

**HYDRODYNAMIC EVALUATION OF THE
DEVONIAN - CAMBRIAN FMNS
NORMAN WELLS/FT. GOOD HOPE AREA
NORTH WEST TERRITORIES
125 - 132° W 64° 30' - 67° 30' N**

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I INTRODUCTION

This text documents the procedures, interpretations and data set used for a hydrodynamic evaluation of the Devonian to Cambrian formations in the Ft. Good Hope area of the North West Territories. The purpose of the evaluation is to define the hydrogeological framework and then to evaluate these results to provide exploration play concepts.

All tops and correlations were obtained from International Petrodata Ltd. Data was collected for all wells. Due to the difficulty in obtaining some data sets in the N.W.T., some of the data was obtained directly from the operators. All units are Imperial due to the early dates of the wells.

Pressure data was collected for all available DST's. Original DST charts were examined for a total of 206 tests. They were evaluated for mechanical success, reservoir phase, effective permeability, formation damage, reservoir anomalies and static pressures. All tests were quality coded for their reliability using the industry standard "A-G" coding system (see appendix for illustration). Based upon the observed rates of build-up on the shut-ins, the effective permeabilities were also graded. They are effective permeabilities, to the recovered fluid or interpreted reservoir phase, at reservoir conditions. They are as follows: (see appendix for illustration)

EX	-	Excellent	> 50 md.
HI	-	High	20-50 md.
RH	-	Relatively High	10-20 md.
AV	-	Average	2-10 md.
RL	-	Relatively Low	.1-2 md.
LO	-	Low	.01-2 md.
VN	-	Virtually None	< < .1 md.

Extrapolation of the shut-ins, on those DST's having sufficient build-up, was conducted to determine their static reservoir pressures at the recording gauge elevations (gauge within DST interval). No AOF or static gradient pressures were obtained, however Esso Canada provided the virgin data, fluid contacts and reserve information for the Norman Wells oilfield. A pressure listing which summarizes the DST results is provided in the data section.

Fluid chemistries were obtained from International Petrodata Ltd. They are from original laboratory analyses. A total of 17 gas, 2 oil and 94 water analyses were examined. A detailed screening process was conducted of the waters to define valid formation waters. Listings which summarize the gas, oil and waters analyses are provided in the data section.

A map suite was constructed to illustrate the hydrogeological framework and prospective exploration trends. All maps were constructed on a custom 1:250000 UTM base provided by Canex. A list of the maps is as follows:

1. DST Base Map

The DST base map is a show map which illustrates all wells having DST's. A circle was plotted, then posted with the DST number, interval in feet, formation abbreviation and permeability rating. Recoveries were coloured, for the test having the most significant recovery (denoted with an asterisk), using a quadrant system for gas, oil, water and mud. Recovery volumes increase clockwise within each quadrant from TSTM to 1 MMcf/d for gas and from 1 foot to 1000 feet for each liquid phase. Fluid cuts were shown with small slashes.

2. Potentiometric Surface Map

Potentiometric surface elevations were calculated on reliable "A-D" quality coded, water tests. The following equation was used:

$$Ps \text{ (ft)} = \frac{\text{Extrapolated Shut-in Pressure (psig)}}{\text{Variable Water Gradient (psi/ft)}} + \text{recording gauge elevation (ft)}$$

Wells having potentiometric surface elevations were plotted with a circle. The potentiometric surface elevations were posted in feet with the formation abbreviation to identify the tested zone. They were contoured using a 100 feet interval justified on the Keescarp and Bearrock/Upper Gossage carrier beds. Large blue arrows were used to illustrate the direction of water flow. Small green slashes were used to show tests in the oil phase. Shading was used to highlight opposing flow hydraulic lows which are preferred migration and entrapment sites for oil.

3. Water Chemistry Map

Wells having reliable formation waters were plotted with a circle. They were posted with the calculated total dissolved solids in mg/l, resistivity measured at room temperature and formation abbreviation. Due to the poor control and the complex cross-formational flow, the formation waters were not contoured. The map provides a basis for petrophysical analysis and compliments the nature of the observed fluid flow.

4. Pressure Versus Elevation Graph

A pressure versus elevation graph was constructed to illustrate the pressure distribution and the position of the fluid columns. Extrapolated shut-in pressures were plotted versus recording gauge elevations for "A-D" quality tests, with a circle. They were posted with their location, DST number, test quality code and formation abbreviation. Recoveries were coloured using the quadrant system for gas (red), oil (green), water (blue) and mud (brown). Recovery volumes increase clockwise within each quadrant from TSTM to 1 MMcf/d for gas and from 1 foot to 1000 feet for each liquid phase. Slashes were used to show fluid cuts.

Calculated fluid gradients were applied in a best fit manner taking into account reservoir phase, test quality, accuracy of recording gauges, accuracy of the extrapolations and effects due to flow. The position of the oil columns and their O/W contacts are approximate due to the effects of cross-formational flow and the possible tilting of the O/W contacts.

5. Play Concept Map

The play concept map was constructed to show the hydraulically favourable areas for oil entrapment. Wells having DST's indicating an oil phase were plotted with a circle. Copies of their original DST charts were attached to show the nature of their reservoir quality and phase. The opposing flow hydraulic low areas defined by the potentiometric surface map were super-imposed using shading. Arrows were used to represent preferred areas for oil migration and entrapment. Oil exploration trends were high-graded into three areas. A schematic hydraulic cross-section was constructed across the Norman Wells Keescarp oil pool to show the hydraulic components and their dramatic effects on the oil entrapment.

II INTERPRETATIONS

A. Hydrogeological Framework

1. Hydrostratigraphic Units

Many distinctive hydrostratigraphic units were defined in the study area. They include several major carrier beds overlain by aquitards providing effective vertical seals for gas and oil. They are as follows:

Devonian Imperial/Canol Shale	Aquitard
* Devonian Keescarp Limestone/Dolomite	Carrier Bed
Devonian Hare Indian Shale	Aquitard
Devonian Hume/Nahanni Limestone	Carrier Bed
Devonian Headless Shale	Aquitard
* Devonian Bearrock Limestone/Dolomite	Carrier Bed
Devonian Bearrock Breccia and Anhydrites	Local Aquitard
* Silurian Ronning Limestone/Dolomite	Carrier Bed
Cambrian Saline River Anhydrite	Aquiclude
* Cambrian Old Fort Island Clastic	Carrier Bed

The most important carrier beds are the Keescarp, Bearrock, Ronning and Old Fort Island formations. All have the important characteristics of appropriate source rocks, maturation histories and potential for secondary migration to accommodate the possibility of large hydrocarbon accumulations. The Devonian carrier beds display oil entrapment potential while the Cambrian Old Fort Island appears to be gas prone.

The regional hydrodynamics strongly supports the Devonian to exhibit cross-formational flow characteristics down to and including the Bearrock. Recharge occurs at outcrop and via faults in the Mackenzie Mountains in the southwestern portion of the study area. Flow is northeasterly towards a regional discharge site along the axis of the Mackenzie River. It is an ascending flow, cross-formational flow discharge site. It is controlled by the position of the Norman Range, Franklin Mountains and Ramparts Plateau which provide an opposing downdip flow component from the east of the Mackenzie River.

Hydrocarbon shows occur in all of the Devonian carrier beds, however the Keescarp has the most shows and the only significant oil pool which is at Norman Wells. Its position is in an opposing flow, hydraulic low at the Keescarp subcrop edge. The oil trapping is a classic, hydraulically assisted stratigraphic trap. The hydraulic component at Norman Wells is illustrated with a schematic hydraulic cross-section located on the play concept map. The Norman Range provides over 1000 feet of hydraulic head, in an opposing flow symmetry, across a short distance

to the Keescarp subcrop. Esso Canada Ltd. indicated it to display a tilted O/W contact of over 100 feet to the southwest. It is estimated that the hydraulic component has assisted in the accumulation of approximately half of the oil (O.I.P. 108,000,000 m³).

2. Pressure Distribution

Analysis of the pressure distribution was conducted with potentiometric surface mapping and fluid gradient interpretation on the pressure versus elevation graph. The potentiometric surface map illustrates the regional flow of water. It was justified based upon the Devonian Keescarp and Bearrock carrier beds (aquifers). Recharge occurs along the Mackenzie Mountains in the southwestern portion of the study area with a northeasterly updip flow within the carrier beds towards a regional discharge site along the axis of the Mackenzie River. The potentiometric surface declines northeasterly from over 1200 feet in the Mackenzie Mountains to 200 feet along the Mackenzie River. A downdip opposing flow occurs east of the Mackenzie River, in a southwesterly direction. It is the result of the Norman Range and Ramparts Plateau which are high elevation topo/hydraulic highs falling immediately east of the Mackenzie River. The potentiometric surface declines rapidly from over 700 feet to 200 feet in a southwesterly direction from the Norman Range to the axis of the Mackenzie River. North of 66° N, the Ramparts Plateau lies east of the Mackenzie River. It displays a potentiometric surface of 400 feet declining southwesterly to 200 to 300 feet along the axis of the Mackenzie River. In effect, the Mackenzie Mountains in the southwest and the Norman Range/Ramparts Plateau envelope the hydraulic low situated along the Mackenzie River. Three specific hydraulic lows were defined within the regional Mackenzie River hydraulic low. They represent three specific opposing flow sites which are in hydraulically favourable areas for oil accumulation. They are as follows:

i) Norman Wells Hydraulic Low

Inclusive of the Norman Wells Keescarp oil pool, this hydraulic low follows the axis of the Mackenzie River. It extends to the northwest of F-39 and to the southeast towards A-37.

ii) Judith Island Hydraulic Low

Based upon a Keescarp oil test at 0-17, it appears to be separate from the Norman Wells low. It may extend along the axis of the Mackenzie River northwesterly to J-27.

iii) Hume Hydraulic Low

The Hume hydraulic low includes two important Keescarp oil shows at 0-62 and A-53. Instead of following the axis of the Mackenzie River, it follows a topographic low area bound to the east by Airport Hill.

Analysis of the pressure distribution was also conducted using fluid gradient interpretation on the pressure versus elevation graph. Two separate pressure regimes were defined. They are as follows:

- i) Devonian Keescarp/Bearrock Water Column
- ii) Cambrian Water Columns (Old Fort Island and Mount Clark)

The Devonian Keescarp/Bearrock water column was illustrated. It varies respective of the effects due to cross-formational flow, therefore several tests in high elevation areas were mud higher in pressure (i.e. I-77 in the Mackenzie Mountains and J-48 in the Norman Range). The illustrated position of the water column is an average near the position of the Mackenzie River hydraulic low. Several oil columns were interpreted to be associated. They are as follows:

- i) Norman Wells Keescarp Oil Column
O/W tilted from -1722' to -1870' towards southwest
over 750 feet of total oil column (39° API)
- ii) Potential Hume River Keescarp Oil Column
O/W speculated at -610' (height of column unknown)
- iii) Potential Judith Island Keescarp Oil Column
O/W uncertain
- iv) Potential A-47 Bearrock Oil Column
O/W \approx -1430' to 1450'
- v) Potential J-27 Carcajou Bearrock Oil Column
O/W uncertain

The Cambrian water columns included both the Mount Clark and Old Fort Island. In the northeastern quadrant of the study area, several gas columns were defined in the Old Fort Island. They are as follows:

- i) Potential Tweed Lake Gas Column
G/W \approx -2970', possibly 500' of gas column
- ii) Potential Nogha Gas Column
G/W \approx -3580', possibly 300' of gas column

- iii) Potential 0-35 Gas Column
Appears to be tested near the G/W contact
Height of gas column unknown

3. Fluid Chemistries

Gas chemistries were available on only seven wells, therefore a detailed evaluation of their nature and distribution could not be made. The available data indicated substantial variability in the gases. In the Cambrian, gases are mature having at least a partial basement source as noted by their high nitrogen content (15-23%). Their methane contents were consequently low in the 65-75% range. Devonian gases were notably high in methane in the 75 to 93% range. They also exhibited some carbon dioxide and hydrogen sulphide.

Oil gravities for free oils were only available for the Ronning at B-45 (20.4° API) and the Norman Wells Keescarp pool average (39° API). Although this data is limited, they correlate with observed cross-formational flow. B-45 is in a descending cross-formational flow area which has low salinities. It suggests a capacity for water washing and possible biodegradation. Norman Wells is in an ascending flow hydraulic low which we would expect to maintain light gravity oils. Importantly, the light gravity oils at Norman Wells support long distance secondary migration of oil to a hydraulically preferred position. No gas column is present due to the differential migration of the gases and oils. Using Norman Wells as an analogy, we interpret that the defined hydraulic lows should maintain light gravity oils.

Formation waters ranged from meteoric in the recharge areas to connate brines in the discharge area. The Devonian Keescarp and Bearrock carrier beds displayed total dissolved solids from 7042 mg/l in the Mackenzie Mountains to 88060 mg/l at the Mackenzie River. The Silurian Ronning was higher in total dissolved solids than the Devonian, ranging from 22279 mg/l in the Mackenzie Mountains to over 100000 mg/l along the Mackenzie River. Poor data was available for the Cambrian aquifers, however they appear to be predominantly connate brines having total dissolved solids between 165000 mg/l and 300000 mg/l.

4. Formation Temperatures

Formation temperatures were collected from bottom temperature surveys and temperature recording gauges on DST's. They ranged 12° C to 88° C with a general increase in temperatures with depth. All had low temperature gradients which suggests cooling due to the effects of cross-formational flow. Based upon the current formation temperatures, only these areas below 4000 feet and falling east of the Mackenzie Mountains have appropriate current maturation capabilities (note at 8800 feet in Mackenzie Mountain descending cross-formational flow has cooled the Bearrock to 26.7° C). This leaves a very narrow area having current oil

maturation capacity. We interpret that the majority of the oils were generated at maximum time of sediment loading in the Cretaceous. Formation temperatures at that time would have been significantly higher.

B. Play Concepts

Several play concepts evolved from the hydrodynamic interpretations. They consist of hydraulically favourable oil accumulation sites which have hard data (DST oil shows) to confirm their potential. The Norman Wells Keescarp oil pool was used as an analogy.

Oil potential is primarily in the Devonian Keescarp and Bearrock formations. The Keescarp subcrop follows the axis of the Mackenzie River south of 67° N. Hydraulically assisted stratigraphic traps may occur at the Keescarp subcrop edge in the opposing flow, hydraulic lows at Judith Island and Hume (see play concept map). Oil phase Keescarp DST's were observed in these areas at N-22, O-17, O-62 and A-53. Sufficient opposing flow exists to significantly assist in the accumulation and maintenance of oil traps. Good quality reservoir rock, at the subcrop edge, is required for a quality trap. A detailed geological review of the Keescarp subcrop edge is required to high-grade possible entrapment sites.

The Devonian Bearrock/Upper Gossage carrier beds also have oil entrapment potential. Since their subcrop edge is east of the Mackenzie River, entrapment potential is limited to hydraulically assisted structural traps. Three Bearrock oil shows were observed in the hydraulic low areas. They are at A-37, J-27 Carcajou and A-47. If they are pure hydrodynamic oil traps, they would consist of thin (small column height) oil columns which would be uneconomic even though they may hold large reserves. It is important for the Bearrock that some structural features be present to increase the oil column height in the traps. We suspect that A-37 and A-47 have a structural component.

Oil entrapment potential may also exist at the Bearrock and Ronning subcrop edges. A detailed review of their position and overlying seal rocks is strongly recommended.

Gas producing potential exists in the Cambrian formations in the northeast quadrant of the study area. Two gas columns were defined at Tweed Lake (possibly 500 feet of gas column) and Nogha (possibly 300' of gas column). Their high nitrogen content (15-23%) and low methane content (65-75%) may be a significant factor in their future development.

Based upon their hydraulic position, the potential oil trends were high-graded for the oil entrapment potential as follows:

i) Norman Wells Keescarp Oil Trend

The Norman Wells oil pool is a Keescarp subcrop accumulation having excellent reservoir quality with a good updip seal. It has over 750 feet of oil column. It is probable that the oil column continues on strike through tight rocks. Local permeability improvements (i.e. subcrop swinging to east) may be a continuation of the pool. Since the pool was discovered in the mid-1940's, the off-setting exploration has not integrated modern techniques. A review of the Keescarp subcrop is recommended along strike to the southeast.

ii) Potential Keescarp Judith Island, Carcajou and Hume Hydraulic Lows

At Judith Island, N-22 and O-17 displayed oil shows in a hydraulic low. Our first impression was that they are an extension of the Norman Wells pool, however we suspect that a separate accumulation may be present. A review of the Keescarp subcrop edge is recommended to define the position of the edge and the best reservoir quality.

At Carcajou, a hydraulic low was observed in the Bearrock. It appears to have a southerly opposing flow from East Mountain. It sets up a possible hydraulic low which is favourable for both the Bearrock and Keescarp (if subcrop present) near Axel Island. A geological review of both horizons is recommended.

The Hume hydraulic low follows the Mackenzie River from Hardie Island northward to Spruce Island, then extends northwestward across the confluence of the Hume and Ramparts Rivers. It covers a low elevation muskeg covered area which is bound to the east by topographic highs. Although the hydraulic head is not as large as Norman Wells or Judith Island, there is still an effective downdip flow which could significantly improve any Keescarp subcrop traps. Two oil tests in the Keescarp were observed at A-53 and O-62. They would appear to be separate accumulations of unknown potential. A detailed review of the Keescarp subcrop edge is required to define potential traps.

Although several geological studies have been conducted, I recommend that additional work be conducted to satisfy some important reservoir questions. They include the following:

- i) isopach major shales to define seal capability (Imperial/Canol, Hare Indian, Headless)
- ii) map major carrier bed subcrops (Keescarp and Bearrock/Upper Gossage)
- iii) independent analysis of surface methane halos such as surface geochemistry, high resolution aero-magnetic surveys and satellite imagery

III CONCLUSIONS

1. Many distinctive hydrostratigraphic units were defined in the study area. The major carrier beds having effective vertical seals include the Devonian Keescarp, Devonian Bearrock, Silurian Ronning and Cambrian Old Fort Island formations.
2. The Devonian exhibits cross-formational flow characteristics. Recharge occurs in the Mackenzie Mountains with flow towards a regional ascending flow discharge site along the Mackenzie River. It is the result of an opposing downdip flow from local recharge sites in the Norman Range and Ramparts Plateau, which border the eastern edge of the Mackenzie River.
3. Distribution of the oil gravities and formation waters correlates with the regional cross-formational flow. Meteoric waters occur in the descending flow recharge areas and connate waters in the ascending flow discharge area. Oil gravities display biodegradation in the recharge areas and preserved light oils in the discharge area.
4. Three specific hydraulic lows were defined within the regional Mackenzie River discharge area. They include Norman Wells, Judith Island and Hume. These areas represent opposing flow sites which are hydraulically favourable for the preferred migration and entrapment of oil.
5. The Norman Wells Keescarp oil pool was used as an analogy. It is in an opposing flow, hydraulic low position at the Keescarp subcrop. It exhibits 39° API oil, no gas column and a tilted O/W contact. These characteristics confirm long distance, preferred migration of oil and a hydraulically assisted stratigraphic trap.
6. Analogous areas to Norman Wells were observed in the Keescarp in the Judith Island and Hume hydraulic lows. Oil phase DST's were found at N-22, O-17 (Judith Island) and O-62, A-53 (Hume). A detailed mapping of the Keescarp subcrop and the overlying Canol/Imperial shales is recommended in these areas.
7. No commercial oil has yet to be found in the Bearrock. Its potential is limited to hydraulically assisted structural traps. Three Bearrock oil shows were observed in the regional Mackenzie River low at A-37, J-27 and A-47.
8. We recommend the following additional work be considered:
 - isopach major shale units to define areas having effective vertical seals (Imperial/Canol, Hare Indian, Headless shales).
 - map major carrier bed subcrops
 - independent analysis of surface methane halos using surface geochemistry, high resolution aero-magnetic surveys and satellite imagery

IV. DATA

FORT GOOD HOPE AREA, N.W.T.
125° - 132°W
64° 30' - 67° 30'N
PRESSURE LISTING

LOCATION	FM	DST#	INTERVAL (FT.)	QUAL CODE	PERM RATING	PMAX (PSIG)	ELEV (FT.)	TEMP (° C)	REMARKS
L-66-6450-12500	CRCS	1	2270-2345	D	RH	948	-1814	15.6	1971, 1050' FrWtr
L-66-6450-12500	CRCS	2	2960-2985	A	EX	1256	-2484	-	1971, 2610' Swtr
L-66-6450-12500	RNNG	3	3317-3392	F	LO	-	-2831	-	1971, 90' Mud
B-45-6450-12530	RNNG	1	3990-4042	G	-	-	-	-	1971, Flow Only, 830' Oil, 530' Swtr
B-45-6450-12530	RNNG	2	4042-4196	A	EX	1596	-3174	58.8	1971, 3540' Swtr
K-53-6450-12615	HUME	1	8323-8455	G	-	-	-	-	1986, Misrun
K-53-6450-12615	HUME	2	8327-8425	E	LO	-	-7179	-	1986, 92' Mud
K-53-6450-12615	IMPL	3	5866-5955	E	LO	-	-4718	-	1986, 276' Mud
K-14-6500-12515	LRCC	1	2234-2400	D	AV	1007	-1868	28.9	1972, 540' FrWtr
A-53-6500-12530	FKLM	1	3520-3553	G	-	-	-	-	1985, Misrun
A-53-6500-12530	FKLM	2	3223-3240	G	-	-	-	-	1985, Misrun
A-53-6500-12530	FKLM	3	3609-3625	G	-	-	-	-	1985, Misrun
A-53-6500-12530	FKLM	4	3609-3691	D	EX	1786	-3281	-	1985, 3215' Swtr
A-49-6500-12545	HRDV	1	1755-1919	G	-	-	-	-	1984, Misrun
A-49-6500-12545	HRDV	2	1755-1919	G	-	-	-	-	1984, Misrun
A-49-6500-12545	HRDV	3	1755-1919	B	RH	913	-1392	-	1984, 394' Swtr (Wet)
K-71-6500-12545	HDLS	1	4918-4972	B	RH	2262	-4437	64.4	1973, 600' Swtr, 120' Mud
K-71-6500-12545	HDLS	2	4797-4910	G	-	-	-	-	1973, Misrun
K-71-6500-12545	HDLS	3	4805-4892	F	LO	-	-4312	-	1973, 40' Mud (S-Shape)
A-37-6500-12600	BRCK	1	3395-3500	D	RL	1615	-2961	48.9	1970, 60' SulWtr, 615' Mud
O-33-6500-12645	LNDY	1	3888-3996	G	-	-	-	-	1984, Misrun
O-33-6500-12645	LNDY	2	3914-4003	G	-	-	-	-	1984, Misrun
O-33-6500-12645	LNDY	3	3878-3986	G	-	-	-	-	1984, Misrun

Fort Good Hope, N.W.T.
125° - 132°W
64° 30' - 67° 30'N
Pressure Listing

LOCATION	FM	DST#	INTERVAL (FT.)	QUAL CODE	PERM RATING	PMAX (PSIG)	ELEV (FT.)	TEMP (° F)	REMARKS
O-33-6500-12645	LNDY	4	3878-3986	G	-	-	-	-	1984, Misrun
N-28-6510-12600	BRCK	1	855-985	G	-	-	-	-	1945, 10' Mud
N-28-6510-12600	BRCK	2	907-945	G	-	-	-	-	1945, 60' Mud
N-28-6510-12600	BRCK	3	1000-1022	G	-	-	-	-	1945, 40' Mud
N-28-6510-12600	BRCK	4	1032-1072	G	-	-	-	-	1945, 480' Mud
J-20-6510-12615	IMPL	1	664-724	G	-	-	-	-	1945, 200' Mud
K-3-6510-12645	LRCC	1	7320-7600	C	AV	3226	-6336	80.0	1972, 1220' Swtr (Reservoir Anomaly)
C-21-6520-12500	MTKD	1	3280-3435	G	-	-	-	-	1973, Misrun, 1940' WCMud
C-21-6520-12500	MTKD	2	3278-3435	D	EX	1430	-2852	30.6	1973, 3106' WCMud
G-51-6520-12615	IMPL	1	1236-1276	G	-	-	-	-	1945,
G-51-6520-12615	IMPL	2	1276-1332	G	-	-	-	-	1945, 200' Mud
G-51-6520-12615	NHNN	3	2030-2066	G	-	-	-	-	1945, 105' Mud
G-12-6520-12645	NHNN	1	4036-4061	G	-	-	-	-	1945, 25' Mud
G-12-6520-12645	BRCK	2	4377-4413	G	-	-	-	-	1945, 25' Mud
G-12-6520-12645	BRCK	3	4530-4564	G	-	-	-	-	1945, 25' Mud
L-28-6520-12645	IMPL	1	267-307	G	-	-	-	-	1944, Misrun
L-28-6520-12645	IMPL	2	541-570	G	-	-	-	-	1944, Misrun
L-28-6520-12645	CNOL	3	791-820	G	-	-	-	-	1944, Misrun
F-39-6520-12645	KCRP	1	2045-2083	G	-	-	-	-	1945, Misrun
J-76-6520-12645	KCRP	1	2097-2570	G	-	-	-	-	1943, 15' FrWtr
P-5-6520-12700	KCRP	1	2462-2503	G	-	-	-	-	1944, Misrun
B-46-6520-12700	CRCS	1	1661-1700	G	-	-	-	-	1944, 30' Mud
B-46-6520-12700	KCRP	2	3284-3347	G	-	-	-	-	1944, 40' Mud

Fort Good Hope, N.W.T.
125° - 132°W
64° 30' - 67° 30'N
Pressure Listing

LOCATION	FM	DST#	INTERVAL (FT.)	QUAL CODE	PERM RATING	PMAX (PSIG)	ELEV (FT.)	TEMP (° F)	REMARKS
J-48-6530-12700	BRCK	1	1300-1510	D	RL	658	-792	21.1	1970, 90' SulWtr, 150' Mud
G-44-6530-12715	CNOL	1	760-990	G	-	-	-	-	1944, 1' Oil, 1' Wtr
J-71-6530-12715	KCRP	1	2943-3022	A	HI	1235	-2482	42.2	1984, 1345'SBrWtr, 282' WCMud
H-77-6530-12715	KCRP	1	1630-2010	G	-	-	-	-	1967, Misrun
H-77-6530-12715	KCRP	2	1650-2010	E	VN	-	-	-	1967, 100' Mud
H-77-6530-12715	KCRP	3	1650-2010	G	-	-	-	-	1967, Misrun
H-77-6530-12715	KCRP	4	1650-2010	E	VN	-	-	-	1967, 1000' Mud
0-17-6530-12730	KCRP	1	1320-1382	C	AV	636	-1149	-	1967, 10' Mud (S-Shape)
0-17-6530-12730	KCRP	2	1382-1890	D	AV	630	-	-	1967, Misrun, 500' Mud
0-17-6530-12730	KCRP	3	1330-1890	G	-	-	-	-	1967, Misrun, 1000' Mud
0-17-6530-12730	KCRP	4	1350-1890	B	EX	595	-1179	-	1967, 900' Mud
N-22-6530-12730	KCRP	1	2425-2484	F	RL	-	-	-	1984, GTS TSTM, 12' OCMud (S-Shape)
H-40-6530-12730	KCRP	1	1321-1362	G	-	-	-	-	1945, 30' Mud
H-40-6530-12730	BRCK	2	2638-2661	G	-	-	-	-	1945, Misrun
H-40-6530-12730	BRCK	3	2630-2673	G	-	-	-	-	1945, Misrun
H-40-6530-12730	BRCK	4	2628-2673	G	-	-	-	-	1945, 60' Mud
L-9-6530-12930	RNNG	1	8200-8550	D	HI	3242	-7116	87.8	1971, 490' Mud (Phase Uncertain)
L-9-6530-12930	RNNG	2	8196-8550	G	-	-	-	-	1971, Flow Only, 1772' Swtr
L-9-6530-12930	RNNG	3	7870-8130	G	-	-	-	-	1971, Flow Only, 1000' Swtr
L-9-6530-12930	RNNG	4	7623-7638	G	-	-	-	-	1971, Flow Only, 4046' GCSwtr
L-9-6530-12930	HRDV	5	4507-4524	E	LO	-	-	-	1971, 40' WCMud (S-Shape)
A-59-6530-13030	RNNG	1	10230-10515	G	-	-	-	-	1973, Misrun, 3400' Mud
A-59-6530-13030	RNNG	2	10220-10515	G	-	-	-	-	1973, Misrun, 1000' Mud

