



WEDNESDAY, DECEMBER 21ST, 2011

# CANADIAN NATURAL RESOURCES LSD 106/12-1-67-3W4 PRIMROSE EAST PAD 75

CONSULTANTS: CALVIN THIRSK AND DOUG BABB  
COIL SERVICE: T ROCK COIL TUBING  
FOAMER SERVICE: MIKES OILFIELD  
NITROGEN UNIT: CANADIAN NITROGEN SERVICES



On the morning of Dec.21, FMI received a call from Doug Babb to run the new 2 3/8” Sandworm prototype on a well in the Primrose Area. FMI arrived on lease and rigged in the prototype flush joint Sandworm tool to T Rock’s coil tubing unit at 4:30pm. After running in to 250m, the first returns were gained on the well. T Rock ran in and cycled the well every 250m until they got to the first bridge at 1120m. The coil unit was running 4% foam and 30 L/min of N2. FMI was informed that the day before, T Rock attempted working the bridge with a jetted nozzle for a period of five hours and made a total of .05 meters of hole. Initially, the Sandworm was gaining approximately .05m/stroke. The decision was made to increase the fluid rate up from 30L/m to 60L/m, and penetration increased to approximately .18m/stroke. 45 minutes after tagging the bridge, the sandworm had broken through a total of 5m of extremely hard baked sand. Doug then suggested we pull back and circulate above the perms before continuing on with the cleanout. After cleaning back a total of 50m the coil unit got a hole in the coil and the job was shut down until morning.

T-Rock arrived on location at 7:30am with a 2” coil tubing rig. At 11:30 am, the coil tubing was rigged in with the sandworm tool and read to run in hole. The coil was run in to the well in 250m intervals, circulating each interval until they made returns. At 820m they lost returns and decided to pull back up to 500m At 724m we encountered an issue; the well string had a PSN nipple at the 724m, and the pin sub of the sandworm was hanging up on it. By 8:00pm the well was circulating again by running N2 down the back side of the coil instead of water. The coil was then run back in to the bridge at 1120m and resumed the cleaning out operations of the well. For the most part it was only a matter of setting the tool down in the sand and letting it hydraulically open, augering into the obstruction.

Two or three times after circulation was regained, the tool re-entered the PSN without any hang ups. This issue with the PSN would have been avoided by beveling the top side of the pin sub on the sandworm tool. Overall Doug and Cal thought it was a very successful run and if it had not been for the rig issues and hanging up on the PSN, they felt confident that this would have been a 10 hour job. For the first field trial, the prototype 2 3/8” sandworm performed superbly at the well cleanout. Since this run, FMI has modified the tool to incorporate a 30 degree tapered bevel to the top side of the pin sub to remove the possibility of future hang-ups. This modification has proved successful in the wells since cleaned for CNRL.



*“NEVER SAY WHOA IN A TIGHT SPOT”*





Canadian Natural

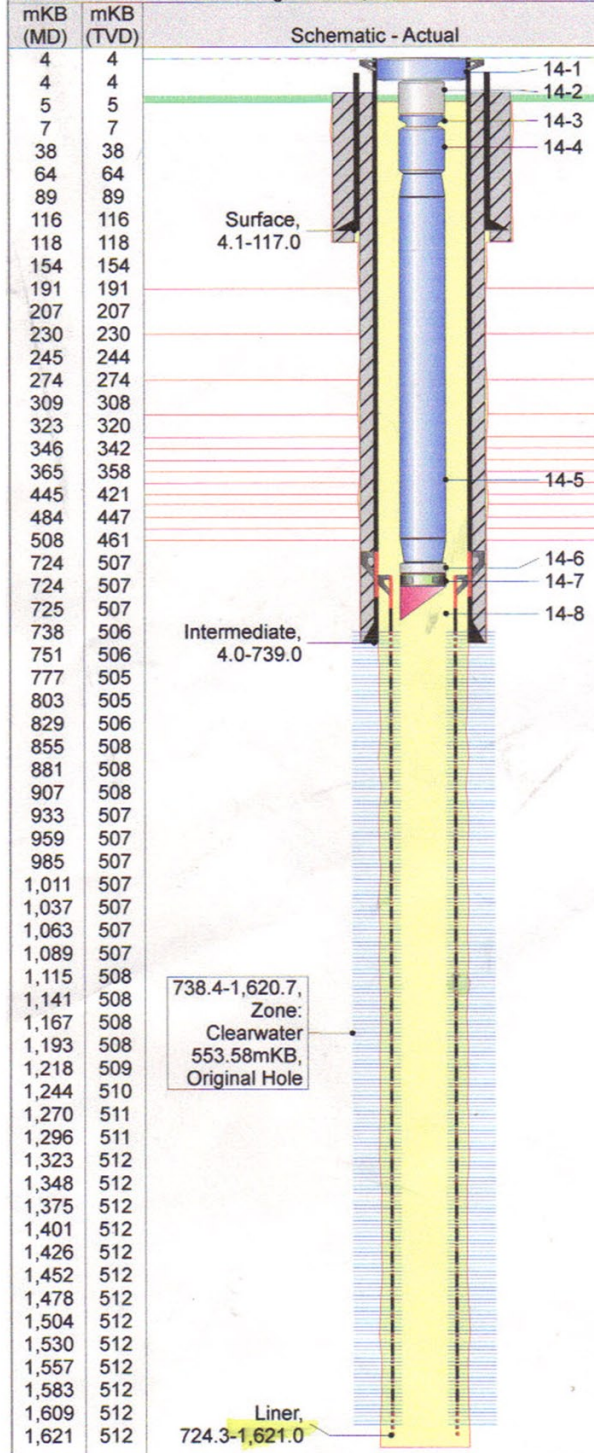
## Downhole Schematic CNRL 9A75 PRIMROSE 12-1-67-3

