

321 - 50TH AVENUE S.E. • CALGARY, ALBERTA T2G 2B3 • PH. (403) 255-1151

DRILL STEM TEST SPECIAL DATA ANALYSIS

Columbia Gas Limited DST #2
Columbia Gas et al Kotaneelee E15085
11,630 - 11,690' 11,690'
September 28, 1977

October 4, 1977

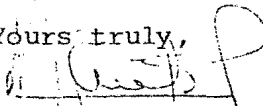
ATTENTION: RICK SMITH

Gentlemen:

The enclosed test appears to be a good mechanical drill stem test during which the tools functioned properly, and the formation produced enough reservoir fluid for proper identification. Reservoir pressure drawdown was sufficient and adequate shut-in build-ups occurred for reliable quantitative analysis.

1. Flow Rate: A flow rate of ²³⁰⁰~~1824~~ MCF/day of gas was noted during this test.
2. Reservoir Pressure: Mechanical Stabilization of the initial shut-in pressure build-up indicates a maximum reservoir pressure of 5689 psig at recorder depth. Mechanical stabilization of the final shut-in pressure build-up indicates a maximum reservoir pressure of 5691 psig at recorder depth.
3. Permeability: The calculated transmissibility factor of 4739 md.ft./cp. indicates an average effective permeability to gas of 2.37 md. for the reported 50 foot porous interval. The calculations were based on a slope of 505,000 psi²/log cycle obtained from the final shut-in build-up plot. It was assumed for these calculations: (A) gas gravity 0.70, (B) viscosity 0.025 cp., (C) and gas deviation factor 1.07. These figures were obtained from the available technical literature.
4. Well Bore Damage: The calculated estimated damage ratio of 12.32 indicates that high well bore damage is present at the time and conditions of this test. This value appears to be excessive and may be due to the partial penetration of the net production interval by the test interval. If subsequent information confirms this possibility then the value for D.R. should be discounted.
5. Radius of Investigation: The calculated radius of investigation of this test is 162.6 feet based on an assumed porosity of 7.5%, compressibility of 1.12 $\times 10^{-4}$ vol/vol/psi, and other assumptions made in number 3 above.
6. General Comments: The formation exhibits the characteristics of relatively low permeability effective to the reservoir fluid and well bore damage is indicated. No unusual characteristics were noted from the analysis of the test data presented. The main feature of this test is that an assumed horner plot slope was utilized to obtain reservoir calculations.

Yours truly,


Jose Cuesta
Technical Analyst

JC/jmh

WELL: COLUMBIA GAS ET AL KOTANEELEE DST #2

| | | |
|---|--|------------|
| FLOW RATE PRIOR TO SHUT IN (MCF/DAY) | | 1824.000 |
| COMPRESSIBILITY FACTOR Z | | 1.0700 |
| HORNER PLOT SLOPE (PSI ² /LOG CYCLE) | | 505000. |
| VISCOSITY (CP) | | 0.025 |
| NET THICKNESS (FT) | | 50.000 |
| MAX RESERVOIR PRESSURE (PSIG) | | 5691.0 |
| FLOWING PRESSURE (PSIG) | | 1672.0 |
| FLOW TIME (MIN) | | 135.0 |
| POROSITY | | 0.075 |
| COMPRESSIBILITY (1/PSI) | | 0.00011200 |
| WELL BORE RADIUS (IN) | | 6.13 |
| WELL ELEVATION (FT) | | 2275.0 |
| RECORDER DEPTH (FT) | | 11650.0 |
| TEMPERATURE (DF) | | 289.0 |

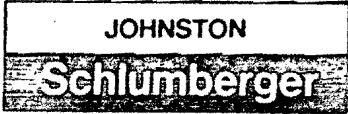
| | | |
|---|--|-----------|
| TRANSMISSIBILITY (MD-FT/CP) | | 4738.57 |
| FLOW CAPACITY (MD-FT) | | 118.46 |
| AVERAGE EFF. PERMEABILITY (MD) | | 2.37 |
| DAMAGE RATIO | | 12.32 |
| FLOW RATE WITH DAMAGE REMOVED (MCF/DAY) | | 22471.092 |
| POTENTIOMETRIC SURFACE (FT) | | 3765.5 |
| RADIUS OF INVESTIGATION (FT) | | 162.6 |

