58deg07'59.758"N-84deg08'02.963"W

LIC. APP. July 24/74

HUDSON'S BAY AREA

300N585810084000

PIX DEL. Sept 30/76

AQUITAINE COMPANY OF CANADA	FTD. 4341' Precamb	CO-ORD.	K.B. RT 77'
AQUITAINE ET AL NARWHAL SOUTH	PBTD.	CORES 1837-1867 R 29'	GR. WD 530'
0-58	I.P.		
SPUD. AUG 4/74 30-672-470			
R/R SEPT 1/74 20-1093-1670		PERFS.	
COMP. 13 3/8-1737-2550			
STATUS PLUGGED & ABANDONED	NET PAY		

FORMATION	TOP	SUBSEA	TOP
HUDSON FORM	665	-588	
M DEV RED BEDS	1220	-1143	
LO SIL	1500	-1423	
SIL EKWAN	R 1780	-1703	
SEVERN RIVER	2550	-2473	
UPPER ORDOV	3285	-3208	
CHURCHILL RIVER	3608	-3531	
BAD CACHE	3980	-3903	
PRECAMB	4277	-4200	
TD	4341	-4264	

WELL COMPLETED

NO DRILLSTEM TESTS RUN.

*Vicinity: 304 miles southeast of Churchill, Manitoba.

LOGS CNL,DILL,FDC,HDT,CLOGR CONTRACTOR Pentagone 82

EST. T.D.— RIGHTS— EMR#132

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COMPANY Aquitaine Company of Canada Ltd.

CLASS New Field Wildcat

CONT. Pentagone #82 PROV. HB OFFSHORE

LOGS DIL, FDC-CNL, SLC-GR, HDT

ISSUED September 22/76

LIC. EMR 132 | 300 | 0 | 58 | 58 | 10 | 084 | 00 | 0

GRID: 58°10' N 84°00' W. UNIT O SEC 58

WELL Aquitaine et al Narwhal South O-58

CO-ORD. Lat 58°07'59.758" N. Long 84°08'02.963" W.

FORMATIONS	LOG	S/S
Sea Floor/Quaternary	580 KB	
Pennsylvanian		
Hudson Formation	665	- 588
Mid Devonian		
Kenogami Red Beds	1220	-1143
Silurian Lower		
Kenogami	1500	-1423
Silurian Ekwan Rvr	1780	-1703
Silurian Severn Rvr	2550	-2473
Upper Ordovician		
Red Head River	3285	-3208
Upper Ordovician		
Churchill River	3608	-3531
Bad Cache	3980	-3903
Pre-Cambrian	4277	-4200

WD 503' RT 77' COMP.

SPUD Aug 4/74 R/R Sep 1/74 Sep 1/74

T.D. 4341'

IN Pre-Camb.

P.B.

T.V.D.

30	x 672 c-470
20	x 1093 c-1670
13 3/8	x 1737 c-2550

STATUS DRY AND ABANDONED ZONE

I.P.

CORES:

1837-1867 Rec 29'

PERFS:

Abandoned, not perforated

No oil or gas shows

DRILLSTEM TESTS:

NO DRILLSTEM TESTS RUN

STATUS HISTORY D M Y

DEPT. OF MINES AND RESOURCES
FEB 11 1977
PETROLEUM BRANCH

MICRO 76

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MICROFILMED
TO .....
HERE .....
June/1979.

1. INTRODUCTION

1.1 Summary

The Narwhal South O-58 well was drilled in the Hudson Bay between August 4, 1974 and September 1, 1974. The Operator was Aquitaine Company of Canada Ltd., based in Calgary, acting on behalf of the "Hudson Bay Group", which was comprised of:

- Aquitaine Company of Canada Ltd.
- Atlantic Richfield Canada Ltd.
- Elf Oil Exploration and Production (Canada) Ltd.
- Petrofina Canada Ltd.
- Shell Canada Ltd.
- Sogepet Ltd.

The selected drilling unit was the semi-submersible "Pentagone 82" (P-82), owned and operated by Sea and Land Drilling Contractors Inc., a subsidiary of the Forex-Neptune group.

The P-82 was towed from the North Sea to Cape Chidley (64^{o}W - 61^{o}N) by the "Oceanic" tug, between June 13th and July 10, 1974. On July 10, 1974, the tow was resumed with two Tidewater tug supply vessels from Cape Chidley to the Narwhal South O-58 wellsite. Details of the last leg of this tow are given in a separate report, namely, "Towing of the P-82 Through the Hudson Bay".

Purpose

The purpose of this wildcat was to evaluate the entire Paleozoic section, in the eastern part of the Hudson Bay Basin. A general high area had been mapped by the various seismic refraction surveys carried out since 1968 and was confirmed by the seismic reflection shot in 1973. The uneven surface of the upper Silurian marker was interpreted as reefal build-up(s) of the Attawapiskat member. In addition, secondary reservoirs were expected deeper, including basal clastics resting on the basement.

Summary of Drilling Operations

Two joints of 30" conductor pipe were set after drilling a 36" hole, to cover the upper part of the glacial drift.

A 20" conductor casing was then set at 1,093', in order to have a BOP assembly and riser installed before drilling a possible Calcium Chloride water bearing formation. Effectively, some gains of calcium chloride water were met at 1,335'.

A 13-3/8" surface casing was set at 1,739' to cover the above formation, just before entering the Attawapiskat formation.

Drilling of a 12-1/4" hole was resumed to T.D. (4,341') with no further casing set, due to the lack of significant reservoir.

Results

The lateral equivalent of the Attawapiskat consists of supertidal, laminated algal limestone, with no porosity. The significant reservoirs were encountered at deeper levels. In particular, the inferred basal clastics were restricted to a 15 foot layer.

No gas or oil shows were encountered.

The well was plugged and abandoned, the P-82 proceeded to the next operation, which was plugging the "Aquitaine et al Walrus A-71" well, temporarily abandoned in 1969.

2. GENERAL DATA

2.1 Well Name and Number: Aquit et al Narwhal South O-58

2.2 Drilling Unit: Pentagone 82 (P-82) Semi-submersible type.
Marathon - Letourneau shipyard, Brownsville, Texas
(Summer 1971 to Fall 1973)
Lloyd's Class + 100 A1 (The unit is ice reinforced but no ice classification is available for this type of vessel.)

2.3 Operator: Aquitaine Company of Canada Ltd.
540 - 5th Avenue S.W.
CALGARY, Alberta
T2P 0M4

2.4 Permittees: Aquitaine Company of Canada Ltd.
Atlantic Richfield Canada Ltd.
Elf Oil Exploration and Production Canada Ltd.
Petrofina Canada Ltd.
Sogepet Limited

2.5 Drilling Contractor: Sea and Land Drilling Contractors, Inc.
(Incorporated in Panama)
8, Aquilino de la Guardia, PANAMA, R.P.

Sea and Land Drilling Contractors
Forex Neptune
Caledon Road, Eastern Wharf
DUNDEE DD1 3LW, Scotland
Telephone: (0382) 453910
Telex: 76455 - PETROBASE

2.6 Permit Number: W1318

2.7 Drilling Authority: EMR Number: 132
Date Issued: July 24, 1974

2.8 Well Location: Hudson Bay
Latitude: 58°07'59.758"N
Longitude: 84°08'02.963"W

Location determined by means of a Decca Lambda "Cesium" system.

2.9 Elevations: R.T./K.B. to Sea Level: 77'
Water Depth: 503'

2.10 Total Depth: 4,341'

2.11 Spudded: August 4, 1974, at 4:15 a.m.

2.12 Drilling Completed: August 28, 1974, at 3:00 p.m.

2.13 Well Abandoned: September 1, 1974, at 2:00 a.m.

2.14 Rig Released: P-82 under tow to WALRUS A-71 location
September 1, 1974, at 1:30 p.m.

2.15 Well Status: Plugged and Abandoned

2.16 Well Classification: New Field - Wildcat

2.17 Support Equipment:

Two Tug Supply Vessels:

Names: M/V Supreme Tide and M/V Giant Tide
Owner: Tidewater Marine Service, Inc.
Built: Hatco Verksted A/S shipyard - Ulsteinvick, Norway
(Delivered in May 1974)
Classification: Navigation: ABS A1(E) + AMS Towing unrestricted
Ice: ABS Class "C" (1971 rules)

One Supply Vessel:

Name: M/V Federal 6
Owner: Federal Offshore Services Ltd.
Built: Star Shipyard
New Westminster, B.C., Canada (1972)
Classification: Navigation: ABS Ocean going A1(E)
Ice: ABS Class "A"

One Helicopter:

Type: Bell 212 IFR Model
Owner: Dominion Pegasus Helicopters Ltd.
Classification: Licensed for commercial night and instrument flying.

2. DRILLING TICKET
CUTTING DESCRIPTION

AQUITAINE — DRILLING TICKET

WELL NAME: NARWHAL S-058

RIG	CO-ORDINATES	TIMING	CASING	LOGS
Pentagone 82	X = 58° 07' 56.28"	Commenced : Aug. 4, / 74	ø 30" at 672'	DIL 1088 - 4340
GEOLOGIST	Y . 84° 08' 16.78"	Temporary Halt =	ø 20" at 1093'	FDC - CNL - GR 500 - 4340
B. Tillement	Z =	Resumption of Drilling =	ø 13 3/8" at 1737'	BHCS - GR 1088 - 4340
A. Pochitaloff	Z KB = 77 A.M.S.L.	Temporary Halt =	ø at	HDT 1750 - 4340
	Hudson Bay	Resumption of Drilling =	ø at	
Brought up to date on	PROVINCE	Completed : Aug 28 / 74		
November 1974	Federal waters			

AGE	Formation	SCALE 1"=500' or 1/6,000 DEPTH	LOG	CORE	DIP	Porosity TYPE	Porosity GRADE	SHOW-TEST	GAIN AND LOSS	LITHOLOGY
	WATER	500								water
		580								580
?	?									no samples
		1000								
MID. DEVON.	MID. KENOG	1112							Partial loss; 90bbls	1112 Siltstone, mudstone, reddish, greenish, slightly dolo. - local fine grained ss - gypsum
		1500							gain 5bbls/h	1500 - Shaly dolomite, light grey - halite and anhydrite
SILURIAN	LOWER KENOG	1780								1780 Limest., coarse, arenitic, laminated, algal, vuggy. Voids filled by salt and anhyd. Limest. brown, tight, hard
	EKWAN	2000		1837 1867 C# 1 100% Rec.	Flat lay	inter crystall - micro vugs no significant porous interval		NONE		Thin salt stringers
		2500								2550
	SEVERN	2550							steady gain; max. 439 g/l of Cl2Ca	Limestone, light grey, brown, cryptox to microx, hard, tight Anhydrite interbed. with dolo. limestone
		3000								Limestone, buff, local oolithic, microx, local porous Limestone, buff, cream, brown, microx. tight
	READ HEAD	3285								3285 Halite Limestone Dolo. limestone, local argillaceous
UPPER ORDOVIC		3500								3608 Anhydrite
	CHURCHILL	3608								Limestone, buff, brown, microx, tight
		3980								3980 Limestone, buff, brown, white, microx. to cryptox, hard, tight
	Bad Cache	4000								4262 clean sand
		4262								4277 granite
		4277	T.D. 4341'							
PRECAMBRIAN	Basal Clastics	4500								

