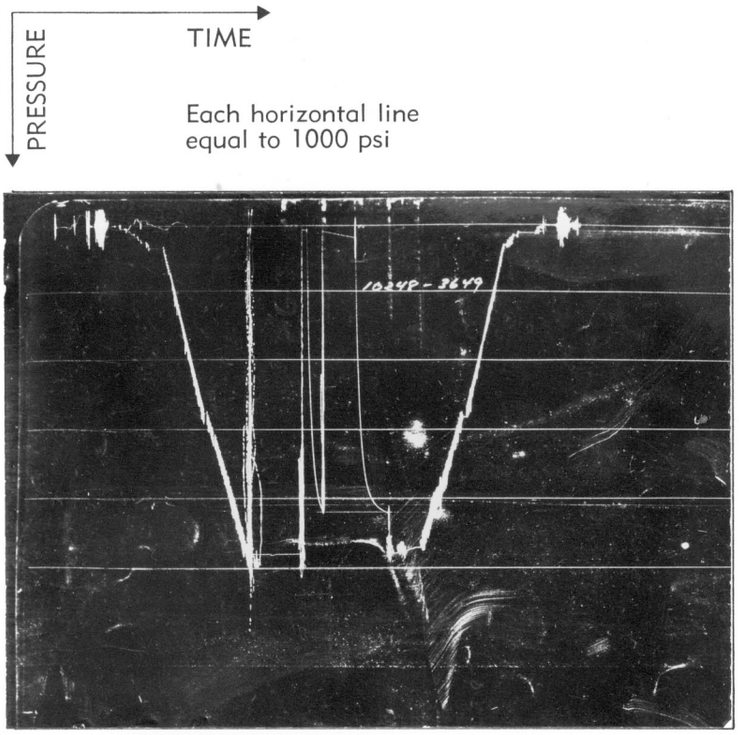
FORMATION TESTING

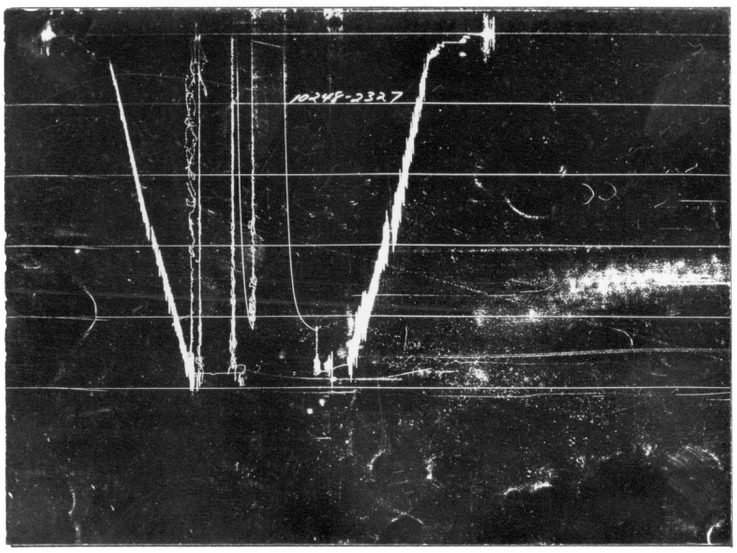
Technical Report

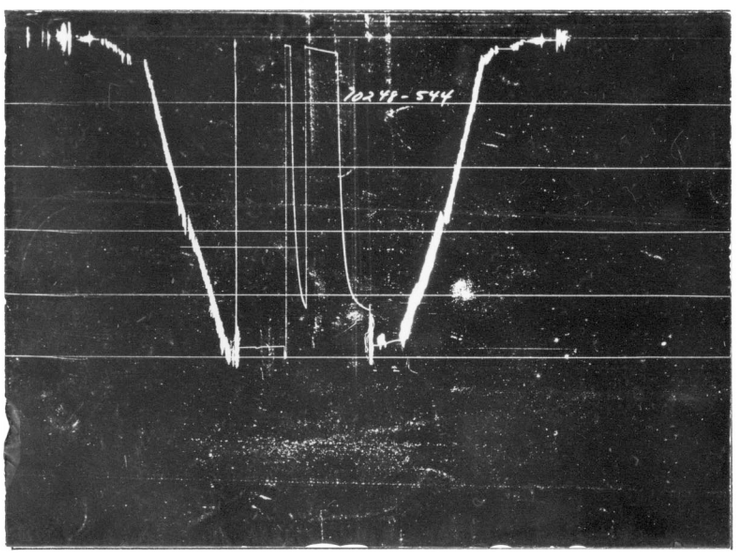
HALLIBURTON
SERVICES LIMITED

CALGARY, ALBERTA

A Halliburton Company







TEMPERATURE RECORD

Each concentric line equals 10° F.
Temperature increases outwardly
Ticket No. 1024 B
Temperature Range °F

250 °F to 350 °F

A to B — Initial CIP

B to C — 2nd Flow

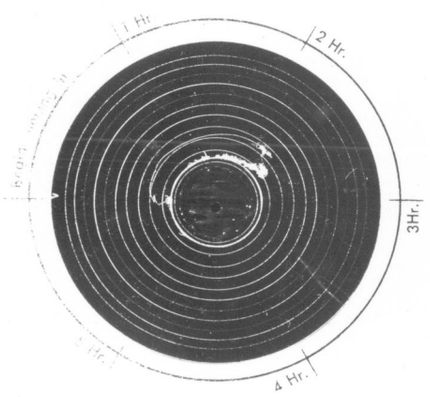
C to D — Final CIP

A _____ °F

B _____ °F

C MAX °F

D 275 °F



FORM 419

Halliburton SERVICES LIMITED

FORMATION TESTING
DATA SHEET

REFER TO INVOICE NO. 10248

HALLIBURTON DISTRICT: Ft. Nelson

JOB DATE: February 14, 1973

OWNER, OPERATOR OR HIS AGENT STATES THE WELL IS IN CONDITION FOR THE SERVICE JOB TO BE PERFORMED AND SUBMITS THE FOLLOWING DATA:

PRESSURE DATA

	TOP	CENTRE	BOTTOM
GAUGE NUMBER	3649	2327	544
GAUGE DEPTH	10909	10943	11041
BLANKED OFF	~~YES~~/NO	~~YES~~/NO	YES/~~NO~~
HOUR CLOCK TRAVEL	24	24	24
INITIAL HYDROSTATIC	4761	4777	4815
FIRST FLOW — INITIAL	64	81	131
FIRST FLOW — FINAL	76	88	138
FIRST CLOSED IN	4163	4170	4207