Fort Good Hope, N.W.T.
125° - 132°W
64° 30' - 67° 30'N
Pressure Listing

LOCATION	FM	DST#	INTERVAL (FT.)	QUAL CODE	PERM RATING	PMAX (PSIG)	ELEV (FT.)	TEMP (° F)	REMARKS
A-59-6530-13030	RNNG	3	10390-10515	G	-	-	-	-	1973, Misrun, 1500' Mud
A-59-6530-13030	BRCK	4	8720-9247	G	-	-	-	-	1973, Misrun, 20' Mud
A-59-6530-13030	BRCK	5	8720-9225	A	EX	3717	-6827	-	1973, 7800' Wtr, 400' Mud, 500' WCMud
I-77-6530-13045	BRCK	1	3712-3862	B	HI	1436	-1741	26.7	1973, 2170' FrWtr
I-77-6530-13045	RNNG	2	4870-4970	G	-	-	-	-	1973, Misrun
I-77-6530-13045	RNNG	3	4870-4970	G	-	-	-	-	1973, Misrun
H-71-6540-12700	BRCK	1	1050-1416	D	RL	337	-264	15.6	1970, 10' Mud (Phase Uncertain)
F-57-6540-12800	KCRP	1	1560-1925	E	LO	-	-	-	1970, 30' Mud
F-57-6540-12800	BRCK	2	2748-2825	B	RH	1214	-2339	35.0	1970, 700' Swtr, 30' Mud
F-57-6540-12800	RNNG	3	3559-3876	A	EX	1599	-3180	42.2	1970, 2980' Swtr, 450' Mud
0-65-6540-12800	KCRP	1	1801-1880	G	-	-	-	-	1986, 925' GCWtr (No Data Available)
K-68-6540-12800	HDLS	1	700-820	B	RH	201	-2	33.3	1972, 120' BrSulWtr, 20' Mud
K-68-6540-12800	DTRL	2	1640-1770	C	HI	715	-1049	32.2	1972, 1326' FrWtr
K-68-6540-12800	MTKD	3	2030-2105	E	VN	-	-	-	1972, 40'Wtr
K-68-6540-12800	MTKD	4	3705-3780	C	AV	1581	-3059	33.9	1972, 1175' FrSulWtr
D-5-6540-12815	KCRP	1	2385-2395	E	VN	-	-	-	1985, 50' Mud
0-25-6540-12815	CNCL	1	1965-2031	G	-	-	-	-	1986, GTS TSTM, 118' Mud (no data avail.)
J-27-6540-12830	BRCK	1	2880-2985	A	RH	1353	-2693	-	1974, 350' BrWtr, 100' Mud
L-24-6540-12845	KCRP	1	3806-3900	F	LO	-	-	-	1970, 120' Mud
L-24-6540-12845	KCRP	2	3700-3750	B	EX	1615	-3355	-	1970, 3645' SulWtr
A-22-6540-13145	MTKD	1	8462-9411	G	-	-	-	-	1972, Misrun
A-22-6540-13145	MTKD	2	7240-7550	G	-	-	-	-	1972, Misrun
A-22-6540-13145	MTKD	3	7260-7605	G	-	-	-	-	1972, Misrun

Fort Good Hope, N.W.T.
125° - 132°W
64° 30' - 67° 30'N
Pressure Listing

LOCATION	FM	DST#	INTERVAL (FT.)	QUAL CODE	PERM RATING	PMAX (PSIG)	ELEV (FT.)	TEMP (° F)	REMARKS
J-5-6550-12815	BRCK	1	1940-2133	D	AV	855	-1531	20.0	1973, 810' SOCWtr (Trace Oil)
J-5-6550-12815	CRCS	2	630-653	E	VN	-	-	-	1973, 60' FrOCWtr
J-5-6550-12815	BRCK	3	2700-3230	D	HI	1170	-2307	20.0	1973, 3063' SOCWtr
J-5-6550-12815	CRCS	4	810-850	C	HI	345	-401	20.0	1973, 600' FrWtr
H-24-6550-12845	BRCK	1	3091-3123	G	-	-	-	-	1945, 15' Mud
H-47-6550-12900	HDLS	1	1920-2144	D	RH	837	-1643	30.0	1971, GTS .088 MMcf/d, 830' SBrSulWtr (Reservoir Anomaly)
H-47-6550-12900	BRCK	2	2350-2515	D	AV	1058	-2053	-	1972, 240' Mud (Wet)
H-47-6550-12900	RNNG	3	3057-3230	A	RH	1373	-2760	38.9	1972, 2790' SBrSulWtr, 90' Mud
H-47-6550-12900	CRCS	4	600-900	G	-	-	-	-	1972, Misrun
H-47-6550-12900	CRCS	5	600-900	G	-	-	-	-	1972, Misrun
H-47-6550-12900	CRCS	6	599-935	G	-	-	-	-	1972, Misrun
A-23-6550-12915	RNNG	1	4460-4766	C	HI	1967	-4063	-	1972, 4650' SSulWtr, 600' Mud
A-23-6550-12915	BRCK	2	4165-4262	C	HI	1849	-3765	62.8	1972, 3850' SWtr
G-26-6600-12830	BRCK	1	1070-1147	D	AV	489	-838	12.2	1966, 40' WCMud, (Phase Uncertain)
G-26-6600-12830	BRCK	2	1185-1289	C	AV	506	-953	29.4	1966, 100' Mud (S-Shape)
G-26-6600-12830	BRCK	3	1280-1435	D	AV	566	-1053	29.4	1966, No Recovery
G-26-6600-12830	RNNG	4	2090-2272	D	RH	922	-1853	32.2	1966, 450' Mud, 830' WCMud
G-26-6600-12830	BRCK	5	1140-1190	D	AV	497	-883	-	1966, Partial Misrun, 150' Mud
G-26-6600-12830	BRCK	6	1134-1184	D	AV	480	-890	-	1966, Partial Misrun
G-26-6600-12830	BRCK	7	1135-1210	G	-	-	-	-	1966, Misrun
G-26-6600-12830	BRCK	8	1135-1215	G	-	-	-	-	1966, Misrun
G-26-6600-12830	BRCK	9	1135-1215	G	-	-	-	-	1966, Misrun

LOCATION	FM	DST#	INTERVAL (FT.)	QUAL CODE	PERM RATING	PMAX (PSIG)	ELEV (FT.)	TEMP (° F)	REMARKS
C-31-6600-12845	BRCK	1	2762-2875	D	AV	1151	-2583	28.9	1966, 5' Oil, 385' Wtr (Reservoir Anomaly)
C-31-6600-12845	BRCK	2	2875-3020	B	RH	1287	-2700	28.9	1966, 2840' SSulWtr
C-31-6600-12845	RNNG	3	4020-4090	B	HI	1849	-3859	33.3	1966, 1710' SSulWtr
D-53-6600-12900	IMPL	1	1608-1755	E	LO	-	-	-	1972, 80' OCMud
D-53-6600-12900	CRCS	2	1370-1610	G	-	-	-	-	1972, Misrun
D-53-6600-12900	CRCS	3	1370-1615	F	LO	-	-	-	1972, 80' Mud
D-53-6600-12900	BRCK	4	3650-3760	B	RH	1646	-3371	44.4	1972, 2555' SSulWtr
0-62-6600-12900	CNCL	1	1630-1707	D	RH	725	-1328	27.2	1970, GTS TSTM, 200' Mud (Damaged Gas/Oil)
0-62-6600-12900	KCRP	2	1700-1812	D	RL	705	-1398	26.7	1970, 10' Mud (S-Shape)
0-62-6600-12900	KCRP	3	1800-2150	G	-	-	-	-	1970, Misrun
0-62-6600-12900	KCRP	4	1800-2150	F	RL	-	-	-	1970, 40' Mud (S-Shape)
0-62-6600-12900	HDLS	5	3100-3140	D	HI	1374	-2797	37.8	1970, 2460' Mud (Wet)
0-62-6600-12900	RNNG	6	4390-4600	B	EX	1990	-4088	42.2	1970, 4236' SSulWtr
N-37-6610-12615	ODFD	1	4209-4255	G	-	-	-	-	1985, Misrun
N-37-6610-12615	ODFD	2	4211-4257	G	-	-	-	-	1985, Misrun
N-37-6610-12615	MTCP	3	4073-4254	E	VN	-	-	-	1985, 30' Mud
A-53-6610-12900	IMPL	1	775-829	D	RL	332	-558	27.8	1969, 8' Mud (S-Shape)
A-53-6610-12900	CNOL	2	829-1117	C	AV	324	-612	28.3	1969, 100' WCMud (Wet)
A-53-6610-12900	BRCK	3	2742-2770	C	EX	1260	-2524	30.0	1969, 2742' Swtr
N-39-6620-12815	BRCK	1	1390-1443	B	EX	617	-1053	21.1	1970, 1163' SulWtr, 180' Mud
N-39-6620-12815	BRCK	2	2170-2220	C	RH	955	-1833	27.8	1970, 700' FrSulWtr, 10' Mud
P-55-6620-12830	HDLS	1	936-946	G	-	-	-	-	1960, Flow Only, GTS .25 MMcf/d

Fort Good Hope, N.W.T.
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Pressure Listing

LOCATION	FM	DST#	INTERVAL (FT.)	QUAL CODE	PERM RATING	PMAX (PSIG)	ELEV (FT.)	TEMP (° F)	REMARKS
P-55-6620-12830	BRCK	2	1439-1544	G	-	-	-	-	1960, 35 BBL - Swtr
I-38-6620-13145	BRCK	1	4767-4800	D	AV	1448	-4298	-	1972, 180' Swtr (Reservoir Anomaly)
I-38-6620-13145	RNNG	2	7096-7157	C	EX	3196	-6625	66.7	1972, 5800' Swtr, 500' Mud
L-61-6630-12845	RNNG	1	2962-3108	C	AV	1239	-2547	30.0	1966, 2700' Swtr
L-61-6630-12845	RNNG	2	4045-4316	G	-	-	-	-	1966, Misrun
L-61-6630-12845	RNNG	3	4045-43316	D	AV	1739	-3625	33.3	1966, 2885' Wtr, 900' Mud
D-72-6630-12900	KCRP	1	431-482	D	AV	160	+12.0	-	1960, 160' Mud
D-72-6630-12900	NHNN	2	1317-1367	B	RH	531	-873	-	1960, 60' Mud (Phase Uncertain)
A-37-6630-12930	NHNN	1	1230-1280	E	VN	-	-	-	1960, 15' Mud
K-47-6630-13000	HRDV	1	1320-1378	E	VN	-	-	-	1961, 10' Mud
K-47-6630-13000	BRCK	2	2104-2155	A	AV	946	-1866	16.7	1961, 750' WCMud (Wet)
K-47-6630-13000	BRCK	3	2376-2425	A	HI	1061	-2136	37.8	1961, 2000' SulWtr, 45' Mud
0-47-6640-12545	ODFD	1	4462-4482	F	RL	-	-	-	1986, GTS .044 MMcf/d
0-47-6640-12545	ODFD	2	4436-4459	C	AV	2165	-3280	16.7	1986, GTS .008 MMcf/d, 49' GCMud (damaged gas)
0-47-6640-12545	MTCP	3	4406-4432	F	RL	-	-	-	1986, 59' Mud
0-47-6640-12545	MTCP	4	4222-4275	F	LO	-	-	-	1986, 39' GCMud
0-47-6640-12545	MTCP	5	3740-3789	E	VN	-	-	-	1986, 23' Mud
0-47-6640-12545	ODFD	6	4462-4482	G	-	-	-	-	1986, Misrun
0-47-6640-12545	ODFD	7	4462-4482	F	RL	-	-	-	1986, 59' Mud
0-35-6640-12615	ODFD	1	4432-4469	B	HI	1938	-3138	-	1986, GTS 3.538 MMcf/d, 52' OCMud, 98' Condensate
L-26-6640-13015	RNNG	1	3400-3560	D	RL	1192	-2863	-	1972, 160' Swtr, 50' Mud

LOCATION	FM	DST#	INTERVAL (FT.)	QUAL CODE	PERM RATING	PMAX (PSIG)	ELEV (FT.)	TEMP (° F)	REMARKS
K-4-6640-13045	RNNG	1	3774-3840	D	HI	1690	-3440	-	1965, 3775' WCMud
K-4-6640-13045	RNNG	2	3774-3840	A	HI	1683	-3441	-	1965, 3685' Swtr
M-47-6700-12545	ODFD	1	3976-4026	B	RH	1860	-2555	11.7	1985, GTS 3.9 MMcf/d, 213' GCMud
M-47-6700-12545	ODFD	2	3898-3934	B	RH	1864	-2443	7.8	1985, GTS .632 MMcf/d (Damaged Gas)
M-47-6700-12545	MTCP	3	3789-3839	E	VN	-	-	-	1985, 33' Mud
M-47-6700-12545	ODFD	4	4006-4055	D	HI	1844	-2567	8.3	1985, GTS 6.68 MMcf/d, 558' Condensate
M-47-6700-12545	ODFD	5	3967-3991	B	RH	1855	-2548	8.3	1985, GTS .174 MMcf/d (Damaged Gas)
A-67-6700-12545	MTCK	1	4232-4268	C	RH	1896	-2936	12.2	1985, GTS 1.8 MMcf/d, 194' GCMud, 3' Condensate
A-67-6700-12545	MTCK	2	4193-4219	D	RH	1890	-2897	-	1985, GTS .009 MMcf/d (Damaged Gas)
C-12-6710-12600	ODFD	1	4337-4364	B	RH	2063	-3371	15.0	1986, 1027' SBrGCWtr, 92' WCMud
C-12-6710-12600	MTCP	2	4295-4331	C	RH	2041	-3328	14.4	1986, 558' WCMud (Wet)
C-12-6710-12600	MTCP	3	4232-4268	F	RL	-	-	12.6	1986, 121' Mud (S-Shape)
C-12-6710-12600	MTCP	4	4157-4193	E	VN	-	-	-	1986, 121' Mud
M-63-6710-12615	MTCP	1	3399-3498	G	-	-	-	-	1972, Misrun
M-63-6710-12615	MTCP	2	3408-3498	G	-	-	-	-	1972, Misrun
M-63-6710-12615	MTCP	3	3234-4211	G	-	-	-	-	1972, Misrun
M-63-6710-12615	MTCP	4	3230-4211	G	-	-	-	-	1972, Misrun
M-63-6710-12615	MTCP	5	3226-4211	G	-	-	-	-	1972, Misrun
M-63-6710-12615	MTCP	6	3187-4211	D	AV	1207	-2092	22.2	1972, 200' Mud (Wet)
M-63-6710-12615	MTCK	7	3450-3500	B	RH	1219	-1939	-	1972, 400' Swtr, 500' WCMud
P-75-6710-12815	BRCK	1	944-969	G	-	-	-	-	1960, Misrun
P-75-6710-12815	BRCK	2	900-1005	G	-	-	-	-	1960, Flow Only (Wet)

LOCATION	FM	DST#	INTERVAL (FT.)	QUAL CODE	PERM RATING	PMAX (PSIG)	ELEV (FT.)	TEMP (° F)	REMARKS
P-75-6710-12815	BRCK	3	935-1005	G	-	-	-	-	1960, Misrun
P-75-6710-12815	BRCK	4	940-1005	G	-	-	-	-	1960, Misrun
P-75-6710-12815	BRCK	5	930-1005	G	-	-	-	-	1960, Misrun
P-75-6710-12815	MTKD	6	1326-1351	G	-	-	-	-	1960, Flow Only, 1351' SulWtr
A-47-6710-13045	CNOL	1	875-915	E	VN	-	-	-	1960, 66' Mud
A-47-6710-13045	BRCK	2	2525-2560	D	AV	808	-1348	-	1960, 25' GCMud (S-Shape)
A-47-6710-13045	BRCK	3	2560-2676	C	RH	816	-1464	26.7	1960, 330' SulWtr (Wet)
A-47-6710-13045	BRCK	4	2678-2710	C	RH	838	-1498	25.6	1960, 220' SSulWtr (Wet)
A-47-6710-13045	BRCK	5	3000-3070	C	RH	973	-1858	38.3	1960, 670' Swtr
A-47-6710-13045	RNNG	6	5957-5996	D	RL	1921	-4734	54.4	1960, 60' Mud (S-Shape) Reservoir Anomaly
D-45-6720-12500	MTCP	1	3002-3062	E	LO	-	-	-	1973, 40' OCMud
D-45-6720-12500	MTCK	2	3186-3233	G	-	-	-	-	1973, Misrun
D-45-6720-12500	MTCK	3	3186-3233	A	EX	1088	-1077	-	1973, 2300' Swtr
D-45-6720-12500	MTCK	4	3207-3224	C	HI	1091	-1100	-	1973, 2200' SGCOCWtr
D-45-6720-12500	MTCK	5	3253-3278	B	RH	1111	-1145	35.0	1973, 2200' Swtr
E-15-6720-12615	RNNG	1	534-660	G	-	-	-	-	1970, Misrun
E-15-6720-12615	RNNG	2	534-660	G	-	-	-	-	1970, Misrun
E-15-6720-12615	RNNG	3	534-660	E	LO	-	-	-	1970, 3' FwWtr
E-15-6720-12615	MTCP	4	4893-4925	G	-	-	-	-	1970, Misrun
E-15-6720-12615	MTCP	5	4518-5996	C	HI	1950	-3265	23.3	1970, 1800' Swtr, 2010' Mud
J-13-6720-12645	MTCP	1	4140-4199	C	AV	1810	-3046	21.1	1984, 525' Mud (S-Shape)
J-42-6720-12915	UGSG	1	1770-1798	C	RH	462	-685	44.4	1971, 50' Mud (Phase Uncertain)
J-42-6720-12915	UGSG	2	1985-2053	A	EX	574	-900	45.6	1971, 1433' FrSulWtr

Fort Good Hope, N.W.T.
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 64° 30' - 67° 30'N
 Pressure Listing

LOCATION	FM	DST#	INTERVAL (FT.)	QUAL CODE	PERM RATING	PMAX (PSIG)	ELEV (FT.)	TEMP (° F)	REMARKS
N-32-6720-13000	BRCK	1	820-970	B	RH	416	-667	-	1966, 880' Swtr
D-40-6730-12945	BRCK	1	1610-1710	D	AV	510	-910	-	1971, 710' Wtr, 60' Mud, 90' WCMud
D-40-6730-12945	SLBS	2	7586-7844	E	VN	-	-	-	1971, 90' Mud
D-40-6730-12945	RNNG	3	2600-2750	D	AV	1103	-1897	16.6	1971, 280' Swtr (Reservoir Anomaly)

FORT GOOD HOPE
125° - 132°W
64° 30' - 67° 30'N
GAS CHEMISTRY DATA

LOCATION	FM	N ₂	CO ₂	H ₂ S	He	C ₁	C ₂	C ₃	C ₄ +	$\frac{C_2+}{C_1+}$	BTU	SPG	REMARKS
O-33-6500-12645	LNDY	1.5	9.9	.1	-	73.4	8.3	2.3	3.3	(15.9)	1216	.785	3944-3960
O-33-6500-12645	LNDY	2.6	23.4	4.3	-	59.6	5.9	2.1	1.9	(14.2)	1156	.902	3944-3960
O-33-6500-12645	NHNN	1.2	12.6	.1	-	76.1	6.2	2.3	1.6	(11.7)	1135	.758	3468-3488
J-71-6530-12715	KCRP	5.9	1.7	-	.010	91.9	.1	-	-	(.1)	930	.595	2943-3022
O-5-6540-12815	KCRP	.6	-	-	-	98.4	.7	.2	-	(.9)	1012	.563	1859-1865
O-5-6540-12815	KCRP	.2	5.9	-	-	92.7	1.0	-	-	(1.0)	965	.965	1837-1849
O-25-6540-12815	CNOL	13.7	.1	-	.010	78.8	4.8	1.7	.8	(8.5)	954	.665	1965-2031
H-47-6550-12900	HDLS	1.2	.4	-	.050	90.4	5.1	1.7	1.2	(8.1)	1086	.621	1920-2144
D-47-6640-12545	ODFD	17.1	-	-	.460	75.9	3.7	1.5	.9	(7.4)	905	.670	4462-4482
D-47-6640-12545	ODFD	56.0	-	-	.120	38.5	3.1	1.2	.8	(13.2)	501	.823	4462-4482
D-47-6640-12545	ODFD	20.3	.1	-	.620	74.3	3.0	1.1	.6	(6.0)	853	.671	4436-4459
D-47-6640-12545	ODFD	19.1	.5	-	.470	74.2	3.3	1.3	1.1	(7.1)	881	.683	4436-4459
A-67-6700-12545	MTCK	20.6	-	-	.700	66.2	6.7	2.7	3.2	(15.9)	971	.751	4232-4268
A-67-6700-12545	MTCK	16.5	-	-	.530	63.9	9.0	5.4	4.7	(23.0)	1111	.796	4232-4268
A-67-6700-12545	MTCK	21.0	-	-	.700	68.8	6.4	1.8	1.4	(12.2)	899	.709	4232-4268
A-67-6700-12545	MTCP	23.0	.2	-	.730	67.2	6.1	1.7	1.1	(11.7)	868	.712	4193-4219
A-67-6700-12545	MTCP	22.6	-	-	.780	68.1	6.0	1.5	1.1	(11.2)	869	.706	4193-4219

FORT GOOD HOPE
125° - 132°W
64° 30' - 67° 30'N
OIL GRAVITY DATA

LOCATION	INTERVAL	FORMATION	API GRAVITY
B-45-6450-12530	3990-4042	RNNG	20.4
O-35-6640-12615	4432-4469	ODFD	72.1

FORT GOOD HOPE AREA, N.W.T.
125° - 132°W
64° 30' - 67° 30'N
WATER CHEMISTRY DATA

LOCATION	INTERVAL (FL.)	FM	CATION/ ANION	RW	PH	TEMP. (° F)	TDS (mg/L)	REMARKS
L-66-6450-12500	2270-2345	CRCS	NaCl > HCO ₃	1.270	8.2	73°	5203	Formation water
L-66-6450-12500	2960-2985	CRCS	NaCl	.175	7.2	72°	40212	Formation water
B-45-6450-12530	3990-4042	RNNG	NaCl	.306	8.0	68°	22279	Formation water
B-45-6450-12530	4042-4196	RNNG	NaCl	.314	7.8	68°	22103	Formation water
B-45-6450-12530	4042-4196	RNNG	NaCl	.275	8.3	73°	21922	Formation water
K-14-6500-12515	2234-2400	LRCC	-	2.950	8.3	75°	2320	Mud filtrate
A-53-6500-12530	3223-3240	FKLM	-	.762	8.8	77°	4712	Mud filtrate
A-53-6500-12530	3609-3691	FKLM	NaCl	.240	8.0	77°	25840	Formation water
K-71-6500-12545	4918-4972	HDLS	NaCl	.078	7.8	68°	107132	Formation water
A-37-6500-12600	3395-3500	BRCK	NaCl > SO ₄	.338	8.7	68°	24326	Poss. formation water
O-33-6500-12645	3944-3960	LNDY	CaCl	.298	6.7	77°	18568	Acid contaminated
O-33-6500-12645	3944-3960	LNDY	CaCl	.151	6.0	77°	32637	Acid contaminated
O-33-6500-12645	3944-3960	LNDY	CaCl	.157	4.0	77°	39533	Acid contaminated
O-33-6500-12645	3944-3960	LNDY	CaCl	.323	6.8	77°	18529	Acid contaminated
O-33-6500-12645	3944-3960	LNDY	CaCl	.371	7.0	77°	16566	Acid contaminated
O-33-6500-12645	3468-3488	NHNN	CaCl	.183	6.7	77°	31117	Acid contaminated
O-33-6500-12645	3468-3488	NHNN	CaCl	.372	6.0	77°	19622	Acid contaminated
O-33-6500-12645	3317-3386	CNOL	CaCl	.209	6.1	77°	31356	Acid contaminated
K-3-6510-12645	7320-7600	BRCK	NaCl > SO ₄	.260	6.7	68°	27678	Formation water
C-21-6520-12500	3278-3435	MTKD	-	.926	7.7	68°	6673	Mud filtrate
C-21-6520-12500	3280-3435	MTKD	-	1.100	8.3	64°	7625	Mud filtrate
J-71-6530-12715	2943-3022	KCRP	NaCl > HCO ₃	.400	6.9	77°	13681	Formation water
J-71-6530-12715	2943-3022	KCRP	NaCl > HCO ₃	.420	7.4	77°	11478	Formation water

Fort Good Hope, N.W.T.
 125° - 132°W / 64° 30' - 67° 30'N
 Water Chemistry Data

LOCATION	INTERVAL (Ft.)	FM	CATION/ ANION	RW	PH	TEMP. (° F)	TDS (mg/L)	REMARKS
J-71-6530-12715	2943-3022	KCRP	NaCl > HCO ₃	.370	7.4	77°	16806	Formation water
J-71-6530-12715	2943-3022	KCRP	NaCl > HCO ₃	.350	7.3	77°	17412	Formation water
L-09-6530-12930	4507-4524	HRDV	-	.768	-	68°	-	Incomplete analysis
L-09-6530-12930	7623-7638	RNNG	NaCl	.081	7.0	68°	109220	Formation water
L-09-6530-12930	7870-8130	RNNG	NaCl	.100	9.5	68°	78250	Formation water
L-09-6530-12930	8196-8550	RNNG	NaCl	.160	7.2	68°	49680	Formation water
I-77-6530-13045	3712-3862	BRCK	-	.843	7.6	72°	7042	Mud filtrate
I-77-6530-13045	4870-4970	RNNG	-	1.470	7.6	70°	4389	Mud filtrate
K-68-6540-12800	700-820	HDLS	-	4.560	7.8	68°	1611	Mud filtrate
K-68-6540-12800	1640-1770	DTRL	-	3.630	6.7	73°	2440	Mud filtrate
K-68-6540-12800	1640-1770	DTRL	NaCl > SO ₄	2.130	6.7	68°	4147	Poss. formation water
K-68-6540-12800	2030-2105	MTKD	-	4.690	7.2	68°	2921	Mud filtrate
K-68-6540-12800	3705-3780	MTKD	NaCl > SO ₄	.529	7.9	68°	17248	Formation water
K-68-6540-12800	3705-3780	MTKD	NaCl > SO ₄	.433	8.9	68°	17860	Formation water
D-5-6540-12815	2385-2395	KCRP	-	-	11.0	-	240	Mud filtrate
D-5-6540-12815	1859-1865	KCRP	NaCl > SO ₄	.321	8.2	77°	21848	Dilute form. water
D-5-6540-12815	1837-1849	KCRP	NaCl > HCO ₃	.215	8.1	77°	35031	Formation water
D-5-6540-12815	2090-2123	KCRP	CaCl	.134	1.6	77°	39953	Acid contaminated
O-25-6540-12815	1965-2031	CNDL	-	1.240	9.0	77°	6201	Mud filtrate
O-25-6540-12815	2880-2985	BRCK	NaCl > SO ₄	.374	7.8	77°	18364	Formation water
L-24-6540-12845	3700-3750	KCRP	NaCl > HCO ₃	.980	7.3	73°	7431	Formation water
J-5-6550-12815	630-653	CRCS	-	3.680	7.5	68°	1826	Mud filtrate
J-5-6550-12815	1940-2133	BRCK	NaCl > SO ₄	.500	7.7	70°	14721	Formation water
H-47-6550-12900	1920-2144	HDLS	-	-	7.9	-	21200	Incomplete analysis

LOCATION	INTERVAL (Ft.)	FM	CATION/ ANION	RW	PH	TEMP. (° F)	TDS (mg/L)	REMARKS
H-47-6550-12900	3057-3230	RNNG	NaCl > SO4	.169	7.8	68°	51438	Formation water
A-23-6550-12915	4165-4262	BRCK	NaCl	.083	7.6	72°	88060	Formation water
A-23-6550-12915	4460-4766	RNNG	NaCl	.072	7.3	73°	100075	Formation water
D-53-6600-12900	3650-3760	BRCK	NaCl > SO4	.120	7.1	68°	72513	Formation water
0-62-6600-12900	4390-4600	RNNG	NaCl > SO4	.060	6.7	75°	130524	Formation water
N-37-6610-12615	4073-4254	MTCP	-	.048	9.6	77°	248472	Salt Base Mud Filtrate
A-53-6610-12900	829-1117	CNOL	-	1.200	9.2	70°	6486	Mud filtrate
A-53-6610-12900	2742-2770	BRCK	NaCl > SO4	.340	8.1	73°	19066	Formation water
N-39-6620-12815	1390-1443	BRCK	NaCl > HCO ₃	1.260	7.7	68°	6043	Formation water
N-39-6620-12815	2170-2220	BRCK	NaCl > SO4	.347	7.9	68°	16396	Formation water
P-55-6620-12830	1439-1544	BRCK	NaCl > SO4	.774	7.4	68°	10429	Formation water
I-38-6620-13145	4767-4800	BRCK	NaCl	.065	5.5	66°	174897	Contaminated
L-61-6630-12845	2962-3108	RNNG	NaCl > SO4	-	8.1	-	25923	Formation water
L-61-6630-12845	4045-4316	RNNG	NaCl > SO4	.098	7.1	68°	88833	Formation water
K-47-6630-13000	2104-2155	BRCK	NaCl	.130	7.6	72°	50251	Formation water
K-47-6630-13000	2376-2425	BRCK	NaCl	.120	7.8	72°	54875	Formation water
0-47-6640-12545	4462-4482	ODFD	-	.040	-	77°	159200	Salt Base Mud Filtrate
0-47-6640-12545	4462-4482	ODFD	-	.044	-	77°	158100	Salt Base Mud Filtrate
0-47-6640-12545	4462-4482	ODFD	-	.044	-	77°	157800	Salt Base Mud Filtrate
0-47-6640-12545	4462-4482	ODFD	-	.045	-	77°	157400	Salt Base Mud Filtrate
0-47-6640-12545	4436-4459	ODFD	-	.043	-	77°	165393	Salt Base Mud Filtrate
0-47-6640-12545	4222-4275	MTCP	-	.044	-	77°	159449	Salt Base Mud Filtrate
0-47-6640-12545	4436-4459	ODFD	-	.040	-	77°	159893	Salt Base Mud Filtrate
0-47-6640-12545	4406-4432	MTCP	-	.039	-	77°	168402	Salt Base Mud Filtrate