NARWHAL SOUTH #1

GEOLOGICAL SAMPLE DESCRIPTION

Sheet No. 1

From	To	Core C Ditch D	No. of Ft. Porous	No. of Ft. Non-Porous	Showings O.G.W.		
1125	1130		5			70%	Reddish, rarely greyish siltstone to very fine grained ss, to soft mudstone
						20%	Cryptox, Whitish to light grey limestone
						10%	Cement
1130	1135		5				As above plus
							white, soft gypsum
1135	1140			5		30%	Reddish to greyish siltstone to mudstone as above . . . slightly dolomitic
						10%	Whitish to light grey cryptox limestone
						60%	Cement
1140	1145			5		60%	Siltstone and mudstone as above
						10%	cryptox limestone as above
						30%	Cement
1145	1150			5			As above
1150	1155			5		90%	Variegated reddish and greyish mudstone to siltstone
							dark grey anhydrite
						10%	cement
							No more limestone
1155	1160			5		100%	Variegated siltstone as above
1160	1165			5		100%	Mostly reddish, to grey-greenish sometimes variegated siltstone (Slightly dolomitic)
1165	1170			5		100%	Reddish to grey-greenish siltstone to very fine grained ss, slightly dolomitic (25%)
1170	1175			5		100%	Reddish to light grey micaceous fine grained ss, locally conglomeratic (Slightly dolomitic)
1175	1180			5		100%	Reddish to light grey siltstone and mudstone, locally with fine sands, slightly dolomitic plus cement
1180	1185			5		20%	Red-grey siltstone as above
						80%	grey cryptocrystalline, silty dolomite to dolomitic siltstone

SAMPLES NOT LAGGED

SAMPLES LAGGED AT 8 ~~FEET~~ PER MIN.

(Delete as Appropriate)

NARWHAL SOUTH #1

GEOLOGICAL SAMPLE DESCRIPTION Sheet No. 2

From	To	Core C Ditch D	No. of Ft. Porous	No. of Ft. Non-Porous	Showings O.G.W.		
1185	1190			5			as above
1190	1195			5		70%	Red-grey siltstone as above
						20%	grey, cryptox, silty dolomite
						-------	Tripping out at 1196 to change bit

SAMPLES NOT LAGGED

SAMPLES LAGGED AT ..... FT. PER MIN.

(Delete as Appropriate)

GEOLOGICAL SAMPLE DESCRIPTION

Sheet No. 3

CONFIDENTIAL

From	To	Core C Ditch D	No. of Ft. Porous	No. of Ft. Non-Porous	Showings O.G.W.	
1,195	1,200			5		95% reddish to green-greyish slightly dolo siltstone to fine grained ss. 5% white gypsum
1,200	1,205			5		95% as above 5% as above
1,205	1,210			5		95% as above 5% as above
1,210	1,215			5		100% Mostly reddish to green-greyish siltstone to mudstone dolomitic (47%), no more gypsum
1,215	1,220			5		100% Half-half reddish and light greyish very dolomitic siltstone & gypsum (soft and white)
1,220	1,225			5		100% Mostly reddish, soft, shaly and slightly dolomitic siltstone to very fine grained ss. & gypsum
1,225	1,230					90% as above 10% white, soft gypsum
1,230	1,235					95% as above 5% as above
1,235	1,240					95% as above 5% as above

SAMPLES NOT LAGGED

SAMPLES LAGGED AT ..... FT. PER MIN.

(Delete as Appropriate)

August 10, 1974

GEOLOGICAL SAMPLE DESCRIPTION

10:00 p.m.

CONFIDENTIAL

From	To	Core C Ditch D	No. of Ft. Porous	No. of Ft. Non-Porous	Showings O.G.W.	
1,245	1,250			5		90% reddish siltstone a/a (to greenish) 10% white soft gypsum
1,250	1,255			5		100% reddish to green-greyish slightly dolomitic siltstone to very fine grained ss. Locally rich in heavy minerals and micas & gypsum
1,255	1,260			5		as above Heavy minerals mostly in light grey intercalations
1,260	1,265			5		as above
1,265	1,270			5		as above
1,270	1,275			5		as above
1,275	1,280			5		as above
1,280	1,285			5		as above, but the colour is mainly green-greyish to blue-greyish
1,285	1,290			5		as above
1,290	1,300			5		Reddish to greenish... as above
1,300	1,310					as above Mainly siltstone and mudstone.
1,310	1,320					as above
1,320	1,330					as above
1,330	1,340					as above with 5% Gypsum, white soft

SAMPLES NOT LAGGED

SAMPLES LAGGED AT ..... FT. PER MIN.

(Delete as Appropriate)

August 11, 1974

GEOLOGICAL SAMPLE DESCRIPTION

Sheet No. 5

CONFIDENTIAL

early morning

From	To	Core C Ditch D	No. of Ft. Porous	No. of Ft. Non-Porous	Showings O.G.W.	
1,340	1,350					100% reddish brown and greenish grey siltstone to vf sandstone. (Minor mudstone) v. sl dolomitic, locally micaceous, & Gypsum, soft, white
1,350	1,360					as above, sl incr in very fine sandstone, reddish brown, friable, subangular - subrounded grains, moderate to well sorted, lt brn grains, argillaceous
1,360	1,370					as above, 70% siltstone to 20% vf sandstone 10% gypsum, white, soft
1,370	1,380					as above but only trace gypsum
1,380	1,390					as above with 10% sandstone. Abundant loose sd grains vf - silt size in sample
1,390	1,400					as above
1,400	1,410					reddish to greenish siltstone and mudstone with good trace very fine sandstone. Small trace gypsum
,410	1,420					as above becoming slight to moderately dolomitic, locally very dolomitic
1,420	1,430					reddish to greenish siltstone and increasing mudstone (50%) as above. Occ gyp.
1,430	1,440					90% mostly reddish siltstone 10% grey dolomitic shaly siltstone & gypsum (36% dolo)
1,440	1,450					100% reddish to greyish dolomitic shaly siltstone to very fine grained ss.
1,450	1,460					Mostly reddish
1,460	1,470					70% reddish, a/a 30% light grey shaly dolomitic siltstone

SAMPLES NOT LAGGED

SAMPLES LAGGED AT ..... FT. PER MIN.

(Delete as Appropriate)

August 11, 1974

GEOLOGICAL SAMPLE DESCRIPTION Sheet No. 6

CONFIDENTIAL

From	To	Core C Ditch D	No. of Ft. Porous	No. of Ft. Non-Porous	Showings O.G.W.	
1,470	1,480					Red to grey siltstone to claystone to very fine ss., dolomitic
1,480	1,490					as above
1,490	1,500					as above, but the grey fraction is more dolomitic
1,500	1,505					70% reddish to greenish as above
						20% shaly cryptox, grey dolomite
						10% gypsum
1,505	1,510					as above
1,510	1,520					10% reddish, as above
						90% whitish to light grey shaly cryptox dolomite & gypsum
1,520	1,525					as above
						change of bit
1,525	1,530					5% reddish siltstone (cavings?) & gypsum
						95% light grey to beige argillaceous cryptox dolomite
1,530	1,535					100% light grey to beige argillaceous cryptox, dolo

SAMPLES NOT LAGGED

SAMPLES LAGGED AT ..... FT. PER MIN.

(Delete as Appropriate)

August 11, 1974

GEOLOGICAL SAMPLE DESCRIPTION

evening

CONFIDENTIAL

From	To	Core C Ditch D	No. of Ft. Porous	No. of Ft. Non-Porous	Showings O.G.W.	
1,535	1,540			5		as above & anhydrite
1,540	1,545			5		100% as above
1,545	1,550			5		as above & gypsum, anhydrite
1,550	1,555			5		100% as above
1,555	1,560			5		100% as above & gypsum
1,560	1,565			5		95% as above
						5% white gypsum
1,565	1,570			5		anhydrite & as above
1,570	1,575			5		50% grey cryptox argillaceous dolo
			2	3		50% buff cryptox to calcarenitic limestone
1,575	1,580		1	4		70% grey to buff cryptocrist, argill. dolo
						30% buff cryptox to calcar and/or succronic
						lims, slightly porous
1,580	1,590		2	8		85% dolo, as above
						15% lims, as above
1,590	1,600			10		85% dolo, as above
						15% lims, tight. No more calcarenite
1,600	1,610			10		90% dolo, as above
						10% lims, as above, tight
						Anhydrite, blueish

SAMPLES NOT LAGGED

SAMPLES LAGGED AT ..... FT. PER MIN.

(Delete as Appropriate)

GEOLOGICAL SAMPLE DESCRIPTION

11:00 p.m.

CONFIDENTIAL

From	To	Core C Ditch D	No. of Ft. Porous	No. of Ft. Non-Porous	Showings O.G.W.	
1,610	1,620			10		30% dolo, as above, buff to grey 15% lims, as above, (tight) 50% bluish anhydrite 5% whitish gypsum
1,620	1,630		1	9		20% dolo, as above 40% lims, buff, cryptox to calcarenitic, slightly porous 35% bluish anhydrite 5% gypsum
1,630	1,640			10		70% light grey argillaceous dolomite 30% buff cryptox tight limestone anhydrite and gypsum
1,640	1,650			10		60% buff to light grey argil. dolo 40% lims, as above
1,650	1,660			10		65% dolo, as above 35% lims, as above, rarely calcarenitic
1,660	1,670					50% dolo, as above
				10		45% lims, as above 5% anhydrite
1,670	1,680			10		60% mostly light grey, locally tan, argellaceous cryptox dolo. 40% buff, cryptox, tight limestone

SAMPLES NOT LAGGED

SAMPLES LAGGED AT ..... FT. PER MIN.

(Delete as Appropriate)

August 11, 1974

GEOLOGICAL SAMPLE DESCRIPTION

Sheet No. 9

CONFIDENTIAL

From	To	Core C Ditch D	No. of Ft. Porous	No. of Ft. Non-Porous	Showings O.G.W.	
1,680	1,685			5		60% light grey to buff argill. dolo. 30% buff cryptox lims, locally fragmental to pelletoidal 10% anhydrite and gypsum
1,685	1,690			5		as above
1,690	1,695			5		75% dolo, as above 20% lims, cryptox to fragmental, as above 5% anhy. and gypsum
1,695	1,700			5		65% dolo, as above 20% lims, as above 15% anhydrite and gypsum
1,700	1,705			5		60% grey dolo, argillaceous 10% grey dolomitic shale 10% buff homogeneous, cryptox, tight lims 10% buff, fragmental to bioclastic, locally slightly porous lims. 10% bluish anhydrite & gypsum
						Midnight! Logging, running casing 13 3/8"

SAMPLES NOT LAGGED

SAMPLES LAGGED AT ..... FT. PER MIN.

