SIMULTANEOUS COMPENSATED NEUTRON-LITHO-DENSITY

Schlumberger

COMPANY	CONOCO, INC
WELL	HERMAN WATER WELL
FIELD	PROPANE CAVERN
COUNTY	LAWRENCE
STATE	MISSOURI
Other Services:	
LOCATION	
API SERIAL NO.	
SECT.	
TWP.	
RANGE	

COUNTY LAWRENCE · FIELD PROPANE CAVERN · LOCATION · WELL HERMAN WATER WELL · COMPANY CONOCO, INC

Permanent Datum: SEA LEVEL Elev. — Elev.: K.B. / D.F. / G.L.

Log Measured From: TOP OF 8 5/8" 126.5 above Perm. Datum

Drilling Measured From:

Date	13 OCT 1989	
Run No.	ONE	
Depth Driller	470.0 F	
Depth Logger (Schl.)	468.0 F	
Btm. Log Interval	459.0 F	
Top Log Interval	10.0 F	
Casing-Driller	8 5/8 @ 360.0 F	4 1/2" @ 470.0 F
Casing-Logger	326.0 F	468.0 F
Bit Size		
Type Fluid in Hole	FRESH WATER	
Dens. / Visc.		
pH / Fld. Loss		
Source of Sample		
Rm @ Meas. Temp	@	@
Rmf @ Meas. Temp	@	@
Rmc @ Meas. Temp	@	@
Source: Rmf / Rmc		
Rm @ BHT	@	@
Time: Circulation Ended		
Time: Logger on Bottom	14:38 10/13	
Max. Rec. Temp.		
Equip. / Location	8510	ENID, OK
Recorded By	ED EATON	
Witnessed By	DAVID JEFFERS	

The well name, location and borehole reference data were furnished by the customer.

All interpretations are opinions based on inferences from electrical or other measurements and we cannot, and do not guarantee the accuracy or correctness of any interpretations, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages or expenses incurred or sustained by anyone resulting from any interpretations made by any of our officers, agents or employees. These interpretations are also subject to Clause 4 of our General Terms and Conditions as set out in our current Price Schedule.

Run No.	ONE	
Service Order No.		
Drilling Fluid Level		
Salinity		
Rmf @ BHT	@	@
Rmc @ BHT	@	@
Logging Speed	1800.0 F/HR	
EQUIPMENT DATA		
Tool Number 1	HLDT 4	
Tool Number 2	GSR-Z 581	
Tool Number 3	CNC-HA 82	
Tool Number 4	NSR-F 2270	
Tool Number 5	SGC-SA 288	
Tool Number 6	TCC-B 136	
Tool Number 7		
Tool Number 8		
Tool Number 9		
Tool Number 10		
Tool Number 11		
Tool Number 12		

REMARKS:

LIMESTONE POROSITY UNITS (2.71).

OPERATORS WERE PHEBUS AND PRICE

LOGGING TOOL STRING SKETCH

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TCCB        LOGGING HEAD                              37.58 F
SGTL                                                  34.58 F
                  GR          33.67 F
CNTH                                                  29.08 F
                  TNRA        25.17 F
                  CFTC        24.67 F
                  CNTC        24.17 F
HLDT                                                  21.83 F
LSW1 LSW2 LSW3 LSW4 LSW5 LSDC
LSDP LSL1 LSL2 LSL3 LSL4 LSPU    3.08 F
SSW1 SSW2 SSW3 SSW4 SSW5 SSDC
SSDP SSL1 SSL2 SSL3 SSL4 SSPU    2.67 F
                  CALI        2.50 F
TCRT TPAD HVLS HVSS PARI      0.00 F            TOOL ZERO
      TOTAL TOOL STRING LENGTH IS   40.00 F.
   TOTAL TOOL STRING WEIGHT IS  716.00 LB IN AIR.
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AFTER SURVEY TOOL CHECK SUMMARY

PERFORMED: 13-OCT-1989 15:15
PROGRAM FILE: DNML (VERSION 32.2A 89/04/07 88/11/16)

HLDT TOOL CHECK

HLDT BEFORE-AFTER BACKGROUND COMPARISON

	BEFORE	AFTER	LIMIT RATIO < 1 ?
LSW1	118.	119.	.4
SSW1	117.	117.	.0
LSW2	117.	119.	.5
SSW2	226.	223.	.4
LSW3	229.	231.	.3
SSW3	586.	584.	.5
LSW4	327.	331.	.9
SSW4	314.	313.	.1
LSW5	737.	740.	.5
SSW5	236.	233.	.5