LOCATION	INTERVAL (Ft.)	FM	CATION/ ANION	RW	PH	TEMP. (° F)	TDS (mg/L)	REMARKS
0-47-6640-12545	4422-4275	MTCP	-	.039	-	77°	164147	Salt Base Mud Filtrate
0-35-6640-12615	4432-4469	CDFD	-	.038	-	77°	184000	Incomplete analysis
L-26-6640-13015	3400-3560	RNNG	-	.074	12.1	72°	114197	Salt Base Mud Filtrate
K-4-6640-13045	3774-3840	RNNG	NaCl	.096	9.0	68°	94445	Formation water
K-4-6640-13045	4880-4880	RNNG	NaCl	.119	7.6	68°	70919	Formation water
K-4-6640-13045	6330-6377	RNNG	NaCl	.058	6.5	68°	194191	Formation water
K-4-6640-13045	7299-7299	RNNG	NaCl	.101	7.0	68°	89074	Formation water
K-4-6640-13045	8026-8026	SLIN	HCO ₃	.920	8.6	68°	9692	Mud filtrate
A-67-6700-12545	4232-4268	MTCK	-	.040	-	77°	169500	Incomplete analysis
A-67-6700-12545	4193-4219	MTCP	-	.040	-	77°	168047	Incomplete analysis
M-63-6710-12615	3450-3500	MTCP	NaCl	.060	8.1	68°	168608	Formation water
P-75-6710-12815	1046-1046	BRCK	NaCl > SO ₄	.943	8.3	68°	5920	Poss. formation water
P-75-6710-12815	1326-1351	MTKD	CaCl	.452	11.2	68°	15277	Contaminated
D-45-6720-12500	3186-3233	MTKD	NaCl	.134	7.0	70°	58986	Formation water
E-15-6720-12615	4518-5996	MTCP	NaCl	.054	6.7	72°	165623	Formation water
J-13-6720-12645	4140-4199	MTCP	-	.060	-	77°	280595	Salt Base Mud Filtrate
J-13-6720-12645	4140-4199	MTCP	-	.060	9.0	77°	298004	Salt Base Mud Filtrate
J-13-6720-12645	4140-4199	MTCP	-	.040	11.6	77°	287234	Salt Base Mud Filtrate
J-13-6720-12645	4140-4199	MTCP	-	.060	11.5	77°	292531	Salt Base Mud Filtrate
J-42-6720-12915	1985-2053	UGSG	NaCl > SO ₄	.976	7.7	68°	7266	Poss. Formation water
N-32-6720-13000	820-970	BRCK	NaCl > HCO ₃	.438	7.8	68°	14189	Formation water
D-40-6730-12945	1610-1710	BRCK	NaCl > SO ₄	.850	7.9	68°	8080	Formation water
D-40-6730-12945	2600-2750	RNNG	NaCl > SO ₄	.083	9.5	68°	125336	Formation water

FORT GOOD HOPE AREA, N.W.T.
 125° - 132° W
 64° 30' - 67° 30' N
 POTENTIOMETRIC SURFACE VALUES

<u>Location</u>	<u>Formation</u>	<u>Potentiometric Surface (feet)</u>
K-68-6540-12800(1)B	HDLS	461
H-71-6540-12700(1)D	BRCK	510
A-53-6610-12900(2)C	KCRP	198
D-72-6630-12900(2)B	NHNN	379
D-40-6730-12945(1)D	BRCK	265
J-42-6720-12915(2)A	VGSG	420
G-26-6600-12830(2)C	BRCK	225
N-39-6620-12815(1)B	BRCK	365
O-17-6530-12800(4)B	KCRP	189
A-47-6710-13045(3)C	BRCK	408
O-62-6600-12900(2)D	KCRP	215
K-47-6630-13000(2)A	BRCK	245
H-47-6550-12900(2)D	BRCK	341
J-05-6550-12815(3)D	BRCK	370
F-57-6540-12800(2)B	BRCK	375
J-71-6530-12715(1)A	KCRP	351
L-61-6630-12845(1)C	RNNG	269
c-31-6600-12845(2)B	BRCK	239
B-45-6450-12530(2)A	RNNG	453
L-24-6540-12845(2)B	KCRP	341
D-53-6600-12900(4)B	BRCK	255
K-04-6640-13045(2)A	RNNG	250
A-23-6550-12915(2)C	BRCK	263
A-59-6530-13030(5)A	BRCK	1167

E. KEY DST CHARTS

5414-70-01 B

64°44'09"

125°38'18"

CDN. DELHI

76 or 5

E. MACKEY B-45

KB 851 DST #1

3990 - 4042

RONNING

DRILL-STEM TEST DATA

Well Name	Candel Decking et al East MacKay	Test No.	1
Well Number	B 45	Zone Tested	Silurian - Ordovician
Company	Canadian Delhi Oil Ltd.	Interval	3990 - 4042
Comp. Rep.	W. R. Smith	Tester	Budvarson
		Date	February 22, 1971.

Type of Test Dual Bottom Hole RFS Tool No. 50 (To Core Lab, Edmonton)

Preflow _____ mins. ISI _____ mins. Flow _____ mins. FSI _____ mins

Specify Inside or Outside	In.	REC. No.	2227	Out.	REC. No.	2011	REC. No.
	3600	RANGE	12	HR. CLOCK	5500	RANGE	12
DEPTH			3914				3992
Initial Hydro Mud Press							
Initial Shut-In Press			No Pressures Recorded				
Initial Flow Press							
Final Flow Press							
Final Shut-In Press							
Final Hydro Mud Press							

Mud Drop Nil Fluid Loss 7.8 Mud Weight 9.2
 Viscosity 60 Temperature °F 148 Net Pay Tested _____
 Top Packer Depth 3925 Bottom Packer Depth 3990 Total Depth 4042
 Drill Pipe Size 4 1/2" E. H. Wt. 16.60 Drill Collar I.D. 2 7/8" Ft. Run 534
 Surface Choke Size Closed Bottom Choke Size 1" Main Hole Size 7 7/8"
 Anchor Size _____ Rat Hole Size _____ Feet of Rat Hole _____
 Cushion Amount _____ Type _____ Rubber Size 6 5/8"

Fluid Recovery Total Feet 2460
 Recovered 100 Feet of Oil Cut Mud
 Recovered 1830 Feet of Oil 20.4° API
 Recovered 530 Feet of Salt Water (1925 ppm)
 Recovered _____ Feet of _____
 Recovered _____ Feet of _____

Gas Recovery _____ How Measured _____ Riser size: _____

_____ mins.	Temp. °F	Press Rdg.	_____ psi	Orifice Size	_____	=	_____ MCF/Day
_____ mins.	Temp. °F	Press Rdg.	_____ psi	Orifice Size	_____	=	_____ MCF/Day
_____ mins.	Temp. °F	Press Rdg.	_____ psi	Orifice Size	_____	=	_____ MCF/Day
_____ mins.	Temp. °F	Press Rdg.	_____ psi	Orifice Size	_____	=	_____ MCF/Day
_____ mins.	Temp. °F	Press Rdg.	_____ psi	Orifice Size	_____	=	_____ MCF/Day
_____ mins.	Temp. °F	Press Rdg.	_____ psi	Orifice Size	_____	=	_____ MCF/Day

Shut Off Time for Drill Pipe 18

REMARKS: Fair blow through out test.
Both recorders had stylus disengage due to rough trip in hole.

TESTING REPORT

WARNER

45 LANDING SUB _____

~~XXXXXXXXXX~~ C. O. Sub _____ 1.00

~~XXXXXXXXXX~~ P.O. SUB _____ 1.00

~~XXXXXX~~ Rec. Well _____ 4.00

SHUT IN TOOL _____ 5.20

R.F.S. No. 50 _____ 3.50

R.F.S. No. _____

HYDRAULIC TOOL _____ 7.15

JARS Sutliff # 19 _____ 5.50

RECORDER No. 2227 _____ 5.00 DEPTH 3914

RECORDER No. _____ DEPTH _____

SAFETY JOINT _____ 1.75

BY PASS SUB _____

3925 _____ PACKER _____ 5.00

1.00

Drill Collars & C.O. Subs 59.00

3990 _____ PACKER _____ 5.00

1.00

TOTAL TOOL ABOVE INTERVAL 104.10

ANCHOR—SPECIFY _____

BLANK OFF OR BY PASS SUB _____

RECORDER No. 2011 _____ 5.00 DEPTH 3992

PACKER _____

TOTAL INTERVAL 52.00

PACKER _____

ANCHOR—SPECIFY _____

Perfs. _____ 43.00

RECORDER No. _____ DEPTH _____

3.00

~~XXXX~~ Rec. Well 4.00

SHUT IN TOOL 5.20

R.F.S. No. 50 3.50

R.F.S. No. _____

HYDRAULIC TOOL 7.15

JARS Sutliff # 19 5.50

RECORDER No. 2227 5.00 DEPTH 3914

RECORDER No. _____ DEPTH _____

SAFETY JOINT 1.75

BY PASS SUB _____

1. PACKER DEPTH 3925

PACKER 5.00
1.00

Drill Collars & C.O. Subs 59.00

2. PACKER DEPTH 3990

PACKER 5.00
1.00

TOTAL TOOL ABOVE

ANCHOR—SPECIFY _____

BLANK OFF OR BY PASS SUB _____

RECORDER No. 2011 5.00 DEPTH 3992

3. PACKER DEPTH _____

PACKER _____

TOTAL INTERVAL

4. PACKER DEPTH _____

PACKER _____

ANCHOR—SPECIFY _____

Perfs. 43.00

RECORDER No. _____ DEPTH _____

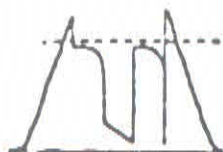
TOTAL DEPTH 4042

BULLNOSE 3.00

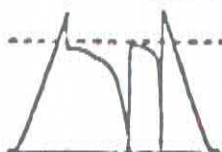
TOTAL TAIL PIPE

TOTAL TEST TOOL

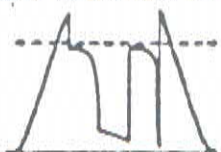
DST CHARTS FOR COMPARATIVE VISUAL ANALYSIS



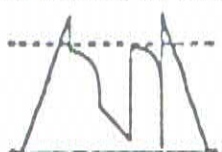
HIGH PERMEABILITY



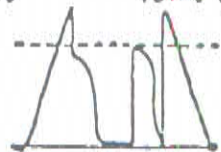
MEDIUM PERMEABILITY



LOW PERMEABILITY



HIGH PERMEABILITY



MEDIUM PERMEABILITY



LOW PERMEABILITY



R.F.S. LEASE ANALYSIS

R.F.S. No.	50	Test No.	1
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Sampler Press.	P.S.I.		
Gas Volume	C.F.	Temp.	*F (at meter)
Total Fluid Volume	C.C.'s	Temp.	*F (at separator)

B S & W

$$\text{Percentage of Water} = \frac{\text{volume of water} \text{ C.C.'s}}{\text{total volume} \text{ C.C.'s} - \text{volume of solvent} \text{ C.C.'s}} \times 100 = \%$$

$$\text{Percentage of Oil} = \frac{\text{volume of oil} \text{ C.C.'s}}{\text{total volume} \text{ C.C.'s} - \text{volume of solvent} \text{ C.C.'s}} \times 100 = \%$$

$$\text{Percentage of Solids} = \frac{\text{volume of solids} \text{ C.C.'s}}{\text{total volume} \text{ C.C.'s} - \text{volume of solvent} \text{ C.C.'s}} \times 100 = \%$$

G.O.R. DETERMINATION

$$\text{G.O.R.} = \frac{\text{C.F.} \times 1000 \times 160}{\text{C.C.'s of Oil}} = \text{c.f./bbl. oil}$$

CRUDE A.P.I.

Gravity	20.4	A.P.I.*	Temp.	60	*F
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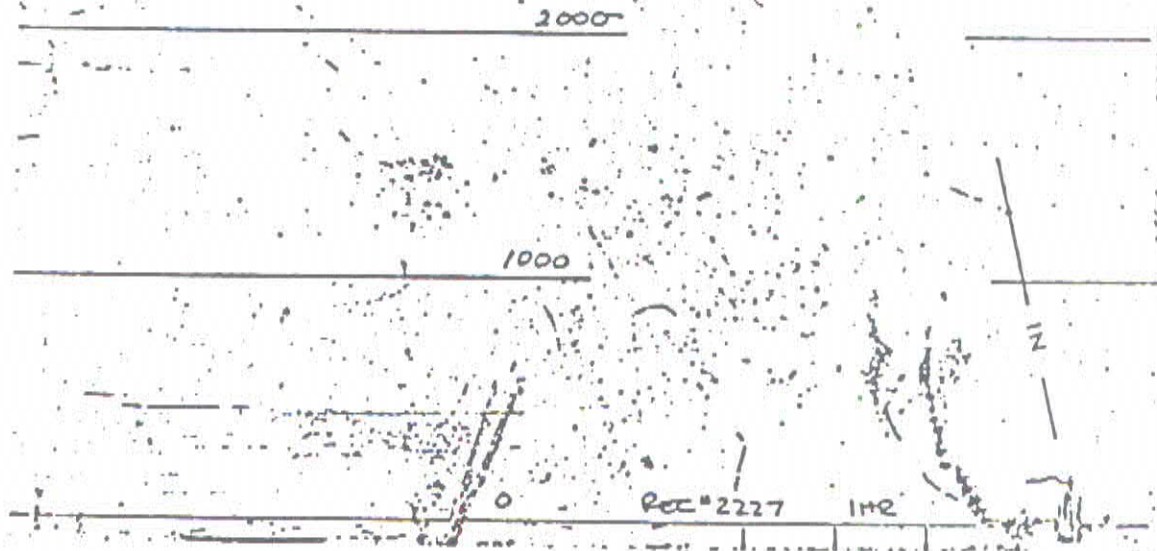
TOTAL DISSOLVED SOLIDS (P.P.M. SALT)

Refractometer Reading 2.2 % = from conversion chart 1925 P.P.M.

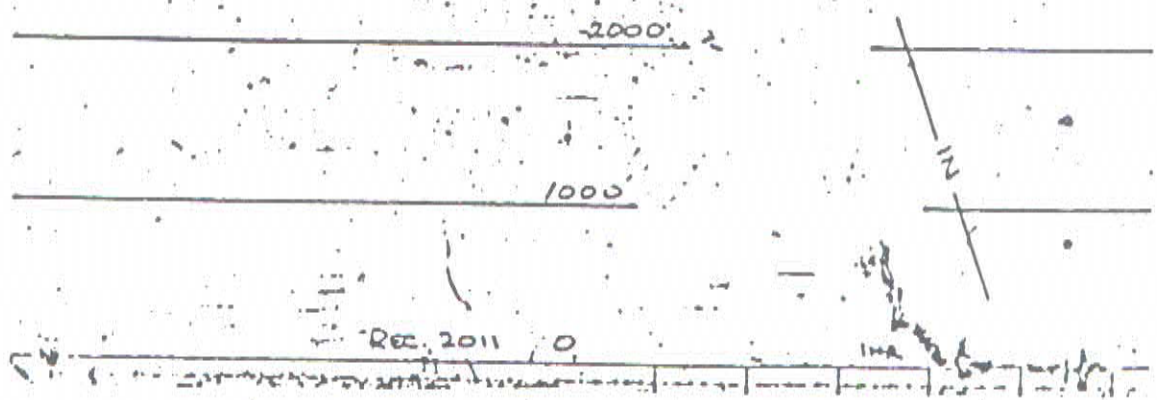
REMARKS:

R. F. S. // 50 & 1 Doz. (12) Fluid Sample Containers shipped to Edmonton via F. W. A. & BJ Service Division Borg-Warner (Canada) Ltd. to Core Lab.

INS. #2007 CANDEL E. MACKAY B-45 TEST #1



OUTS. #2011 CANDEL E. MACKAY B-45 TEST #1 79



5400-10-01 B

64° 56' 05"

126° 05' 42"

MOBIL

SLATER RIVER A-37

KB 435 DST #1

3395 - 3500

BEAR ROCK

DRILL-STEM TEST DATA

Well Name <u>Mobil Slater A-37</u>		Test No <u>One</u>
Well Number <u>64-56 05 & 126-05-42 W</u>		Zone Tested <u>Bear Rock</u>
Company <u>Jennings Int. Drilling</u>		Interval <u>3395 - 3500</u>
Comp Rep <u>J. Lukasiwich</u>	Tester <u>B. Budvarson</u>	Date <u>August 21, 1970</u>

Type of Test Dual Bottom Hole RFS Tool No. 51 & 100

Preflow 5 mins ISI 55 mins Flow 65 mins FSI 115 min

Specify Inside or Outside.	INS REC No. <u>5040</u> 3600 RANGE <u>12</u> HR. CLOCK	OUT REC No. <u>5041</u> 3600 RANGE <u>12</u> HR. CLOCK	REC No. _____ RANGE _____ HR. CLOCK
DEPTH	<u>3377</u>	<u>3396</u>	
Initial Hydro Mud Press	<u>1677</u>	<u>1686</u>	
Initial Shut-In Press	<u>1573</u>	<u>1584</u>	
Initial Flow Press	<u>213</u>	<u>240</u>	
Final Flow Press	<u>357</u>	<u>402</u>	
Final Shut In Press	<u>1452</u>	<u>1459</u>	
Final Hydro Mud Press	<u>1675</u>	<u>1681</u>	

Mud Drop 30' Fluid Loss 10 Mud Weight 9.5
 Viscosity 59 Temperature °F 120 Net Pay Tested _____
 Top Packer Depth 3390 Bottom Packer Depth 3395 Total Depth 3500
 Drill Pipe Size 4 1/2 E.H. Wt. 16 Drill Collar I.D. 2 7/8 Ft Run 538
 Surface Choke Size Closed Bottom Choke Size 1 Main Hole Size 7 7/8
 Anchor Size 4 1/2" O.D. Rat Hole Size _____ Feet of Rat Hole _____
 Cushion Amount _____ Type _____ Rubber Size 63

Fluid Recovery Total Feet 675'
 Recovered 615 Feet of Drilling Mud
 Recovered 60 Feet of Sulphur H₂O mixture
 Recovered _____ Feet of _____
 Recovered _____ Feet of _____
 Recovered _____ Feet of _____

Gas Recovery How Measured _____ Riser size: _____

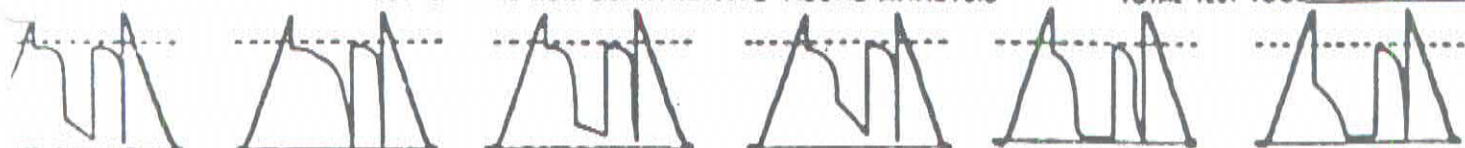
_____ mins	Temp. °F	Press Rdg. _____ psi	Orifice Size _____	= _____ MCF/Day
_____ mins	Temp. °F	Press Rdg. _____ psi	Orifice Size _____	= _____ MCF/Day
_____ mins	Temp. °F	Press Rdg. _____ psi	Orifice Size _____	= _____ MCF/Day
_____ mins	Temp. °F	Press Rdg. _____ psi	Orifice Size _____	= _____ MCF/Day
_____ mins	Temp. °F	Press Rdg. _____ psi	Orifice Size _____	= _____ MCF/Day
_____ mins	Temp. °F	Press Rdg. _____ psi	Orifice Size _____	= _____ MCF/Day

Bleed Off Time for Drill Pipe _____

REMARKS Good blow during preflow. Reset packers & tool on initial flow due to mud dropping in annulus. Strong blow during initial flow decreasing slowly to weak blow on final flow.

	43 CHAMBER		
	OR P.O. SUB	1.00	
	CO SUB	1.00	
	SHUT IN TOOL	5.20	
	R.F.S. No. 51	3.50	
	R.F.S. No. 100	3.50	
	HYDRAULIC TOOL	7.15	
	JARS Suttiff	5.50	
	RECORDER No. 5040	5.00	DEPTH 3377
	RECORDER No.		DEPTH
	SAFETY JOINT	1.75	
	BY PASS SUB		
TM 3390	PACKER	6.00	
TM 3395	PACKER	5.00	TOTAL TOOL ABOVE INTERVAL 44.6
	ANCHOR-SPECIFY	1.00	
	BLANK OFF OR BY PASS SUB		
	RECORDER No. 5041	1.00	DEPTH 3396
TM	PACKER		TOTAL INTERVAL 105.00
TM	PACKER		
	ANCHOR-SPECIFY parfa	9.00	
	RECORDER No.		DEPTH
	Drill Collars	90.00	
	C.O. Sub	1.00	
		3.00	
3500	BULLNOSE		TOTAL TAIL PIPE 60.00
			TOTAL TEST TOOL

DST CHARTS FOR COMPARATIVE VISUAL ANALYSIS



HIGH PERMEABILITY NO DAMAGE EFFECT
 HIGH PERMEABILITY NO DAMAGE EFFECT
 MEDIUM PERMEABILITY STRONG DAMAGE EFFECT
 MEDIUM PERMEABILITY NO DAMAGE EFFECT
 LOW PERMEABILITY STRONG DAMAGE EFFECT
 LOW PERMEABILITY NO DAMAGE EFFECT

DST PRESSURE INCREMENTS

Recorder No. 5040

Depth 3377

Points	INITIAL CIP				FINAL CIP			
	Time Defl. "	T + 0	$\frac{T + 0}{0}$	PSIG	Time Defl. "	T + 0	$\frac{T + 0}{0}$	PSIG
1	0			164	0			357
2	5			1342	5			567
3	10			1407	10			628
4	15			1489	15			750
5	20			1512	20			907
6	25			1523	25			993
7	30			1541	30			1062
8	35			1550	35			1132
9	40			1558	40			1184
10	45			1565	45			1228
11	50			1570	50			1263
12	54			1573	55			1294
13					60			1319
14					65			1342
15					70			1360
16					75			1376
17					80			1390
18					85			1402
19					90			1413
20					95			1422
21					100			1431
22					105			1438
23					110			1447
24					113			1452

Recorder No 5061

Depth 3396

Points	INITIAL CIP				FINAL CIP			
	Time Diff.	T+G	$\frac{T+G}{G}$	PSIG	Time Diff.	T+G	$\frac{T+G}{G}$	PSIG
1	0	5	0	188	0	70	0	402
2	5	10	2.00	1336	5	75	15.0	517
3	10	15	1.50	1462*	10	80	3.00	632*
4	15	20	1.33	1498	15	85	5.65	749
5	20	25	1.25	1522	20	90	4.50	854 =
6	25	30	1.20	1540*	25	95	3.80	961 =
7	30	35	1.17	1552	30	100	3.34	1054
8	35	40	1.14	1563	35	105	3.00	1126*
9	40	45	1.13	1571	40	110	2.75	1192
10	45	50	1.11	1576*	45	115	2.55	1222
11	50	55	1.10	1581	50	120	2.40	1265*
12	55	60	1.09	1584*	55	125	2.28	1310
13					60	130	2.16	1332
14					65	135	2.02	1357
15					70	140	2.00	1372*
16					75	145	1.93	1394
17					80	150	1.88	1392
18					85	155	1.82	1414
19					90	160	1.78	1421
20					95	165	1.74	1434*
21					100	170	1.70	1441
22					105	175	1.66	1448*
23					110	180	1.64	1455
24					115	185	1.61	1459*

CALCULATIONS FOR LIQUID RECOVERY

DATA

Recovery	(4.30 PPI)	538	D.C. ft	Estimated viscosity (μ)	1	cp
	(1.95 PPI)	137	D.P. ft	Total flowing time (t)	70	min
Interval (h)	(FST)	50	ft	Reservoir press (P_o)	1700	psig
Wellbore radius (r_w)		.334	ft	Final SIP (P_w)	1459	psig
Cushion volume			bbl	Final FP (P_f)	407	psig
Annular mud vol			bbl	Slope (ΔP)	1150	psig/cycle

AVERAGE DST PRODUCTION RATE

$$Q = \frac{1440 \text{ (Recovery in bbls.)}}{\text{Total flowing time (min)}}$$

$$= \frac{1440}{(6.25)} = 131.3 \text{ bbl/day}$$

IN SITU CAPACITY

$$Kh = \frac{162.6 Q \mu}{\Delta P} = \frac{162.6 (131.3) (1)}{1150}$$

$$= 18.5 \text{ md-ft}$$

EFFECTIVE PERMEABILITY

$$K = \frac{\text{In situ Capacity}}{h} = \frac{18.5}{50}$$

$$= .37 \text{ md.}$$

PRODUCTIVITY INDEX

$$PI = \frac{Q}{P_o - P_f} = \frac{131.3}{1292} = .106 \text{ bbl/day/psi}$$

APPROXIMATE DRAINAGE RADIUS:

$$b = \sqrt{K t} = \sqrt{(.37) (70)} = 5.1 \text{ ft.}$$



CALCULATIONS FOR LIQUID RECOVERY (PAGE 2)

ESTIMATED DAMAGE RATIO:

$$\text{D.R.} = \frac{P_o - P_i}{2 (\Delta P) \log b/r_w} = \frac{1298}{(1150) \log \left(\frac{5.1}{.334} \right)}$$

PRODUCTION WITH DAMAGE REMOVED

$$Q_{\text{No Damage}} = Q(\text{D.R.}) = \quad = \quad \text{bbl./day}$$

NO DAMAGE INDICATED

NOMENCLATURE

Q	=	Average DST Production (oil and/or water)—bbl/day
Q_g	=	Gas production rate during test corrected to 14.4 psia and 60° F—MCF/D
K	=	Permeability—md
h	=	Thickness of zone or interval tested—ft.
μ	=	Viscosity—cp
Z	=	Deviation factor for gas—dimensionless
T	=	Reservoir temperature—°R
t	=	Total flowing time—min.
θ	=	Shut-in time—min.
r_w	=	Radius of wellbore—ft.
b	=	Radius of drainage or investigation (i.e. r_e)—ft.
P_o	=	Original Reservoir pressure (extrapolated)—psig
P_s	=	Final shut-in pressure—psig
P_i	=	Final flowing pressure—psig
P_s	=	Extrapolated pressure when $\frac{T+\theta}{\theta}$ is very small—psig (i.e., effect of damage is shown in build-up curve when shut-in time (θ) is very small in comparison to flowing time (t)).
ΔP	=	Slope of straight line portion of pressure build up plot—psig/cycle or psig ² /cycle (gas)
$\Delta P_{\text{Damaged Zone}}$	=	Pressure drop caused by damaged zone.
A O F	=	Absolute open flow (estimated from DST data and using an assumed slope of 45°).

SUMMARY

Initial shut-in pressure (ISIP)	1584	psi
Formation pressure (extrapolated)	1700	psi
Final flowing pressure (FFP)	402	psi
Final shut-in pressure (FSIP)	1459	psi
Effective permeability (K)	.37	md
DST production rate	131.3	BBL/D
		MCF/D
		BBL/D
DST production without damage NO DAMAGE INDICATED		MCF/D
Estimated A O F with no damage		MCF/D

ASSUMPTIONS AND LIMITATIONS

The above DST interpretation calculations require several necessary assumptions to provide a quick estimate of many of factors involved. As a result the information gained should be used to form an opinion or estimate only, until the assumptions are verified by other data or by a more complete analysis and testing.

EXTRAPOLATION REDUCED FROM EXPANDED SCALE

DST No

1

Well 64-56-05:126-03-42W

Recorder No

5041

Depth

3356

ft.