(Delete as Appropriate)

GEOLOGICAL SAMPLE DESCRIPTION Sheet No. 10

From	To	Core C Ditch D	No. of Ft. Porous	No. of Ft. Non-Porous	Showings O.G.W.	
1,710	1,715			5		50% Dolomite, light buff, argillaceous, hard, massive, microcr.
						30% Limest. white to buff, cryptocr. locally calcarenitic and slightly vuggy
						20% Anhydrite and gypsum
1,715	1,720			5		60% Dolomite a/a
						20% Limestone a/a
						20% Anhydrite
1,720	1,725			5		70% Dolomite a/a
						20% Limestone a/a
						10% Anhydrite
1,725	1,730			5		60% Dolomite a/a
						10% Limestone a/a
						30% Anhydrite
1,730	1,735			5		50% Dolomite a/a
						10% Limestone
						40% Anhydrite a/a
1,735	1,740			5		50% Dolomite a/a
						20% Limestone a/a
						30% Anhydrite
1,740	1,745					60% Limestone, buff, cryptocr. to microcr.
						20% Dolomite a/a, occasion. vuggy or intergran porosity (5%)
						20% Anhydrite
1,745	1,750					60% Limestone a/a
						10% Anhydrite
						30% Dolomite a/a
1,750	1,755					60% Limestone a/a
						30% Dolomite
						10% Anhydrite a/a
1,755	1,765					90% Dolomite, buff to light brown, microcr. tight
						10% Anhydrite
1,765	1,775					70% Dolomite
						30% Anhydrite
1,775	1,780					80% Limest. buff to light brown, microcr, ocasionally porous
						20% Dolomite, buff, microcr. tight

SAMPLES NOT LAGGED

SAMPLES LAGGED AT ..... FT. PER MIN.

(Delete as Appropriate)

GEOLOGICAL SAMPLE DESCRIPTION

Sheet No. 11

From	To	Core C Ditch D	No. of Ft. Porous	No. of Ft. Non-Porous	Showings O.G.W.	
1,780	1,790					90% Limest. light brown, microcr. algal, tight
						10% Dolomite a/a
1,790	1,795					As above.
1,795	1,800					100% Limest., light brown, microcr., tight, occas. porous
1,800	1,810			3		Limest., light brown, reefal w/stromat, granular, coarse
						Porosity to 30%
1,810	1,820			6		40% Limest., white to buff, microcr. occas. porous
						60% Limest., brown, reefal w/stromat, granular and coarse
1,820	1,825			3		50% Limest., white, a/a
						50% Limest., brown, a/a
1,825	1,830			3		30% Limest., white, a/a
						70% Limest., brown, a/a
						CORE NO. 1 1,837 - 1,867 Rec. 100%
1,870	1,875					Limest., dark buff, microcr., tight, occas. porous
1,875	1,880					Limestone a/a
1,880	1,890					Limestone a/a
1,890	1,895					Limestone, white, microcr., occas. porous, (traces)
1,895	1,900					60% Limest., white, a/a
						40% Limest., dark buff, a/a
1,900	1,905			3		80% Limest., buff, microcr.
						20% Limest., dark buff, microcr. tight
1,905	1,910					50% Limest., white to buff, occas. porous
						50% Limest., dark brown, tight
1,910	1,915					90% Limest., white to buff, a/a
						10% Limest., dark brown, a/a
1,915	1,920					90% Limest., white to buff, a/a
						10% Limest., dark brown, a/a
1,920	1,925			3		80% Limest., white to buff, occas. very porous (30%)
						20% Limest., dark brown, a/a
1,925	1,930			2		60% Limest., white to buff, a/a
						40% Limest., dark brown, a/a

SAMPLES NOT LAGGED

SAMPLES LAGGED AT ..... FT. PER MIN.

(Delete as Appropriate)

Sheet No. 12

From	To	Core, C Ditch, D	No. of Ft. Porous	No. of Ft. Non-Porous	Showings O.G.W.	GEOLOGICAL SAMPLE DESCRIPTION
1,930	1,935					30% Limest., white to buff, a/a
						70% Limest., dark brown, a/a
1,935	1,940		1			30% Limest., white to buff, a/a
						70% Limest., dark brown, a/a
1,940	1,945					40% Limest., white to buff, a/a
						60% Limest., dark brown, a/a
1,945	1,950					70% Limest., buff to white, microcr., mostly tight with rare vuggy porosity
						30% Limest., brown, micro- to cryptocr. tight
1,950	1,955		2			50% Limest., buff, a/a, porosity around 5%
						50% Limest., brown, a/a
1,955	1,960		2			70% Limest., buff, a/a, porosity up to 10%
						30% Limest., buff, a/a
1,960	1,965					80% Limest., buff to white, microcr. with rare porosity
						20% Limest., brown, tight
1,965	1,970					80% Limest., buff, a/a
						20% Limest., brown, a/a
1,970	1,975					80% Limest., buff, a/a
						20% Limest., brown, a/a
1,975	1,980					70% Limest., buff, a/a
						30% Limest., brown, a/a
1,980	1,985					50% Limest., buff, a/a
						50% Limest., brown, a/a
1,985	1,990					40% Limest. buff, a/a
						60% Limest., brown, a/a
1,990	1,995					20% Limest., buff, a/a
						80% Limest., brown, a/a
1,995	2,005					30% Limest., buff, a/a
						70% Limest., brown, a/a
2,005	2,010					40% Limest., buff, a/a
						60% Limest., brown, a/a

SAMPLES NOT LAGGED

SAMPLES LAGGED AT ..... FT. PER MIN.

(Delete as Appropriate)

Sheet No. 13

From	To	Core C Ditch D	No. of Ft. Porous	No. of Ft. Non-Porous	Showings O.G.W.	GEOLOGICAL SAMPLE DESCRIPTION
2,010	2,015					60% Limest., buff, a/a
						40% Limest., brown, a/a
2,015	2,020					Limest., white, very pure, microcr. hard, some corals.
						Occas. buff fragments. Calcite with vugs and bioclasts
2,020	2,025					a/a
2,025	2,030					a/a
2,030	2,035					a/a
2,035	2,040					60% Limest., white, a/a
						40% Limest., brown, bioclastic and vuggy. Porous to 5%
2,040	2,045		3			60% Limest., white, a/a
						40% Limest., brown a/a. Porosity to 25%
2,045	2,050					80% Limest., white a/a
						20% Limest., brown a/a, rare porosity
2,050	2,055					60% Limest., white a/a
						40% Limest., brown a/a
2,055	2,060					20% Limest., white a/a
						80% Limest., brown a/a
2,060	2,065					50% Limest., white, a/a, trace calcite
						50% Limest., brown, a/a, rare pyrite
2,065	2,070					70% Limest., white, a/a
						30% Limest, brown, a/a, trace calcite
2,070	2,075					70% Limest., white to buff, microcr. cherty, very hard,
						local bioclastic
						30% Limest., brown a/a
						Calcite
2,075	2,080					70% Limest., white, microcr. to cryptocr., non porous, occasion.
						bioclastic
						30% Limest., brown, microcr. very hard, tight
						Calcite, translucide
2,080	2,085					60% Limest., white a/a
						40% Limest. brown a/a
						Coral fauna; no porosity

SAMPLES NOT LAGGED.

SAMPLES LAGGED AT ..... FT. PER MIN.

(Delete as Appropriate)

Sheet No. 14

From	To	Core C Ditch D	No. of Ft. Porous	No. of Ft. Non-Porous	Showings O.G.W.	GEOLOGICAL SAMPLE DESCRIPTION
2,085	2,090					----------do----------
2,090	2,095					----------do----------
2,095	2,100					90% Limest., white a/a
						10% Limest., brown a/a
2,100	2,105					----------do----------
2,105	2,110					----------do----------
						Abundant fauna
2,110	2,115					----------do----------
2,115	2,120					100% Limest., white, a/a Coral fauna
2,120	2,125					----------do----------
2,125	2,130					----------do----------
2,130	2,135					----------do----------
2,135	2,140					----------do----------
2,140	2,145					----------do----------
2,145	2,150					70% Limest., white, very pure, moder. hard, microcr. no porosity
						30% Limest., brown, microcr. hard, non porous
						Calcite
2,150	2,155					----------do----------
2,155	2,160					----------do----------
2,160	2,165					90% Limest., white, a/a
						10% Limest., brown, a/a
2,165	2,170					----------do----------
2,170	2,175					----------do----------
2,175	2,180					100% Limest., white, a/a
2,180	2,185					----------do----------
2,185	2,190					----------do----------
2,190	2,195					----------do----------
2,195	2,200					80% Limest., white, a/a, no porosity
						20% Limest., brown, a/a
2,200	2,205					----------do----------
2,205	2,210					60% Limest., white, a/a
						40% Limest., brown, a/a

SAMPLES NOT LAGGED

SAMPLES LAGGED AT ..... FT. PER MIN.

(Delete as Appropriate)

From	To	Core C Ditch D	No. of Ft. Porous	No. of Ft. Non-Porous	Showings O.G.W.	GEOLOGICAL SAMPLE DESCRIPTION — Sheet No. 15
2,210	2,215					----------do----------
2,215	2,220					----------do----------
2,220	2,225					----------do----------
2,225	2,230					----------do----------
2,230	2,235					75% Limest., white, very pure, microcr., non porous 25% Limest., brown, traces of porosity Corals
2,235	2,240					----------do----------
2,240	2,245					----------do----------
2,245	2,250					----------do----------
2,250	2,255					----------do----------
2,255	2,260					----------do----------
2,260	2,265					----------do----------
2,265	2,270					----------do----------
2,270	2,275					----------do----------
2,275	2,280					90% Limest. white, a/a 10% Limest., brown, a/a Corals
2,280	2,285					----------do----------
2,285	2,290					----------do----------
2,290	2,295					----------do----------
2,295	2,300					----------do---------- slight porosity
2,300	2,305					----------do---------- slight porosity
2,305	2,310					----------do---------- no porosity
2,310	2,315					70% Limestone., shite, very pure, predomin. microcr., locally transluc., occasion. buff and cherty. Traces of calcilutite. Rare corals. 30% Limest., brown, a/a
2,315	2,320					----------do----------
2,320	2,325					----------do----------
2,325	2,330					----------do----------
2,330	2,335					----------do----------

SAMPLES NOT LAGGED

SAMPLES LAGGED AT ..... FT. PER MIN.

