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PRELIMINARY ENGINEERING REPORT ON THE WORKOVER OF LADUBORO LA BAIE NO 5 YAMASKA

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Québec 

**PRELIMINARY
ENGINEERING REPORT
ON THE WORKOVER OF
LADUBORO LA BAIE NO. 3 YAMASKA
YAMASKA COUNTY, QUEBEC**

JANUARY 18, 1966

Ministère de l'Énergie et des Ressources
Gouvernement du Québec
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LADUBORO OIL LTD.

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INTRODUCTION

A first workover was conducted on Ladubero La Baie No. 3 Yamaska well to clean out a possible sand plug that was believed to have been formed in the tubing during the blowing down operations after the well was fractured. (See Geological and Engineering Report on the Workover of Ladubero La Baie No. 5 Yamaska, Yamaska County, Quebec, dated October 3, 1963 by J.C. Sproule and Associates Ltd. of Calgary, Alberta.)

Eventually, it was concluded that there was no sand plug in the tubing but a sand plug was found lower in the open hole at 3,854 ft. The well was then cleaned to 3,910 ft. (plugged-back depth) and swabbed at a rate of approximately 576 barrels per day but the fluid level could not be reduced below 500 feet indicating that the volume of water produced with the gas (perhaps up to 10,000 barrels per day) was too large to allow pumping the water out through the tubing and thereby allowing the gas to be produced from the casing annulus.

It was then concluded that the fracture treatment had probably broken into formation water and that this second workover should be conducted in order to determine where the water was coming from and if it was possible to seal it off.

WORKOVER PROGRAM

Lachore et al La Bata No. 3 Well

The following workover program is based on the following premises:

- (a) The fracturing pressure gradient of the first fracture was 1.145 psi/foot and the fracture gradient of the second fracture was 1.013 psi/foot. The difference in these pressure gradients indicates that the first fracture occurred at considerably greater depth than the second fracture (or the second fracture was a vertical fracture).
- (b) After the well plugged off, sand fallout was found at 3854', indicating the second fracture had occurred ^{above} about 3854'.
- (c) When the well was flowed after the fracture treatments, water production gradually declined until suddenly the well slugged off, giving the engineer the impression that the restriction to flow was due to sand rather than to water. The "thinning" of the temporary plugging agent used to seal the first fracture could have been the cause of this sudden water intrusion.
- (d) Although considerable testing took place over the interval which is now open hole, there was no indication of formation water recovery. Analysis of the Nicolet No. 1 Well logs, which show a similar log to the subject well, indicates that the zone of critical water saturation might be at 3950'.

Workover Program

1. Mix an 11 lbs. per gallon calcium chloride water and kill the well.
2. Install a Series 600 Blowout Preventor capable of shutting in the well with 2" EUE tubing in or out of the hole. Have a stripper rubber and tubing stabbing valve handy at all times when running or pulling tubing.

- 1670
3. Run tubing to total depth and reverse circulate the hole clean. Take a sample of the fluid in the hole and keep it available for analysis. Determine the chloride content of this sample.
 4. Measure tubing out of the hole.
 5. Run a Welox Spinner survey and determine the source or sources of water and gas entry to the well bore.
 6. If it is determined that water is entering the well bore from below the main fractured interval, seal it off by dumping and squeezing Hydromite. Flow test the well.
 7. If it is found that water production is originating from above 3805', dump pea gravel, capped with Hydromite, to 3812' and squeeze cement using a retrievable cementer set above the production casing shoe. Drill out cement, Hydromite and pea gravel and flow test the well.
 8. If gas and water production are originating in the same zone and if there is no room available to recomplete the well, flow tests should be carried out with the assistance of swabbing equipment, if necessary, to obtain the gas/water ratio of produced fluids to determine whether gas can be produced through the casing in sufficient quantities to serve local markets while water is being pumped with a bottom hole pump through the tubing. If this flow information and the economics of gas well operation including costs of disposing the produced water are sufficiently attractive, flow tests should be carried out over an extended period with the use of a rental bottom hole pump and equipment.
- Should the above Hydromite plugging be only partially successful, and result in a water-wet gas well, the bottom hole pump method of gas water production should be considered and if economically feasible, this work should be carried out.