ΔP

1150

psig/cycle

$\Delta P(\text{gas})$

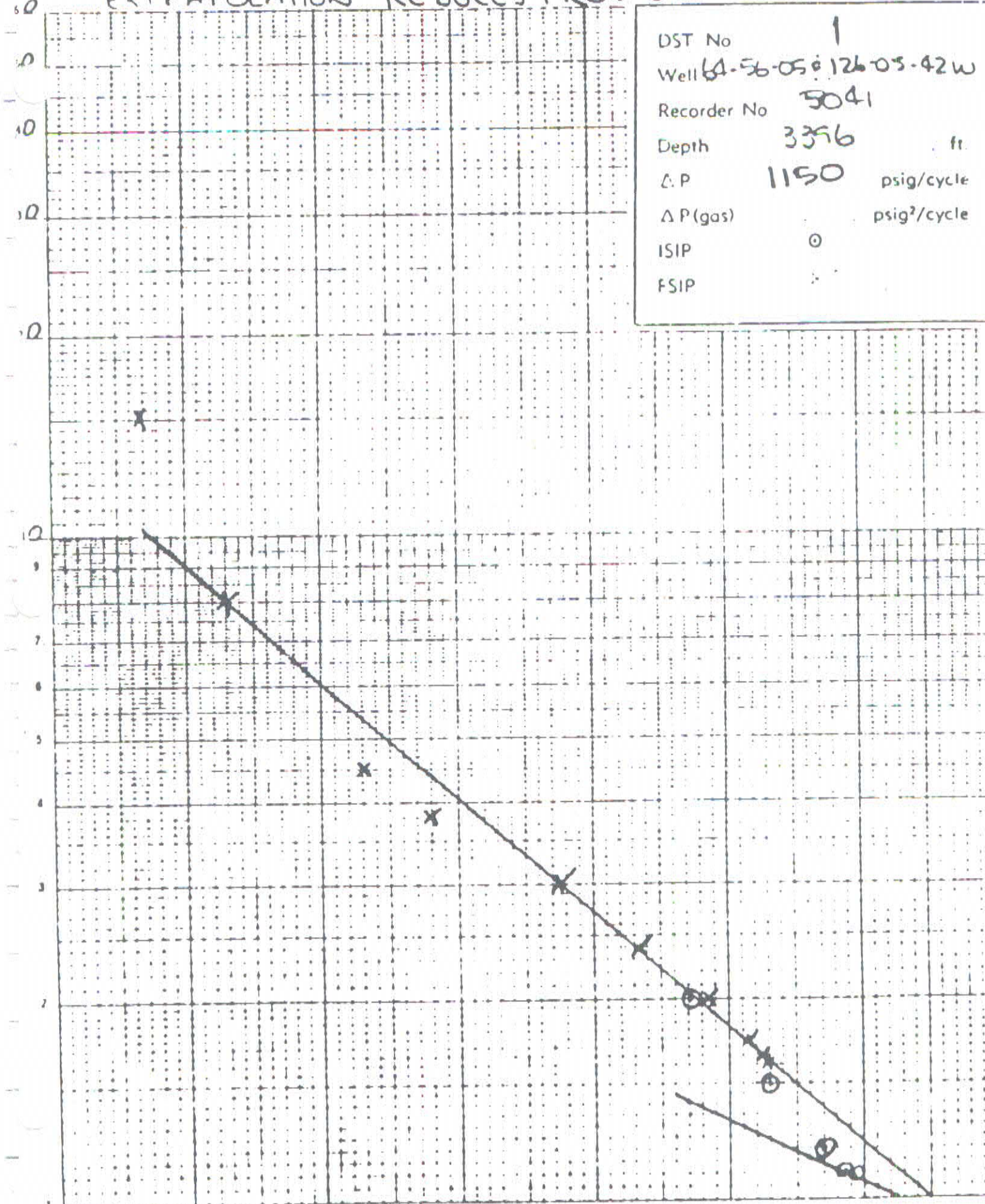
psig²/cycle

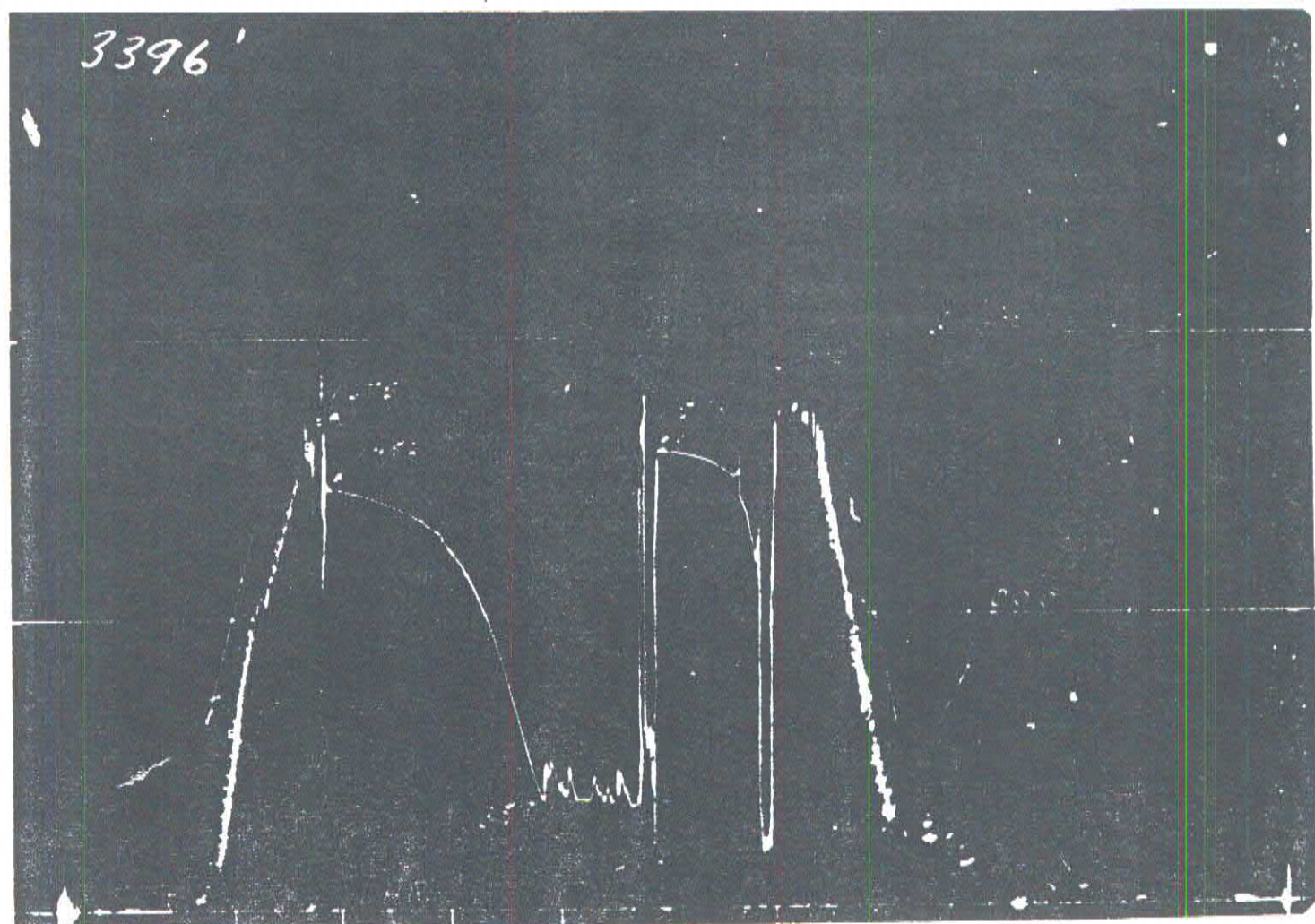
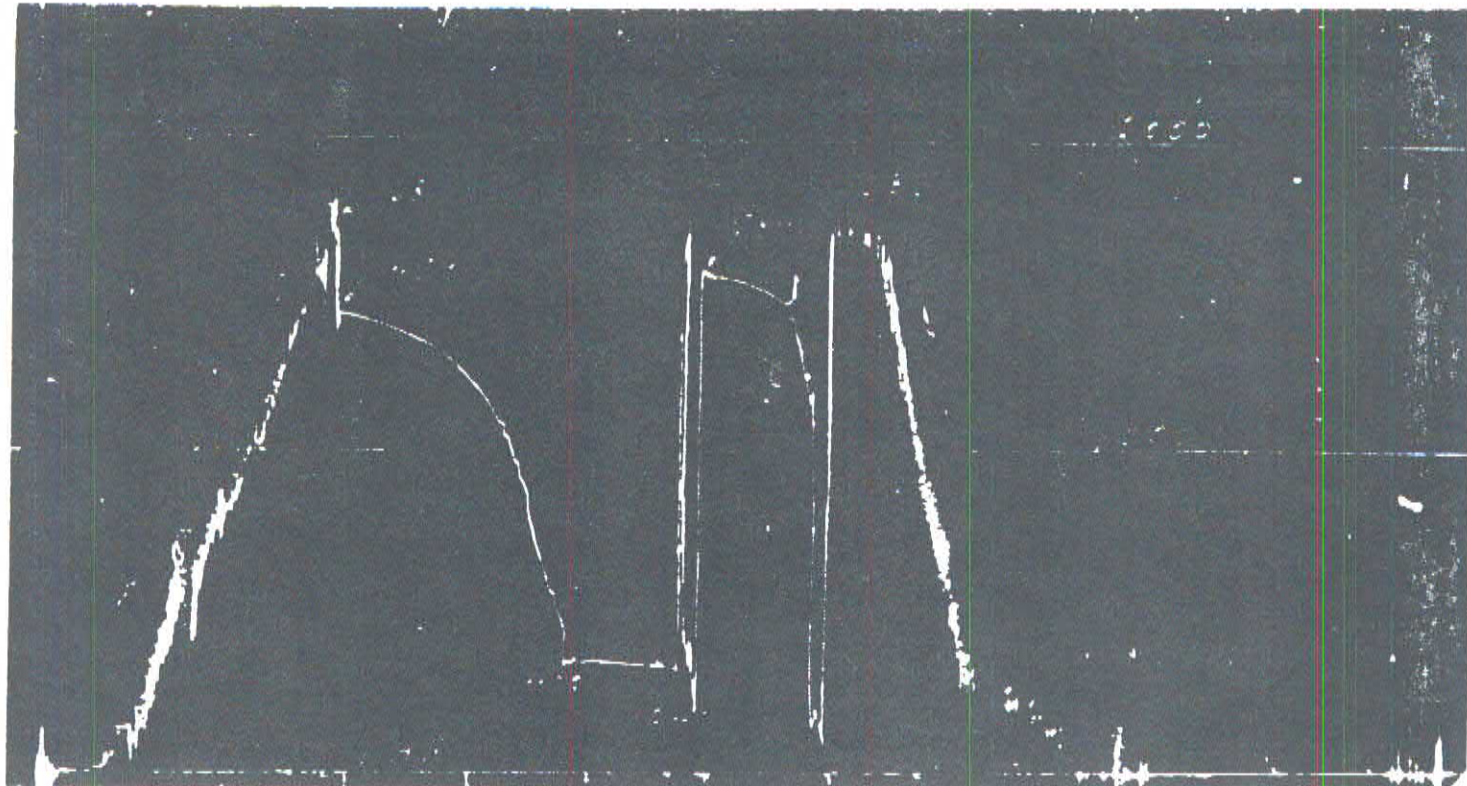
ISIP

0

FSIP

0





A-37 6500-12600 'DST / 3395-3500' BRCK
'DST PLUGGING', S-SHAPE

5323-20-01 A

65° 26' 53"

127° 32' 35"

PACIFIC

JUDILE 0-17

KB 196 DST #1

1320 - 1382

KEE SCARP

[illegible]

PRESSURE DATA

PRESSURE DATA				FIELD REPORT No. C-10155	
INSTRUMENT No.		AK1-1847	AK1-2259		
CAPACITY (phg)		2100	2300		
INSTRUMENT DEPTH		1340	1345		
INSTRUMENT OPENING					
PRESSURE GRADIENT psi/FT.					
WELL TEMP. °F.					
INITIAL HYDROSTATIC	A	810#	815#		
FIRST FLOW	B				
INITIAL SHUT-IN	C		FALSE		
SECOND FLOW	D	38#	40#		
D-1		91#	93#		
SECOND SHUT-IN	E				
THIRD FLOW	F				
FINAL SHUT-IN	G	609#	609#		
FINAL HYDROSTATIC	H	728#	731#		
REMARKS:					

TIME DATA		
TIME GIVEN	TIME COMPUTED	
5	MINS	MINS
30	MINS	MINS
60	MINS	MINS
	MINS	MINS
	MINS	MINS
60	MINS	MINS
CLOCK TRAVEL		IN/MIN

PRESSURE INCREMENTS

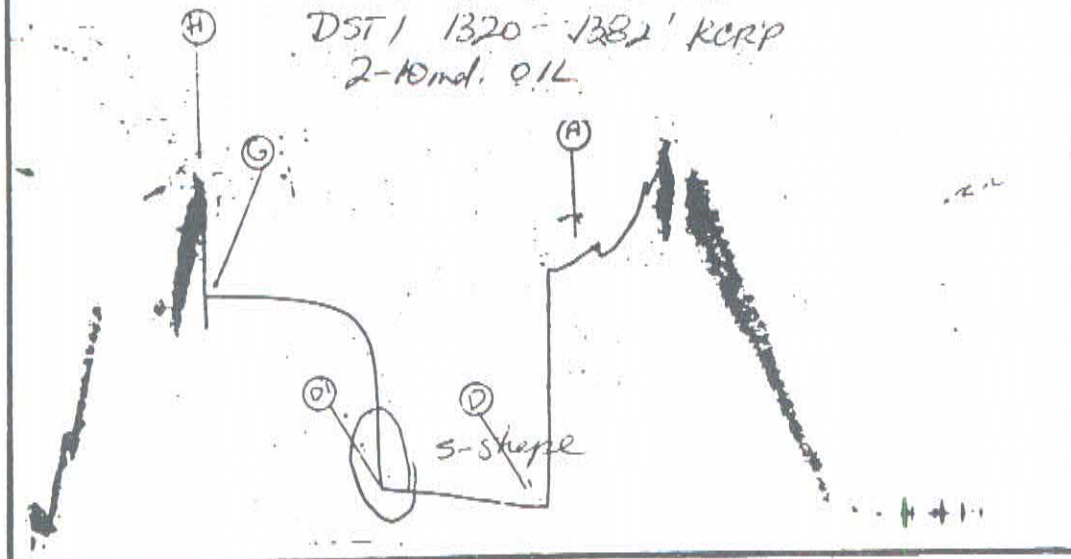
[illegible]

C10155-AK1-2259

O-17 6530-12730

DST/ 1320-1382' KCRP

2-10md. OIL



FIELD
REPORT NO

C-10155

RECORDER NO.

AK1-1847

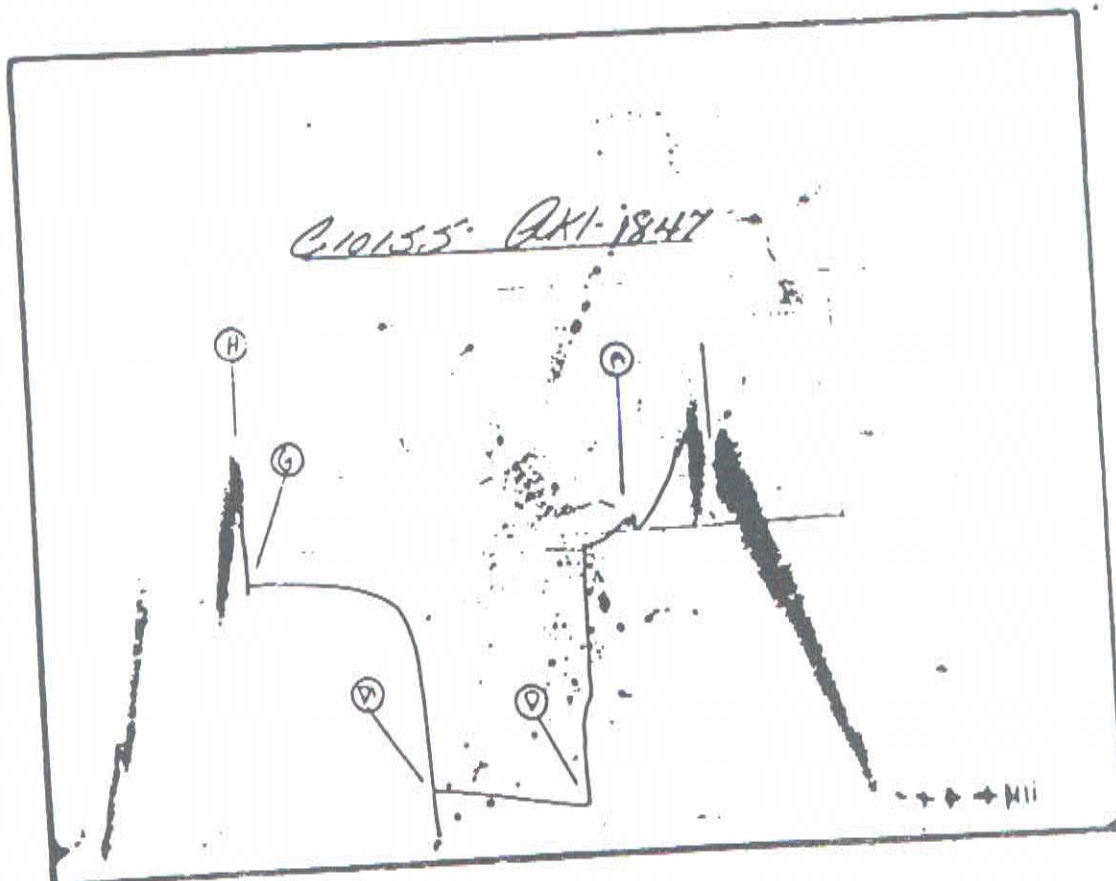
CAPACITY

2100

REPORTS
REQUESTED

6

C10155-AK1-1847



6155-48-01 B

65°21'56.63"N
127°34'48.65"W

PETRO-CANADA

HOOOSIER RIDGE N-22

KB 160.3M DST #1

739 - 757M

KEE SCARP

REF#:C-70-999-67076-66

TEST DATE: 84/02/19

LAT: 65° 21' 56.6 " N
LONG: 127° 34' 48.7 " W

PCI ET AL HOOSIER RIDGE N-22

400/ 65.210 / 127.340 / 00

DST#01

739.00m to 757.00m

KEE SCARF

DEPTH: 743.00m

RECORDER # 001760

PRESSURE
kPa

1) Initial Hydro : 8412.
2) 1st Flow Start: 293.
3) 1st Flow End : 310.
4) END 1st Shutin: 6378.
5) 2nd Flow Start: 328.
6) 2nd Flow End : 431.
7) END 2nd Shutin: 3568.
14) Final Hydro. : 8308.

TEST TIMES(MIN)

1stFLOW : 14.
SHUTIN: 178.
2ndFLOW : 179.
SHUTIN: 240.

RECOVERY DATA

THIS IS A CLOSED CHAMBER TEST. TOTAL FLUID RECOVERY CONSISTS OF 3.66 M OF SLIGHTLY OIL FLECKED DRILLING MUD.

REMARKS AND TEST SUMMARY

Test results indicate a mechanically successful test. Bottom hole pressures

JUST MEAS IN
1stFLOW : 4.
SHUTIN: 178.
2ndFLOW : 179.
SHUTIN: 240.

RECOVERY DATA

THIS IS A CLOSED CHAMBER TEST. TOTAL FLUID RECOVERY CCNSISTS OF 3.66 M OF SLIGHTLY OIL FLECKED DRILLING MUD.

REMARKS AND TEST SUMMARY

Test results indicate a mechanically successful test. Bottom hole pressures and the shape of the shut-in curves suggest RELATIVELY LOW PERMEABILITY within the interval tested. Electronic OMR recorder #1760 - pressures are recorded in kPa(a); increments for this recorder are included. Recorder #9772 - was run between the shut-in tool and the above hydraulic tool, therefore does not record hydrostatic pressures, only flows and shut-in data. The initial and final shut-in curves were incremented but not extrapolated due to insufficient curve development.

TABLE OF CONTENTS

PAGE 1	PAGE 2	PAGE 3	PAGE 4
General Data	Tool Sequence	PRESSURE	Plot Summary
Blow Description	Recorder Summary	-TIME	Reservoir Calculations
Liquid Recovery	Mud and Hole Data	LISTING	-Parameters used
Gas Measurements			-Results

***** RECORDER PAGES & FIGURES *****

LYONS UNITED SERVICES LTD
DST#01 REPORT

name : PCI ET AL HOOSIER RIDGE N-22
ation : 400/ 65.210 / 127.340 /00
erval : 739.00m to 757.00m
t Date : 84/02/19
t Type : DUAL CONVENTIONAL BOTTOM HOLE
ation : KEE SCARP

K.B.Elevation : 160.3
Grd.Elevation : 154.1
TD @ test Date: 757.0
Ticket Number : 67076
Unit Number :

rted in hole at : 2345 hrs
l opened at : 0456 hrs
erse circulated?: NO
rtractor & Rig No: ATCO #76
es#1 : 1 of 1 on the same trip.

erator: PETRO-CANADA INC.
ROOM 937 WEST
150 - 6TH AVE. S.W.
CALGARY ALBERTA
T2P3E3

Company Rep : WALSH P
Testers : MARSHALL L

12 REPORTS(S) TO: STEVE BENKO
Company:

DESCRIPTION

losed chamber run by Dyna Well.

TOTAL LIQUID RECOVERY : 3.66m

For CST# 1 through D'
2 Fluid Samples
Sent to: KEPT ON
LOCATION

3.66m SLIGHTLY OIL FLECKED DRILLING MUD.

GAS MEASUREMENTS

No Gas Measurements

739.00m to 757.00m

•TOOL SEQUENCE•

RECORDER SUMMARY

SUB	LENGTH (m)
PLMP OUT SUB	.33
CROSS OVER SUB	.30
SHUT-IN TOOL	2.58
BIM. HOLE SAMPLER	1.03
INSIDE RECORDER	1.38
HYDRAULIC TOOL	1.50
INSIDE RECORDER	1.38
HYDRAULIC JARS	2.25
SAFETY JOINT	.65
TCP CONV. PACKER	2.43
TCP CONV. PACKER	2.28
TCP CONV. PACKER	1.24
PACKER STICK DOWN	1.04
PERFORATED SPACING	1.53
PEPFORATED SPACING	1.53
RECORDER CARRIER	2.06
SPACING	1.24
CROSS OVER SUB	.33
DRILL COLLAR	9.54
CROSS OVER SUB	.33
BLL NCSE	.40

1) NUMBER : 001760	ELECTRONIC GAU
TYPE : DMRB	TEMPERATURE AN
LOCATION: OUTSIDE	PRESSURES.
RANGE: 68900.00kPa	
DEPTH : 743.00m	
2) NUMBER : 005539	
TYPE : K-3	
LOCATION: OUTSIDE	
RANGE: 10000.00kPa	
DEPTH : 743.00m	
3) NUMBER : 009772	ABOVE INTERVAL
TYPE : K-3	RECORDER.
LOCATION: INSIDE	
RANGE: 13400.00kPa	
DEPTH : 727.00m	
4) NUMBER : 009993	ABOVE INTERVAL
TYPE : K-3	RECORDER.
LOCATION: INSIDE	
RANGE: 20300.00kPa	
DEPTH : 730.00m	
5) NUMBER : 013967	
TYPE : K-3	
LOCATION: OUTSIDE	
RANGE: 20300.00kPa	
DEPTH : 743.00m	

***** TOOL TOTAL 35.35

LL COLLARS

ID= 72.0mm: 171.48
ID= :

LL PIPE

OD=114.3mm: 354.41
OD= :

COLLAR-PIPE TOTAL 725.89

CK UP ABOVE TABLE : 4.24

L ABOVE INTERVAL : 17.35

AL INTERVAL : 18.00

TOM CHOKE SIZE: 25.40 mm

MUD AND HOLE DATA

ured Hole Size @ Test Depth:

e Condition at Test Time : GOOD

e Conditioned Prior to Test? : YES

Weight : 1120.0 kg/m3

Type : GEL CHEMICAL

osity : 65.03/1

Water Loss : 7.0cc/s

Filter Cake:

Main Hole Size: 216.00mm

Temperature @743.00m = 24.7C

DST#01
PCI ET AL HOOSIER RIDGE N-22
739.00 m to 757.00 m

ation: 400/ 65.210 / 127.340 /00
Test Type: DUAL CONVENTIONAL BOTTOM HOLE
Formation: KEE SCARP

Recorder Number: 001760
Recorder Depth: 743.00 m
Subsea Depth: -582.67 m

TIME-PRESSURE LISTING

CHART LABEL	COMMENTS	TIME MIN.	DELTA P kPa	PRESSURE kPa	(T+dt)/dt ABSCISSA
1	INITIAL HYDROSTATIC			8412	
2	START OF 1st FLOW	0.0		293	
		1.		293	
		2.		293	
		3.		293	
		5.		293	
		6.		293	
		7.		293	
		8.		293	
		9.		293	
		10.		293	
		11.		293	
		13.		293	
3	END OF 1st FLOW	14.		310	
	1st SHUTIN PERIOD	0.0		310	
		5.	69	379	3.8000
		11.	190	500	2.2727
		17.	362	672	1.8235
		23.	603	914	1.6087
		29.	896	1207	1.5000
		34.	1293	1603	1.4118
		40.	1724	2034	1.3500
		45.	2068	2379	1.3111
		51.	2465	2775	1.2745
		57.	2844	3154	1.2456
		63.	3189	3459	1.2222
		68.	3465	3775	1.2059
		74.	3758	4068	1.1892
		80.	4016	4326	1.1750
		85.	4223	4533	1.1647
		91.	4464	4775	1.1538
		97.	4688	4999	1.1443

DST#01
PCI ET AL HOOSIER RIDGE N-22
739.00 m to 757.00 m

Location: 400/ 65.210 / 127.340 /00
Test Type: DUAL CONVENTIONAL BOTTOM HOLE
Formation: KEE SCARP

Recorder Number: 001760
Recorder Depth: 743.00 m
Subsea Depth: -582.67 m

TIME-PRESSURE LISTING

CHART LABEL	COMMENTS	TIME MIN.	DELTA P kPa	PRESSURE kPa	(T+dt)/dt ABSCISSA
		103.	4895	5206	1.1359
		108.	5050	5361	1.1296
		114.	5223	5533	1.1228
		120.	5361	5671	1.1167
		125.	5464	5774	1.1120
		131.	5585	5895	1.1069
		137.	5671	5981	1.1022
		143.	5757	6067	1.0979
		148.	5809	6119	1.0946
		154.	5878	6188	1.0909
		160.	5929	6240	1.0875
		165.	5981	6251	1.0848
		171.	6016	6326	1.0819
		177.	6050	6350	1.0791
4	END OF 1st SHUTIN	178.	6067	6378	1.0787
5	START OF 2nd FLOW	0.0		328	
		11.		345	
		21.		362	
		31.		352	
		41.		362	
		52.		379	
		62.		379	
		72.		379	
		83.		396	
		93.		396	
		103.		396	
		113.		396	
		124.		396	
		134.		414	
		144.		414	
		155.		414	
		165.		431	
		175.		431	
6	END OF 2nd FLOW	179.		431	

DST#01
PCI ET AL HOOSIER RIDGE N-22
739.00 m to 757.00 m

Location: 400/ 65.210 / 127.340 /00
Test Type: DUAL CONVENTIONAL BOTTOM HOLE
Formation: KEE SCARP

Recorder Number: 001760
Recorder Depth: 743.00 m
Subsea Depth: -582.67 m

TIME-PRESSURE LISTING

CHART LABEL	COMMENTS	TIME MIN.	DELTA P kPa	PRESSURE kPa	(T+dt)/dt ARSCISSA
2nd SHUTIN PERIOD		0.0		431	
		6.	0	431	33.1667
		13.	34	465	15.8462
		20.	69	500	10.6500
		27.	86	517	8.1481
		34.	121	552	6.6765
		41.	138	569	5.7073
		48.	172	603	5.0208
		54.	207	638	4.5741
		61.	241	672	4.1639
		69.	276	707	3.8382
		75.	310	741	3.5733
		82.	362	793	3.3537
		89.	414	845	3.1685
		96.	448	879	3.0104
		102.	500	931	2.8922
		109.	552	983	2.7706
		116.	621	1051	2.6638
		123.	689	1120	2.5691
		130.	776	1207	2.4846
		137.	862	1293	2.4088
		144.	965	1396	2.3403
		150.	1069	1500	2.2867
		157.	1189	1620	2.2293
		164.	1327	1758	2.1768
		171.	1465	1896	2.1287
		178.	1620	2051	2.0843
		185.	1793	2224	2.0432
		192.	1948	2379	2.0052
		198.	2103	2534	1.9747
		205.	2275	2706	1.9415
		212.	2448	2879	1.9104
		219.	2620	3051	1.8813
		226.	2792	3223	1.8540
		233.	2965	3396	1.8283

* VALUES USED FOR EXTRAPOLATIONS

DST#01

PCI ET AL HOOSIER RIDGE N-22

739.00 m to 757.00 m

Location: 400/ 65.210 / 127.340 / 00

Recorder Number: 001760

Test Type: DUAL CONVENTIONAL BOTTOM HOLE

Recorder Depth: 743.00 m

Formation: KEE SCARP

Subsea Depth: -582.67

TIME-PRESSURE LISTING

CHART LABEL	COMMENTS	TIME MIN.	DELTA P kPa	PRESSURE kPa	(T+dt)/dt ABSCISSA
7	END OF 2nd SHUTIN	240.	3137	3568	1.8042
14	FINAL HYDROSTATIC			8308	