SECOND FLOW — INITIAL	92	101	153
SECOND FLOW — FINAL	182	198	247
SECOND CLOSED IN	4181	4199	4237
THIRD FLOW — INITIAL			
THIRD FLOW — FINAL			
THIRD CLOSED IN			
FINAL HYDROSTATIC	4750	4769	4800

TYPE OF TEST	TESTER	EMPL. NO.
Dual Bottom Hole	B. Miller	219
WITNESS: D. Snydmiller	DRILLING CONTRACTOR: Peter Bawden #31	

EQUIPMENT AND WELL DATA

FORMATION TESTED	GAUGE DEPTH 275 °F MEAS. TEMPERATURE °F EST.
NET PRODUCTIVE THICKNESS FT.	MUD TYPE Gel
K B ELEVATION 2034	MUD WEIGHT 8.6 MUD VISC. 68
ALL DEPTHS MEASURED FROM: ☑ KB ☐ GROUND	CASING OR HOLE SIZE 8 1/2"
PACKER DEPTHS (TOP / BOTTOM) 10931	RATHOLE SIZE NA
DEPTH OF TESTER VALVE 10898	DRILL PIPE (OD / WEIGHT) 5" 19.50
CASING PERFORATED INTERVAL NA	DRILL COLLARS ABOVE TESTER (ID / LENGTH) 2 7/8" 648'
TOTAL DEPTH 11045	SURFACE CHOKE 1"
AMOUNT AND TYPE CUSHION Nil	BOTTOM CHOKE 5/8"

FLUID SAMPLER DATA

SAMPLER PRESSURE AT SURFACE _____ PSIG

RECOVERY: C.C. OIL _____ CU.FT. GAS _____

C.C. WATER _____

C.C. MUD _____

TOTAL LIQUID C.C. _____

SAMPLE SHIPPED TO LABORATORY: YES ☐ NO ☐

OIL GRAVITY _____ API @ _____ °F

GAS/OIL RATIO _____ CU.FT./BBL.