BEFORE SURVEY: BACK: 13-OCT-1989 13:59 JIG:
AFTER SURVEY CHECK: BACK: 13-OCT-1989 15:05 JIG:

CNTH TOOL CHECK

INPUT	BEFORE JIG	AFTER JIG
CNTC	2992.39	3004.93
CFTC	1331.06	1353.74

CHANGE IN THERMAL POROSITY AT 20 PU IS -.430 PU

BEFORE SURVEY: BACK: 13-OCT-1989 13:59 JIG: 13-OCT-1989 14:06
AFTER SURVEY CHECK: BACK: 13-OCT-1989 15:05 JIG: 13-OCT-1989 15:11

CP 32.2A FILE 8 13-OCT-1989 15:14

EXPERIMENTAL COMPUTATIONS

C LC01 - DENSITY POROSITY CASING CORRECTION
LC01 = 0.667 * DPHI - 0.03

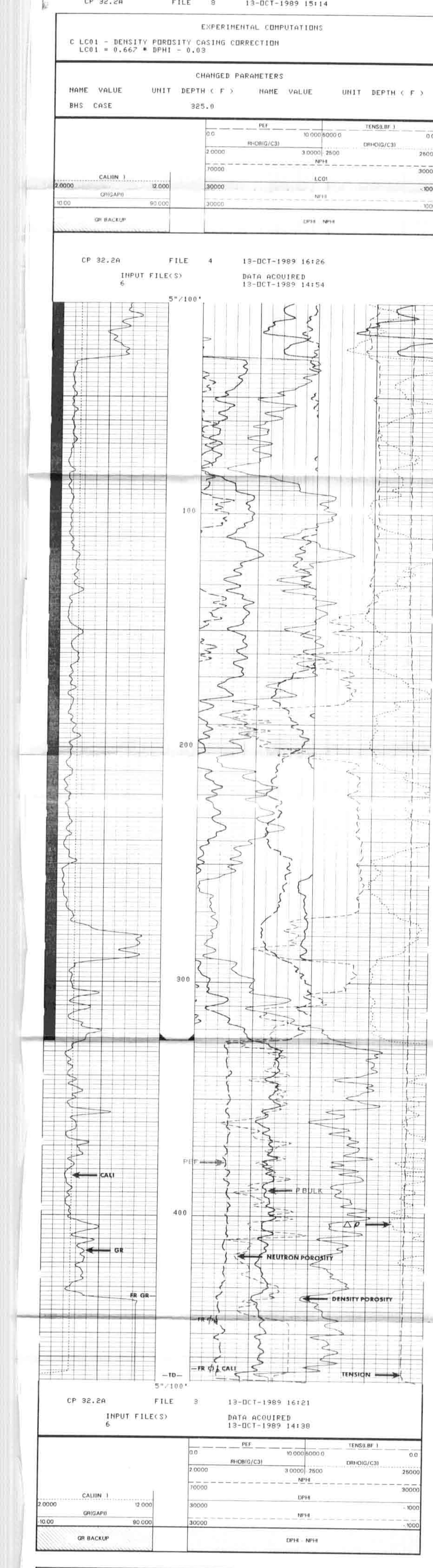
CHANGED PARAMETERS

NAME	VALUE	UNIT	DEPTH (F)	NAME	VALUE	UNIT	DEPTH (F)
BHS	CASE		325.0				

CALI(IN) 2.0000 – 12.000; GR(GAPI) -10.00 – 90.000; GR BACKUP; PEF 0.0 – 10.000; RHOB(G/C3) 2.0000 – 3.0000; NPHI .70000 – .30000; LC01 .30000 – -.1000; NPHI .30000 – -.1000; DPHI - NPHI; TENS(LBF) 5000.0 – 0.0; DRHO(G/C3) -.2500 – .25000

CP 32.2A FILE 4 13-OCT-1989 16:26
INPUT FILE(S) 6 DATA ACQUIRED 13-OCT-1989 14:54

5"/100'



5"/100'

CP 32.2A FILE 3 13-OCT-1989 16:21
INPUT FILE(S) 6 DATA ACQUIRED 13-OCT-1989 14:38

CALI(IN) 2.0000 – 12.000; GR(GAPI) -10.00 – 90.000; GR BACKUP; PEF 0.0 – 10.000; RHOB(G/C3) 2.0000 – 3.0000; NPHI .70000 – .30000; DPHI .30000 – -.1000; NPHI .30000 – -.1000; DPHI - NPHI; TENS(LBF) 5000.0 – 0.0; DRHO(G/C3) -.2500 – .25000