★ VALUES USED FOR EXTRAPOLATIONS

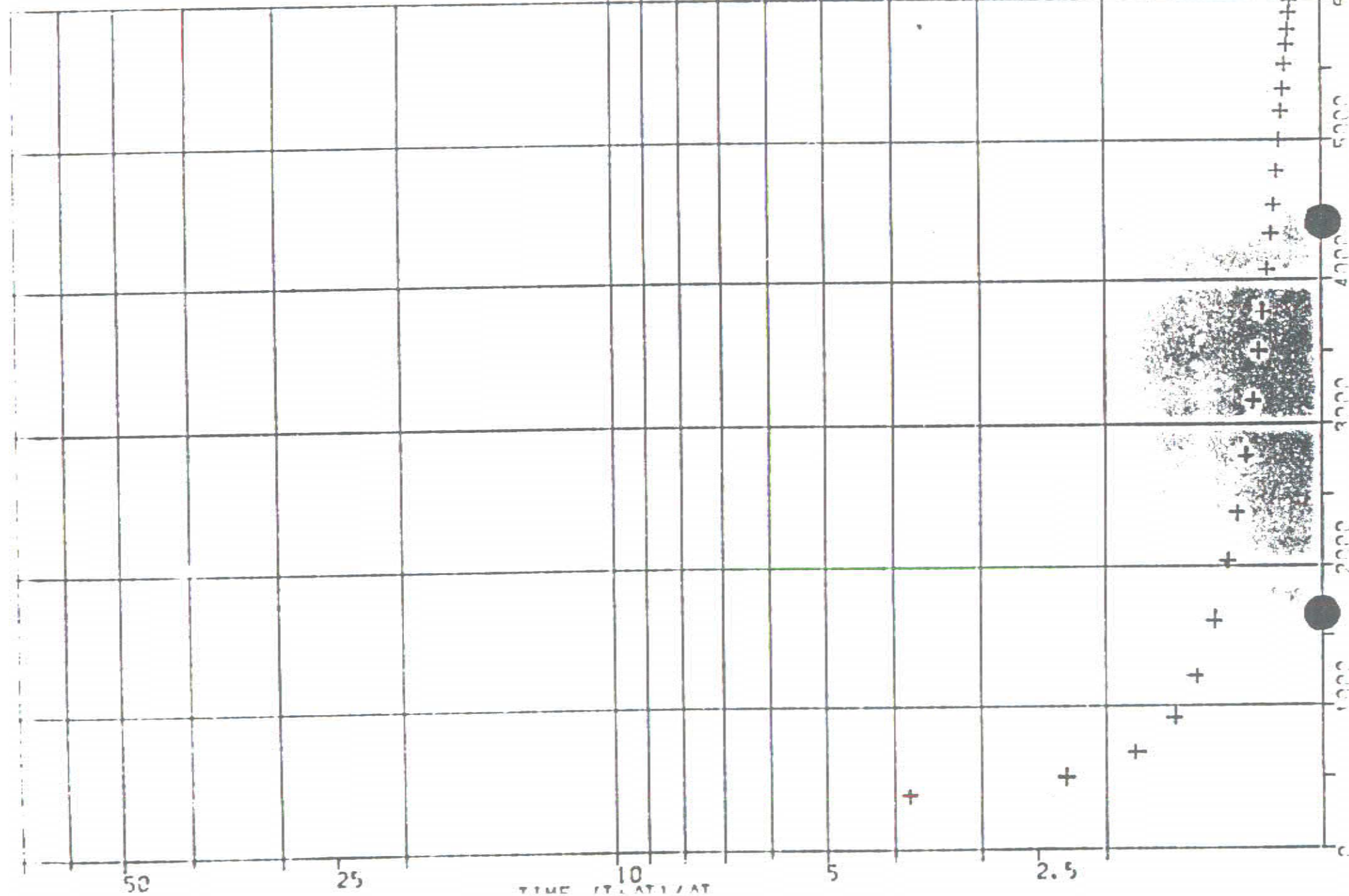
1st SHUT-IN

HORNER EXTRAPOLATION
HORNER SLCPE.00 kPa
.00000 kPa/cycle

2nd SHUT-IN

HORNER EXTRAPOLATION
HORNER SLOPE.00 kPa
.00000 kPa/cycle

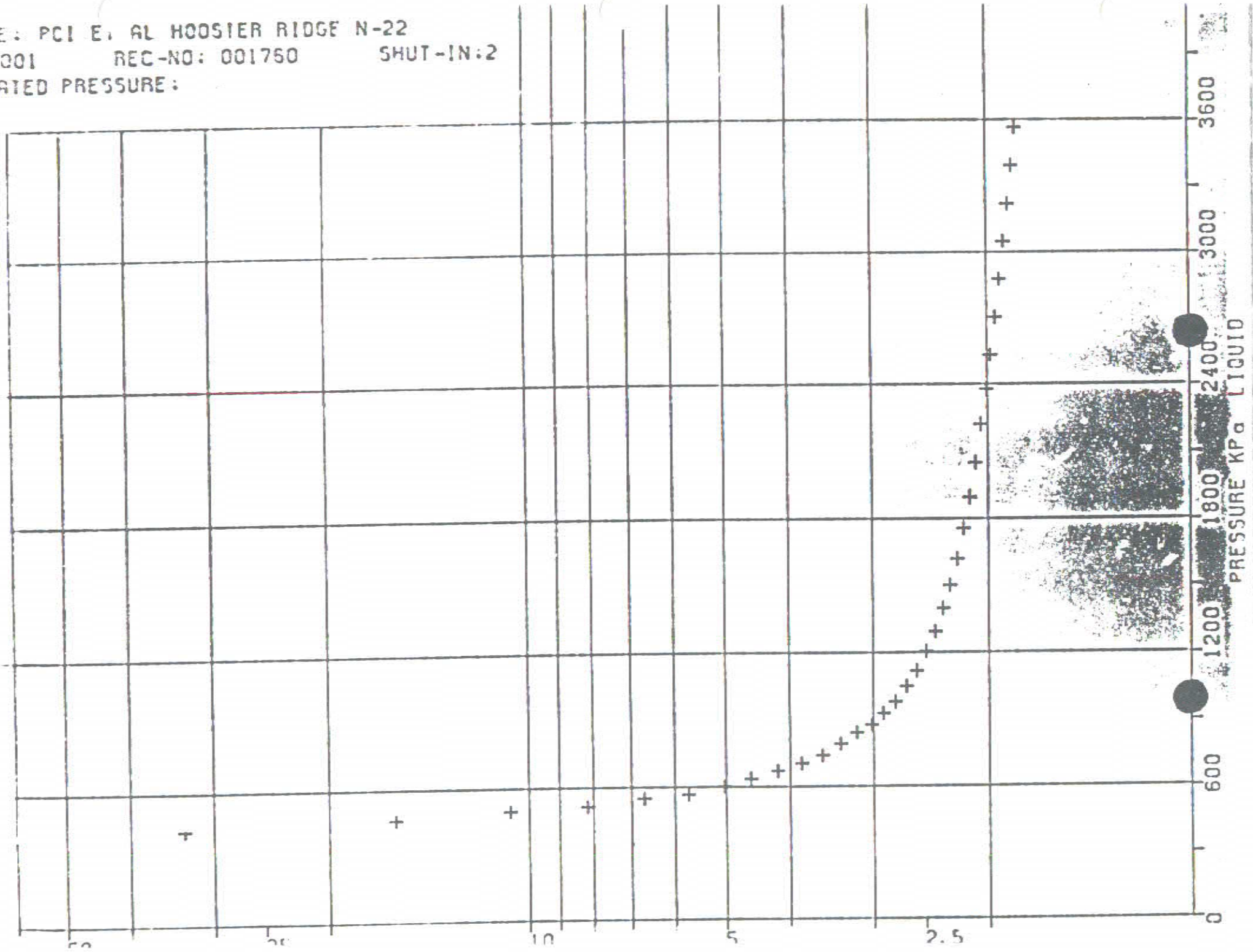
NAME: PC T AL HOOSIER RIDGE N-22
D: 001 REC-NO: 001750 SHUT-IN: 1
POLATED PRESSURE:



WELL: PCI E. AL HOOSIER RIDGE N-22

001 REC-NO: 001750 SHUT-IN: 2

REPORTED PRESSURE:



PCI E1 AL HOOSIER RIDGE N-22

55.210 / 127.340

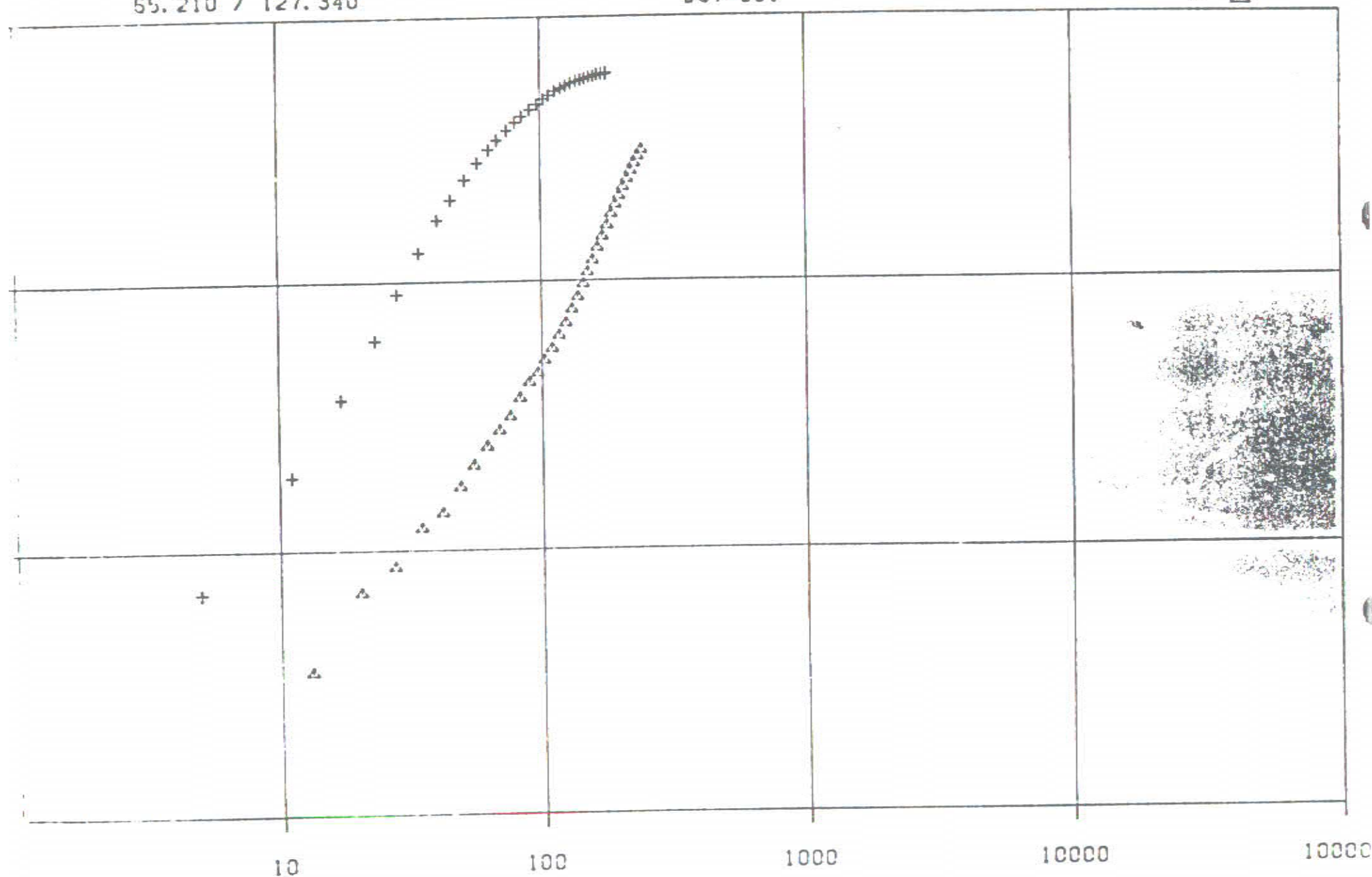
REC#001760

DST#001

SHUTIN #

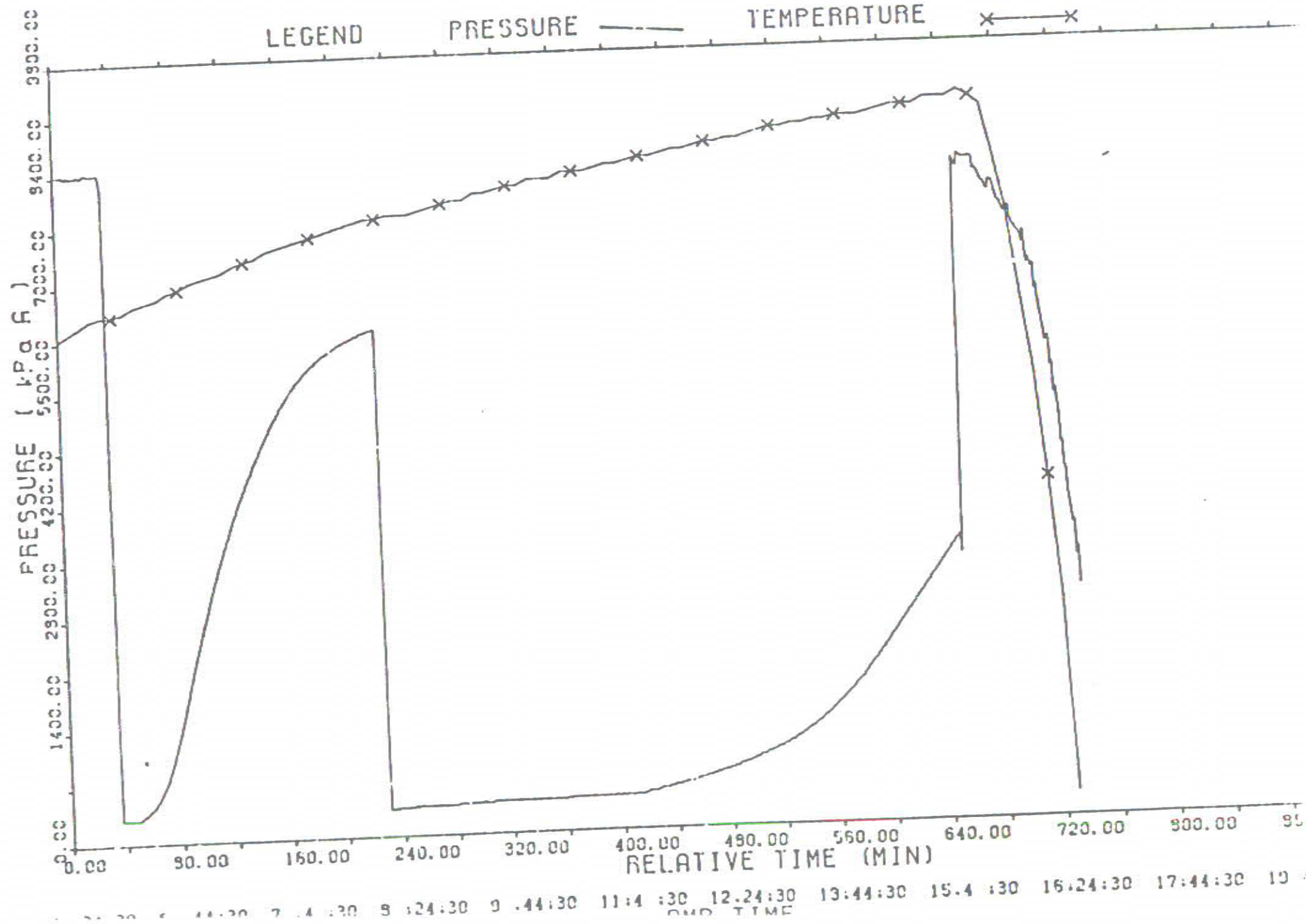
1 +

2 Δ



REL TO MINUTES

UJ-210 ELECTRONIC GAUGE #1760



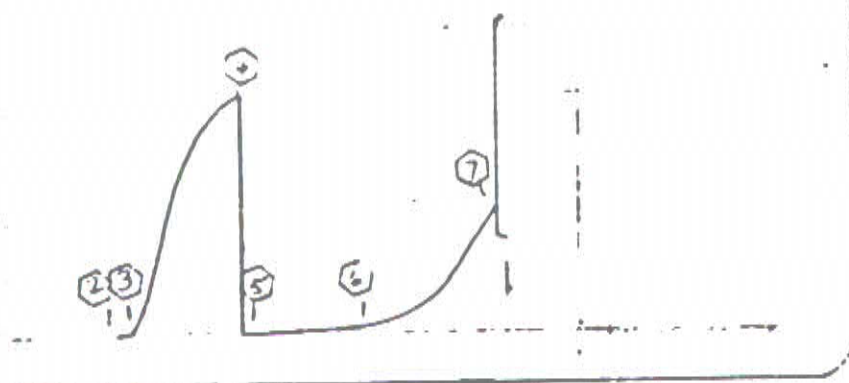
27.00m
-3

LOCATION : INSIDE
CAPACITY : 13403.00kPa

PRESSURE
kPa

- 1)Initial Hydro :
- 2)1st Flow Start: 83.
- 3)1st Flow End : 83.
- 4)END 1st Shutin: 6072.
- 5)2nd Flow Start: 133.
- 6)2nd Flow End : 155.
- 7)END 2nd Shutin: 3212.
- 14)Final Hydro. :

Interval



ABOVE INTERVAL
RECORDER.

- TEST TIMES(MIN)
- 1st FLOW : 14.
 - SHUTIN: 178.
 - 2nd FLOW : 179.
 - SHUTIN: 240.

RECORDER NUMBER : 009993

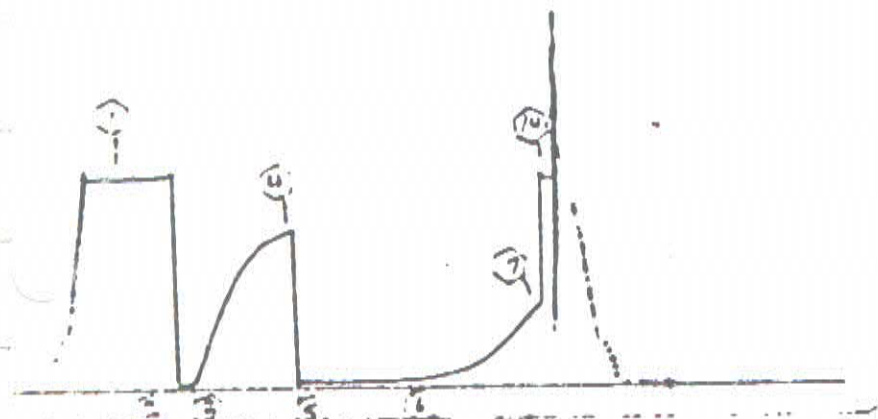
730.00m
K-3

LOCATION : INSIDE
CAPACITY : 20300.00kPa

PRESSURE
kPa

- 1)Initial Hydro : 8287.
- 2)1st Flow Start: 366.
- 3)1st Flow End : 299.
- 4)END 1st Shutin: 6166.
- 5)2nd Flow Start: 291.
- 6)2nd Flow End : 415.
- 7)END 2nd Shutin: 3306.
- 14)Final Hydro. : 8135.

Above interval



ABOVE INTERVAL
RECORDER.



HUGH W. REID & ASSOCIATES LTD.
PETROLEUM CONSULTANTS

#302, 602 - 11th Avenue S.W.
Calgary, Alberta, Canada
T2R 1J8

Telephone

(403) 262-1261

CLOSED CHAMBER DST REPORT

GENERAL DATA

WELL NAME:	PCI et al HOOSIER	TEST DATE:	1984-02-19
LOCATION:	RIDGE N-22 65°21'56.6"N 127°34'48.7"W	CHAMBER VOLUME:	4.83 m ³ (30.41 bbls)
WELL NO.:	1	DOWNHOLE CHOKE	
DEPTH INTERVAL:	739 - 757m	DIAMETER:	12.7mm (½")
FORMATION:	Kee Scarp	RECOVERY:	Reported as 3.66 m (12ft) "very slightly oil flecked mud".

SUMMARY OF CONCLUSIONS OF REPORT

The zone co-produced very low rate gas ($<1 \text{ s.m}^3/\text{D}$) and mud at approximately 1 B/D ($0.18 \text{ m}^3/\text{D}$) during main flow.

The characteristics of the downhole pressure charts indicate that formation liquid, probably oil, displaced the rathole mud from the sump to the chamber.

The gas produced is either free gas or solution gas from oil, although the latter is more probable.

The fact that no free oil was recovered is likely due to relative permeability effects (explained in comment #4).

The zone has inherently low permeability and it is not known if the future deliverability would be commercial. Similar DST's in carbonates in Alberta often yield low rate pumping oil wells (refer to comment #4).

These conclusions are explained in detail in the pages immediately following.

TEST DISCUSSION

COVERY AND FLOW RATES

The reported recovery of 3.66 metres (12 ft) of oil flecked mud would appear to be slightly pessimistic. The recovery has been recomputed utilizing the final flowing pressure measured by the upper inside gauge (135 kPa) and the mud gradient (11.3 kPa/m) as 11.9 metres (39 ft) of mud. This amounts to a volume of 0.005 m^3 (0.31 bbls).

AVERAGE LIQUID FLOW RATES (Computations shown on pages A-3 and A-4)

Of the total liquid volume recovered some 53% (0.03 m^3) was produced during the preflow. The remaining 0.02 m^3 (0.14 bbls) was produced relatively constantly over the 180 minute main flow period yielding an average influx rate of only $0.18 \text{ m}^3/\text{D}$ (1.12 B/D).

ASSOCIATED MINOR GAS RATES

Very low rate gas was produced at the rates tabulated in Table 1 and graphed in Figure 2. In summary, the rates are as follows.

reflow: Between the 4th and 12th minutes of preflow the rates increased somewhat erratically from $0.5 \text{ s.m}^3/\text{D}$ to $7.5 \text{ s.m}^3/\text{D}$ (0.02 to 0.26 Mscf/D). (For the previous 4 minutes the surface pressure declined due to residual liquid in the test head draining into the pressure hose. The data could not be used for gas rate computations.)

Main Flow: Apart from a minor initial surge to $6.5 \text{ s.m}^3/\text{D}$ for the first minute, the rates were all less than $1 \text{ s.m}^3/\text{D}$ and fluctuated rather erratically between a low of 0.05 to a maximum of $0.99 \text{ s.m}^3/\text{D}$ with an average of $0.142 \text{ s.m}^3/\text{D}$ (0.005 Mscf/D).

These rates (derived from the surface pressure change and Equation 8 - Alexander, SPE 6024) have been independently verified utilizing the Equation for Corresponding States (refer to Appendix pages A-5 and A-6). It is thought that this gas represents solution gas from oil in the zone, as discussed below.

CONTENT OF ZONE

Referring to the downhole pressure charts in the attached Lynes Unit Services report, the gradual inverted S-shape at the start of the FS1 is thought to represent solution gas being dissolved in oil in the zone. This configuration is typical of tests of oil zones. Gas break

5477-71-01 A

65[°] 36' 38" N

128[°] 34' 26" W

TRANS PRAIRIE

CARCAJOU J-27

KB 195 DST #1

2880 - 2985

BEAR ROCK

Well Name and Description

Test No.

Date of Test

Main Hole or Casing Size 02		athole or Liner Size 9 5/8		No. of Feet 612	
Bottom Hole Choke Size 1"					
Surface Choke Size					
Packer Rubber Size 7 1/2					
REMARKS					
Shut-in pressures suggest average permeability within the interval tested.					
RECOVERY					
TOTAL FLUID RECOVERED 450 Ft. Consisting of:					
100	Ft. of Drilling mud-salinity too low to read.				
350	Ft. of Brackish formation fluid				
	Ft. of -salinity 11,540 PPM				
	Ft. of				
Test was/was not Reverse Circulated was not					
Oil Recovery A.P.I. Water Specific Gravity					
Salinity					

PRESSURE READINGS		Inside _____ Outside <u>X</u>		Inside <u>X</u> Outside _____		Inside _____ Outside <u>X</u>		Inside _____ Outside _____	
Recorder No. 8870		Recorder No. 909		Recorder No. 2835		Recorder No. _____		Recorder No. _____	
Capacity 4300		Capacity 4000		Capacity 5400		Capacity _____		Capacity _____	
Depth 2888		Depth 2893		Depth 3207		Depth _____		Depth _____	
NUMBER KEY:									
1 - INITIAL HYDROSTATIC		1358		1345		1411			
2 - PRE-FLOW		75		72					
3 - INITIAL SHUT-IN		1344		1340					
4a - 2nd INITIAL FLOW						Below			
4b - 2nd FINAL FLOW						Straddle			
4c - 2nd SHUT-IN									
5 - 3rd INITIAL FLOW		105		94					
6 - FINAL FLOW		237		233					
7 - FINAL SHUT-IN		1319		1314					
8 - FINAL HYDROSTATIC		1358		1345		1410			

LYNES UNITED SERVICES LTD.

TransPrairie Pipe Line

TPPL Et Al Carcajou J-27

Company

Well Name and Location

TEST DATA				Test No. 1		Lynes Test 1		GENERAL INFORMATION	
Formation		Bear Rock		T.D. 3250		Ft.		Company TransPrairie Pipe Line	
Interval Tested		2880		Ft. to		2985		Ft. Address	
Interval Tested		105		Ft.		Net Pay Tested		Ft.	
Type of Test		Blank Off Dual Conventional Straddle							
Cushion		Amount		Ft.		Well Name		TPPL Et Al Carcajou	
Started in Hole at		7:30		Hrs.		Tool Open at		12:35 Hrs.	
Pre-Flow		8		Mins.		Initial Shut-in		60 Mins.	
2nd Flow				Mins.		Second Shut-in		Mins.	
Final Flow		60		Mins.		Final Shut-in		60 Mins.	
Remarks:									
Blows		Weak bubble to surface on preflow. Very little increase throughout preflow. Weak bubble to surface on final flow. Very little increase throughout final flow.							
GAS BLOW MEASUREMENTS									
Measured with		No gas to surface.							
MUD AND HOLE DATA									
Mud Type		G:1 Chem							
Weight		9.1		Viscosity		55		Water Loss 6.4	
Filter Cake		2/32		Bottom Hole Temperature					
Drill Pipe Size		4 1/2 XH		Weight		16			
Drill Collars		6 1/2		I.D.		2 1/2		Feet Run 411.41	
Main Hole or Casing Size		8 1/2							
Rathole or Liner Size		9 5/8		No. of Feet		612			
Bottom Hole Choke Size		1"							
Surface Choke Size									
Packer Rubber Size		7 1/2							
REMARKS									
Shut-in pressures suggest average permeability within the interval tested.									
RECOVERY									
TOTAL FLUID RECOVERED		450		Ft. Consisting of:					
100		Ft. of		Drilling mud-salinity too low to read.					
350		Ft. of		Brackish formation fluid					
		Ft. of		-salinity 11,540 PPM					

LYNES UNITED SERVICES LTD.

WELL NAME - TPPL ET AL CARAJOU

LOCATION - J-27

DST NUMBER - 1

INTERVAL TESTED - 2880 TO 2985

RECORDER NO. - 8870

DEPTH - 2888

INITIAL SHUT IN PRESSURE

TIME(MIN) ϕ	$\frac{T + \phi}{\uparrow}$	PSIG
0	0.0000	75
5	2.6000	1292
10	1.8000	1315
15	1.5333	1324
20	1.4000	1330
25	1.3200	1333
30	1.2667	1336
35	1.2286	1339
40	1.2000	1340
45	1.1778	1342
50	1.1600	1343
55	1.1455	1344
60	1.1333	1344

EXTRAPOLATION OF INITIAL SHUT-IN = 1352.22

LYNES UNITED SERVICES LTD.

WELL NAME - TPPL ET AL CARAJOU

LOCATION - J-27

DST NUMBER - 1

INTERVAL TESTED - 2880 TO 2985

RECORDER NO. - 8870

DEPTH - 2888

SECOND SHUT IN PRESSURE

TIME(MIN) ϕ	$\frac{T + \phi}{\phi}$	PSIG
0	0.0000	237
5	14.6000	1189
10	7.8000	1224
15	5.5333	1260
20	4.4000	1275
25	3.7200	1286
30	3.2667	1294
35	2.9429	1300
40	2.7000	1305
45	2.5111	1309
50	2.3600	1312
55	2.2364	1314
60	2.1333	1316

EQU. FITTED LINE IS $\log((T+\phi)/\phi) = -0.00686 \text{ PSIG} + 2.37403$

EXTRAPOLATION OF SECOND SHUT-IN = 1366.99 PSIG = 145.83

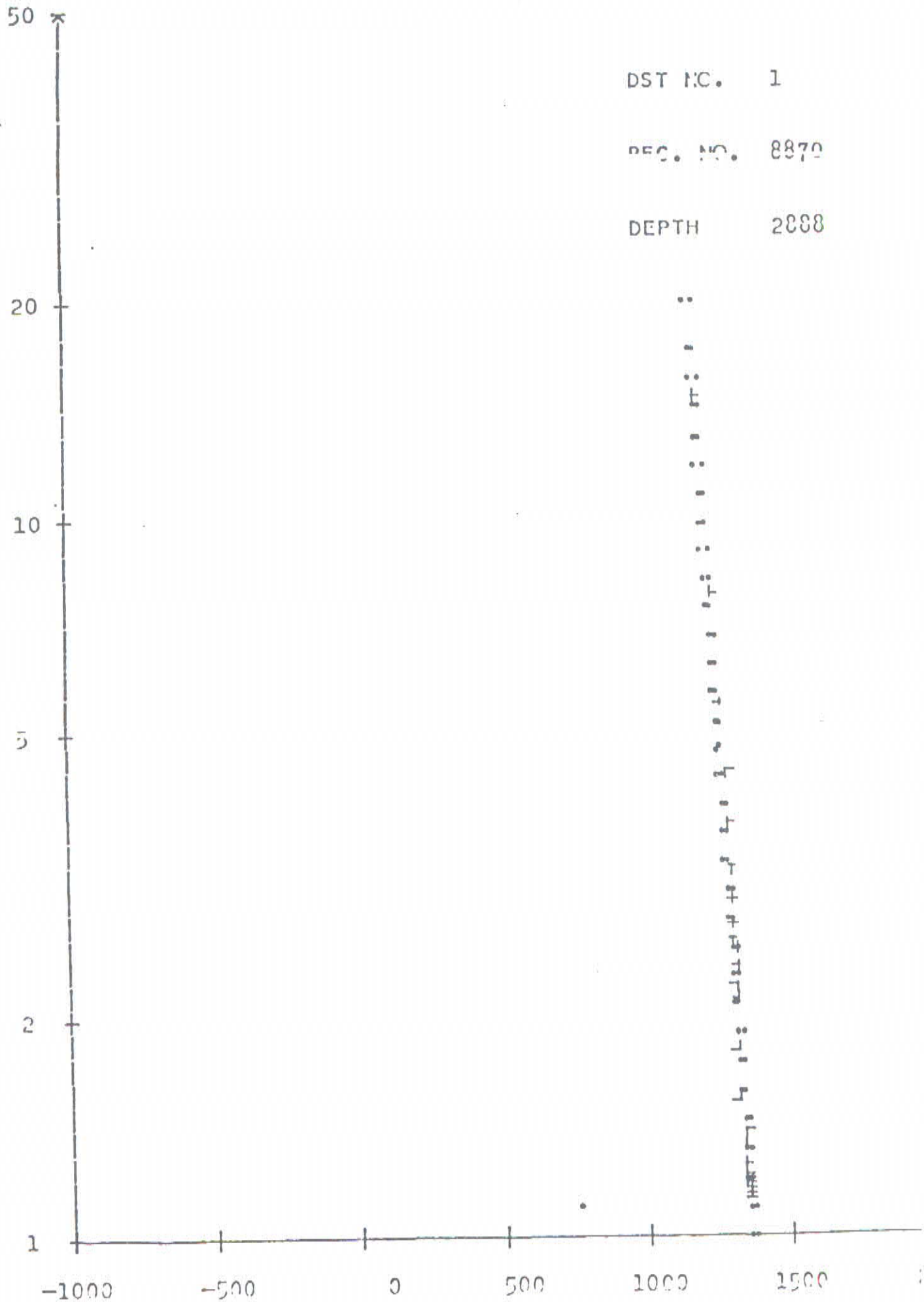
LINES UNITED SERVICES LTD.