(Delete as Appropriate)

Sheet No. 16

From	To	Core C Ditch D	No. of Ft. Porous	No. of Ft. Non-Porous	Showings O.G.W.	GEOLOGICAL SAMPLE DESCRIPTION
2,335	2,340					----------do----------
2,340	2,345					80% Limest., white, a/a
						20% Limest., brown, a/a
2,345	2,350					----------do----------
2,350	2,355					----------do----------
2,355	2,360					90% Limest., white, a/a
						10% Limest., brown, a/a
2,360	2,365					80% Limest., white, a/a
						20% Limest., brown, a/a Traces of porosity. Corals
2,365	2,370					----------do----------
2,370	2,380					----------do----------
2,380	2,390					----------do----------
2,390	2,395					70% Limest., white, a/a
						30% Limest., brown, a/a
2,395	2,400					60% Limest., white, a/a
						40% Limest., brown, a/a
2,400	2,410					----------do----------
2,410	2,415					70% Limest., white, a/a
						30% Limest., brown, a/a
2,415	2,420					80% Limest., white, a/a
						20% Limest., brown, a/a
2,420	2,430					60% Limest., white, a/a
						40% Limest., brown, a/a
2,430	2,435					70% Limest., white, a/a
						30% Limest., brown, a/a
2,435	2,440					80% Limest., white, some rhombs of calcite, local vugs. Rare corals. No primary porosity
						20% Limest., brown to dark buff, microcr., tight
2,440	2,450					60% Limest., white, a/a
						40% Limest., brown, a/a
						Pyrite

SAMPLES NOT LAGGED

SAMPLES LAGGED AT ..... FT. PER MIN.

(Delete as Appropriate)

GEOLOGICAL SAMPLE DESCRIPTION — Sheet No. 17

From	To	Core C. Ditch D	No. of Ft. Porous	No. of Ft. Non-Porous	Showings O.G.W.	GEOLOGICAL SAMPLE DESCRIPTION
2,450	2,460					60% Limest., white, a/a
						40% Limest., brown, a/a
						Some grey, cryptocr. limestone
2,460	2,470					50% Limest., white, a/a
						50% Limest., brown, a/a
2,470	2,480					----------do----------
2,480	2,490					----------do----------
2,490	2,500					60% Limest., white, a/a
						40% Limest., brown to dark buff, a/a
2,500	2,510					65% Limest., white, a/a
						35% Limest., brown to dark buff, a/a
2,510	2,520					60% Limest., white, a/a
						40% Limest., brown to dark buff, a/a
2,520	2,530					----------do----------
2,530	2,540					50% Limest., white, a/a
						50% Limest., brown, a/a
2,540	2,545					60% Limest., white, a/a Traces of light grey limest., tight, hard
2,545	2,550					50% Limest., white to buff, microcr. tight
						50% Limest., grey, microcr., tight, hard
2,550	2,555					20% Limest., white, a/a
						80% Limest., grey, a/a
						Corals
2,555	2,560					20% Limest., white
						80% Limest., grey/buff, very hard, microcr. glauconitic,
						porous, fractures, tight
2,560	2,565					40% Limest., grey, glauconitic traces of pyrite
						40% Limest., dark grey to brown, thinly banded, microcr.,hard
						20% Limest., dark brown, soft, argilaceous
2,565	2,570					20% Limest, grey, a/a
						60% Limest., dark brown banded
						20% Limest., brown argillaceous

SAMPLES NOT LAGGED

SAMPLES LAGGED AT ..... FT. PER MIN.

(Delete as Appropriate)

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GEOLOGICAL SAMPLE DESCRIPTION

Sheet No. 18

From	To	Core C Ditch D	No. of Ft. Porous	No. of Ft. Non-Porous	Showings O.G.W.	
2,570	2,575					40% Limest., grey/buff
						50% Limest., dark brown, locally banded
						10% Limest., brown, argillaceous
2,575	2,580					100% Limest., predominantly light brown, locally buff, moder. hard, microcr. non porous
2,580	2,585					----------do----------
2,585	2,590					----------do----------
2,590	2,595					----------do----------
2,595	2,600					80% Limest., light brown to buff, a/a
						20% Limest., brown, soft, argillaceous
2,600	2,610					Limest., buff to brown, microcr., to cryptocr., hard, tight
						Some argillaceous limest., a/a
2,610	2,620					----------do----------
2,620	2,630					----------do----------
2,620	2,640					----------do----------
2,640	2,650					Limest., buff to brown, a/a, with some mud balls
2,650	2,660					Limest., buff to light brown, moder. hard, microcr., non porous, locally mud balls and bioclasts
						Pyrite
2,660	2,670					----------do----------
2,670	2,680					----------do----------
2,680	2,690					Limest., buff to brown, micro- to cryptocr., hard, tight occasion. bioclastic
2,690	2,700					----------do----------
2,700	2,710					----------do----------
2,710	2,720					----------do----------
2,720	2,730					----------do----------
2,730	2,740					----------do----------
2,740	2,745					Limest., a/a, with gravels
2,745	2,750					60% Dolomite, light to med. grey, hard, microcr. tight
						40% Limest., buff, a/a

SAMPLES NOT LAGGED

SAMPLES LAGGED AT ..... FT. PER MIN.

(Delete as Appropriate)

From	To	Core C Ditch D	No. of Ft. Porous	No. of Ft. Non-Porous	Showings O.G.W.	GEOLOGICAL SAMPLE DESCRIPTION — Sheet No. 19
2,750	2,755					50% Dolomite a/a
						50% Limest., a/a
						Traces of anhydrite
2,755	2,760					20% Dolomite, a/a
						20% Limest., a/a
						60% Anhydrite, brown, translucide
2,760	2,765					10% Dolomite, a/a
						60% Limest., a/a
						30% Anhydrite
2,765	2,770					10% Anhydrite
						10% Dolomite
						80% Limest.,
2,770	2,775					Limest., buff to cream, microcr., locally porous
						Traces of dolomite and anhydrite
2,775	2,780		2			80% Limest., a/a, slightly porous
						10% Anhydrite, a/a
						10% Dolomite, a/a
2,780	2,785					40% Limest., buff, microcr.
						30% Dolomite, grey
						30% Anhydrite
2,785	2,790					Traces of Limest.
						30% Dolomite, a/a
						70% Anhydrite
2,790	2,795					----------do----------
2,795	2,800					80% Limest., buff to light brown, hard, microcr., blocky, non unporous
						10% Dolomite, a/a
						10% Anhydrite a/a
2,800	2,805					100% Limest, a/a
						Traces of dolomite and anhydrite
2,805	2,810					----------do----------
2,810	2,815					----------do----------

SAMPLES NOT LAGGED

SAMPLES LAGGED AT ..... FT. PER MIN.

(Delete as Appropriate)

Sheet No. 20

From	To	Core C Ditch D	No. of Ft. Porous	No. of Ft. Non-Porous	Showings O.G.W.	GEOLOGICAL SAMPLE DESCRIPTION
2,815	2,820					----------do----------
2,820	2,830					----------do----------
2,830	2,840					Limest., cream to buff, cryptocr., fauna of lamelli, corals Some calcite
2,840	2,850					----------do----------
2,850	2,860					----------do----------
2,860	2,865					40% Limest., a/a 60% Anhydrite, buff, translucide
2,865	2,870					40% Limest., a/a 60% Anhydrite, a/a
2,870	2,875					30% Limest., a/a 70% Anhydrite, a/a
2,875	2,880					40% Limest., a/a 60% Anhydrite, a/a
2,880	2,885					70% Limest., buff to cream, microcr., tight 30% Anhydrite
2,885	2,890					50% Limest., a/a 50% Anhydrite, a/a
2,890	2,895					60% Dolomite, grey, crystalline.with veins of limest., tight 20% Anhydrite, a/a 20% Limest., a/a
2,895	2,900					80% Limest., a/a 20% Dolomite, a/a
2,900	2,910					Limest., a/a
2,910	2,915					30% Limest., a/a 40% Dolomite, a/a 30% Anhydrite, a/a
2,915	2,920					60% Limest., buff, oolitic, microcr., occasion. friable and granular, some porosity 10% Dolomite, a/a 30% Anhydrite

SAMPLES NOT LAGGED

SAMPLES LAGGED AT ..... FT. PER MIN.

(Delete as Appropriate)

Sheet No. 21

From	To	Core C Ditch D	No. of Ft. Porous	No. of Ft. Non-Porous	Showings O.G.W.	GEOLOGICAL SAMPLE DESCRIPTION
2,920	2,930					85% Limest., a/a 15% Anhydrite, a/a
2,930	2,940					----------do--------
2,940	2,950					Limest., buff, microcr. to cryptocr., tight, locally porous oolitic
2,950	2,960					Limest., a/a
2,960	2,970					90% Limest., a/a 10% Anhydrite
2,970	2,980					Limest., a/a
2,980	2,990					----------do--------
2,990	3,000					Limest., buff, to light brown, microcr., bioclastic, med. hard, tight
3,000	3,010					Limest. a/a, interbedded with Limest., light to med. grey, microcr., moder. hard, non porous
3,010	3,020					----------do----------
3,020	3,030					Limest., buff to light brown, microcr., crystal, moder. hard, non porous
3,030	3,040					----------do--------
3,040	3,050					Limest, buff to light brown, microcr. to crystal, occasion. oolitic, tight
3,050	3,060					-
3,060	3,070					Limest., a/a Intercalations of grey limest., microcr. tight
3,070	3,080					----------do--------
3,080	3,090					----------do--------
3,090	3,095					Limest., medium brown to grey, microcr. dolomitic, hard, tight
3,095	3,100		2			Limest., brown to yellowish, microcr., dolomitic, tight locally porous
3,100	3,110					----------do----------
3,110	3,120					Limest., cream to buff, microcr., slightly dolomitic, hard, rare traces of porosity
3,120	3,130					----------do----------

SAMPLES NOT LAGGED

SAMPLES LAGGED AT ..... FT. PER MIN.

(Delete as Appropriate)

Sheet No. 22

From	To	Core C Ditch D	No. of Ft. Porous	No. of Ft. Non-Porous	Showings O.G.W.	GEOLOGICAL SAMPLE DESCRIPTION
3,130	3,140					----------do--------
3,140	3,150					----------do--------
3,150	3,160					----------do--------
3,160	3,170					70% Limest. a/a 30% Limest., med. brown, dolomitic, microcr. granular, occasion. fine grained, little porosity
3,170	3,180					50% Limest., cream to buff, a/a 50% Limest., brown, a/a
3,180	3,185					----------do--------
3,185	3,190					70% Limest., cream 30% Limest., brown, porous
3,190	3,200					----------do--------
3,200	3,205					80% Limest., cream, a/a 20% Limest., brown, a/a
3,205	3,210					Limest., cream to buff, microcr., to finely crystal, rarely sucrosic, tight, but occasion. traces of porosity
3,210	3,220					----------do--------
3,220	3,230					----------do--------
3,230	3,240					Same lithology - Presence of fossils
3,240	3,250					----------do--------
3,250	3,260					Limest., cream to buff, micro.- to cryptocr. tight
3,260	3,270					Same lithology - Presence of fossils
3,270	3,275					----------do--------
3,275	3,280					60% Limest., light grey, slightly argillaceous, slightly dolomitic, brittle 40% Limest., cream a/a
3,280	3,290					70% Limest., grey, a/a 30% Limest., cream a/a Traces of anhydrite
3,290	3,300					50% Limest., grey, a/a 40% Limest., cream, a/a 10% Anhydrite, buff, translucent

SAMPLES NOT LAGGED

SAMPLES LAGGED AT ..... FT. PER MIN.