USED 12.81 UNITS
PURGE PRES DAT
FILE NOT SAVED
READY
PURGE BLD2DATA

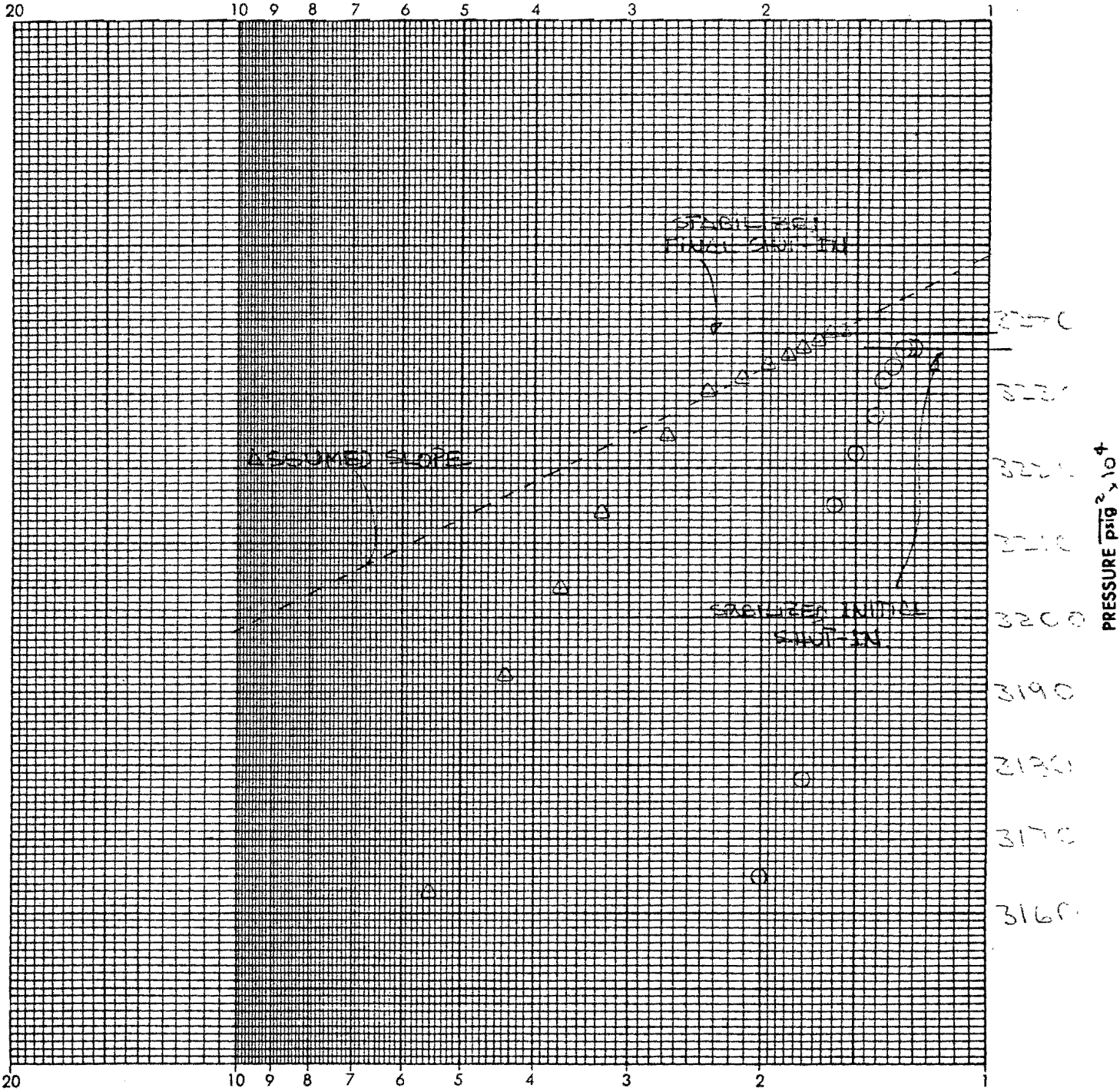
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00015.98 CRU 0000.05 TCH 0002.07 KC