DST NO. 1

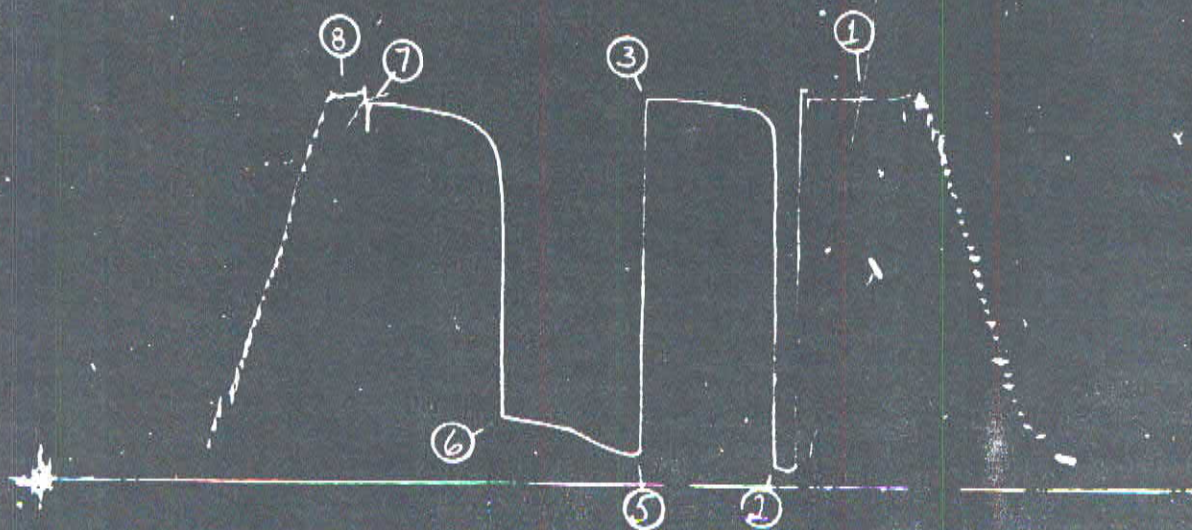
REC. NO. 8870

DEPTH 2000

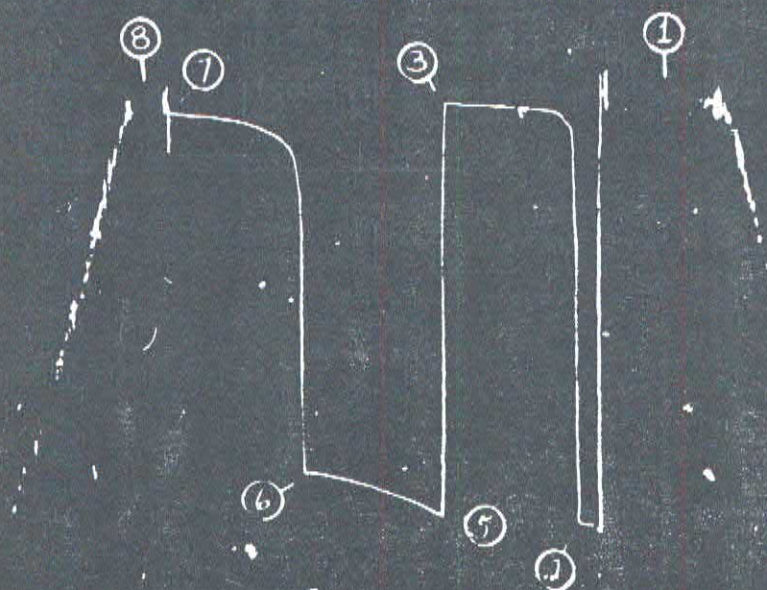
$$\frac{\tau_0 + \phi}{\phi}$$



TPPL ET AL CARCAJON
J-27 8870-1



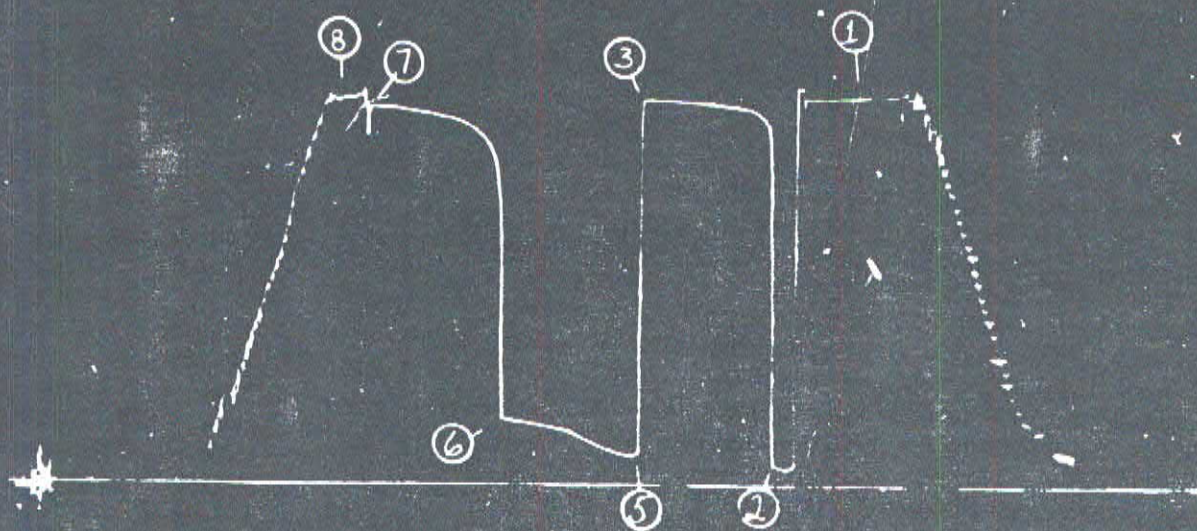
909-1



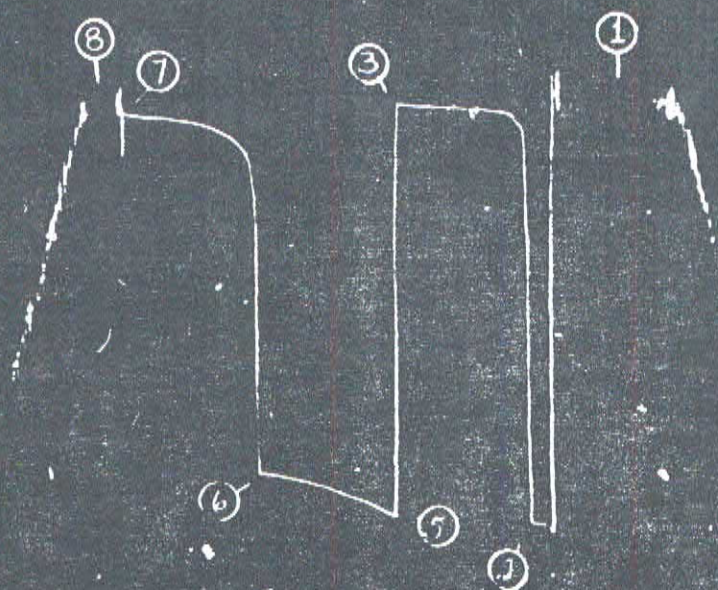
2835-1

8
1
BELOW
STRADE

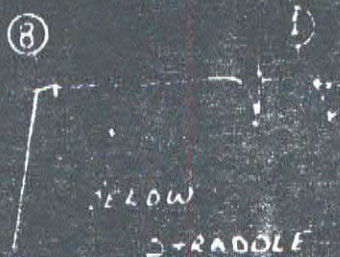
TPPL ET AL CARCAJON
J-27 3870-1



909-1



2835-1



YELLOW
D-RADOLE

5372-37-01 A

65°51'46"

129°12'04"

TR IAD

CC HUME R O-62

KB 285 DST #1

1630 - 1707

DEVONIAN

DRILL-STEM TEST DATA

Well Name <u>Triad BP Arco CC Hume R</u>		Test No <u>one</u>
Well Number <u>0-62-66-00-129-000</u>		Zone Tested
Company <u>Triad Oil Company Ltd.</u>		Interval <u>1630' - 1707'</u>
Comp Rep <u>Mr. E. Popowich</u>	Tester <u>Joe Hugi</u>	Date <u>Feb. 19/70</u>

Type of Test Dual Bottom Hole RFS Tool No. 19 (Drained at Loc.)

Preflow 11 mins ISI 62 mins Flow 61 mins FSI 89 mins

Specify Inside or Outside	INS REC No. <u>504.0</u>	OUT REC No. <u>504.1</u>	REC No.
	<u>3600</u> RANGE <u>12</u> HR CLOCK	<u>3600</u> RANGE <u>12</u> HR CLOCK	RANGE <u> </u> HR CLOCK
DEPTH	<u>1613</u>	<u>1639</u>	
Initial Hydro Mud Press	<u>746</u>	<u>756</u>	
Initial Shut-In Press	<u>720</u>	<u>731</u>	
Initial Flow Press	<u>94</u>	<u>98</u>	
Final Flow Press	<u>94</u>	<u>105</u>	
Final Shut-In Press	<u>719</u>	<u>729</u>	
Final Hydro Mud Press	<u>746</u>	<u>764</u>	

Mud Drop 5' Fluid Loss Mud Weight 9.1
 Viscosity 60 Temperature °F 81 Net Pay Tested
 Top Packer Depth Bottom Packer Depth 1630' Total Depth 1707'
 Drill Pipe Size 4" Wt. 13.75 Drill Collar I.D. 2 7/8" Ft. Run 448
 Surface Choke Size 1" OPEN Bottom Choke Size 1/2" Main Hole Size 7 7/8"
 Anchor Size 4 1/2" OD Rat Hole Size 6 1/2" Feet of Rat Hole 54
 Cushion Amount Type Rubber Size 6 5/8"

Fluid Recovery Total Feet 200
 Recovered 200 Feet of Drilling Mud
 Recovered Feet of
 Recovered Feet of 3 Samples of recovery fluid left with Ed Popowich
 Recovered Feet of
 Recovered Feet of

Gas Recovery How Measured Too small to measure Riser size:

<u> </u> mins	Temp. F	Press Rdg. <u> </u> psi	Orifice Size <u> </u>	=	Est. <u>15</u> MCF/Day
<u> </u> mins	Temp. °F	Press Rdg. <u> </u> psi	Orifice Size <u> </u>	=	MCF/Day
<u> </u> mins	Temp. °F	Press Rdg. <u> </u> psi	Orifice Size <u> </u>	=	MCF/Day
<u> </u> mins	Temp. °F	Press Rdg. <u> </u> psi	Orifice Size <u> </u>	=	MCF/Day
<u> </u> mins	Temp. °F	Press Rdg. <u> </u> psi	Orifice Size <u> </u>	=	MCF/Day
<u> </u> mins	Temp. °F	Press Rdg. <u> </u> psi	Orifice Size <u> </u>	=	MCF/Day

Bleed Off Time for Drill Pipe

REMARKS Tool skidding throughout test. Weak air blow on preflow. Gas to surface on initial flow, remaining weak throughout flow period.

A

Core Lab Gas Cont. No.

Chem - Geo. Lab Gas Cont. No.

LOW PERMEABILITY
NO DAMAGE EFFECT

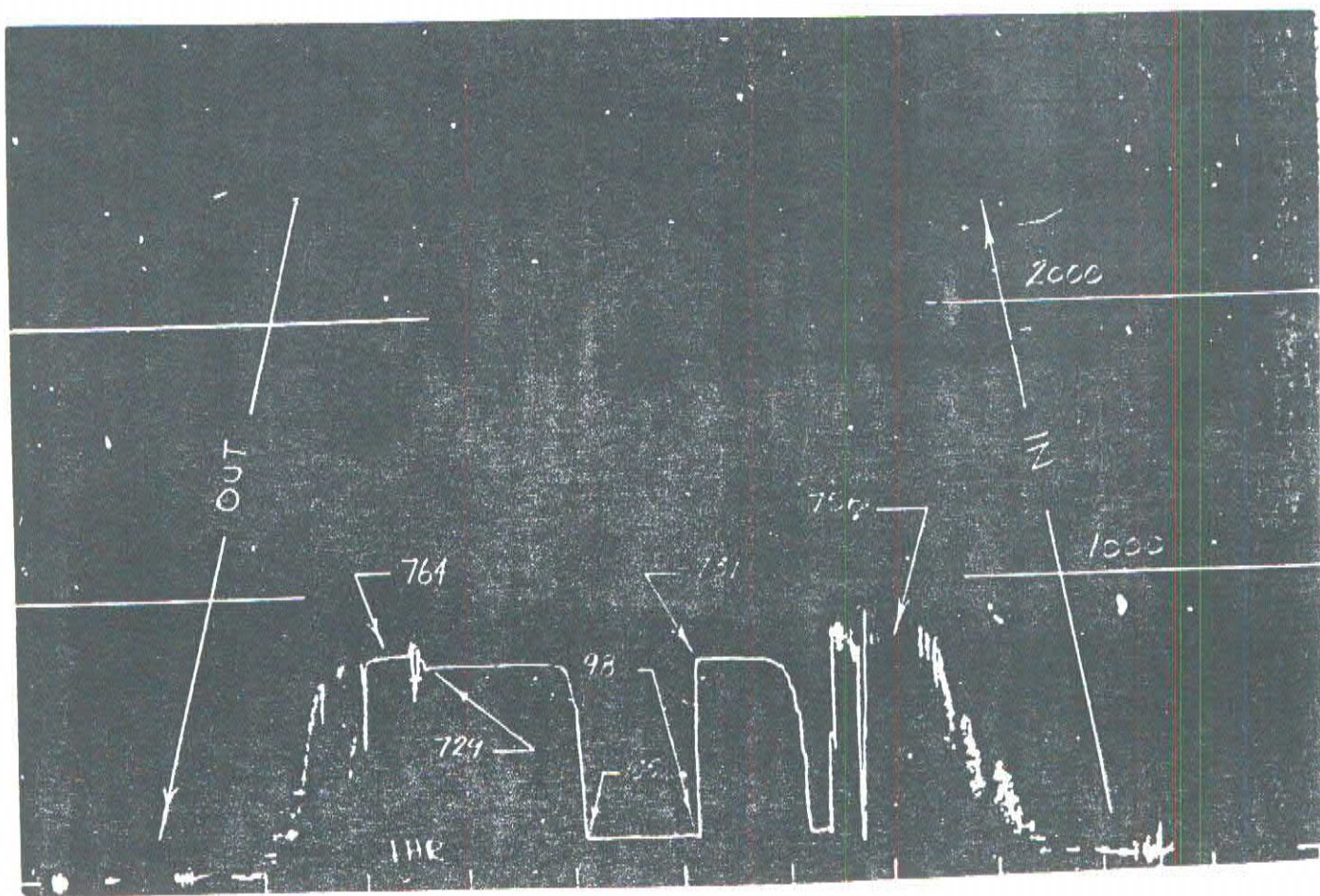
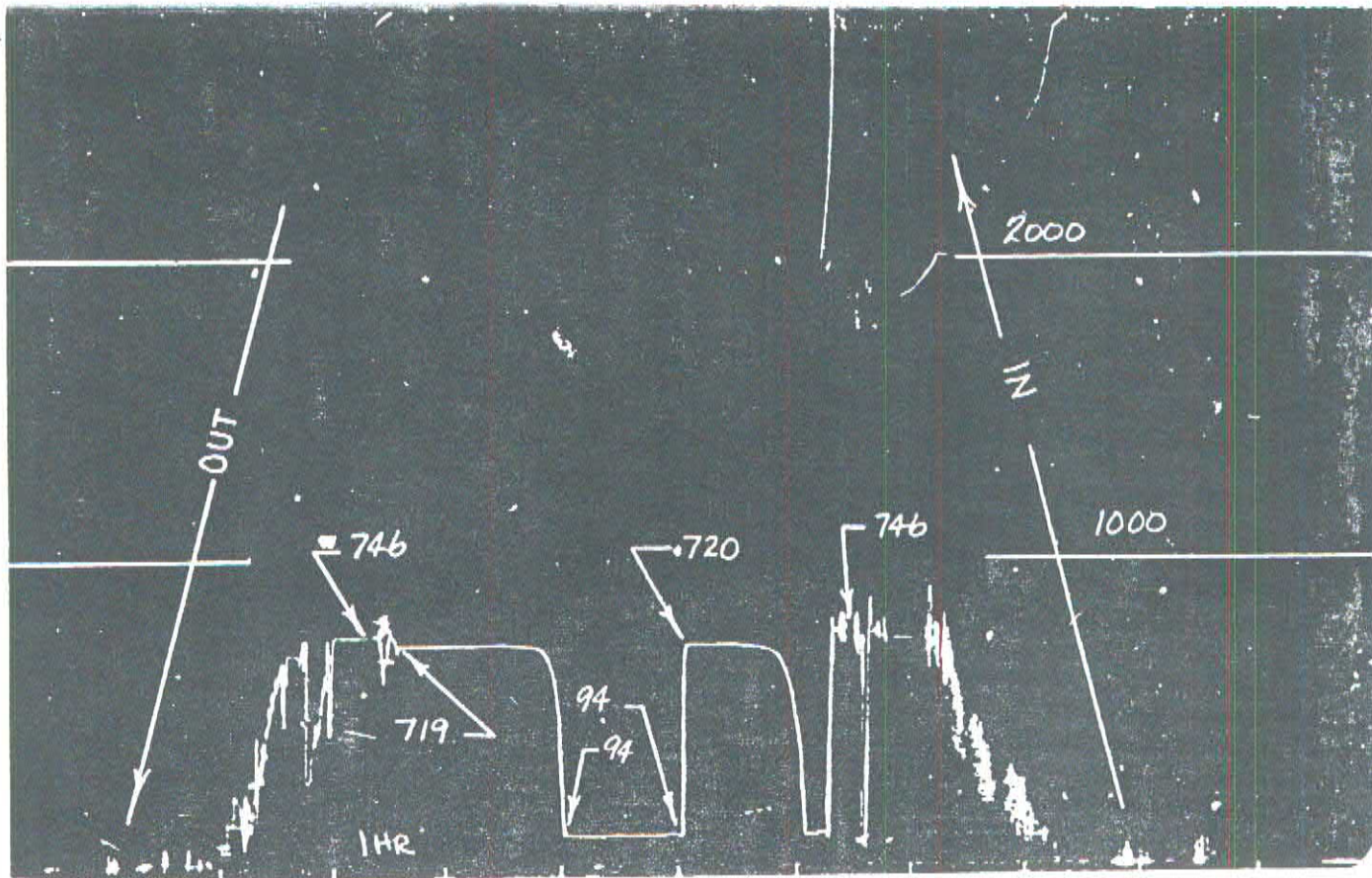


DST PRESSURE INCREMENTS

Recorder No.

Depth

Points	INITIAL CIP				FINAL CIP			
	Time Defl. "	T + θ	$\frac{T + \theta}{\theta}$	PSIG	Time Defl. "	T + θ	$\frac{T + \theta}{\theta}$	PSIG
1	(97	0			94
2	5			447	5	-		556
3	10			614	10			671
4	15			676	15			706
5	20			704	20			713
6	25			713	25			715
7	30			717	30			717
8	35			719	35			718
9	40			719	40			718
10	45			719	45			718
11	50			719	50			718
12	55			720	55			719
13	60			720	60			719
14	62			720	65			719
15					70			719
16					75			719
17					80			719
18					85			719
19					89			719
20								
21								
22								
23								
24								



5372-37-02 B

65°51'46"

129°12'04"

TR IAD

CC HUME R O-62

KB 285 DST #2

1700 - 1812

RAMPARTS



DRILL-STEM TEST DATA

Well Name	Triad BP Arco CC Hume R	Test No	Two
Well Number	6266 0-86-89-00-129-00	Zone Tested	
Company	Triad Oil Company Ltd.	Interval	1700' - 1812'
Comp Rep	Mr. E. Popowich	Tester	J. Hugi
		Date	Feb. 22, 1970

Type of Test Dual Bottom Hole RFS Tool No 19 (Drained at Rig)

Preflow 5 mins ISI 58 mins Flow 61 mins FSI 60 mins

Specify Inside or Outside	INS REC No <u>5040</u>	OUT REC No <u>5041</u>	REC No
	<u>3600</u> RANGE <u>12</u> HR CLOCK	<u>3600</u> RANGE <u>12</u> HR CLOCK	RANGE HR CLOCK
DEPTH	<u>1683</u>	<u>1712</u>	
Initial Hydra Mud Press	<u>791</u>	<u>809</u>	
Initial Shut-In Press	<u>614</u>	<u>632</u>	
Initial Flow Press	<u>18</u>	<u>40</u>	
Final Flow Press	<u>26</u>	<u>47</u>	
Final Shut-In Press	<u>526</u>	<u>543</u>	
Final Hydra Mud Press	<u>791</u>	<u>809</u>	

Mud Drop NIL Fluid Loss Mud Weight 9.2
Viscosity 66 Temperature °F 80 Net Pay Tested
Top Packer Depth Bottom Packer Depth 1700 Total Depth 1812
Drill Pipe Size 4" Wt. 13.75 Drill Collar I.D. 2 7/8" Ft Run 448
Surface Choke Size CLOSED Bottom Choke Size 1" Main Hole Size 7 7/8
Anchor Size 4 1/2" OD Rat Hole Size 6 1/8" Feet of Rat Hole 54
Cushion Amount Type Rubber Size 6 5/8"

Fluid Recovery Total Feet 10
Recovered 10 Feet of Drilling Mud
Recovered Feet of
Recovered Feet of Two samples from the recovery fluid were given to
Recovered Feet of Mr. E. Popowich
Recovered Feet of

Gas Recovery How Measured Riser size

mins	Temp. F	Press Rdg	ps.	Orifice Size	=	MCF Day
mins	Temp. F	Press Rdg	ps.	Orifice Size	=	MCF/Day
mins	Temp. F	Press Rdg	ps.	Orifice Size	=	MCF/Day
mins	Temp. F	Press Rdg	ps.	Orifice Size	=	MCF/Day
mins	Temp. F	Press Rdg	ps.	Orifice Size	=	MCF/Day
mins	Temp. F	Press Rdg	ps.	Orifice Size	=	MCF/Day

Bleed Off Time for Drill Pipe

REMARKS Very weak airblow on preflow. Very weak airblow on initial flow, dead in
18 mins. Tool skidding throughout test. Uneven build up curve on initial
shut-in due to tool skidding.

A Core Lab Gas Cont. No Chem. Geo. Lab Gas Cont. No

45 LANDING SUB _____
 45 CHAMBER Jars _____ 6.00
 45 TOOL OR P.O. SUB _____
 CO SUB _____ 1.00
 SHUT IN TOOL _____ 5.50
 R.F.S. No. 19 Drained at Riv _____ 3.35
 R.F.S. No. _____
 HYDRAULIC TOOL _____ 7.20

JARS _____
 RECORDER No. 5040 INS _____ 5.00 DEPTH 1683
 RECORDER No. _____ DEPTH _____
 SAFETY JOINT _____ 1.75
 BY PASS SUB _____

PACKER DEPTH 1646

PACKER _____ 6.00

PACKER DEPTH 1700

PACKER _____ 5.00
 TOTAL TOOL ABOVE INTERVAL 10.80

ANCHOR—SPECIFY _____
 _____ Perfs _____ 10.00

BLANK OFF OR BY PASS SUB _____
 RECORDER No. 5041 OUT _____ 1.00 DEPTH 1712

_____ Perfs _____ 2.00

PACKER DEPTH _____

PACKER _____
 TOTAL INTERVAL 111.90

PACKER DEPTH _____

PACKER _____

ANCHOR—SPECIFY _____

RECORDER No. _____ DEPTH _____

Drill Pipe _____ 43.90

Perfs _____ 1.00

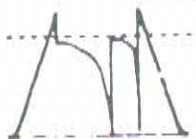
TOTAL DEPTH 1812

BULLNOSE _____ 3.00
 DST CHARTS FOR COMPARATIVE VISUAL ANALYSIS

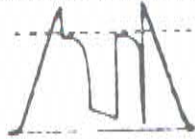
TOTAL TAIL PIPE 111.90
 TOTAL TEST TOOL 15.70



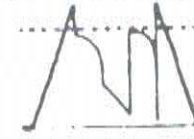
HIGH PERMEABILITY
STRONG DAMAGE EFFECT



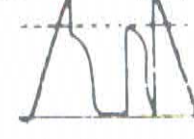
HIGH PERMEABILITY
NO DAMAGE EFFECT



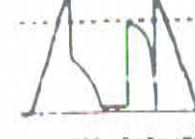
MEDIUM PERMEABILITY
STRONG DAMAGE EFFECT