|  |  |                                     |  |                                       |
|--|--|-------------------------------------|--|---------------------------------------|
| Bottom Hole Location<br><b>106/12-01-067-03W4/00</b> | Surface Legal Location<br>100/05-12-067-03W4 | License No.<br>0381913              | Field Name<br><b>PRIMROSE EAST FIELD</b> | Province<br><b>Alberta</b>            |
| Well Profile<br>Horizontal                           | Fluid Type<br>Thermal Oil                    | Original KB Elevation (m)<br>678.08 | KB-Ground Distance (m)<br>5.15           | KB-Casing Flange Distance (m)<br>4.00 |
| KB-Tubing Head Distance (m)<br>4.00                  |  |                                     |  |                                       |

Directions To Well

Well 3437 west MARK

Well Profile: Horizontal - Original Hole, 20/12/2011 10:09:12 AM



| PBTds      |             |
|------------|-------------|
| Date       | Depth (mKB) |
| 01/05/2008 | 1,621.00    |

| Casing Strings     |         |           |       |                      |
|--------------------|---------|-----------|-------|----------------------|
| Casing Description | OD (mm) | Wt (kg/m) | Grade | Set Depth (MD) (mKB) |
| Surface            | 339.7   | 71.400    | H40   | 117.00               |
| Intermediate       | 244.5   | 59.527    | L-80  | 739.00               |
| Liner              | 168.3   | 29.760    | L-80  | 1,621.00             |

| Cement Stages       |        |           |           |              |                 |                |
|---------------------|--------|-----------|-----------|--------------|-----------------|----------------|
| Description         | Type   | Top (mKB) | Btm (mKB) | Rtns Mix (%) | Rtns Displ. (%) | Cmnt Rtnm (m³) |
| Surface Cement      | casing | 5.00      | 118.00    | 100          | 100             | 4.00           |
| Intermediate Cement | casing | 5.00      | 739.00    | 100          | 100             | 10.00          |

| Perforations                        |           |           |                |
|-------------------------------------|-----------|-----------|----------------|
| Zone                                | Top (mKB) | Btm (mKB) | Current Status |
| Clearwater 553.58mKB, Original Hole | 738.37    | 1,620.70  |                |

| Tubing Strings  |         |           |              |                 |
|---|---------|-----------|--------------|-----------------|
| Tubing - Extended Production set at 732.47mKB on 18/12/2011 10:30 |         |           |              |                 |
| Tubing Description  | OD (mm) | Wt (kg/m) | String Grade | Set Depth (mKB) |
| Tubing - Extended Production                                      | 114.3   | 15.630    | J-55         | 732.47          |

Comment  
Extended Intake for Foam Job

| Item No. | Jts | Item Description                | OD (mm) | ID (mm) | Len (m) | Top (mKB) | Btm (mKB) |
|----------|-----|---------------------------------|---------|---------|---------|-----------|-----------|
| 14-1     | 1   | Tubing Hanger                   | 224.5   | 114.3   | 0.29    | 4.00      | 4.29      |
| 14-2     | 1   | 40-40 Pup Joint                 | 114.3   | 102.9   | 1.12    | 4.29      | 5.41      |
| 14-3     | 1   | XO Pup to 40-40                 | 114.3   | 102.9   | 1.17    | 5.41      | 6.58      |
| 14-4     | 5   | S-Max Tubing                    | 114.3   | 102.9   | 56.90   | 6.58      | 63.48     |
| 14-5     | 56  | S-Max Tubing                    | 114.3   | 102.9   | 660.29  | 63.48     | 723.77    |
| 14-6     | 1   | 29 Mpa XO Burst #10763-1 SR# 64 | 114.3   |         | 0.51    | 723.77    | 724.28    |
| 14-7     | 1   | PSN # 96699                     | 114.3   | 96.4    | 0.17    | 724.28    | 724.45    |
| 14-8     | 1   | Muled Tubing Joint              | 114.3   | 102.9   | 8.02    | 724.45    | 732.47    |

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