(Delete as Appropriate)

Sheet No. 23

From	To	Core C Ditch D	No. of Ft. Porous	No. of Ft. Non-Porous	Showings O.G.W.	GEOLOGICAL SAMPLE DESCRIPTION
3,300	3,310					----------do----------
3,310	3,320					----------do----------
3,320	3,330					----------do----------
3,330	3,340					60% Limest. Poor cuttings recovery. Dried samples salt 30% Dolomite encrusted. 10% Anhydrite
3,340	3,350					----------do----------
3,350	3,360					----------do----------
3,360	3,370					Limest., light brown to cream, microcr. to cryptocr. slightly dolomitic. No porosity. Traces of anhydrite.
3,370	3,375					----------do----------
3,375	3,380					Limest., cram to buff, microcr. tight, occasion. slightly dolo.
3,380	3,385					Limest., cream
3,385	3,390					Limest., cream to white, rare porosity Traces of Anhydrite
3,390	3,400					----------do----------
3,400	3,410					----------do----------
3,410	3,420					----------do----------
3,420	3,425					----------do----------
3,425	3,430					80% Limest., a/a 20% Limest., medium grey, microcr., hard, dolomitic
3,430	3,435					20% Limest., cream, a/a 80% Limest., grey, a/a
3,435	3,440					80% Limest., cream 20% Limest., grey
3,440	3,445					30% Limest., grey 70% Limest., cream Anhydrite
3,445	3,450					10% Limest. grey, 70% Limest. cream 20% Anhydrite
3,450	3,460		2			Limest., cream to buff, microcr. to cryptocr. hard, locally porous

SAMPLES NOT LAGGED

SAMPLES LAGGED AT ..... FT. PER MIN.

(Delete as Appropriate)

Sheet No. 24

From	To	Core C Ditch D	No. of Ft. Porous	No. of Ft. Non-Porous	Showings O.G.W.	GEOLOGICAL SAMPLE DESCRIPTION
3,460	3,470					----------do----------
3,470	3,480					Alternating:
						Limest., slightly dolomitic, cream to light brown and Limest., grey, microcr, no porosity, tight
3,480	3,490					----------do----------
3,490	3,495					90% Limest., grey
						10% Limest., cream
3,495	3,500					70% Limest., grey
						30% Limest., cream
3,500	3,505					60% Limest., grey
						40% Limest., cream
3,505	3,510					80% Limest., cream to light brown, dolomitic, microcr. no porosity
						20% Limest., grey, a/a
3,510	3,520					60% Limest., cream
						40% Limest., grey
3,520	3,530					Limest., buff to brown, med. hard, no porosity, microcr. to cryptocr.
3,530	3,540					----------do----------
3,540	3,550					----------do----------
3,550	3,555					60% Limest., cream, a/a
						30% Limest., grey, dolo
						10% Anhydrite
3,555	3,560					20% Limest., cream
						20% Limest. grey, dolo
						60% Anhydrite
3,560	3,565					30% Limest., cream
						70% Anhydrite
3,565	3,570					30% Limest., cream
						40% Limest., grey, dolo.
						30% Anhydrite
3,570	3,575					40% Limest.,cream
						20% Limest., grey, dolo.
						40% Anhydrite

SAMPLES NOT LAGGED

SAMPLES LAGGED AT ..... FT. PER MIN.

(Delete as Appropriate)

Sheet No. 25

From	To	Core C Ditch D	No. of Ft. Porous	No. of Ft. Non-Porous	Showings O.G.W.	GEOLOGICAL SAMPLE DESCRIPTION
3,575	3,580					90% Limest., cream to brown, dolomitic, cryptocr., medium hard, non porous
						10% Anhydrite
3,580	3,590					Limest., buff to light brown, dol., microcr., tight, hard
3,590	3,600					----------do----------
3,600	3,605					40% Limest., buff a/a
						60% Limest., medium grey, dol., microcr., hard, tight
3,605	3,610					20% Limest., buff a/a
						80% Limest., medium grey, a/a
3,610	3,615					20% Limest., buff a/a
						60% Limest., medium grey a/a
						20% Anhydrite
3,615	3,620					30% Limest., a/a
						70% Anhydrite
3,620	3,625		1			60% Anhydrite
						30% Limest., buff to brown, microcr., slightly argillaceous, occas. porous
						10% Limest., grey a/a
3,625	3,630		1			20% Anhydrite, clear, transluc.
						50% Limest., buff to brown, non porous
						20% Limest., cream, porous
						10% Limest., grey a/a
3,630	3,635					30% Anhydrite
						60% Limest., buff to brown, a/a
						10% Limest., cream, porous
3,635	3,640		1			50% Anhydrite
						30% Limest., buff to brown and cream, porous
						20% Limest., light brown, hard, microcr., dolomitic, tight
3,640	3,645					50% Limest., buff to brown, microcr. occasion. porous
						20% Limest., light brown, dolomitic
						30% Anhydrite
3,645	3,650					70% Limest., buff to brown, microcr. locally porous

SAMPLES NOT LAGGED

SAMPLES LAGGED AT ..... FT. PER MIN.

(Delete as Appropriate)

Sheet No. 26

From	To	Core C Ditch D	No. of Ft. Porous	No. of Ft. Non-Porous	Showings O.G.W.	GEOLOGICAL SAMPLE DESCRIPTION
3,645	3,650	(contd)				20% Limest., brown, dolomitic
						10% Anhydrite
3,650	3,660					Limest., buff to brown, microcr, occasion. cryptocr., hard, tight
3,660	3,670					Same lithology, but darker rock
3,670	3,680					----------do----------
3,680	3,685					Same lithology with light brown fossils
3,685	3,690					Same lithology. No fossils.
3,690	3,700					----------do----------
3,700	3,710					Limest., light brown, microcr., hard, tight, locally brecciated and slightly porous.
3,710	3,715					Limest., buff to brown, microcr. or cryptocr., little pores
3,715	3,720					Same lithology, locally brecciated, with rare pores
3,720	3,730					----------do----------
3,730	3,735					----------do----------
3,735	3,740					Limest., buff to brown, micro.- to cryptocr.
3,740	3,750					----------do----------
3,750	3,755					Limest., dark brown, micro.- to cryptocr.
3,755	3,760					----------do----------
3,760	3,765					----------do----------
3,765	3,770					Limest., medium grey, microcr., or crypto., hard, tight
3,770	3,780					----------do----------
3,780	3,790					----------do----------
3,790	3,795					----------do----------
3,795	3,800					Limest., buff to medium grey, microcr., or cryptocr., slightly translucent, hard, tight, non porous
3,800	3,810					----------do----------
3,810	3,820					----------do----------
3,820	3,830					----------do----------
3,830	3,840					----------do----------
3,840	3,850					----------do----------

SAMPLES NOT LAGGED

SAMPLES LAGGED AT ..... FT. PER MIN.

(Delete as Appropriate)

Sheet No. 27

From	To	Core C Ditch D	No. of Ft. Porous	No. of Ft. Non-Porous	Showings O.G.W.	GEOLOGICAL SAMPLE DESCRIPTION
3,850	3,860					Limest., buff, light grey to brown varicoloured and mottled, micro.- or cryptocr., hard, tight, black minor, specks of (MnO_2)
3,860	3,870					Limest. brown to buff or white, microcr. tight
3,870	3,880					Limest., light brown, buff or white, micro- to cryptocr.
3,880	3,890					----------do----------
3,890	3,900					Limest., dark brown or buff, micro- to cryptocr., tight
3,900	3,910					----------do----------
3,910	3,915					----------do----------
3,915	3,920					Limest., medium grey, micro- to cryptocr., tight
3,920	3,930					Limest., brown, micro- to cryptocr.,tight
3,930	3,940					Limest., buff to light brown, micro- to cryptocr., slightly translucide
3,940	3,945		2			Limest., light brown, microcr., locally slightly porous (30%)
3,945	3,950		1			Limest., light grey to buff, microcr., locally slightly porous (20%)
3,950	3,955		1			70% Limest., brown to buff or grey, microcr. tight 30% Limest., light brown, microcr., slightly porous
3,955	3,960					Limest., brown to brown - grey, microcr., tight
3,960	3,965					Limest., light grey, microcr., slightly dolomitic, tight
3,965	3,970					Limest., a/a interbedded with Limest., buff, cryptocr. tight
3,970	3,980					----------do----------
3,980	3,990					----------do----------
3,990	4,000					Same lithology - Traces of Limest., light brown, cryst. and slightly porous
4,000	4,010					Limest., medium brown to buff-brown, micro- to cryptocr., tight
4,010	4,015					Same lithology, locally white
4,015	4,020					----------do----------
4,020	4,030					----------do----------
4,030	4,040					Same lithology, but about 30% is becoming dark brown
4,040	4,050					40% Limest., dark brown, microcr. medium hard, tight black specks. 60% Limest., buff to light brown or white, crypto- to microcr. non porous

SAMPLES NOT LAGGED

SAMPLES LAGGED AT ..... FT. PER MIN.

(Delete as Appropriate)

From	To	Core C Ditch D	No. of Ft. Porous	No. of Ft. Non-Porous	Showings O.G.W.	GEOLOGICAL SAMPLE DESCRIPTION — Sheet No. 28
4,050	4,055					50% Limest., dark brown a/a
						50% Limest., buff to light brown a/a
4,055	4,060					40% Limest., dark brown a/a
						60% Limest., brown to buff a/a
4,060	4,065					----------do----------
4,065	4,070					30% Limest., dark brown a/a
						70% Limest., brown to buff a/a
4,070	4,080					20% Limest., dark brown a/a
						80% Limest., buff to brown a/a
4,080	4,085					----------do----------
4,085	4,090					10% Limest., dark brown a/a
						90% Limest. buff to light brown a/a
4,090	4,100					----------do----------
4,100	4,110					Limest., buff-white, chalky, cryptocr., occas. microcr. hard, tight
4,110	4,120					----------do----------
4,120	4,125					The Limest. becomes light brown
4,125	4,130					Limest., white, buff-brown, crypto- or microcr., tight, hard, presence of fossils
4,130	4,140					----------do----------
4,140	4,150					----------do----------
4,150	4,160					Limest., buff, cryptocr. tight.
						Minor white limestone
4,160	4,170					----------do----------
4,170	4,180					Limest., buff to brown, cryptocr., tight
						Minor white to cream limestone
4,180	4,190					----------do----------
4,190	4,200					----------do----------
4,200	4,210					Same lithology. The brown limestone is predominant
4,210	4,220					----------do----------
4,220	4,230					----------do----------

SAMPLES NOT LAGGED

SAMPLES LAGGED AT ..... FT. PER MIN.

