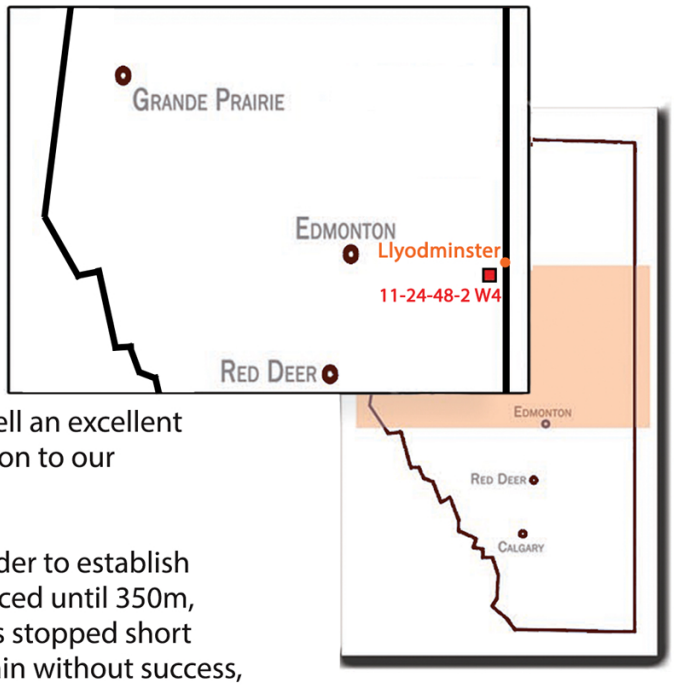
LONGHORN CASING TOOLS

SANDWORM

Canadian Natural Resources

Llyodminster, AB

104/9-24-48-2 W4



Longhorn received a call from CNRL to clean a second well on the same pad as the first trial well for the 2 3/8" Sandworm. Just as with the original trial, the clean-out is planned using compressed air being used to energize the fluid through the coil tubing. In previous clean-outs on this well, the turbine cleaning solution experienced service issues entering the tubing string, making this well an excellent test for the Sandworm's ability to enter the tubing string in comparison to our competitor's equipment.

The coil was run in to 50m, and foam was initiated immediately in order to establish returns immediately. After returns were achieved, the coil was advanced until 350m, where returns were lost. Coil was continued to be advanced, and was stopped short of entering the liner at 775m. Hurricane tried to establish returns again without success, and the coil was pulled back to 300m. After regaining returns, the coil was advanced to 788m; the Sandworm entered the liner without contact, eventually tagging sand at 800m.

The string was advanced at a slow rate initially, starting at approximately 2m/min to ensure that returns were sustained. Once confirmed, the coil speed was increased to 4-5m/min. The coil was pull tested at 850m, and again at 900m, and no restrictions were experienced. At 925m, the sand cuts were approximately 12% sand. While there was some discussion about running the clean-out into the night, the decision was made to shut down the clean-up, and finish the job the next morning.

Once the clean-out resumed, the coil was tasked with re-cleaning the initial interval between 300m and 900m several times before advancing the coil again. The well was cleaned up to 975m, and the decision was made to call the clean-out complete, and the coil was worked back to 50m. The coil was advanced again to bottom at 975m, and after no additional returns were achieved, it was then POOH and rigged out.

CNRL's foreman and all of the services on lease were very optimistic about the performance of the tool and the results of the clean-out, as well as the potential of running the Sandworm on additional jobs in the future.

Run Summary

Tool:	2 3/8" Sandworm
Target:	Coil Tubing Clean-out
Production Tubing:	114.3 mm / 4.5"
Coil Tubing Size:	50.8mm / 2"
Well TD:	1442 m / 4731 ft
Total Run Time:	12 Hours
Liner Cleaned:	175 m / 574 ft
Client:	Canadian Natural Resources
Consultant:	Jason Topp
Coil Service:	Titanium Tubing Technologies
Foamer Service:	Hurricane Industries
Service Rig:	Royal Well Servicing Rig 12

Downhole Schematic (Heavy Oil)

