



DRILEX SYSTEMS, INC.

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November 18, 1996

To: James L. Pagan
President
Liquid Casing, Inc.
PO Box 56324
Houston TX 77256-6324

On behalf of DRILEX International, Inc., I would like to thank you and Liquid Casing, Inc. for assisting us in testing our prototype Electric Bottom Hole Assembly Quick Disconnect on June 28, 1996.

Your assistance throughout this test and supply of Liquid Casing and OM Seal were instrumental in helping us develop what we hope is the most innovative tool of it's type available in the industry. It is because of your products that it can be released knowing that if it is used in lost circulation environments with Liquid Casing and OM Seal to remedy the problem, it will continue to work and not plug off prematurely.

Again, Thank You and I hope that both our companies can continue to work together towards each other's mutual benefit in the future.

Sincerely,

Brad Lamirand
Senior Design Engineer

BJL/bjl



DRILEX SYSTEMS, INC.
15151 SOMMERMEYER
HOUSTON, TX 77041

ENGINEERING TEST REPORT NO. 0003
WRITTEN BY: BRAD J. LAMIRAND
DATE: OCTOBER 22, 1996

CONCLUSIONS:

THE BEST
UNDER PRESSURE

OIL COMPANY PILOT TEST CRITERIA:

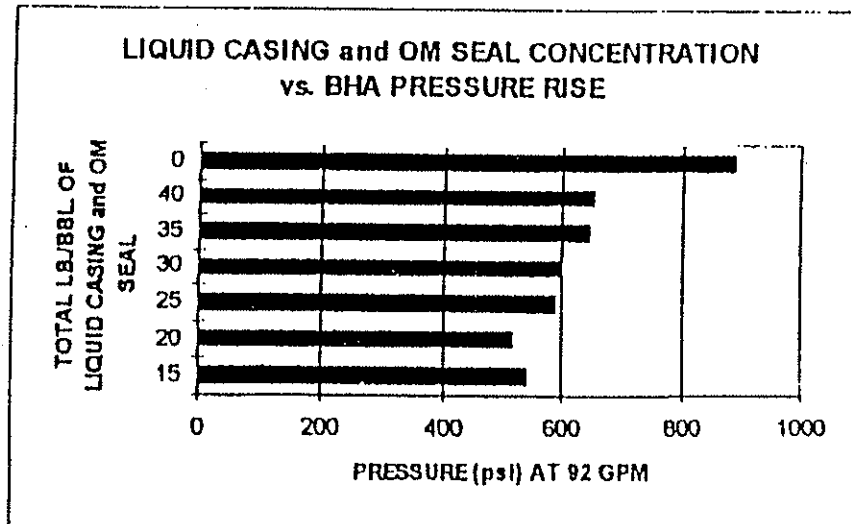
To determine what types, and the maximum concentration of Lost Circulation Material (LCM) could pass through a strainer of a mud motor used for coiled tubing drilling without causing premature disconnect. Thus, allowing the operator to drill through massive vertical fractures without concerns relating to lost circulation and time spent fishing for a mud motor.

ELECTRIC BHA QUICK DISCONNECT (from pump to bit)

- | | |
|--|---|
| (1) Moyno Pump | (6) Simulated Tomahawk Orienter |
| (2) High Pressure 'T' with pressure gage | (7) 15' Non-Mag collar with telescoping
conducting assy., wireline swivel, &
steering tool inside |
| (3) Side entry sub | (8) Pressure port sub |
| (4) Western Atlas Cable Head Assembly | (9) DRILEX D287 PDM with BeCu bit |
| (5) Electric Disconnect with *strainer
*strainer has 32 (3/16") orifi | |

LIQUID CASING® / OM SEAL® TEST:

A simulated drilling fluid was formulated with 0.75 lb./bbl. clarified biopolymer (liquid form) to obtain low shear rate viscosity. The drilling fluid obtained a PV value of 5 cp and YP value of 8 lb./100 ft² @ 120 °f. Equal parts of LIQUID CASING® and OM SEAL® was added to the drilling fluid at the following concentrations (lb./bbl.): 0, 15, 20, 25, 30, 35, and 40. Flow and pressure drop readings were recorded as the drilling fluid with LCM was pumped at a maximum flow rate of 92 gpm for (2) 30 minute segments to clarify results.





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PAGE 5 OF 5

CONCLUSIONS:

The objective of 30 ppb of equal parts OM Seal and Liquid Casing set by DP was exceeded by 30%, to 40 ppb, without incident. Upon subsequent discussions with Liquid Casing, Inc., it has been learned that they have gone to as high as 60 ppb in a downhole system, of unknown geometry, without appreciable pressure rise. It is the recommendation of this author that OM Seal and Liquid Casing be used solely to remedy lost circulation conditions. A graph of LCM concentration vs. pressure rise and the water baseline pressure vs. flow are given in Appendix G.

This test proved that the disconnect will function after extended periods of use. All of the problems of losing continuity have been addressed by:

- 1) Assembly procedures of the Amphenol connector into the disconnect, in the area where the wires were pinched and short circuited, have been revised. The wires in this area have been stiffened by passing them thru heat shrink to assure that they buckle below the connector when assembled. This revision has helped not only the reliability of the system, but also it's assembly and serviceability.
- 2) The wire line tape jobs which wetted out were not done by wire line technicians, but instead by engineers. This type of tape job, required in several areas of the disconnect and telescoping conducting assembly, are common and considered standard operating procedure. As long as these tape jobs are done by experienced technicians in the future, there is no reason why they shouldn't perform as well as all the others currently used within the industry everyday.


This test also showed that manual disconnection works as designed and should be considered a full proof backup so long as the system can be circulated long enough for the balls to reach the strainer.

Although the swivel retained continuity throughout the test, it was not able to be rotated under pressure as much as originally planned.

The disconnect was tested at 0% above BP's recommendations and should be considered safe to reuse up to at least 25,000 lbf. over pull. Although analysis showed that it should survive up to 45,000 lbf., 25,000 lbf. should be considered the maximum to allow for wear associated with normal use.

Attachments: Drawing 95-306-004P in Appendix H

WRITTEN BY: 
Brad J. Lamirand
Design Engineer

APPROVED BY: 
Joe Le
Lead Engineer

DRILEX


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CONCLUSIONS: ELECTRIC QUICK DISCONNECT / ALASKA BRA LCM FLOW TEST

WITNESS CONFIRMATION

WE, THE UNDERSIGNED, HAVE WITNESSED THE ABOVE MENTIONED TEST, ON THIS THE 28 DAY OF JUNE, 1996, AS RECORDED ON THE ATTACHED DATA SHEET

 6/28/96

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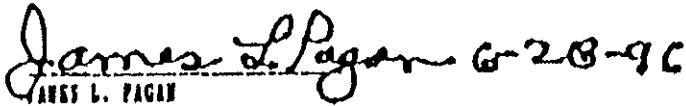
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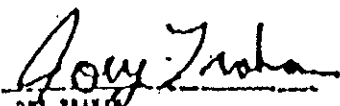
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