OFF AT 13:49MDT 10/04/77

RESERVOIR PRESSURE PLOT



RECORDER No. AKI 507E CAPACITY 8650 FIELD REPORT No. _____
 MAXIMUM RESERVOIR PRESSURE P_o = _____ psig INITIAL SHUT-IN = 5689 PSIG
 SLOPE OF SHUT-IN CURVE M1 = _____ psig/LOG CYCLE FINAL SHUT-IN = 5691 PSIG
 SLOPE M1 = P₁ 3248.5 × 10⁴ P₁₀ 3198.0 × 10⁴ = psig/LOG CYCLE 50500
 SLOPE M2 = P₁ _____ P₁₀ _____ = psig/LOG CYCLE _____



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JOHNSTON TESTERS

A DIVISION OF SCHLUMBERGER CANADA LIMITED

321 - 50th AVENUE S.E. CALGARY, ALBERTA T2G 2B3

| | | | | | | | |
|------------|---|------------|-----------|-------------------------------|----------------------|-----------|------------|
| District | Calgary | Ticket No. | E15085 | Company | Columbia Gas Limited | | |
| Address | 1420 Standard Life Building, 639 - 5 Avenue S.W., Calgary, Alberta T2P 0M9 | | | Test No. | 2 | J.T. No. | 2 |
| Field | Kotaneelee | | Well Name | Columbia Gas et al Kotaneelee | | | |
| Province | Yukon Territory | | Number | H-28-60-10-124 | | | |
| Co. Rep. | J. Dortch | | Date | September 28, 1977 | | | |
| Technician | T. Thompson | | Formation | 11,630 - 11,690' | | Thickness | TD 11,690' |
| | | | Interval | | | | |

| TEST DATA | | | |
|---------------------------------|---|------------------|-----------|
| Type of Test | Open hole, Bottom hole. | | |
| Time Started in Hole | 0830 Hrs. | Tool Opened | 1512 Hrs. |
| First Flow | 15 Min. | Initial Shut-In | 60 Min. |
| Second Flow | 120 Min. | Second Shut In | 240 Min. |
| Third Flow | Min. | Final Shut In | Min. |
| Pulled Loose @ | 2245 Hrs. | Out of Hole | 0700 Hrs. |
| Wt. Set/on Packers | 30,000 # | Pulled Loose Wt. | 30,000 # |
| Description of Blow During Test | Fair initial air puff on preflow. Fair air blow on final flow period with gas to surface in 25 minutes. | | |

| FLUID RECOVERY | | | |
|--------------------------------|---|-----|--------------------------|
| Was Test Reverse Circulated | Yes <input checked="" type="checkbox"/> | No | <input type="checkbox"/> |
| Total Fluid Recovered | 755 | Ft. | |
| Description of Fluid Recovered | 755' Gasified water. | | |

| GAS BLOW MEASUREMENT | | | |
|----------------------|-----------------------------|-------------|------------------|
| Measured With | Critical Flow Prover Gauge. | | 2" I.D. Riser |
| Time | Sfce. Choke | Reading psi | M Cubic Feet/Day |
| 1735 | 64 | 180 | 5090 |
| 1745 | 64 | 170 | 4700 |
| 1755 | 54 | 170 | 2580 |
| 1805 | 54 | 160 | 2450 |
| 1815 | 54 | 155 | 2390 |
| 1825 | 54 | 150 | 2300 |

REMARKS: Test satisfactory.

