RMOTC TEST REPORT
DOE/RMOTC - 020167

TUCKER WIRELINE OPEN HOLE WIRELINE LOGGING

April 5, 2002 - April 6, 2002

**Work performed under Rocky Mountain Oilfield Testing Center (RMOTC)
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Rocky Mountain Oilfield Testing Center

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ABSTRACT

The Tucker Wireline unit ran a suite of open hole logs right behind the RMOTC logging contractor for comparison purposes. The tools included Dual Laterolog, Phased Induction, BHC Sonic, and density-porosity.

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Summary of results. The Tucker Wireline unit ran a suite of open hole logs right behind the RMOTC logging contractor for comparison purposes. The tools included Dual Laterolog, Phased Induction, BHC Sonic porosity, and density porosity.

For this report, the logs were compared at picks based on three types of Tensleep lithologies: clean blocky sand, dolomitic sand, and a clean thin sand. Most of the data were comparable, and the differences are probably within the error range of the tools and supporting algorithms. There was an 8-9 ft difference in measured depth.

Tucker Wireline and their technology. Tucker Wireline is one of seven divisions of the Tucker Energy Services, based in Houston, TX. Tucker's other divisions include drilling, completion, marine, completion, technology, and oilfield services.

Equipment. For the RMOTC test, Tucker Wireline brought in these tools (Figure 1):

- Triple stack.
- Dual Laterolog (run at RMOTC's request).
- BHC Sonic.

The triple stack includes the Phased Induction (PIT), Neutron (CNT), and Density (LDT) tools. The digital Phased Induction tool is designed to measure deep, medium, and shallow resistivity. The digital Borehole Compensated Neutron tool is a contact pad device used to determine formation porosity. It is compensated to overcome environmental conditions affecting detector neutron tools. The digital Borehole Compensated Litho-Density tool is a contact pad device used to determine the bulk density of the formation.

The Dual Laterlog tool provides the deep resistivity measurement, LLD, and the shallow resistivity measurement, LLS. Under normal conditions, LLS will be the resultant of the flushed, invaded and transition zones, while LLD, although affected by the previous zones, will respond to mainly the virgin zone. The accuracy of the measurement requires that the undisturbed formation have the largest contribution on the reading. Therefore, the mud resistivity must be low relative to the formation resistivity. RMOTC requested this tool to get more accurate deep resistivity (R_t) data in the Tensleep formation. The relatively fresh Tensleep formation water (0.6 ohm-m) is fresher than the mud filtrate (0.47 ohm-m).

The Phased Induction (PIT) tool measures induction signals for deep and medium induction. SP, temperature and spherically focused resistivity (SFL) are also measured.

The BHC Sonic (CST-AA) tool is a two transmitter, two receiver design with 3' - 5' spacing. The tool provides borehole compensated travel time, sonic amplitude and integrated transit time.

Test procedure and results. A log run was attempted on April 5 about 2 hours after the contract logger left the location. A bridge was encountered at about 4400 ft., and a decision was made to abandon the logging attempt to clean out the hole. On April 6, Tucker re-entered the hole with the triple combo string to a depth of 5947 ft, the driller's depth. All three logging trips were made without problem. The results are summarized in Appendix 1. Logs of the Tensleep B sand zone are shown in Appendix 2 for comparison.

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Figure 1. The Tucker Wireline crew prepares the triple stack tool (middle). Sonic tool is on the left, and dual laterlog on the right.

APPENDIX 1

COMPARISON OF TUCKER AND CONTRACTOR OPEN HOLE LOGGING DATA

APPENDIX 1. COMPARISON OF TUCKER AND CONTRACTOR OPEN HOLE LOGGING DATA
NPR3 25-1-X-14

LOG PICK	MEASURED DEPTH			SONIC POROSITY %			TRAVEL TIME, MS/F			NEUTRON POROSITY %		
	TUCKER	CONTR.	DIFF*	TUCKER	CONTR.	DIFF	TUCKER	CONTR.	DIFF	TUCKER	CONTR.	DIFF
TENSLEEP UPPER B SAND	5826	5834	8	18	17	-1	76	75	-1	12	13	1
TENSLEEP LOWER B DOLOMITE	5854	5863	9	2	1.5	-0.5	53	53	0	3.5	4	0.5
TENSLEEP LOWER B SAND	5859	5868	9	12	12	0	68	68	0	9	11	2
*DIFF = CONTR. - TUCKER	MILLIKEN 5/17/02											
	DENSITY POROSITY %			DEEP LATEROLOG RT OHM-METERS			DUAL INDUCTION RT OHM-METERS					
	TUCKER	CONTR.	DIFF	TUCKER	CONTR.	DIFF	TUCKER	CONTR.				
TENSLEEP UPPER B SAND	13	13	0	55	48	-7	40	N/A				
TENSLEEP LOWER B DOLOMITE	-7	-6	1	900	1100	200	>2000	N/A				
TENSLEEP LOWER B SAND	10	12	2	60	40	-20	70	N/A				

APPENDIX 2

Log Comparisons