EXPERIMENTAL COMPUTATIONS

C LC01 - DENSITY POROSITY CASING CORRECTION
LC01 = 0.667 * DPHI - 0.03

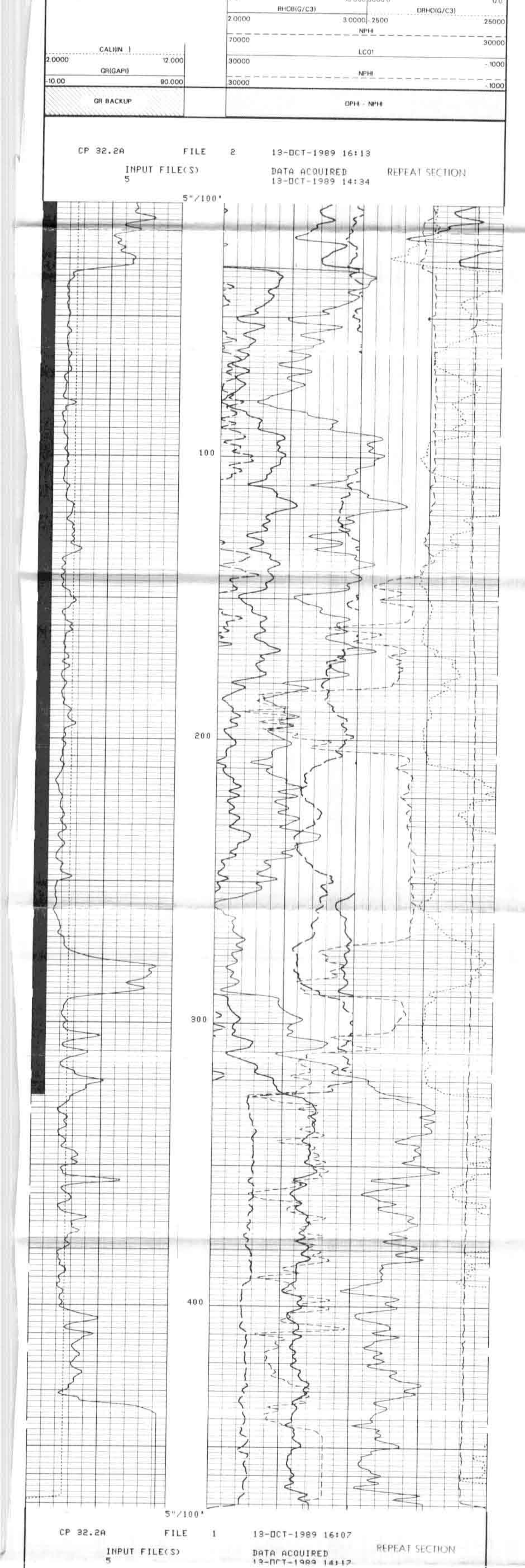
CHANGED PARAMETERS

NAME	VALUE	UNIT	DEPTH (F)	NAME	VALUE	UNIT	DEPTH (F)
BHS	CASE		325.0				

CALI(IN) 2.0000 – 12.000; GR(GAPI) -10.00 – 90.000; GR BACKUP; PEF 0.0 – 10.000; RHOB(G/C3) 2.0000 – 3.0000; NPHI .70000 – .30000; LC01 .30000 – -.1000; NPHI .30000 – -.1000; DPHI - NPHI; TENS(LBF) 5000.0 – 0.0; DRHO(G/C3) -.2500 – .25000

CP 32.2A FILE 2 13-OCT-1989 16:13
INPUT FILE(S) 5 DATA ACQUIRED 13-OCT-1989 14:34 REPEAT SECTION

5"/100'



5"/100'

CP 32.2A FILE 1 13-OCT-1989 16:07
INPUT FILE(S) 5 DATA ACQUIRED 13-OCT-1989 14:17 REPEAT SECTION

CALI(IN) 2.0000 – 12.000; GR(GAPI) -10.00 – 90.000; GR BACKUP; PEF 0.0 – 10.000; RHOB(G/C3) 2.0000 – 3.0000; NPHI .70000 – .30000; DPHI .30000 – -.1000; NPHI .30000 – -.1000; DPHI - NPHI; TENS(LBF) 5000.0 – 0.0; DRHO(G/C3) -.2500 – .25000