	RESISTIVITY/REFRACTOMETER/SP. GR. READING			CHLORIDE CONTENT
RECOVERY WATER		@ °F		PPM
RECOVERY MUD FILTRATE		@ °F		PPM
MUD PIT SAMPLE FILTRATE		@ °F		PPM

TIME PERIODS

	FIRST	SECOND	THIRD		AM	PM
FLOW	5	60		TESTER OPENED	5:15	
CLOSED IN	30	60		PACKER UNSEATED	7:50	

LIQUID RECOVERY DATA

MEASURED FROM TESTER VALVE

FEET	DESCRIPTION OF LIQUID
390	Mud.
390	TOTAL LIQUID RECOVERY

GAS FLOW RATE DATA

TYPE OF INSTRUMENT: ☐ CRITICAL FLOW PROVER ☐ PITOT TUBE ☐ ORIFICE WELL TESTER ☐ SIDE STATIC

FLOW TIME	INSTRUMENT PRESSURE "WATER	"MERC.	PSI	ORIFICE SIZE	GAS TEMP.	GAS RATE MCFD @ 60°F

REMARKS: Very weak air blow throughout test.

COMPANY: AMOCO CANADA PETROLEUM CO LTD.

LEGAL DESCRIPTION: 65 41' 12.62 133 07' 52.10

PROVINCE OR TERRITORY: YUKON

FIELD OR AREA: CRANSWICK

TEST NUMBER: 4

WELL NAME AND NUMBER: AMOCO PCP B-1 CRANSWICK A-42

TESTED INTERVAL: 10931-11045

NOMENCLATURE

AOF = absolute open flow potential, MCFD

AOF_t = theoretical absolute open flow potential if damage were removed, MCFD

B = formation volume factor, res bbl/ST bbl

c = compressibility, psi^{-1}

D = gauge depth from KB, ft

DR = damage ratio, dimensionless

E = KB elevation, ft

F = drill pipe capacity, bbl/ft

G = hydrostatic gradient of recovery fluid, psi/ft

h = net productive thickness of formation, ft

h^1 = thickness of test interval, ft

k = average effective permeability, md

k^1 = estimated average effective permeability, md

m = slope of final CIP buildup plot, psig/cycle ($psig^2$/cycle for gas)

M = slope of flow plot, min^{-1}

P_D = average pressure drop across damaged zone during flow, psig

P_f = reservoir pressure, psig

P_s = wellbore flow pressure, psig

$\overline{P}$ = weighted average wellbore flow pressure, psig

PI = productivity index, bbl/day-psi

PI_t = theoretical productivity index if damage were removed, bbl/day-psi

PS = potentiometric surface, fresh water corrected to 100°F, ft

Q = average liquid production rate during test, bbl/day

Q_g = measured gas production rate, MCFD at 60°F, 14.4 psig, sp. gr. 0.60

Q_m = maximum production rate, U.S. gal/min

Q_{mt} = maximum theoretical production rate if damage were removed, U.S. gal/min

q = flow rate calculated from hydrostatic of recovery, psi/×min

r_i = radius of investigation, ft

r_w = wellbore or shaft radius, ft

R_s = solution gas-oil ratio, MCFD/ST bbl

s = fluid saturation, fraction

t = effective flow time, min

t_f = time interval from start of continuous production to some future point of interest, min

T = reservoir temperature, °R

μ = viscosity, cp

x = time increment during which q values are calculated, min

Z = compressibility factor, dimensionless

ϕ = porosity, fraction

θ = time point during the closed-in period, minutes

Subscripts

g = gas

o = oil

w = water

t = total