceed the requirements of OROGO Well Suspension and Abandonment Guidelines - 6A, a balanced cement plug will be set as per Step #49.
- Step #49 of the revised well abandonment program states "Circulate a 1.5m3 balanced continuous cement plug from PBTD to about 993m KB.". This will place over 100m of cement above the liner top, exceeding the requirements of 6A in the OROGO Well Suspension and Abandonment Guidelines.

The well abandonment program has been revised as follows:

- Step #42 If the well holds fluid to surface prepare to run the cement bond log at this point. If the well does not hold a fluid level the bond log may be run after repairing a possible casing leak.
- Step #43 MIRU E-line unit with lubricator and BOPs. Purge and pressure test the lubricator to 1400kPa (low) and 14MPa (high) with Nitrogen gas. Purge the lubricator each time before running in the hole with tools. Hang the wireline sheave in the derrick.
- Step #44 Run a RBL/VDL/GR/CCL from PBTD to surface. If required run a pressure pass to 7000 Kpa and run repeat log. POOH. Correlate to the previous Noise/Temp log run if it was run. If not, there are no other cased hole logs available. Rig off e-line.
- Step #45 If casing leaks are identified, cement squeezing will be conducted with either a balanced cement plug or a cement retainer squeeze to repair the leak. This will be determined once the cause of the casing leak is known.
- Step #46 Depending on the pressure test results above a balanced cement plug may be utilized to the abandon the liner top.
- As indicated in step #53 after the well is logged with a cement bond log and Noise/Temp log, the porous intervals, BGWP and any identified sources of SCVF will be cement squeezed as programmed. The porous intervals, BGWP are identified, any potential SCVF sources will be addressed after logging has occurred. If those logging results indicate that any potential SCVF leak is coming from the 127mm liner, then cement squeezing will be conducted as required.

1.2 Well History

Request: Please verify casing depths and rig release dates and provide an updated well history.

Response:

The attached well abandonment program has revised the well history summary and all dates with the correct casing details and rig release dates.

Should you require additional information regarding this response please contact me.

Regards,

John Hawkins, P. Eng.
Director Asset Management
Paramount Resources Ltd.
403-817-5074