SENSOR MEASURE POINT TO TOOL ZERO

CFTC	24.7	FEET	GR	33.7	FEET
PARI	0.0	FEET	CNTC	24.2	FEET
LSPU	3.1	FEET	SSPU	2.7	FEET
SSL3	2.7	FEET	SSL4	2.7	FEET
SSL1	2.7	FEET	SSL2	2.7	FEET
LSL3	3.1	FEET	LSL4	3.1	FEET
LSL1	3.1	FEET	LSL2	3.1	FEET
HVLS	0.0	FEET	HVSS	0.0	FEET
TCRT	0.0	FEET	TPAD	0.0	FEET
SSDC	2.7	FEET	SSDP	2.7	FEET
LSDC	3.1	FEET	LSDP	3.1	FEET
SSW4	2.7	FEET	SSW5	2.7	FEET
SSW2	2.7	FEET	SSW3	2.7	FEET
LSW5	3.1	FEET	SSW1	2.7	FEET
LSW3	3.1	FEET	LSW4	3.1	FEET
LSW1	3.1	FEET	LSW2	3.1	FEET
TENS	-.3	FEET	CALI	2.5	FEET
TNRA	25.2	FEET			

PARAMETERS

PARAMETER	VALUE	UNIT
PP - Playback Processing	RECO	
DO - Depth Offset	0.0	F
WMUD - Weight of Mud	8.00000	LB/G
TD - Total Depth	468.000	F
FCD - Future Casing Diameter	0.0	IN
DHC - Density Hole CorrectionS	NONE	
QPPS - Quicklook Processing PE Select	PEFL	
MDEN - Matrix Density	2.71000	G/C3
FD - Fluid Density	1.00000	G/C3
MATR - Matrix	LIME	
HC - Hole Correction Origin	CALI	
NPDC - Neutron Alpha Process Depth Constant	0	
HSCO - Hole Size Correction Option	YES	
SOCO - Stand Off Correction Option	NO	
MCCO - Mud Cake Correction Option	NO	
BSCO - Borehole Salinity Correction Option	NO	
FSCO - Formation Salinity Correction Option	NO	
MWCO - Mud Weight Correction Option	NO	
PTCO - Pressure Temperature Correction Option	NO	
SDAT - Standoff Data Source	SOCN	
MCOR - Mud Correction	NATU	
SOCN - Stand Off for CNL	.500000	IN
FSAL - Formation salinity	-50000.0	PPM
ANGL - Angle of Well	0.0	DEG
GGRD - Geothermal Gradient	.0100000	DF/F
BHFL - Borehole Fluid Type	WATE	
GTSE - Generalized Temperature Selection	TEMP	
SHT - Surface Hole Temperature	80.0000	DEGF
BHT - Bottom Hole Temperature	90.0000	DEGF
BS - Bit Size	6.00000	IN
BHS - Bore Hole Status (Open or Cased)	OPEN	

BEFORE SURVEY CALIBRATION SUMMARY

PERFORMED: 13-OCT-1989 14:11
PROGRAM FILE: DNML (VERSION 32.2A 89/04/07 88/11/16)

HLDT DETECTOR CALIBRATION SUMMARY

DATE: 13-OCT-1989 14:11
HLDT SERIAL NUMBERS:
CARTRIDGE: 4 SONDE: 4 PAD: 4 SOURCE: 581

	PMEA (AL)	PREF (AL)	PMEA (AL+FE)	ZMEAS	OFFS	UNITS	GAIN
LSW1	589.7	648.4	392.1	117.6	-129.33	CPS	1.099
LSW2	1027.3	1018.1	817.3	117.0	-115.99	CPS	.991
LSW3	1154.0	1104.8	1023.1	228.9	-219.15	CPS	.957
LSW4	653.2	609.5	602.6	326.6	-304.70	CPS	.933
LSW5	610.3	533.8	560.8	736.9	-644.50	CPS	.875
SSW1	2679.0	2663.9	1969.6	116.6	-115.94	CPS	.994
SSW2	7691.3	7730.9	6505.1	225.5	-226.70	CPS	1.005
SSW3	10516.2	10376.0	9713.7	585.5	-577.74	CPS	.987
SSW4	4670.8	4573.5	4324.4	313.9	-307.37	CPS	.979
SSW5	765.6	745.2	674.3	235.7	-229.45	CPS	.973