(Delete as Appropriate)

Sheet No. 29

From	To	Core C Ditch D	No. of Ft. Porous	No. of Ft. Non-Porous	Showings O.G.W.	GEOLOGICAL SAMPLE DESCRIPTION
4,230	4,240					Limest., buff-light brown or white-cream, crypto- microcr. slightly translucid, hard, tight
4,240	4,250					----------do----------
4,250	4,260					----------do----------
4,260	4,270					----------do----------
4,270	4,280					90% Limest., white-cream, crypto- to microcr., soft, tight 10% Quartz, rounded,
4,280	4,285					Traces of pyrite Quartz, rounded, mica, pink and white feldspar, pyrite
4,285	4,290					Angular Quartz, mica, feldspar: granite
4,290	4,300					Angular Quartz, mica, feldspar: granite
4,300	4,310					Granite
4,310	4,320					----------do----------
4,320	4,330					----------do----------
4,341	4,341					----------do----------

August 28, 1974
T.D. reached at 4:30 p.m.

SAMPLES NOT LAGGED

SAMPLES LAGGED AT ..... FT. PER MIN.

(Delete as Appropriate)

OF CANADA LTD.

MEMORANDUM

TO: M. E. Hriskevich

DATE: September 10, 1974

FROM: A. J. Brinker

FILE: W. F. (Narwhal N-58)

RE: Aquitaine et al Narwhal N-58
Log Evaluation

CONFIDENTIAL

Well Data

Elevation, K.B.:	77'
K.B. to Sea Floor:	580'
Casing:	30" to 672' K.B. 20" to 1093' K.B. 13 3/8" to 1,737' K.B.
Total Depth:	4,341'
Logs:	DIL, CNL/FDC to 1,706' BHC-SGR to 1,756' DIL, CNL/FDC, BHC-SGRC, HDT to 4,341'

Summary of Log Evaluation

A complete suite of logs were run with the exception of a DLL and MLL. The DLL equipment failed at the time of running and delay in bringing in another tool made it necessary to waive the operation. The MLL was not run because there did not appear to be any potential hydrocarbon reservoirs and it would not be of much value anyway without the DLL.

A GR and CNL was run through 20" casing with the GR indicating increasing shaliness below 797'. The CNL is useless because of casing/large hole effect.

Logs of 17½" intermediate hole indicate: shale, 1,090' - 1,112'. Salt 1,112 - 1,165'. Shale/Siltstone 1,165 - 1,495' with a band of Sandstone 1,350 - 1,370, porosity of 5-8%, logs indicate some salt or gypsum within the sandstone. Shaly dolomite 1,495 - 1,544'. Salt 1,544 - 1,710' with bands of salt infilled dolomite. Dolomite 1,710' - 1,752' (sonic log only).

Logs for the 12¼" hole from 1,756 to 4,262 indicate the interval to be primarily a tight limestone with bands of dolomite, anhydrite, salt and shaly material, some salt and gypsum infilling. Porosity is intermittent and generally in the dolomitic rock. Complex mixtures of rock make it difficult, in some cases, to determine the difference between porosity and lithology change. Resistivities are low and are generally depressed opposite effective porous intervals indicating all effective porosity to be water bearing. The interval 4,262 to total depth is a porous conglomerate for 14' and granite for remainder. Circulation after logging indicated calcium chloride water from 1,900' to 2,900' which may have come from intervals 2,823' - 2,852' and 2,884' - 2,930'.

..... 2

The following is a summary of major lithology changes and location of porous intervals for 12¼" hole below 13 3/8" casing, see Details of Log Evaluation for additional information.

The interval 1,756' - 2,550' is primarily a tight limestone, some salt and gypsum infilling, thin bands of poor porosity. Dipmeter indicates base of reefal material to be at 2,550'.

The interval 2,550' - 2,823' is a tight limestone with shaly material 2,550' - 2,600' and anhydrite 2,740' - 2,755'.

The interval 2,823' - 2,930' is dolomitic limestone, dolomite and limestone with anhydrite 2,856' - 2,884'. The dolomite and dolomitic limestone has approximately 40' of effective porosity, 6 - 12%, and a water saturation of 65% if Rw is .040 at BHT.

The interval 2,930' - 3,286' is primarily a limestone, dolomitic in part, some gypsum infilling, band of anhydrite, intermittent poor porosity.

The interval 3,286' - 3,362' is salt, dolomite bands in bottom 14'.

The interval 3,362' - 3,637' is tight limestone, porous dolomite with gypsum infilling and bands of anhydrite. The dolomite porosity over approximately 60' of the interval ranges from 6 to 14% with water saturation of 40 to 70% using an Rw of .035 at BHT.

The interval 3,637' - 4,262' is a tight limestone, slightly dolomitic in part with some poor porosity in the dolomitic sections. Dolomite with gypsum infilling from 3,938' - 3,976', porosity in dolomite is 3-13% from CNL/FDC but sonic generally indicates poor porosity.

The interval 4,262' - 4,276' is conglomerate from samples. Porosity of 17% from logs and Sw of 40% if Rw is .035 at BHT and if Rt from deep induction is correct.

Details of Log Evaluation

500' - 1,088'	Ran GR and CNL through casing. GR indicates increasing shaliness below 797'. The CNL is useless because of casing effect.
1,088' - 1,112'	Logs indicate shale.
1,112' - 1,165'	Salt, hole size in excess of 22", logs indicate wall face to be rough which is probably due to the presence of some argillaceous dolomite.
1,165' - 1,200'	Shaly dolomite, minor salt infilling.

1,200' - 1,350'	Shale/Siltstone, dolomitic stringers, minor salt infilling, hole conditions are good, very slightly oversize.
1,350' - 1,370'	Sandstone, shaly in part, slightly dolomitic, some salt or gypsum infilling, porosity of 5 - 8%.
1,370' - 1,495'	Shale/Silstone, dolomitic in part, hole conditions are good.
1,544' - 1,710'	Salt with bands of dolomite and salt infilled dolomite, hole is only 1/2" to 2 1/2" oversize in salt sections indicating that drilling fluid is almost saturated at this point.
1,710 - 1,752'	Dolomite/Limestone (sonic log only).
1,756' - 1,774'	Dolomite and Anhydrite, 4' of porosity otherwise tight.
1,774' - 1,779'	Limestone, ϕ 6%, drop in resistivity indicating a permeable, water bearing horizon, Sw is 70% if Rw is .040 and if Rt from DIL is correct.
1,779' - 2,336'	Limestone, intermittent salt infilling, tight except for interval 1,988' - 1,995 which has a porosity of 6 - 8%, Sw is 40% if Rw is .040 and Rt is correct. Bands of salt? 2,206' - 09' and 2,226' - 29', CNL/FDC effected by rough hole.
2,336' - 2,390'	Limestone, dolomitic? or gypsum? intermittent porosity of 6 - 8%, drop in Rt opposite porous horizons, Sw indicated to be 50 - 60%. Hole is oversize and rough indicating some leaching from drilling fluid.
2,390' - 2,474'	Limestone, tight.
2,474' - 2,550'	In part similar to interval 2,336' - 2,390'. Dipmeter indicates a change of formation at 2,550', possibly base of reefal material.
2,550' - 2,600'	Limestone, shaly, thin band of dolomite 2,572' - 2,577', tight.
2,600' - 2,740'	Limestone, generally tight, 3 - 6% porosity 2,610' - 2,620' and 2,700' - 2,720'.
2,740' - 2,755'	Anhydrite, some dolomite.
2,755' - 2,780'	Limestone, slightly dolomitic, ϕ 9%, Sw 65% using Rw of .040. Location of calcium chloride water after logging might indicate that this interval is the source of this water.

..... 4

2,780' - 2,795' Limestone, some anhydrite? tight.

2,795' - 2,823' Limestone, tight.

2,823' - 2,852' Limestone, slightly dolomitic, ϕ 9%, Sw 65% using Rw of .010. Location of calcium chloride water after logging might indicate that this interval is the source of the water.

2,852' - 2,856' Probably limestone and gypsum.

2,856' - 2,884' Anhydrite, some dolomite.

2,884' - 2,930' Dolomite, limestone and some gypsum? then bands of porosity, 6 - 12%, drop in resistivity opposite porous intervals, also possible source of calcium chloride water.

2,930' - 3,003' Limestone tight.

3,003' - 3,037' Limestone/Dolomite, ϕ of 6%, probably a fine porosity, water bearing.

3,037' - 3,082' Limestone, gypsum at 3,055', poor porosity?

3,082' - 3,093' Dolomite and anhydrite, gypsum infilling in the dolomite.

3,093' - 3,108' Dolomite, gypsum, possibly porous with a porosity of 3 - 4%.

3,108' - 3,273' Limestone, dolomitic in part, essentially tight except for thin band of dolomite 3,199' - 3,204', ϕ 15%, Sw 45% (Rw .035).

3,286' - 3,348' Salt, oversize hole with relatively smooth bore hole face except for bottom 14', some dolomite in bottom 14'.

3,348' - 3,362' Dolomite and salt.

3,362' - 3,380' Dolomite, porosity 6%, Sw 70%.

3,380' - 3,436' Limestone, dolomitic, shaly 3,431'-36' tight.

3,436' - 3,440' Anhydrite.

3,440' - 3,448' Dolomitic limestone, tight.

3,448' - 3,480' Limestone, poor fine porosity.

3,480' - 3,510' Dolomite, argillaceous in part, band of anhydrite, possibly some gypsum porosity intermittent at 8 - 14%, drop in resistivity opposite porous intervals.

3,510' - 3,545' Limestone, tight.

3,545' - 3,568' Anhydrite, dolomite bands.

3,568' - 3,584' Dolomite, minor porosity.

3,584' - 3,598' Limestone, tight.

3,598' - 3,608' Dolomite, shaly, ϕ 10%, Sw 40%.

3,608' - 3,617' Anhydrite.

3,617' - 3,626' Limestone, tight.

3,626' - 3,632' Anhydrite.

3,632' - 3,637' Dolomite limestone, poor porosity.

3,637' - 3,660' Limestone, tight.

3,660' - 3,670' Dolomite/limestone, poor porosity?

3,670' - 3,938' Limestone, tight, dolomitic 3,870' - 3,903' with some poor porosity.

3,938' - 3,976' Dolomite and limestone, porosity of 3 - 13%, drilling times do not indicate good porosity, sonic log does not indicate good porosity except in the lower 4' where there is a drop in resistivity in high porosity from CNL is probably due to inclusions of gypsum.