CNRL 104 LLOYD 9-24-48-2

Canadian Natural

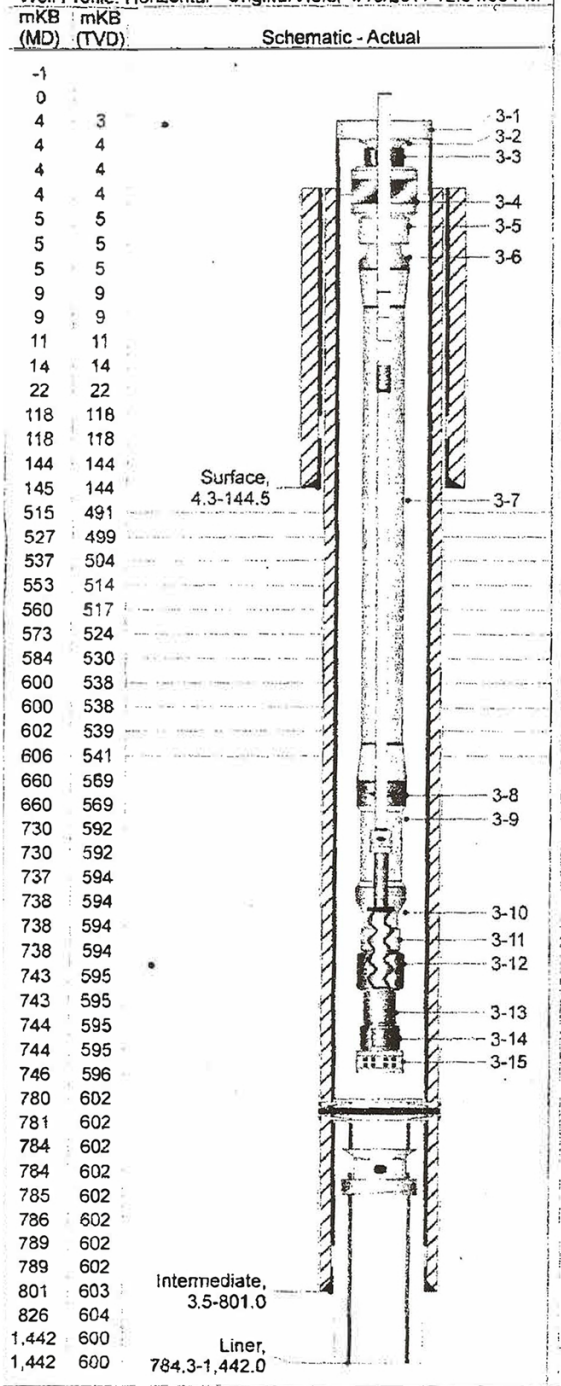
Bottom Hole Location	Surface Legal Location	License No.	Field Name	Province
104/09-24-048-02W4/00	100/11-24-048-02W4	0413979	RIVERCOURSE OIL	Alberta

Well Profile	Fluid Type	Original KB Elevation (m)	KB-Ground Distance (m)	KB-Casing Flange Distance (m)	KB-Tubing Head Distance (m)
Horizontal	Heavy Oil	639.34	4.34		3.50

Directions To Well

Lloydminster Hwy # 17 South to Sec Hwy # 619, West to RRD 21, South .5 km, East into pad.

Well Profile: Horizontal - Original Hole, 4/19/2011 12:34:36 PM



PBTD's

Date	Depth (mKB)
1/17/2010	1,442.00

Well History (with last 3 jobs)

General Notes

Comment

Potential H2S as this well continues to produce.

Casing Strings

Casing Description	OD (mm)	Wt (kg/m)	Grade	Top (mKB)	Set Depth (MD) (mKB)
Surface	298.4	62.503	H-40	-0.47	144.50
Intermediate	219.1	41.669	J-55	3.45	801.00
Liner	139.7	23.067	J-55	784.33	1,442.00

Tubing Strings

Tubing - Production set at 745.65mKB on 2/24/2011 12:00

Tubing Description	OD (mm)	Wt (kg/m)	String Grade	Set Depth (mKB)
Tubing - Production	114.3	18.980	J-55	745.65

Comment

New Weatherford 10-1600xxxl @ 75 % eff, w/ Midfield gas breaker

Item No.	Jts	Item Description	OD (mm)	Len (m)	Top (mKB)	Btm (mKB)
3-1	1	Tubing Hanger lock tite	218.0	0.25	3.50	3.75
3-2	1	Swedge 114.3mm x 88.9mm	114.3	0.10	3.75	3.85
3-3	1	Nipple & Coupling	88.9	0.33	3.85	4.18
3-4	1	T.C.S. Tbg Rotator # 6827	150.0	0.78	4.18	4.96
3-5	1	Coupling 88.9mm	114.3	0.15	4.96	5.11
3-6	1	Swedge 88.9mm x 114.3mm	114.3	0.10	5.11	5.21
3-7	68	Tubing / Enerlined	114.3	654.71	5.21	659.92
3-8	1	Tbg Drain 9 pin 45K	114.3	0.42	659.92	660.34
3-9	8	Tubing / Enerlined	114.3	77.10	660.34	737.44
3-10	1	Swedge w/ 114.3mm Enerlined Cplg x 88.9mm welded	114.3	0.30	737.44	737.74
3-11	1	Pup Jt welded	88.9	0.69	737.74	738.43
3-12	1	Weatherford 10-1600 stator # E68212 @75% eff	108.0	4.93	738.43	743.36
3-13	1	Solid Tag Bar	73.0	0.83	743.36	744.19
3-14	1	x-over	88.9	0.13	744.19	744.32
3-15	1	Midfield Gas Breaker	108.0	1.33	744.32	745.65

Rods

Pro-rod 620c /28.6mm on 2/24/2011 14:30

Rod Description	OD (mm)	Wt (kg/m)	String Grade	Set Depth (mKB)
Pro-rod 620c /28.6mm	28.6			743.35

Item No	Jts	Item Description	OD (mm)	Len (m)	Top (mKB)	Btm (mKB)
3-1	1	Polished Rod	31.7	9.14	-0.24	8.90
3-2	1	Pony Rod	31.7	0.33	8.90	9.23
3-3	1	Pony Rod	31.7	1.83	9.23	11.06
3-4	1	Pony Rod	31.7	3.03	11.06	14.09
3-5	1	Sucker rod	31.7	7.62	14.09	21.71
3-6	1	Continuous Rod	28.6	708.00	21.71	729.71
3-7	1	Shear Coupling 40,000 lb	49.0	0.22	729.71	729.93
3-8	1	Sucker rod	31.7	7.62	729.93	737.55