NOTE: LSWN AND SSWN DATA ARE CORRECTED FOR BACKGROUND

BACK: 13-OCT-1989 13:59 JIG: COMP: 13-OCT-1989 14:06

SGTL DETECTOR CALIBRATION SUMMARY

	MEASURED BKGD	MEASURED JIG	CALIBRATED	UNITS
GR	76	232	165	GAPI

BACK: 13-OCT-1989 13:59 JIG: 13-OCT-1989 14:06 COMP: 13-OCT-1989 14:06

CNTH DETECTOR CALIBRATION SUMMARY

NEUTRON COMPENSATED CARTRIDGE NUMBER: 82
NEUTRON SOURCE SERIAL NUMBER : 2270
THERMAL HOUSING NUMBER : 2514
THERMAL CALIBRATED NEUTRON BOX : 2533

INPUT	PLUS REFERENCE COUNTS	SHOP TANK COUNTS	SHOP JIG COUNTS	BEFORE JIG COUNTS	GAIN
CNTC	6031.00	6208.33	2984.45	2992.39	.971
CFTC	2793.00	2697.21	1294.48	1331.06	1.036
RATIO	2.159	2.302	2.306	2.248	

BACK: 13-OCT-1989 13:59 JIG: 13-OCT-1989 14:06 COMP: 13-OCT-1989 13:55

HLDT CALIPER CALIBRATION SUMMARY

	MEASURED SMALL	MEASURED LARGE	CALIBRATED SMALL	CALIBRATED LARGE	UNITS
CALI	11.33	15.5	8.00	12.0	IN

SMALL: 13-OCT-1989 13:52 LARGE: 13-OCT-1989 13:53 COMP: 13-OCT-1989 13:54

CP 32.2A FILE 1 13-OCT-1989 14:11

SHOP SUMMARY

PERFORMED: 22-SEP-1989 10:05
PROGRAM FILE: CCSHOP (VERSION 32.2 88/12/01 88/11/30)

CNTH DETECTOR CALIBRATION SUMMARY

NEUTRON COMPENSATED CARTRIDGE NUMBER: 82
NEUTRON SOURCE SERIAL NUMBER : 2270
THERMAL HOUSING NUMBER : 2514
THERMAL CALIBRATED NEUTRON BOX : 2533

INPUT	PLUS REFERENCE COUNTS	SHOP TANK COUNTS	SHOP JIG COUNTS	GAIN
CNTC	6031.00	6208.33	2984.45	.971
CFTC	2793.00	2697.21	1294.48	1.036
RATIO	2.159	2.302	2.306	

SHOP COUNTS TEMPERATURE AND HOUSING SIZE CORRECTED

BKGD: 22-SEP-1989 09:45 TANK: 22-SEP-1989 09:53 COMP: 22-SEP-1989 09:53

CP 32.2 FILE 0 22-SEP-1989 10:05

SHOP SUMMARY

PERFORMED: 20-JUL-1989 09:46
PROGRAM FILE: CCSHOP (VERSION 32.2 89/06/02 88/11/30)

HLDT DETECTOR CALIBRATION SUMMARY

DATE: 20-JUL-1989 09:46
HLDT SERIAL NUMBERS:
CARTRIDGE: 4 SONDE: 4 PAD: 4 SOURCE: 581

	PMEA (AL)	PREF (AL)	PMEA (AL+FE)	ZMEAS	OFFS	UNITS	GAIN
LSW1	589.7	648.4	392.1	115.7	-127.21	CPS	1.099
LSW2	1027.3	1018.1	817.3	117.0	-115.94	CPS	.991
LSW3	1154.0	1104.8	1023.1	226.0	-216.40	CPS	.957
LSW4	653.2	609.5	602.6	329.5	-307.43	CPS	.933
LSW5	610.3	533.8	560.8	737.8	-645.34	CPS	.875
SSW1	2679.0	2663.9	1969.6	115.4	-114.74	CPS	.994
SSW2	7691.3	7730.9	6505.1	225.4	-226.56	CPS	1.005
SSW3	10516.2	10376.0	9713.7	588.2	-580.33	CPS	.987
SSW4	4670.8	4573.5	4324.4	315.3	-308.78	CPS	.979
SSW5	765.6	745.2	674.3	235.8	-229.48	CPS	.973

NOTE: LSWn AND SSWn DATA ARE CORRECTED FOR BACKGROUND

CP 32.2 FILE 7 20-JUL-1989 09:46

COMPANY	CONOCO, INC	SCHL. FR	465.0 F
		SCHL. TD	468.0 F
WELL	HERMAN WATER WELL	DRLR. TD	470.0 F
FIELD	PROPANE CAVERN	Elev: KB	
		DF	
COUNTY	LAWRENCE	STATE	MISSOURI
		GL	

Schlumberger

SIMULTANEOUS COMPENSATED NEUTRON-LITHO-DENSITY