If, after the workover and after consideration of the feasibility of bottom hole pumping to obtain economic gas production, there is no possibility that commercial gas production can be obtained, the well should be abandoned in accordance with government regulations.

SUMMARY OF PERTINENT WELL DATA

Name of Operator: Laduboro Oil Ltd.

Well Name: Laduboro La Baie No. 5 Yamaska

Location: Lot 391, Concession 1, Parish of St. Antoine de la Baie du Fevre, Yamaska County, P.Q.

Co-ordinates: 375.90' north from Highway No. 3 and 745.08' west of the east lot line.

Elevation: Ground - 20'.
E.B. - 33.3'
K.B. to 7" casing flange - 13.3'

Technical Supervision: Laduboro Oil Ltd.
C. Robitaille, Eng.

Drilling Contractor: James Drilling Ltd.
Rig. No. 2 (Falling 2500, trailer mounted)
Single gate Guiberson and Hydral D.O.P.'s

Status: Pumping.

Producing Zone: Pet. lam.

Workover Operations Commenced: November 30, 1965

Workover Operations Suspended: December 14, 1965, to January 4, 1966.

Workover Operations Completed: January 15, 1966

No. of Rig Days: 20

Tubing: Ran blanked-off collar, 10 foot pup joint, 4 feet perforated pup joint, pump seating nipple and (3,510') 130 joints of 2-3/8" E.B.E., J-55, 4.6 lb/ft. 8 rd. seamless oilwell tubing. Tubing landed at 3,541' K.B.; pump seating nipple at 3,510' K.B.

Pump: 2" x 1-1/2" x 9" top hold-down stainless steel with double balls and seats (53" stroke)

Pumping Unit:

Allen model 57-109-CF 43

Mud Type:

Surface to 209' - Gel
209' to 2,585' - Salt Water
2,585' to 4,085' - Oil Base
4,085' to 4,437' - Fresh water (created with formation gas)

Geological Markers:

<u>Formation or Group</u>	<u>Sample</u>		<u>Radioactivity Log</u>	
	<u>Depth</u> Foot	<u>Subsea</u> <u>Elevation</u> Foot	<u>Depth</u> Foot	<u>Subsea</u> <u>Elevation</u> Foot
Champain Clay	Surface	+33.8	(Driller's Report)	
Pre-Champain Deposits	78	-42	"	"
Pontgrave River	95	-42	"	"
Nicolet River	201	-172	105	-172
Leclercville	1,350	-1,317		
Utica (Top not recognized)				
Trenton				
Terrebonne-Tetreauville	2,525	-2,492	2,525	-2,492
Montreal-St. Casimir	2,723	-2,690	2,720	-2,197
Black River				
Loray-Lowville (Undivided)	3,050	-3,017	3,058	-3,025
Pamelia	3,080	-3,056	3,080	-3,047
Chazy	3,095	-3,062	3,105	-3,072
Beekmantown	3,310	-3,277	3,302	-3,269
Potsdam	3,800	-3,767	3,805	-3,772
Granite Wash	-	0	4,314	-4,281
Precambrian	4,345	-4,312	4,892	-4,559

Core Summary:

Trenton cored from 2,637' to 2,734". Full recovery of 109'.

Formation Test Summary:

DST No. 1 - From 3,790' - 3,836' - Potsdam.
DST No. 2 - From 3,699' - 3,912' - Chazy, Beekmantown and Potsdam
DST No. 3 - From 3,955' - 4,017' - Potsdam and Precambrian
DST No. 4 - From 3,327' - 3,370' - Chazy

Logs:

Welox of Canada - Gamma Ray-Neutron -
Surface-4,437' T.D.
Gamma Gamma Density -
2,591' - 4,437'
Temperature Survey -
Surface-4,437'
J.C. Sproule and Associates Ltd. - Visual Well Log
Birdwell, Division of Seismograph Services Corp.
Flo-Pak-3796-3840

Wellhead Equipment:

Surface casing head housing 10", Series 900 x 10-3/4" screwed female w/2-2" LP female outlets (Cameron); 10" series 900 x 10" series 600 Adapter flange; 10" series 600 x 6" series 600 casing spool w/2-2" LP female outlets; 6" series 600 x 6" series 600 tubing spool; 3" Retigan B.O.P.