MEDIUM PERMEABILITY
NO DAMAGE EFFECT



LOW PERMEABILITY
STRONG DAMAGE EFFECT



LOW PERMEABILITY
NO DAMAGE EFFECT

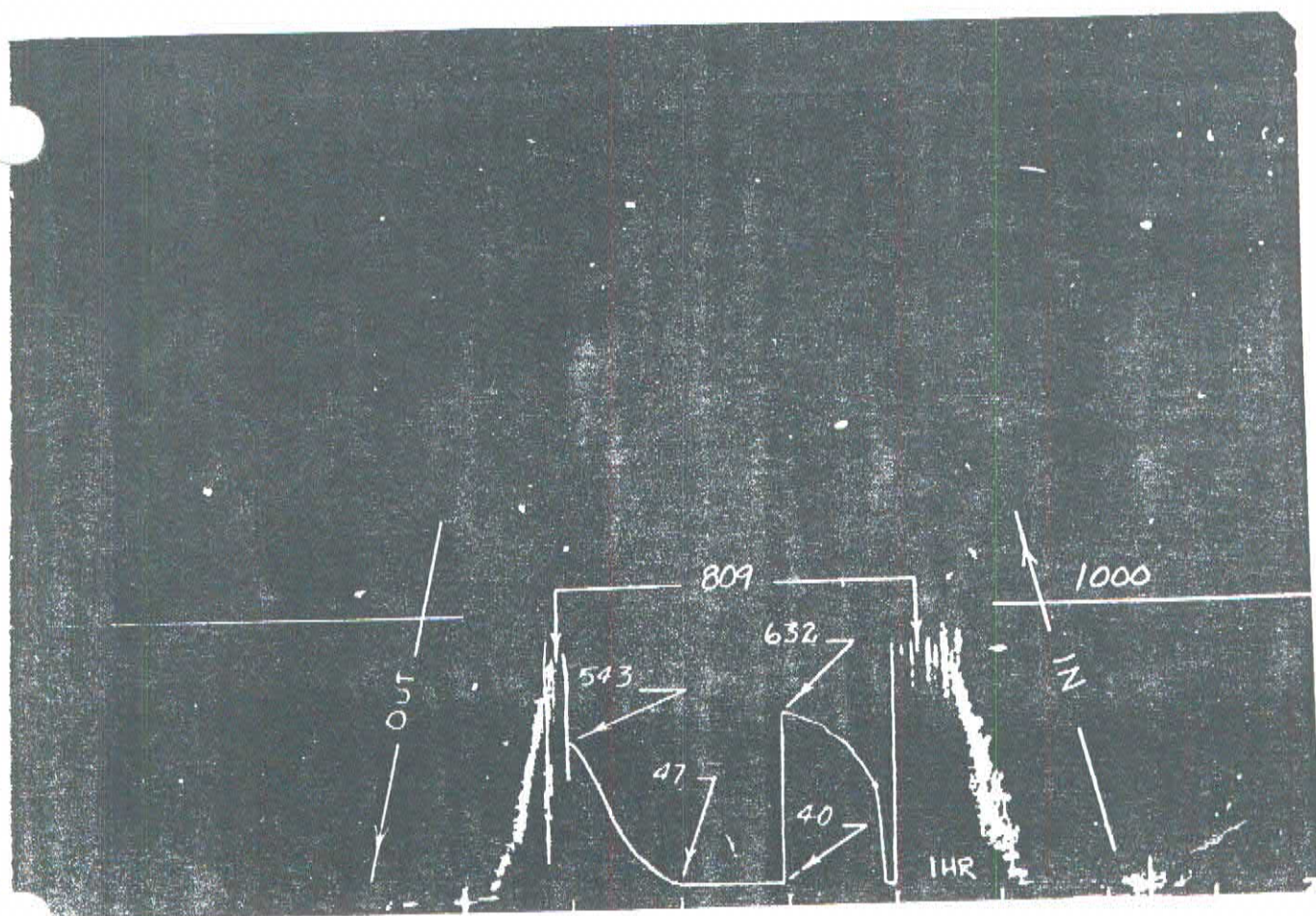
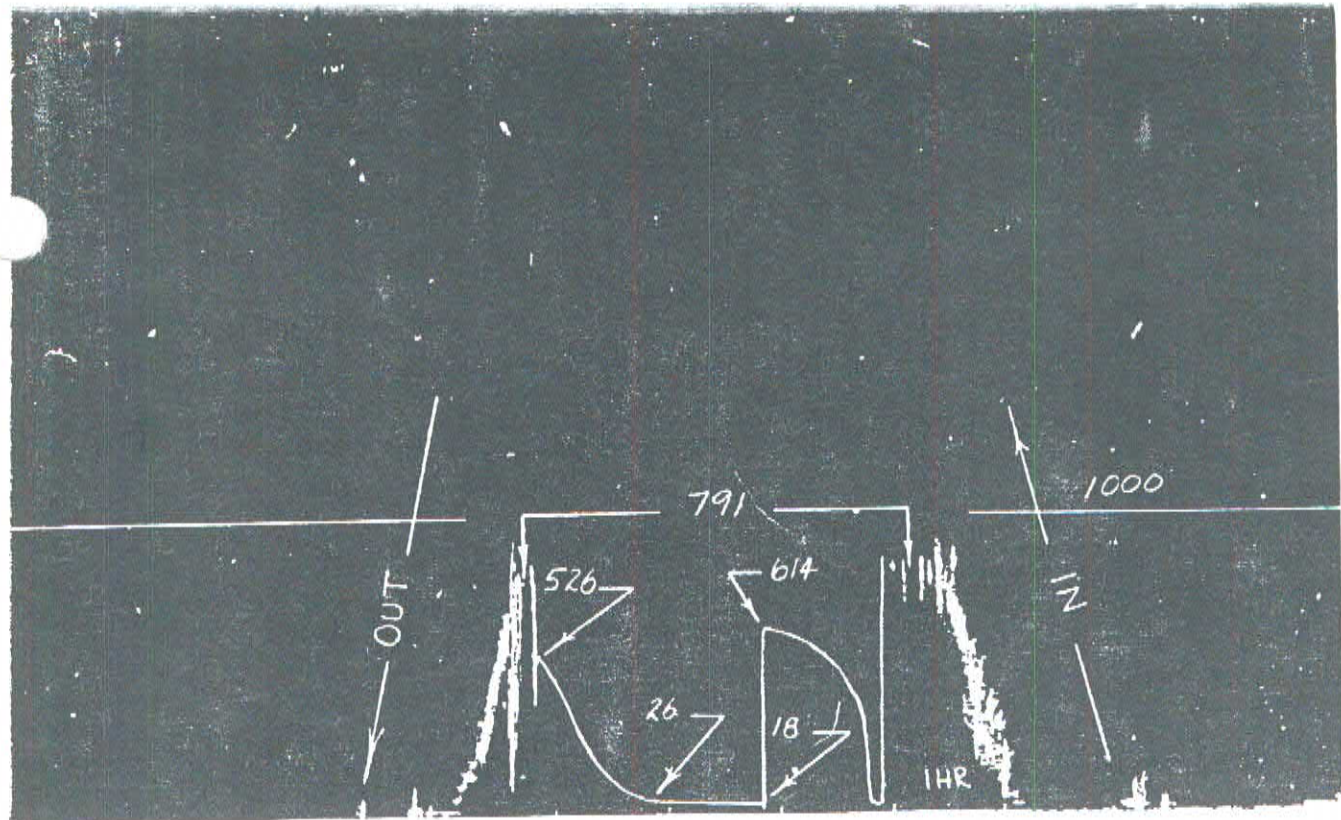


DST PRESSURE INCREMENTS

Recorder No. 5040

Depth 1683

Points	INITIAL CIP				FINAL CIP			
	Time Defl. "	T + 0	$\frac{T + 0}{0}$	PSIG	Time Defl. "	T + 0	$\frac{T + 0}{0}$	PSIG
1	0			12	0			26
2	5			334	5			37
3	10			396	10			51
4	15			442	15			70
5	20			489	20			95
6	25			512	25			132
7	30			535	30			181
8	35			563	35			238
9	40			576	40			305
10	45			588	45			369
11	50			600	50			433
12	55			609	55			479
13	58			614	60			526
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								



5386-92-01 B

66°02'12"

129°09'46"

TRIAD

HUME R A-53

KB 206 DST #1

775 - 827

RAMPARTS

DRILL-STEM TEST DATA

Well Name <u>TRIAD BP ARCO CC HUME R</u>		Test No <u>1</u>
Well Number <u>A-53-66-10-129-00</u>		Zone Tested
Company <u>TRIAD OIL CO. LTD</u>		Interval <u>775-829</u>
Comp Rep Mkt. <u>C. HUBER</u>	Tester <u>JOE HUGI</u>	Date <u>JULY 9/69</u>

Type of Test 12 Dual Bottom Hole RFS Tool No. 19 drained at location

Preflow 12 mins ISI 60 mins Flow 90 mins FSI 60 min

Specify Inside or Outside	Ins REC No. <u>5040</u>	Outs REC No. <u>5041</u>	REC No.
	<u>3600</u> RANGE <u>12</u> HR CLOCK	<u>3600</u> RANGE <u>12</u> HR CLOCK	RANGE HR CLOCK
DEPTH	<u>758</u>	<u>817</u>	
Initial Hydro Mud Press	<u>344</u>	<u>372</u>	
Initial Shut-In Press	<u>272</u>	<u>297</u>	
Initial Flow Press	<u>22</u>	<u>53</u>	
Final Flow Press	<u>29</u>	<u>56</u>	
Final Shut-In Press	<u>275</u>	<u>296</u>	
Final Hydro Mud Press	<u>344</u>	<u>372</u>	

Mud Drop 2' Fluid Loss 8.8 Mud Weight 9.4
 Viscosity 100 Temperature °F 82 Net Pay Tested ?
 Top Packer Depth 775 Bottom Packer Depth 829 Total Depth 829
 Drill Pipe Size 4" Wt. 14 Drill Collar I.D. 2 7/8" Ft Run 448
 Surface Choke Size Closed Bottom Choke Size 1" Main Hole Size 7 7/8"
 Anchor Size 4 3/4" OD Rat Hole Size 6 3/16" Feet of Rat Hole 33
 Cushion Amount Type Rubber Size 6 1/8"

Fluid Recovery Total Feet 8
 Recovered 8 Feet of Drilling mud
 Recovered Feet of
 Recovered Feet of
 Recovered Feet of
 Recovered Feet of

Gas Recovery How Measured Riser size

mins	Temp. F	Press Rdg.	psi	Orifice Size	=	MCF/Day
mins	Temp. F	Press Rdg.	psi	Orifice Size	=	MCF/Day
mins	Temp. F	Press Rdg.	psi	Orifice Size	=	MCF/Day
mins	Temp. F	Press Rdg.	psi	Orifice Size	=	MCF/Day
mins	Temp. F	Press Rdg.	psi	Orifice Size	=	MCF/Day
mins	Temp. F	Press Rdg.	psi	Orifice Size	=	MCF/Day

Bleed Off Time for Drill Pipe

REMARKS Mud drop of 2 feet, due to tool skidding
Tool skidded for 2 feet during preflow
Very weak air blow on preflow, dead after 2 minutes
Very weak air blow on initial flow, dead after 1 minute

Core Lab Gas Cont. No Chem - Geo. Lab Gas Cont. No

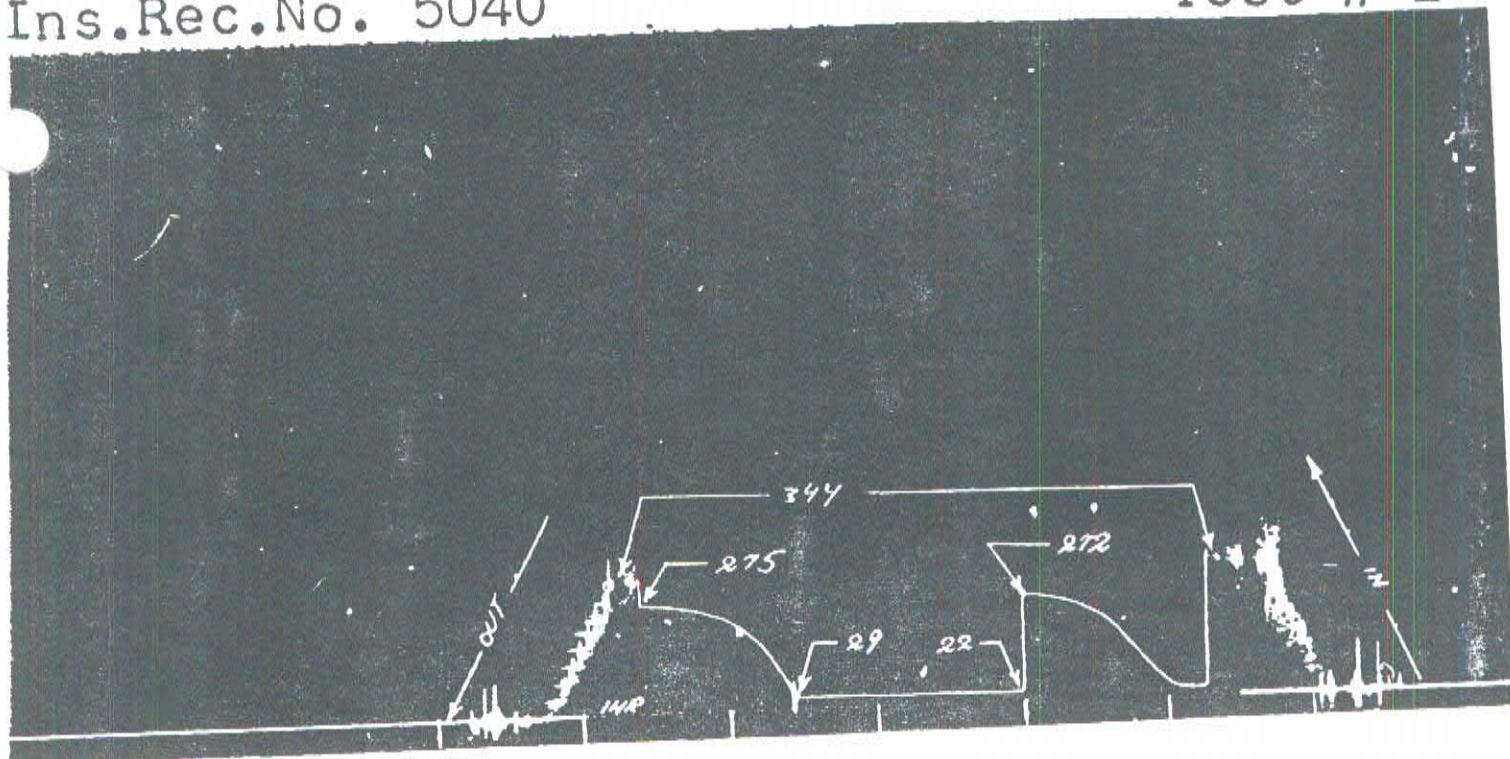
Recorder No. 5040

Depth 758

Points	INITIAL CIP				FINAL CIP			
	Time Defl. "	T + 0	$\frac{T+0}{0}$	PSIG	Time Defl. "	T + 0	$\frac{T+0}{0}$	PSIG
1	0			21	0			27
2	5			39	5			90
3	10			70	10			137
4	15			108	15			176
5	20			143	20			201
6	25			177	25			222
7	30			204	30			237
8	35			224	35			247
9	40			240	40			256
10	45			250	45			262
11	50			258	50			266
12	55			265	55			270
13	60			270	60			273
14	64			272	63			275
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								

Ins.Rec.No. 5040

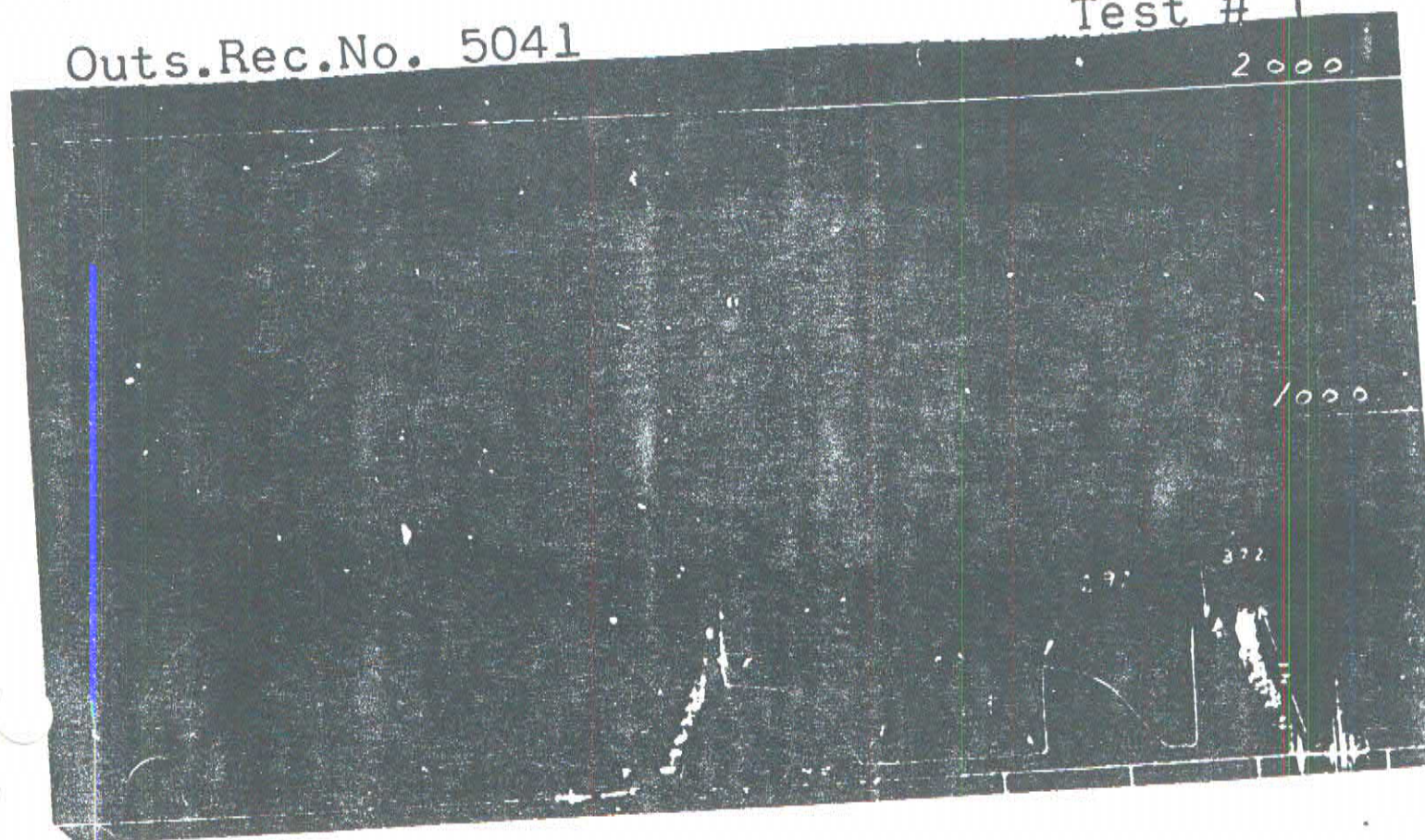
Test # 1



TRAID BP ARCO CC HUME R A-53-66-10-129-00

Outs.Rec.No. 5041

Test # 1



5150-27-02 A

A-47 6710-13045

A-21-E-106-0-2

RICHFIELD

GRANDVIEW HILLS #1

KB 1213 DST 2

BEARROCK

2525 - 2560

JOHNSTON TESTERS LTD.

321 - 50th Avenue S.E.



Calgary, Alberta

Phone CH 3-3461

COMPANY Richfield Oil Corporation TICKET # B-1027
 FIELD Wildcat P.O. #
 WELL NAME Richfield Grandview Hills #1
 COMPANY REP. J.R. Brown Tester for JOHNSTON J. Withers

GENERAL TEST DATA Lone Mtn.

TYPE TEST	Open hole		BOTTOM HOLE TEMP.	
TOTAL DEPTH	2560'		CHOKE SIZE	1/2"
INTERVAL TESTED	2525'-2560'		FLUID CUSHION TYPE	water AMT 25'
TIME STARTED IN HOLE	A.M.	P.M.	AIR CHAMBER SIZE I.D.	2 7/8" AMT 5'
TIME TOOL ON BOTTOM	A.M.	P.M.	WAS TOOL CHASED TO BOTTOM	yes 2'
TIME TOOL OPENED	9:20	A.M. P.M.	DID PACKERS HOLD	yes
INITIAL SHUT-IN PERIOD	30 mins.		WAS TOOL PLUGGED	no
FLOW PERIOD	45 mins.		WAS JARRING NECESSARY	no
FINAL SHUT-IN PERIOD	30 mins.		WAS TEST REVERSED OUT	no

REMARKS There was approximately 2 feet of fill in the bottom of the hole, opened tool for initial shut in, tool kept sliding slightly causing initial shut in to squeeze out
 ----Test satisfactory.

AIR OR GAS BLOW Good initial puff with fair blow decreasing in 2 minutes to very weak blow throughout test.

FLUID RECOVERY. 25 feet of gas cut mud. 25 feet of water cushion

SURFACE INFORMATION WHEN CHOKE OR ORIFICE USED

TIME	MAXIMUM PRES.	CHOKE SIZE
TIME	MAXIMUM PRES.	CHOKE SIZE
TIME	MAXIMUM PRES.	CHOKE SIZE
TIME	MAXIMUM PRES.	CHOKE SIZE
TIME	MAXIMUM PRES.	CHOKE SIZE

OTHER TEST DATA

MAIN HOLE SIZE 9" RAT HOLE SIZE 4 1/2" F.H.
 TYPE MUD WEIGHT 10.0 VISCOSITY WATER LOSS FILTER CAKE
 TYPE PACKER'S SIZE TYPE SIZE
 RECORDERS:
 TOP NO. T-373 CAPACITY 3000# INSIDE ☒ OUTSIDE ☐ DEPTH 2530'
 BOTTOM 867 CAPACITY 3000# INSIDE ☐ OUTSIDE ☒ DEPTH 2560'
 EXTRA CAPACITY INSIDE ☐ OUTSIDE ☐ DEPTH
 NO. SERVICE REPORTS 5 - Richfield Calgary

RICHFIELD OIL CORPORATION
COMPANY

RICHFIELD GRANDVIEW HILLS #1
WELL NAME AND NUMBER

TEST NO. 2

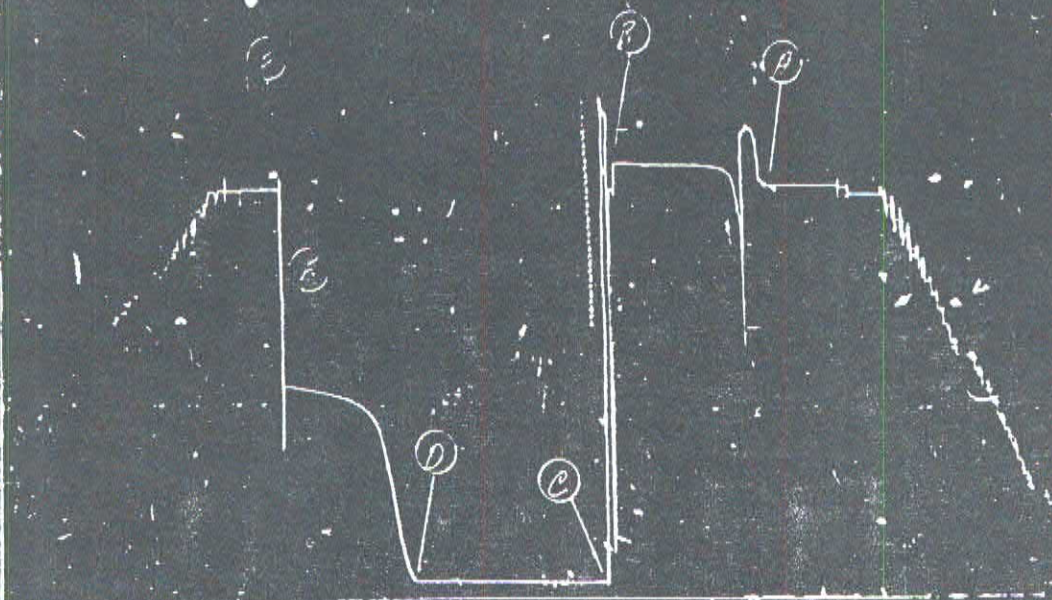
JAN 21, 1960
DATE

PRESSURE DATA		Point	Pressure	Point	Pressure
A Initial Hyd.	1317#				
B Initial Shut-In	false 1389#				
C Initial Flow	71#				
D Final Flow	71#				
E Final Shut-In	689#				
F Final Hyd.	1329#				
Remarks:					

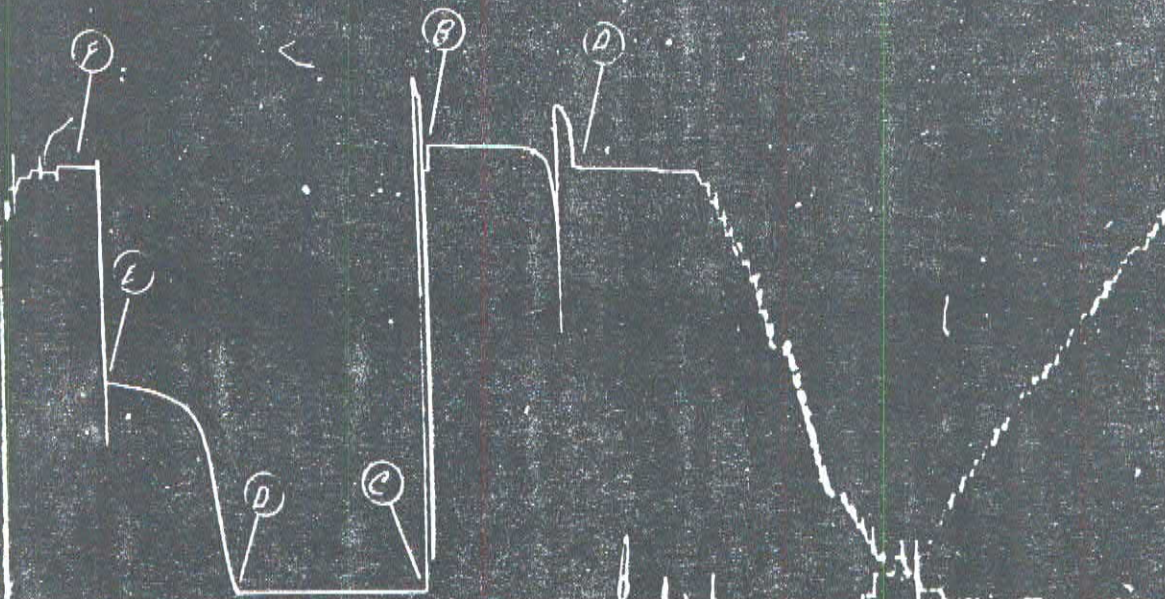
SECONDARY RECORDER

PRESSURE DATA		Point	Pressure	Point	Pressure
A Initial Hyd.	1297#				
B Initial Shut-In	false 1367#				
C Initial Flow	55#				
D Final Flow	60#				
E Final Shut-In	671#				
F Final Hyd.	1291#				
Remarks:					

PRIMARY RECORDER



Sub B-1027 Rev T-372



Sub B-1027 Rev 2-867

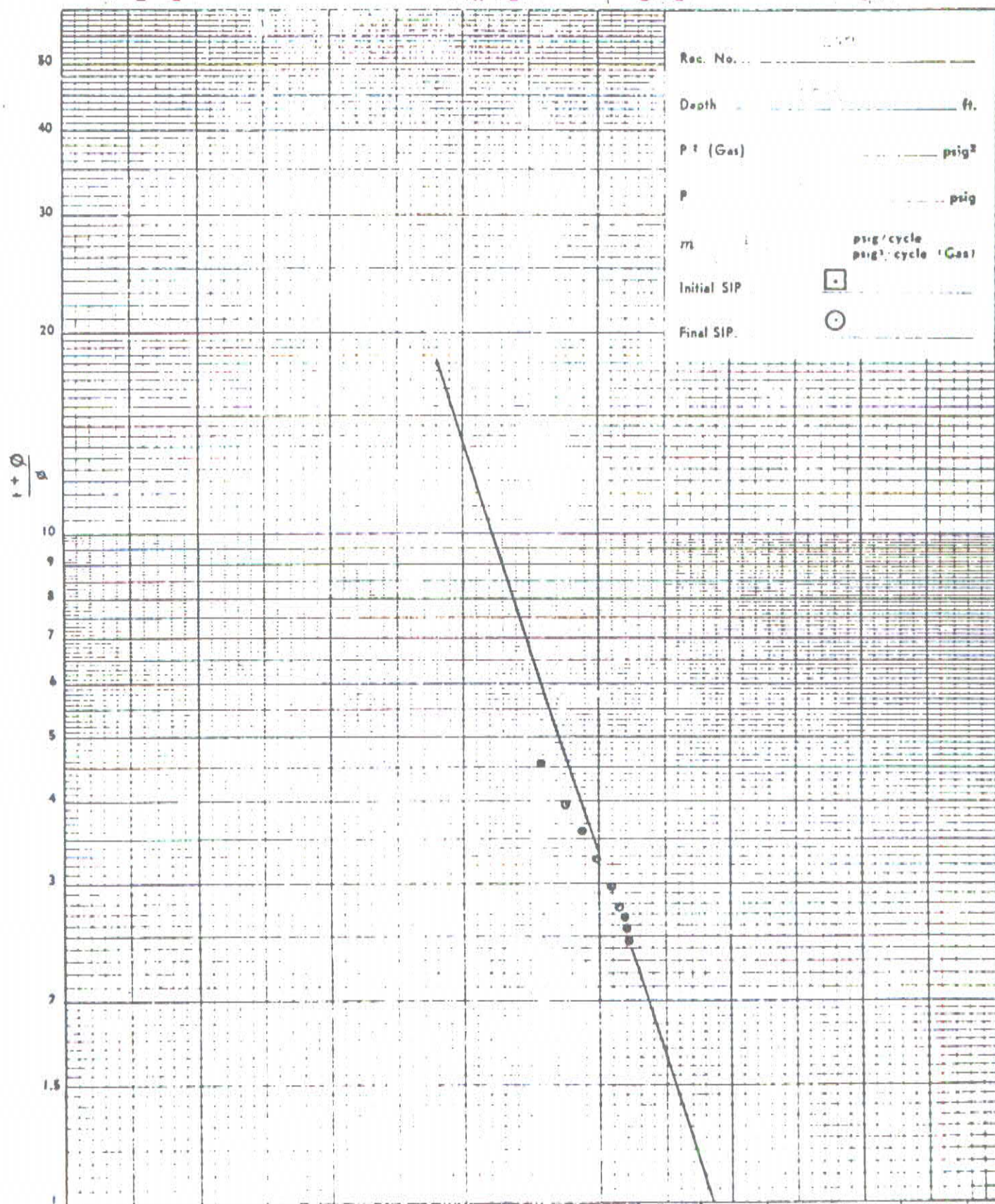
HORNER PLOT

5150-27-02

$67^{\circ}06'12''$

$130^{\circ}52'30''$

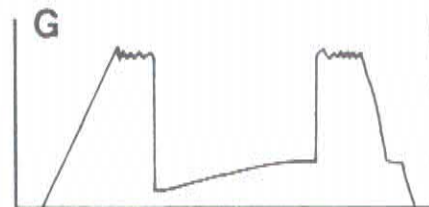
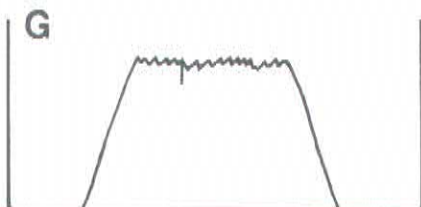
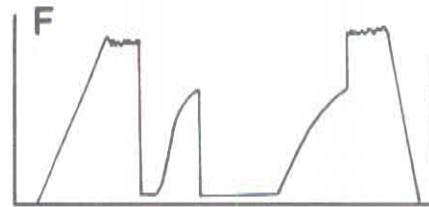
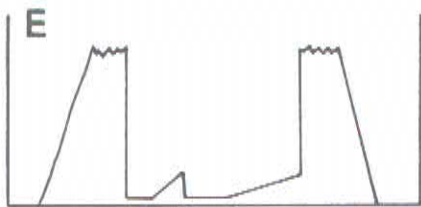
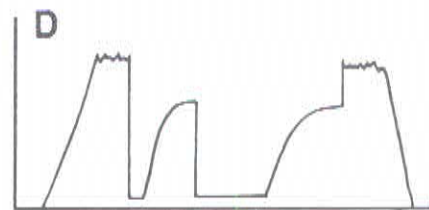
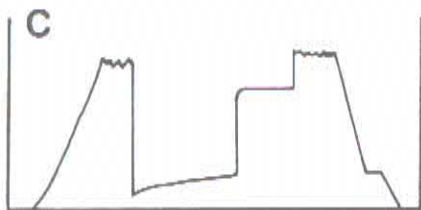
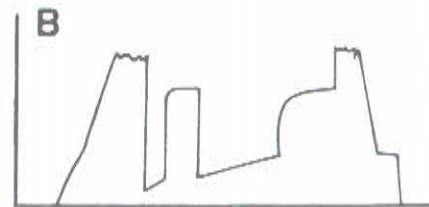
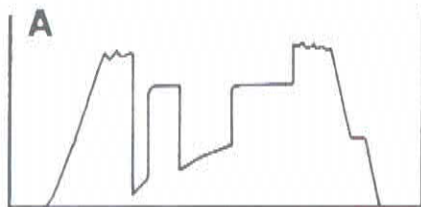
2525 - 2560