3,976' - 3,988' Limestone, tight.

3,988' - 3,993' Dolomitic limestone, ϕ 5%.

3,993' - 4,262' Limestone, tight.

4,262' - 4,276' Sandstone, ϕ17%, Sw 40% (Rw .035)
Sw 73% (Rw .10)

Formation water is probably in the order of 100,000 ppm NaCl for an Rw of .035 to .04 at BHT of 150°F. Relationship of deep and medium resistivity measurements opposite porous horizons indicate the formation water salinity to be slightly lower than the mud filtrate salinity.

4,276' - T.D. Precambrian.

AJB/dl

AQUITAINE ET AL NARWHAL O-58

8710-A11-4-1

WELL FILE COPY

East Coast ☐
Hudson Bay – Hudson Strait ☒
West Coast ☐

CANADA

DEPARTMENT OF ENERGY, MINES AND RESOURCES

RESOURCE MANAGEMENT AND CONSERVATION BRANCH
OPERATIONS AND CONSERVATION DIVISION

Offshore Drilling Notice

This Notice is submitted in compliance with Section 52 of the "Canada Oil and Gas Land Regulations". Its approval constitutes the requisite authority to commence drilling operations under Section 4 of the "Canada Oil and Gas Drilling and Production Regulations".

Well Information

Well Name in full: AQUIT ET AL NARWHAL SOUTH N-58

Operator: Aquitaine Company of Canada Ltd. — Exploratory Licence No.: 2168

Contractor: Sea and Land Drilling Contractors Inc. — Permit or Lease No.: W1318

Drilling Rig or Unit: Pentagone 82 — Estimated Well Cost: $ 4,000,000.00

Location: Unit: N — Section: 58 — Grid Area: 58° 10' 84° 00'

Coordinates: Lat. 58° 07' 56.28" N — Long. 84° 08' 16.78" W

Elevation: RT/KB 77 feet — Water Depth: ~~530~~ 503 feet

Approx. Spud Date: Summer 1974 — Estimated Time on Location: 30 days

Anticipated Total Depth: 4,500 feet from sea surface

Potentially Productive Intervals:

Age	Name	Lithology	Top	Thickness
Middle Silurian	Attawafisket	Reefal Limestone	1,700'	300'
Upper Ordovician	Churchill	Limestone Dolomite	3,100'	
Middle Ordovician	Bad Cache	Basal Clastics		

Casing and Cement Program:

Name of String:	O.D	Weight/Ft.	Grade	Setting Depth below seafloor	Cement Program
Conductor	30"	1" Wall	X52	120'	600 sacks Class B
Conductor Casing	20"	438" Wall	K55	480'	1,700 sacks Class B
Surface Casing	13-3/8"	68#	K55	1,070'	1,300 sacks Class B
Intermediate Casing	9-5/8"	47#	MN80	3,400'	850 sacks Class B

B.O.P. Equipment: 1 - B.O.P. Stack 21-1/4 x 2,000

1 - B.O.P. Stack 13-5/8 x 10,000

AAPG Well Classification:

- New-field wildcat ☒
- New-pool wildcat ☐
- Shallow-pool test ☐
- Deeper-pool test ☐
- Outpost well ☐
- Development well ☐

Other Information:

Signed: G. Kuhn de Chizelle — Title: Drilling Superintendent

Date: July 19, 1974 — Company: Aquitaine Company of Canada Ltd.

Notes

Five copies of this Notice and tentative survey plan should be submitted for each well. Other requirements and procedures are given in the information circular "Offshore Exploratory Drilling".
All Notices should be addressed to the Director, Resource Management and Conservation Branch, Department of Energy, Mines and Resources, Ottawa. One copy will be returned to the Company.

RESOURCE MANAGEMENT BRANCH — Approval

APPROVED

JUL 24 1974

OPERATIONS AND CONSERVATION DIVISION

DEPARTMENT OF ENERGY, MINES AND RESOURCES

Drilling Authority: EMR #132 Project No. 8710-A11-4-1

East Coast ☐
Hudson Bay - ~~Hud-on-Strait~~ ☒
West Coast ☐

CANADA

DEPARTMENT OF ENERGY, MINES AND RESOURCES

RESOURCE MANAGEMENT AND CONSERVATION BRANCH
OPERATIONS AND CONSERVATION DIVISION

Offshore Well Abandonment Program

This program is submitted in triplicate with respect to Sections 15 and 19 of the Canada Oil and Gas Drilling and Production Regulations. All depths referenced to Rotary Table (RT) elevation at Mean Local Low Water (MLLW)

Well Name in Full: AQUIT ET AL NARWHAL SOUTH O-58 (O-Well Data) Grid Area: 58°10' - 8.400'

Drilling Authority: ~~EMR #2,168~~ 132 Field/Pool: Wildcat eastern Hudson Bay

Permit or Lease No.: W 1318 59.758 Elevations: RT: /KB 77 feet 02.963 Sea floor: 503 (water depth)

Final Coordinates: Lat. 58° 07' ~~58.6742~~" N Long 84° 08' ~~12.1659~~" W

Date Spudded: August 4, 1974 4:15 A.M. Date Drilling Terminated: August 28, 1974 3:00 P.M.

Date Rig Released: Sept. 1, 1974 1:30 P.M. Total Depth: 4,341 feet

Casing Record: (Additional space on back of form, if needed)

O.D.	Weight:	Grade:	Depth Set:	Cement and Additives:
30"	1" wall	X52	672'	400 sx Class B + 3% $CaCl_2$
20"	0.438 wall	X52-K55	1093'	1700 sx Class B + 3% $CaCl_2$
13 3/8"	68 lb./ft.	K 55	1738'	1520 sx Class B + 3% $CaCl_2$ and saturated salt water

Permeable Intervals: (Additional space on back of form, if needed).

Interval:	Age/Name:	Oil, Gas and Water Encountered:	Test No.
4,262' - 4,277'	Basal Clastics (Ordovician ?)	No show	No

Perforation, Stimulation, Testing and Evaluation Programs: job details to be given on the back of the form.

Plugging Program

Oral approval of the following program was obtained by (person) G. Kuhn de Chizelle of (company) Aquitaine Company of Canada from (person) Mr. Glen Yungblut in the Operations and Conservation Division by means of Telephone and Telex at 9:00 P.M. hrs. on August 28 19 74

Plug No.	Interval:	Type of Plug:	Cement and Additives:	Felt?	Date and Hour Run:
1	4,340' - 3,534'	Cement	500 sx. Class B + ~~10%~~ 12% gel	No	Aug. 30/74 11:45 P.M.
2	3,534' - 2,728'	Cement	540 sx. Class B + 10% gel	No	Aug. 31/74 1:15 A.M.
3	2,728' - 1,922'	Cement	540 sx. Class B + 10% gel	No	Aug. 31/74 2:15 A.M.
4	1,922' - 1116'	Cement	540 sx. Class B + 10% gel	No	Aug. 31/74 3:35 A.M.
5	1,117' - 700'	Cement	350 sx. Class B + 3% $CaCl_2$	No	Aug. 31/74 6:15 A.M.

Additional information, including any variations to the original program dictated by on-the-job considerations, to be given on the back of the form.

Certification

I certify that the abandonment or suspension program was carried out in full in accordance with good offshore oil and gas field practices:

Signed G. Kuhn de Chizelle P. Eng. Title: Drilling Superintendent

Date 3 September, 1974 Company: Aquitaine Company of Canada

DW 12/2/75

Acknowledgement

RESOURCE MANAGEMENT AND CONSERVATION BRANCH
FEB 13 1975
OTTAWA, CANADA

OPERATIONS AND CONSERVATION DIVISION

Acknowledgement of this completed form in no way absolves the permittee or lessee of record at the time of drilling from responsibility for an abandonment or suspension program should it prove to be inadequate.

See Reverse Side

Resource Man. Cons.
SEP 9 1974
OTTAWA, CANADA
DEPT. OF ENERGY, MINES & RESOURCES

Additional Information

Casing and Cementing Record:

Permeable Intervals:

Perforation, Stimulation, Testing and Evaluation Jobs:

Equipment recovered ~~and/or remaining at sea floor~~:

All casings 13 3/8" -20" - 30" have been cut 554 feet below M.S.L. and all equipment (13 3/8" casing hanger - 20" Housing - 30" Housing - permanent and temporary guide - bases) Recovered

No anchors were lost

Other Information:
(To include variations to the original, orally approved program dictated by on-the-job considerations).

Co-ordinates of the well, as shown on this form were obtained with satellite positioning equipment. More accurate co-ordinates obtained with a Decca Lambda positioning system will be available in mid September, 1974, when the raw data will be processed. Official report will be sent at that time to E.M.R. Ottawa.

AQUITAINE COMPANY
OF CANADA LTD.

Resource Management and Conservation Branch
OPERATIONS AND CONSERVATION DIVISION
FEB 6 1975
OTTAWA, CANADA
DEPT. OF ENERGY, MINES & RES. URCES

WELL HISTORY REPORT

AQUIT ET AL NARWHAL SOUTH O-58

RESOURCE MANAGEMENT AND CONSERVATION
BRANCH
DEPARTMENT OF ENERGY, MINES AND
RESOURCES
RELEASED
SEP 1 1976
PURSUANT TO THE CANADA OIL AND GAS
LAND REGULATIONS

DIRECTION DE LA GESTION ET DE LA CONSERVATION
DES RESSOURCES
MINISTÈRE DE L'ÉNERGIE, DES MINES ET DES
RESSOURCES
PUBLICATION AUTORISÉE
LE SEP 1 1976
EN VERTU DU RÈGLEMENT SUR LES TERRES
PÉTROLIFÈRES ET GAZIFÈRES DU CANADA

AQUITAINE COMPANY OF CANADA LTD.

540 - Fifth Avenue S.W.

Calgary, Alberta

December 1974

Compiled by:

- Andre JOURDAN
- Pierre POUVREAU
- Bernard TILLEMENT

Submitted by:

Gerard KUHN DE CHIZELLE

AQUITAINE COMPANY
OF CANADA LTD.

AQUIT ET AL NARWHAL SOUTH O-58

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1. INTRODUCTION

1.1 Summary

The Narwhal South O-58 well was drilled in the Hudson Bay between August 4, 1974 and September 1, 1974. The Operator was Aquitaine Company of Canada Ltd., based in Calgary, acting on behalf of the "Hudson Bay Group", which was comprised of:

- Aquitaine Company of Canada Ltd.
- Atlantic Richfield Canada Ltd.
- Elf Oil Exploration and Production (Canada) Ltd.
- Petrofina Canada Ltd.
- Shell Canada Ltd.
- Sogepet Ltd.

The selected drilling unit was the semi-submersible "Pentagone 82" (P-82), owned and operated by Sea and Land Drilling Contractors Inc., a subsidiary of the Forex-Neptune group.