Perforations:

None. All previous perforations have been cemented off behind the 4-1/2" casing string.

Special Treatments:

May 19, 1968. Washed opened hole from 3,805' to 3,910' with 750 gallons of 10% MCA acid and squeezed acid into formation at 2,200 psig at a rate of 1/2 barrel per minute and increased to 2 1/2 barrels per minute at 2,700 psig. Followed with 420 gallons of diesel-Hyflo (10 gal.) mixture. Squeezed into open hole at 2,700 psig and 2 barrels per minute. Followed with 28 barrels of Howco suds with no over-displacement.

May 20, 1968. Fractured open hole from 3,805' to 3,910' in two stages using 30,430 gals. of gelled CaCl₂ water with 31,000 lbs. of 20-40 and 10-20 mesh sand on first stage. Plugged first stage fracture with saturated salt water gel and 800 lbs. of rock salt. Second stage used 33,840 gals. of gelled CaCl₂ water with 29,000 lbs. of 20-40 and 10-20 mesh sand. (See Halliburton report)

Plugs:

Cement plug from 4,427' to 3,910' (May 13, 1968); gravel, sand and Hydromite plugs from 3,910' to 3,844' on December 9, 10 and 11, 1965.

Daily Chronological Well Report

Well Name: Laduboro La Baie No. 5 Yamshe

<u>Date</u> 1965	<u>Remarks</u>
Nov. 23	Loading equipment in Wallaceburg, Ontario.
Nov. 24	Finishing loading equipment and moving from Ontario to Quebec.
Nov. 25	Moving from Ontario to Quebec.
Nov. 26	Moving rig onto location at 2.00 PM. and waiting for bulldozers.
Nov. 27	Rigging up. Waiting on trailer carrying equipment.
Nov. 28	Rigging up.
Nov. 29	Rigging up. Hauled mud tanks from Pointe du Lac.
Nov. 30	Flowing well on tubing; mixed 15 sxs CaCl ₂ to kill well. Water started to foam; dug 40' pit; tubing dead, casing flowing. Ran in with sinker bar on sand line and knocked crossbar off tubing bottom. Birdwell logging truck arrived 12.00 PM. Left casing open overnight.
Dec. 1	Well dead. Removed wellhead. Pulled 3 joints tubing. Well started to kick. Put wellhead back. Tubing at 3,816' K.B. Rigged up to run spinner survey. First packer setting at 3,840'; 250 counts per minute decreasing to 0 c.p.m. Set packer at 3,875, 3,820 and 3,840 without registering any counts; packer was broken probably on the first setting. Ran out and put on new packer set at 3,840'; packer split - Set at 3,820'; no flow. Set at 3,835'; 250 c.p.m. decreasing rapidly to 0'; packer failure. Mixed 43 sxs CaCl ₂ in tanks with 9.6" water (unloaded from casing) to bring weight up to 10.8". Shut down for night leaving casing open. Found fluid level at 300'.

1965
Dec. 2

Well dead. Removed wellhead. Pulled 5 joints tubing. Put wellhead back. Rigged up to swab to get some formation water to flow into the borehole. Pulled 3 swabs; fluid level remained constant. Had difficulty in letting swab down due to friction inside the tubing. Rigged up to run spinner survey. Set at 3,796' (inside casing): no flow. Started to pump water into the hole to see where the water was going.

Packer Setting at 3,796'	:	2,000	s.p.m.
3,818'	:	750	"
3,796'	:	4,800	"
3,818'	:	1,000	"

Then packer failed. Ran in with new packer.

Packer Setting at 3,796'	:	5,000	s.p.m.
3,815'	:	600	"
3,840'	:	1,000	"

Then packer failed again. Decided to abandon spinner survey. Shut down for night.

Dec. 3 Installed B.O.P. Tripped tubing out to 600'. Waited on Halliburton to run hydromite plug.

Dec. 4 Tripped out rest of tubing. Dumped gravel slowly to 3,879'. Tried to dump sand with bailer. Sand would not dump. Ran bailer to dump hydromite. Could not get bailer past the casing shoe on the way out. Bailor finally came out after two hours. Found out the disc had not broken loose and hydromite hardened in bailer. Shut down until Monday.