PRESSURE EXTRAPOLATION PLOT

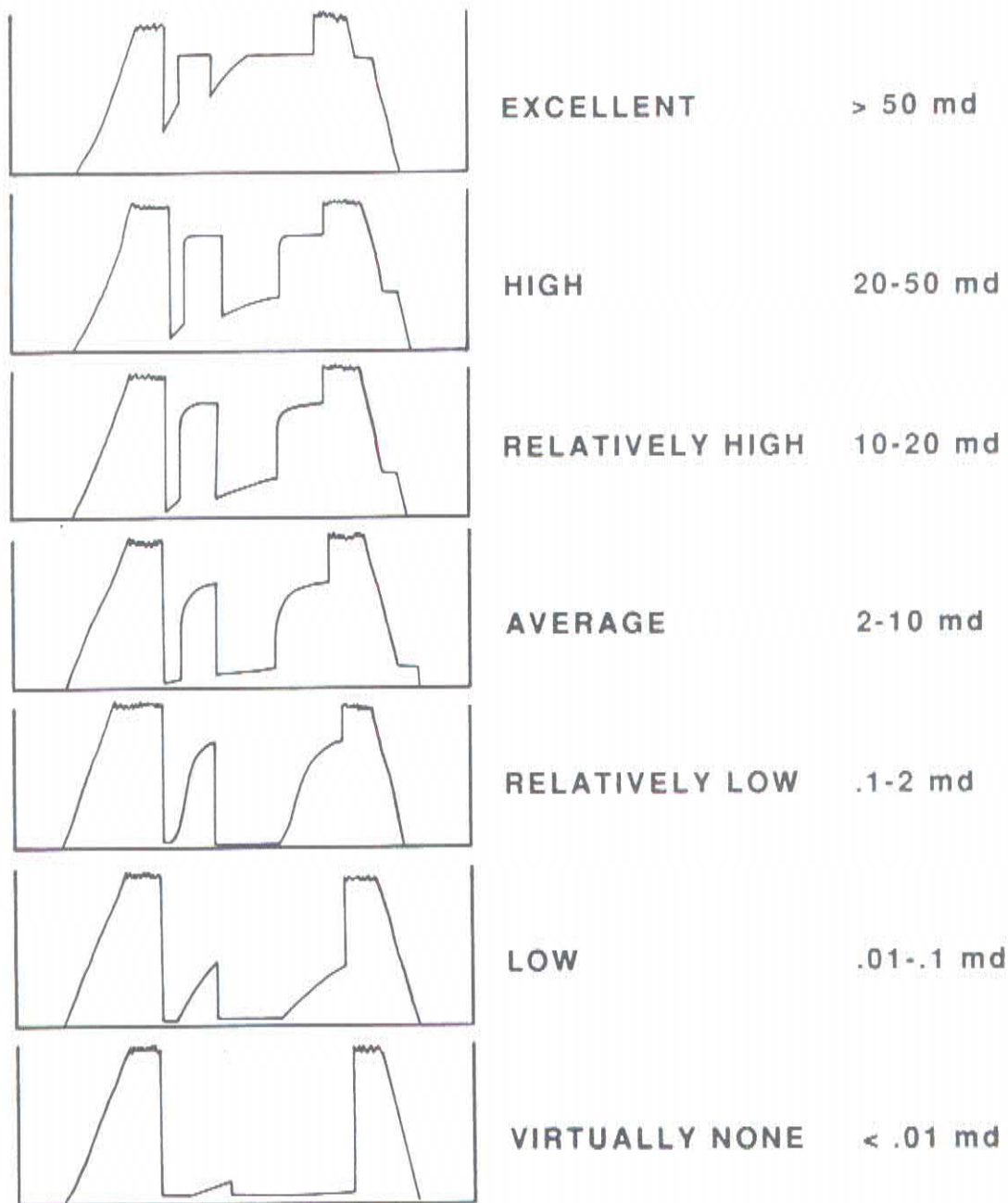
V. APPENDIX

Drill Stem Test Quality Codes

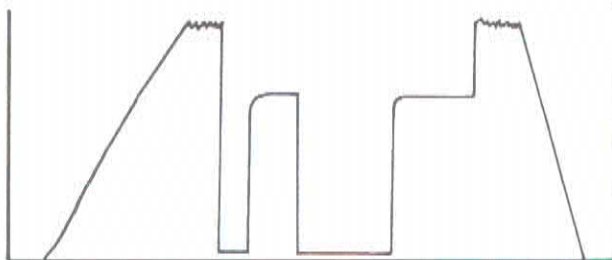


Drill Stem Test Permeability Ratings

"Permeability is Directly Proportional to the Rate of Build-up on DST shut-ins"



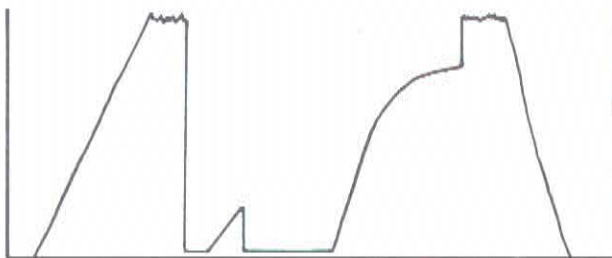
By-Passed Drill Stem Tests



GAS

"CLASSIC FORMATION DAMAGE"

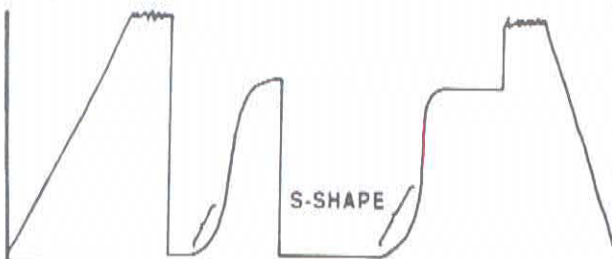
- STABILIZED SHUT-INS
- LOW FLOWING PRESSURES



GAS

"CLEAN-UP FORMATION DAMAGE"

- INCREASE IN RATE OF BUILD-UP ON F.S.I. COMPARED WITH I.S.I.
- LOW FLOWING PRESSURES



OIL

"NEAR WELLBORE WATER BLOCK"

- RAPID BUILD-UP ON SHUT-INS
- LOW FLOWING PRESSURES
- S-SHAPE ON EARLY PORTION OF SHUT-INS

CONVERSION TABLE

WATER SALINITIES

mg/l	Density (kg/m ³)	ppm	psi/ft.
381 150	1.21	315 000	.528
369 000		307 500	.525
360 000	1.20	300 000	.523
348 075		292 500	.521
339 150	1.19	285 000	.519
325 090		275 500	.517
318 600	1.18	270 000	.514
304 200		260 000	.511
292 500	1.17	250 000	.508
278 400		240 000	.506
266 800	1.16	230 000	.503
255 875		222 500	.500
247 250	1.15	215 000	.498
236 550		207 500	.496
228 000	1.14	200 000	.493
218 655		193 500	.491
211 310	1.13	187 000	.489
202 720		181 000	.487
196 000	1.12	175 000	.485
185 925		167 500	.483
177 600	1.11	160 000	.480
167 750		152 500	.478
159 500	1.10	145 000	.476
149 875		137 500	.474
141 700	1.09	130 000	.471
132 300		122 500	.469

mg/l	Density (kg/m ³)	ppm	psi/ft.
124 200	1.08	115 000	.467
115 025		107 500	.465
107 000	1.07	100 000	.463
98 050		92 500	.461
90 100	1.06	85 000	.459
81 375		77 500	.457
73 500	1.05	70 000	.454
65 000		62 500	.452
57 200	1.04	55 000	.450
48 925		47 500	.448
41 200	1.03	40 000	.445
37 700		35 000	.443
30 600	1.02	30 000	.441
22 725		22 500	.439
15 150	1.01	15 000	.437
7 500		7 500	.435
Zero	1.00	Zero	.433

Conversion ppm to mg/l:

$$\text{ppm} \times \text{density} = \text{mg/l}$$

TABLE 1
CONVERSION TABLES
WEIGHTS, GRAVITIES, SALINITIES

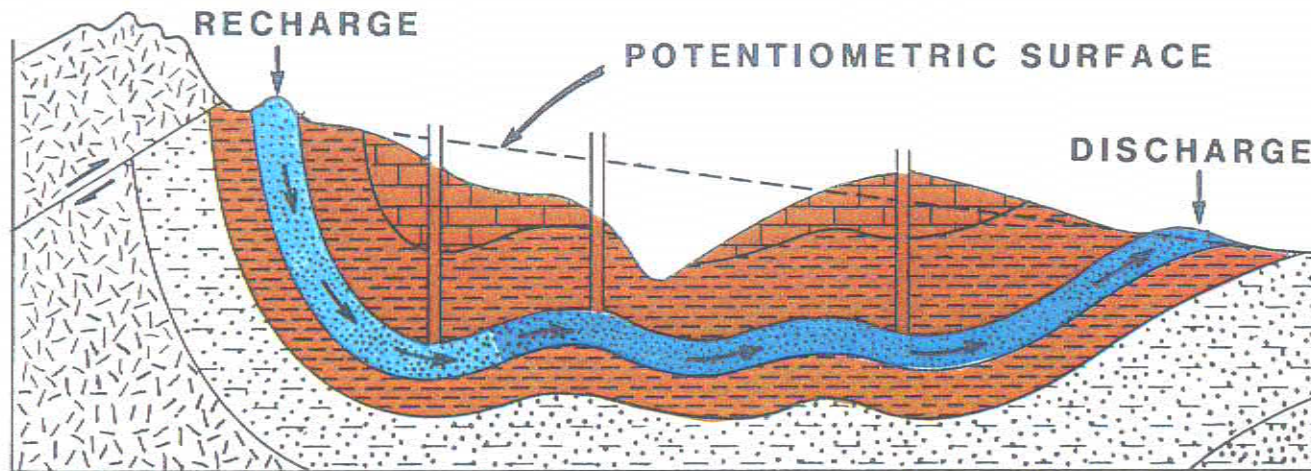
<u>NOTES</u>	<u>S.G.</u>	<u>kPa/m</u>	<u>API</u>	<u>kg/m³</u>	<u>WATER IN</u> <u>PPM TOTAL SOLIDS</u>	<u>psi/ft</u>
Very heavy oils	1.140	11.152	-7.5°	1140	200 000 ppm	.493
	1.130	11.061	-6.3°	1129	187 000 ppm	.489
	1.120	10.971	-5.2°	1120	175 000 ppm	.485
	1.110	10.858	-3°	1110	160 000 ppm	.480
	1.100	10.767	-2.7°	1100	145 000 ppm	.476
	1.090	10.654	-1.7°	1090	130 000 ppm	.471
	1.080	10.564	-0.5°	1080	115 000 ppm	.467
	1.070	10.473	1°	1070	100 000 ppm	.463
	1.060	10.383	2°	1060	85 000 ppm	.459
	1.050	10.270	3°	1050	70 000 ppm	.454
	1.040	10.179	4.5°	1040	55 000 ppm	.450
	1.030	10.066	6°	1030	40 000 ppm	.445
	1.020	9.976	7°	1020	30 000 ppm	.441
	1.010	9.885	8.5°	1010	15 000 ppm	.437
	1.000	9.795	10°	1000	zero ppm	.433
Fresh Water	0.993	9.727	11°	993		.430
Heavy oil	0.986	9.659	12°	986		.427
	0.979	9.591	13°	979		.424
	0.972	9.523	14°	972		.421
	0.966	9.455	15°	966		.418
	0.959	9.388	16°	959		.415
	0.953	9.342	17°	952		.413
	0.947	9.274	18°	947		.410
	0.940	9.207	19°	940		.407
	0.934	9.139	20°	931		.404
	0.928	9.093	21°	928		.402
	0.922	9.026	22°	922		.399
	0.916	8.958	23°	916		.396
	0.910	8.913	24°	910		.394
	0.904	8.845	25°	904		.391
	0.898	8.799	26°	898		.389
	0.894	8.754	27°	894		.387
	0.887	8.686	28°	887		.384
	0.881	8.618	29°	881		.381
	0.876	8.573	30°	876		.379
	0.870	8.528	31°	870		.377
	0.865	8.483	32°	865		.375
	0.860	8.415	33°	860		.372
	0.855	8.370	34°	855		.370

TABLE 1 Con't

<u>NOTES</u>	<u>S.G.</u>	<u>kPa/m</u>	<u>API</u>	<u>kg/m³</u>	<u>psi/ft</u>
Light oils	0.850	8.324	35°	850	.368
	0.845	8.300	36°	845	.366
	0.840	8.234	37°	840	.364
	0.835	8.189	38°	835	.362
	0.830	8.121	39°	830	.359
	0.825	8.076	40°	825	.357
	0.820	8.030	41°	820	.355
	0.816	7.985	42°	816	.353
	0.810	7.940	43°	810	.351
	0.806	7.895	44°	806	.349
	0.802	7.849	45°	802	.347
	0.797	7.804	46°	797	.345
	0.793	7.759	47°	793	.343
	0.788	7.714	48°	788	.341
	0.784	7.668	49°	784	.339
	0.780	7.646	50°	780	.338
Distillates	0.702	6.877	60°	702	.304
	0.669	6.560	70°	669	.290
	0.638	6.243	80°	638	.276
	0.611	5.994	90°	611	.265
	0.586	5.746	100°	586	.254

Laminar Flow Model

Pressure and Water Chemistry Distributions

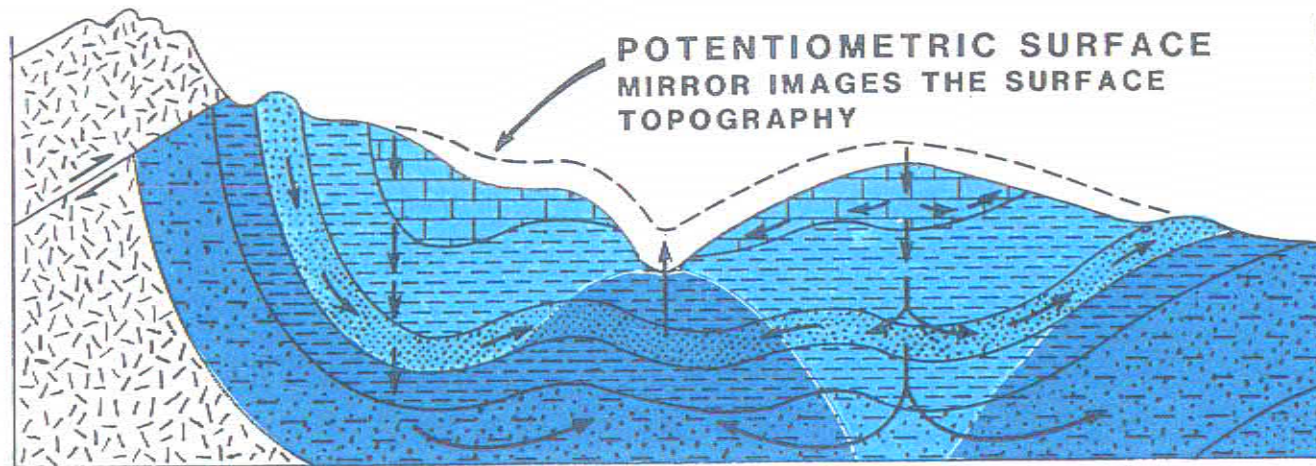


SURFACE WATER INTAKE AT OUTCROPS ALONG UPLIFTED FLANKS
OF BASIN WITH GAS, OIL AND WATER MOVING WITHIN THE LAMINAR
CONFINES OF THE CARRIER BED TOWARD REGIONAL SURFACE
DISCHARGE AREA OCCURRING ALONG LOWER ELEVATION EDGE OF BASIN.
(REVISED AFTER HUBBERT, 1953, Fig. 11).

- METEORIC WATERS
- CONNATE WATERS

Cross-Formational Flow Model

Pressure and Water Chemistry Distributions



BASED UPON THE ASSUMPTION OF WATER WET ROCKS, SURFACE RECHARGE IS BY DESCENDING CROSS-FORMATIONAL FLOW ALONG HIGH TOPOGRAPHIC AREAS. FLOW IS CROSS-FORMATIONAL TOWARDS ASCENDING FLOW AREAS IN CURRENT TOPOGRAPHIC LOWS.
(REVISED AFTER HUBBERT, 1953, Fig. 11 AND TOTH, 1980, Fig. 44).

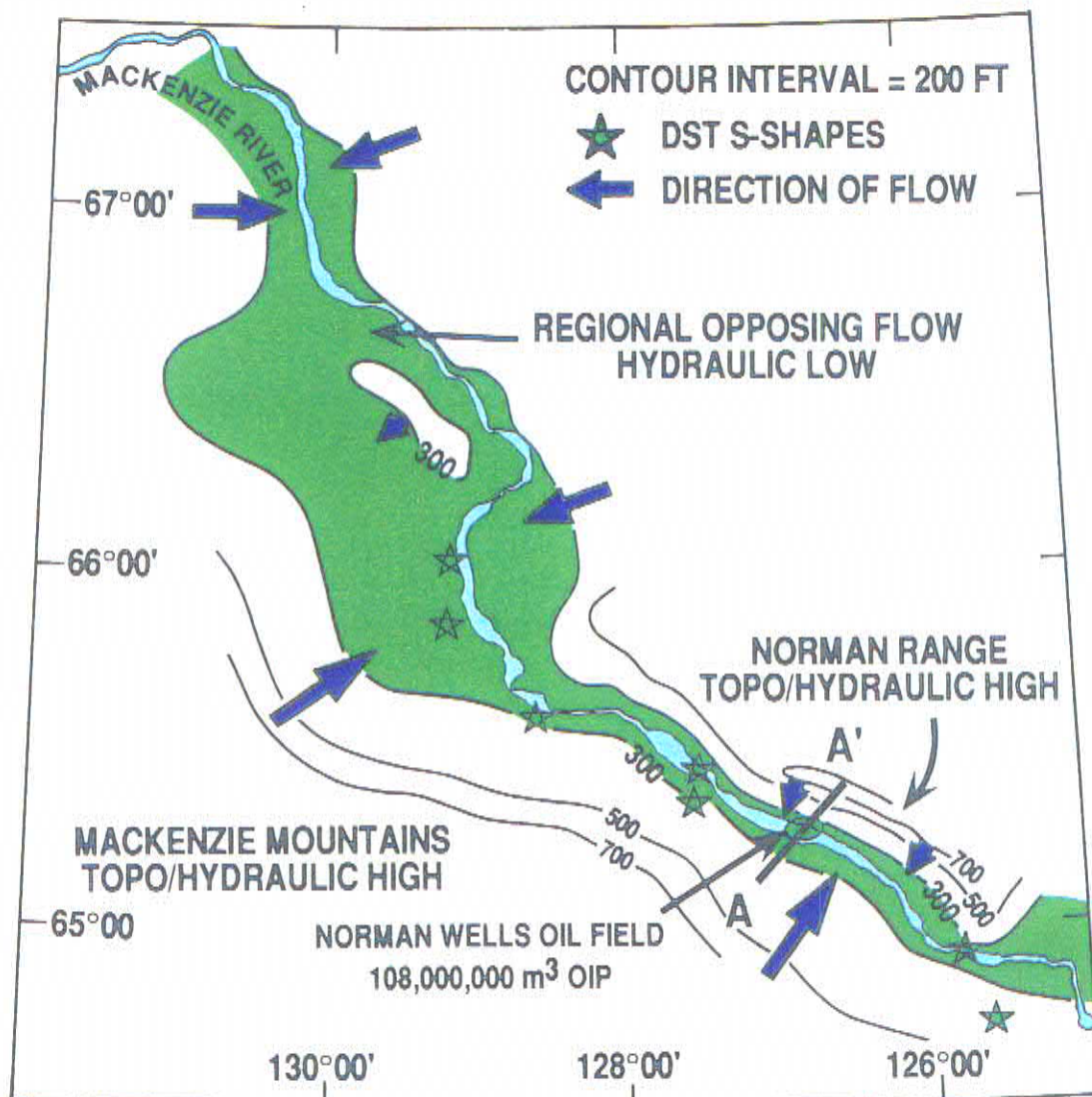
- METEORIC WATERS
- CONNATE WATERS

POTENTIOMETRIC SURFACE MAP

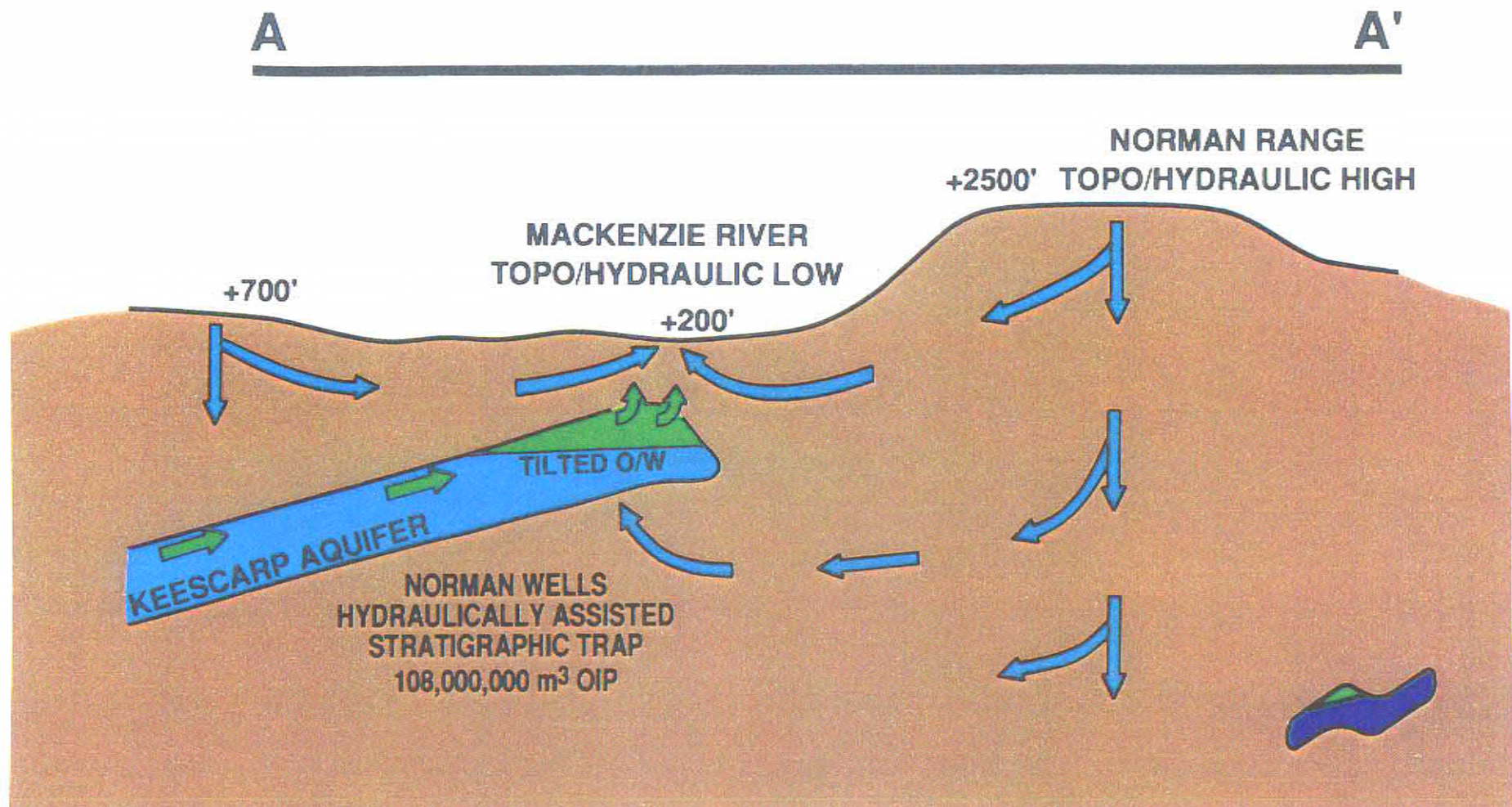
KEESCARP FORMATION

NORMAN WELLS AREA

NORTHWEST TERRITORIES



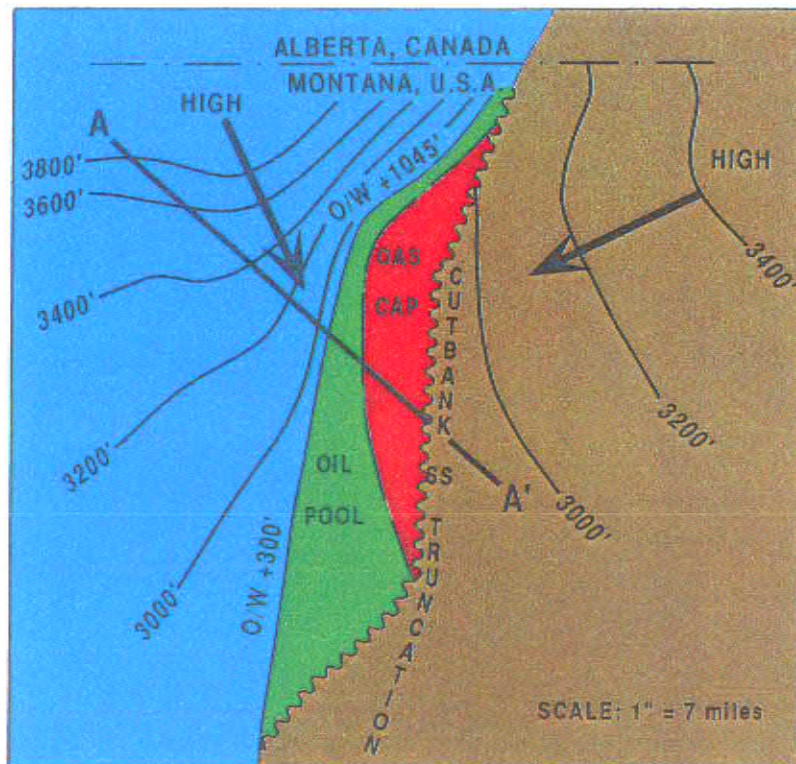
SCHEMATIC HYDRAULIC CROSS-SECTION NORMAN WELLS OIL FIELD NORTHWEST TERRITORIES



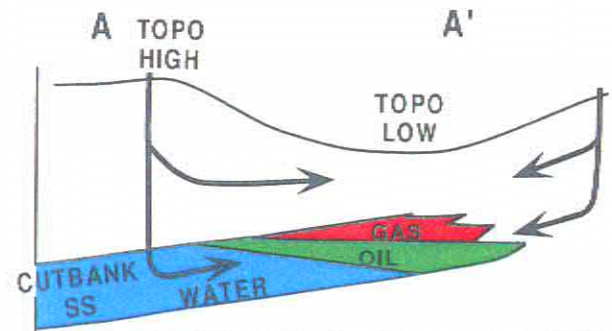
Lower Cretaceous Cutbank Oil Field

"A Hydraulically Assisted Stratigraphic Trap"

POTENTIOMETRIC SURFACE MAP



SCHEMATIC HYDRAULIC CROSS SECTION



CUTBANK OIL FIELD

342 MILLION BARRELS OIL IN PLACE
 488 BCF
 AVERAGE NET PAY 26 FEET
 AVERAGE POROSITY 18%

O/W TILTED OVER 700' FROM
 NORTH TO SOUTH

WARD HYDRODYNAMICS