| TOOL SEQUENCE | | |
|----------------|--------|--------|
| Tool | Length | O.D. |
| P.O. Sub | 1.00 | |
| D.P. Sub | .65 | |
| MFE Tool | 12.55 | |
| Bypass Tool | 2.85 | |
| Recorder | 4.40 | |
| Safety Joint | 1.75 | |
| S.S. & Packer | 9.30 | 7 1/2" |
| T.C. & Packer | 6.55 | 7 1/2" |
| Total | 39.05 | |
| Packer Stub | 1.00 | |
| Perfs | 15.00 | |
| Recorder | 4.40 | |
| Recorder | 4.40 | |
| Perf | 3.00 | |
| Sub | 1.00 | |
| Drill Collar | 28.55 | |
| Sub | 1.00 | |
| Packer Stub | 2.00 | |
| Total Interval | 60.35 | |

| | | |
|-------------------------|-----------|------------|
| TOTAL LENGTH | | |
| Elevation G.L. | 2250 K.B. | 2275 |
| Bottom Hole Choke Size. | 1/2" | |
| Fluid Cushion Type | Water | Amt. 3500' |

| MUD AND HOLE DATA | | | |
|---------------------|------------------|----------|---------|
| Mud Type | KCL | W.L. | |
| Filter Cake | 2/32 | Visc. 70 | Wt. 9,8 |
| Time Taken | 2400 hours | | |
| Contractor | Nabours Drilling | Rig No. | 9 |
| Drill Pipe Size | 4 1/2" IF | | |
| Drill Collar Size | 4 1/2" XH & | | |
| Drill Collar Length | 605' | | |
| Main Hole Size | 12 1/4" Rat Hole | | |

| RESISTIVITY | | SALT CONTENT | |
|-------------------------|---|--------------|------|
| Recovery Water | @ | °F. | ppm. |
| Mud Pit sample filtrate | @ | °F. | ppm. |

Distribution of Reports 12 - Calgary Attention: Rick Smith

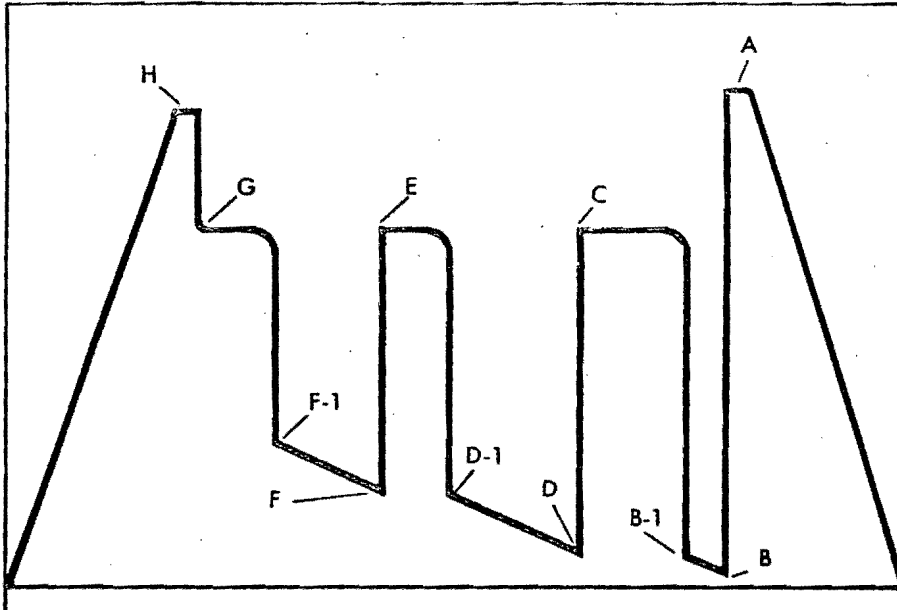
GUIDE TO IDENTIFICATION OF DRILL STEM TEST PRESSURE CHARTS

FIELD
REPORT NO.

RECORDER NO.

E15085

AK1-4371



- A. Initial Hyd. Mud
- B. First Flow
- C. Initial Shut-In
- D. Second Flow
- E. Second Shut-In
- F. Third Flow
- G. Final Shut-In
- H. Final Hyd. Mud

The following points are either fluctuating pressures or points indicating other packer settings (testing different zones).

- A-1, A-2, A-3, etc. Initial Hyd. Pressures
- Z — Special pressure points such as pumping pressures recorded for formation breakdown.