Dec. 6 Plugged back to 3,873' with core gravel. Ran hydromite in bailer on 3 joints tubing so tubing would not go below casing shoe and hevelled off tubing collars. Measured plug at 3,866'. Tripped tubing in to 1,000'. Rigged up to swab. Swabbed and well started to kick. Tubing unloaded gas and water continuously for about two hours. Shut well in for night.

Dec. 7 Tubing pressure 50 psi.
Casing pressure 20 psi.
Blow down immediately. Installed stripper rubber. Ran tubing to 3,863' and hooked wellhead to swab. Swabbed for 3 hours; fluid level remained at about 300'. Shut well in for night.

- Dec. 8 8:00 A.M. Casing pressure: 480 psi
Tubing pressure: 100 psi
Opened tubing - died rapidly. Rigged to swab.
Swabbed from 12:30 PM. to 5:30 PM. Fluid level
remained at 1,000'.
- | | | | | |
|-------------------|---------|--------|----------------|------|
| From 12:30 - 2:30 | Swabbed | 16 BBL | - Casing pres: | 700' |
| " 2:30 - 3:30 | " | 11 " | " " | 730' |
| " 3:30 - 5:30 | " | 16 " | " " | 760' |
- Dec. 9 Blew well down and installed B.O.P.. Tripped out
tubing. Dumped gravel. Measured plug seat 3,857'.
Dumped hydronite. Measured 3,854'. Dumped more
gravel. Checked at 3,854'.
- Dec. 10 Dumped more hydronite. Measured no fill indicating
that hydronite was going into the formation and that
there was probably a fracture at 3,854'. Dumped more
hydronite. Checked again at 3,854'. Dumped sand.
Dumped more hydronite and checked at 3,853'. Dumped
more sand. Measured at 3,848'. Left well open for
night.
- Dec. 11 Dumped hydronite. Checked 3,846'. Released Halliburton.
Ran tubing to 3,818'. Removed B.O.P., installed wellhead
and swabbed 2-1/2 hours. Shut down until Monday for
weekend.
- Dec. 13 8:00 AM. Casing pressure: 400 psi
Tubing pressure: 230 psi
Fluid level at 700'. Swabbed a total of 47 barrels;
fluid level remained at about 2000'. At 5:30 PM.
casing pressure was 350 psi.
- Dec. 14 Shut operation down for Christmas and New Year's.
- 1956
- Jan. 4 8:00 AM. Tubing pressure: 0 psi
Casing pressure: 740 psi
Starting rig; Blowing well down. Installed B.O.P. and
pulled 98 joints of tubing. Fluid level was at 600'.
- Jan. 5 Waited for pump equipment that left Sombra, Ont. on
December 30, 1955.
- Jan. 6 Waited for pump equipment.
- Jan. 7 Waited for pump equipment.

- Jan. 8 Unloaded pump. Pulled rest of tubing out. Ran blanked-off tubing collar, 19 feet of pup joints, 4-foot perforated tubing pup joint, seating nipple and tubing. Tubing blanked-off collar landed at 3,341' K.B., pump seating nipple at 3,318' K.B. Shut down until Monday.
- Jan. 10 Removed B.O.P. Put wellhead on. Ran pump and sucker rods with rod guides. Assembled pumping unit.
- Jan. 11 Levelled off ground with sand. Laid 4" x 10" matting on top. Finished building pump steel base and installed in on matting.
- Jan. 12 Installed pumping unit on base, adjusted it and bolted it. Hooked polished rod to pumping unit.
- Jan. 13 Adjusted and mounted meter on pumping unit base.
- Jan. 14 Installed clutch and belts on meter. Aligned pumping unit to center rods in well. Installed flowlines from tanks. Well started pumping at 3:00 PM. Pump motor broke down at 7:00 PM.
- Jan. 15 Repaired pump motor. Loaded equipment and tore down rig.
 8:00 AM.: Casing pressure: 200 psi
 Drained 48 barrels from tanks.
 3:00 PM.: Casing pressure: 400 psi
 11:30 PM.: Drained 32 barrels from tanks.
- Jan. 16 8:00 AM.: Casing pressure: 900 psi
 Drained 26 barrels from tanks.
 Finished loading equipment and moved rig off well.
 Worked on pump motor.
 2:30 PM. : Casing pressure: 800 psi
- Jan. 17 9:30 AM. Casing pressure: 1100 psi
 No more water was coming out of the pump.
 Blew well down. Pump motor then broke down and was repaired at 4:30 PM.
 4:00 PM. : Casing pressure: 400 psi
 Blew well down again. Water started to come out of the pump again at 4:30 PM.

SUMMARY AND CONCLUSIONS

A spinner survey was run in the well in an attempt to determine at which level the water entered the borehole. Since no flow could be obtained, even by swabbing prior to running the survey, no results could be obtained.

When the survey was run again while pumping slowly into the well, to determine where the water was going, the readings showed that at least there was no leak in the casing where the water could come from (all the water was going through the tool with the packer set inside the casing) and that either:

- a) Some of the water was going below 3,840' and some above, or
- b) All the water was going below 3,840' but, due to bad packer seats in the open hole, some water was going around the packer, thus accounting for the lower readings.

This fact led to the decision of gradually plugging back the open hole. A first plug to 3,866' followed by swabbing indicated that there was almost as much water still coming in.

When a second plug was run, a great quantity of hydronite was lost to the formation at 3,854'. During cleaning out operations on the first workover, a sand plug had also been found at 3,854'. This seemed to indicate that a fairly big fracture must have been induced at this level by the fracture treatment and that, most probably, this was where the water was also coming from.

A third plug, successfully run to 3,846', sealed off most of the incoming water, as was subsequently shown by swabbing. It was figured that only about 150 barrels per day were being produced by the formation.

It is possible that between the two workovers, some water from the lower zone may have invaded the higher gas-producing horizon. A pump has been installed on the well to find out if it will eventually take all the water out or if gas and water may be economically produced simultaneously. Constant observation of the water/gas ratio during the pumping operation will reveal this.

LADUBORO OIL LTD.

Ch. de Faille
C. MORITAILLE, Eng.

January 18, 1964



OIL WELL CEMENTING COMPANY LTD.

PLACE: Sarria, Ontario

Dec. 15, 1965

DATE:

La Baie #5

Laduboro La Baie #5 Yamaska

Original to 3910'

Initial FETD requested 3865' (45' total)

45' to .3E - 31.2' gravel
 - 3.8' sand
 - 10' hydromite

31.2' = 49.6 gals gravel

6' possible junk . . . 40 gals gravel

Sat. Dec. 4th

11:00 A.M. 36 gals gravel dumped
12:30 P.M. Wireline check @ 3886'
1:00 P.M. 11 gals gravel dumped
2:00 P.M. Checked @ 3879'
4:30 Mixed 9 gals Hyd -
 Dumped @ 4:40 P.M. -
 Struck @ csg end with 3" bailer at surface @ 7:00 P.M.

Mon. Dec. 6th

9:00 A.M. Dump additional 11 gal gravel
11:00 A.M. " 11 gal hydromite
1:00 P.M. Checked FETD @ 3866'

Plus Back Terminal depth

Thurs. Dec. 9th

2:00 P.M. T.D. Checked @ 3867'
2:10 Dump 13 gals gravel
 FETD checked @ 3857'
4:30 P.M. Dumped 8 gals hydromite
 FETD checked @ 3856'
 Measured 1' fill
6:00 P.M. Dumped 1.75 gals gravel
 FETD checked @ 3854'
 Measured 2' fill

La Baie # 5

-2-

Fri. Dec. 10

9:30 A.M.

Dumped 6½ gals hydromite

PETD checked @ 3854'

Measured no fill

11:15

Dumped 8 gals hydromite

PETD checked @ 3854'

1:00 P.M.

Dumped 16 gals sand

not checked with wireline

1:45

Dumped 5 gals hydromite

PETD checked @ 3853'

Measured 1' fill

3:40

Dump 10 gals sand

PETD checked @ 3846'

Measured 7' fill

Sat. Dec. 11

Checked PETD @ 3846'

Dumped 4 gals hyd

Checked @ 3846'