The P-82 was towed from the North Sea to Cape Chidley ($64^{o}W$ - $61^{o}N$) by the "Oceanic" tug, between June 13th and July 10, 1974. On July 10, 1974, the tow was resumed with two Tidewater tug supply vessels from Cape Chidley to the Narwhal South O-58 wellsite. Details of the last leg of this tow are given in a separate report, namely, "Towing of the P-82 Through the Hudson Bay".

Purpose

The purpose of this wildcat was to evaluate the entire Paleozoic section, in the eastern part of the Hudson Bay Basin. A general high area had been mapped by the various seismic refraction surveys carried out since 1968 and was confirmed by the seismic reflection shot in 1973. The uneven surface of the upper Silurian marker was interpreted as reefal build-up(s) of the Attawapiskat member. In addition, secondary reservoirs were expected deeper, including basal clastics resting on the basement.

Summary of Drilling Operations

Two joints of 30" conductor pipe were set after drilling a 36" hole, to cover the upper part of the glacial drift.

A 20" conductor casing was then set at 1,093', in order to have a BOP assembly and riser installed before drilling a possible Calcium Chloride water bearing formation. Effectively, some gains of calcium chloride water were met at 1,335'.

A 13-3/8" surface casing was set at 1,739' to cover the above formation, just before entering the Attawapiskat formation.

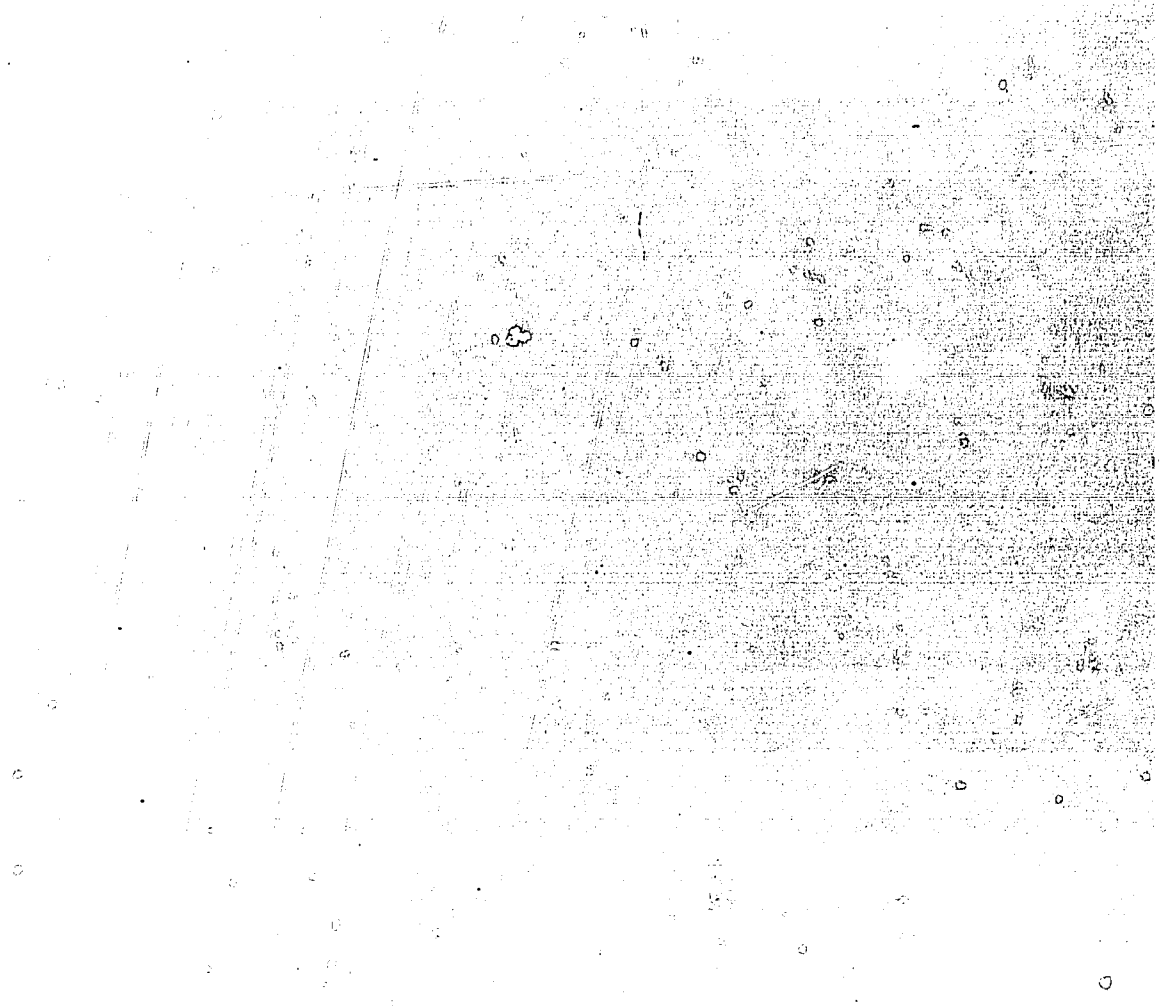
Drilling of a 12-1/4" hole was resumed to T.D. (4,341') with no further casing set, due to the lack of significant reservoir.

Results

The lateral equivalent of the Attawapiskat consists of supertidal, laminated algal limestone, with no porosity. The significant reservoirs were encountered at deeper levels. In particular, the inferred basal clastics were restricted to a 15 foot layer.

No gas or oil shows were encountered.

The well was plugged and abandoned, the P-82 proceeded to the next operation, which was plugging the "Aquitaine et al Walrus A-71" well, temporarily abandoned in 1969.



2. GENERAL DATA

2.1 Well Name and Number: Aquit et al Narwhal South O-58

2.2 Drilling Unit: Pentagone 82 (P-82) Semi-submersible type.
Marathon - Letourneau shipyard, Brownsville, Texas
(Summer 1971 to Fall 1973)
Lloyd's Class + 100 A1 (The unit is ice reinforced but no ice classification is available for this type of vessel.)

2.3 Operator: Aquitaine Company of Canada Ltd.
540 - 5th Avenue S.W.
CALGARY, Alberta
T2P 0M4

2.4 Permittees: Aquitaine Company of Canada Ltd.
Atlantic Richfield Canada Ltd.
Elf Oil Exploration and Production Canada Ltd.
Petrofina Canada Ltd.
Sogepet Limited

2.5 Drilling Contractor: Sea and Land Drilling Contractors, Inc.
(Incorporated in Panama)
8, Aquilino de la Guardia, PANAMA, R.P.

Sea and Land Drilling Contractors
Forex Neptune
Caledon Road, Eastern Wharf
DUNDEE DD1 3LW, Scotland
Telephone: (0382) 453910
Telex: 76455 - PETROBASE

2.6 Permit Number: W1318

2.7 Drilling Authority: EMR Number: 132
Date Issued: July 24, 1974

2.8 Well Location: Hudson Bay
Latitude: 58°07'59.758"N
Longitude: 84°08'02.963"W

Location determined by means of a Decca Lambda "Cesium" system.

2.9 Elevations: R.T./K.B. to Sea Level: 77'
Water Depth: 503'

2.10 Total Depth: 4,341'

2.11 Spudded: August 4, 1974, at 4:15 a.m.

2.12 Drilling Completed: August 28, 1974, at 3:00 p.m.

2.13 Well Abandoned: September 1, 1974, at 2:00 a.m.

2.14 Rig Released: P-82 under tow to WALRUS A-71 location
September 1, 1974, at 1:30 p.m.

2.15 Well Status: Plugged and Abandoned

2.16 Well Classification: New Field - Wildcat

2.17 Support Equipment:

Two Tug Supply Vessels:

Names: M/V Supreme Tide and M/V Giant Tide
Owner: Tidewater Marine Service, Inc.
Built: Hatco Verksted A/S shipyard - Ulsteinvick, Norway
(Delivered in May 1974)
Classification: Navigation: ABS A1(E) + AMS Towing unrestricted
Ice: ABS Class "C" (1971 rules)

One Supply Vessel:

Name: M/V Federal 6
Owner: Federal Offshore Services Ltd.
Built: Star Shipyard
New Westminster, B.C., Canada (1972)
Classification: Navigation: ABS Ocean going A1(E)
Ice: ABS Class "A"

One Helicopter:

Type: Bell 212 IFR Model
Owner: Dominion Pegasus Helicopters Ltd.
Classification: Licensed for commercial night and instrument flying.

AQUITAINE — DRILLING TICKET

WELL NAME: NARWHAL S-058

RIG	CO-ORDINATES	TIMING	CASING	LOGS
Pentagone 82	X = 58° 07' 56.28"	Commenced - Aug. 4, /74	ø 30" at 672'	DIL 1088 - 4340
GEOLOGIST	Y = 84° 08' 16.78"	Temporary Halt =	ø 20" at 1093'	FDC - CNL - GR 500-4340
B. Tillement A. Pochitaloff	Z =	Resumption of Drilling =	ø 13 3/8" at 1737'	BHCS - GR 1088-4340
	Z KB = 77 A.M.S.L.	Temporary Halt =	ø at	HDT 1750-4340
	Hudson Bay	Resumption of Drilling =	ø at	
Brought up to date on	PROVINCE			
November 1974	Federal waters	Completed - Aug. 28 / 74		

AGE	Formation	DEPTH	LOG	CORE	DIP	Porosity TYPE	Porosity GRADE	SHOW-TEST	GAIN AND LOSS	LITHOLOGY
	WATER	500								water
		580								580
?	?	1000								no samples
		1112							Partial loss	1112
MID. DEVON.	MID. KENOG								90 bbls	Siltstone, mudstone, reddish, greenish, slightly dolo. - local fine grained ss - gypsum
		1500							gain 5 bbls/h	1500
	LOWER KENOG									- Shaly dolomite, light grey - halite and anhydrite
		1780								1780
SILURIAN	EKWAN			1837 1867 C #1 100% Rec.	flat lay	inter crystall - micro vugs		NONE		Limest., coarse, arenitic, laminated, algal, vuggy. Voids filled by salt and anhyd. Limest. brown, tight, hard Thin salt stringers
		2000								
		2500								
	SEVERN	2550							steady gain	2550 Limestone, light grey, brown, cryptox to microx, hard, tight
										Anhydrite interbed. with dolo. limestone
		3000							max. 439 g/l of Cl_2Ca	Limestone, buff, local oolithic, microx, local porous Limestone, buff, cream, brown, microx. tight
		3285								3285
UPPER ORDOVIC.	READ HEAD									Halite Limestone Dolo. limestone, local argillaceous
		3500								
	CHURCHILL	3608								3608 Anhydrite Limestone, buff, brown, microx, tight
		3980								3980
	Bad Cache	4000								Limestone, buff, brown, white, microx. to cryptox, hard, tight
		4262								4262 clean sand
		4277								4277 granite
		T.D. 4341'								
PRECAMBRIAN	Basal Clastics	4500								

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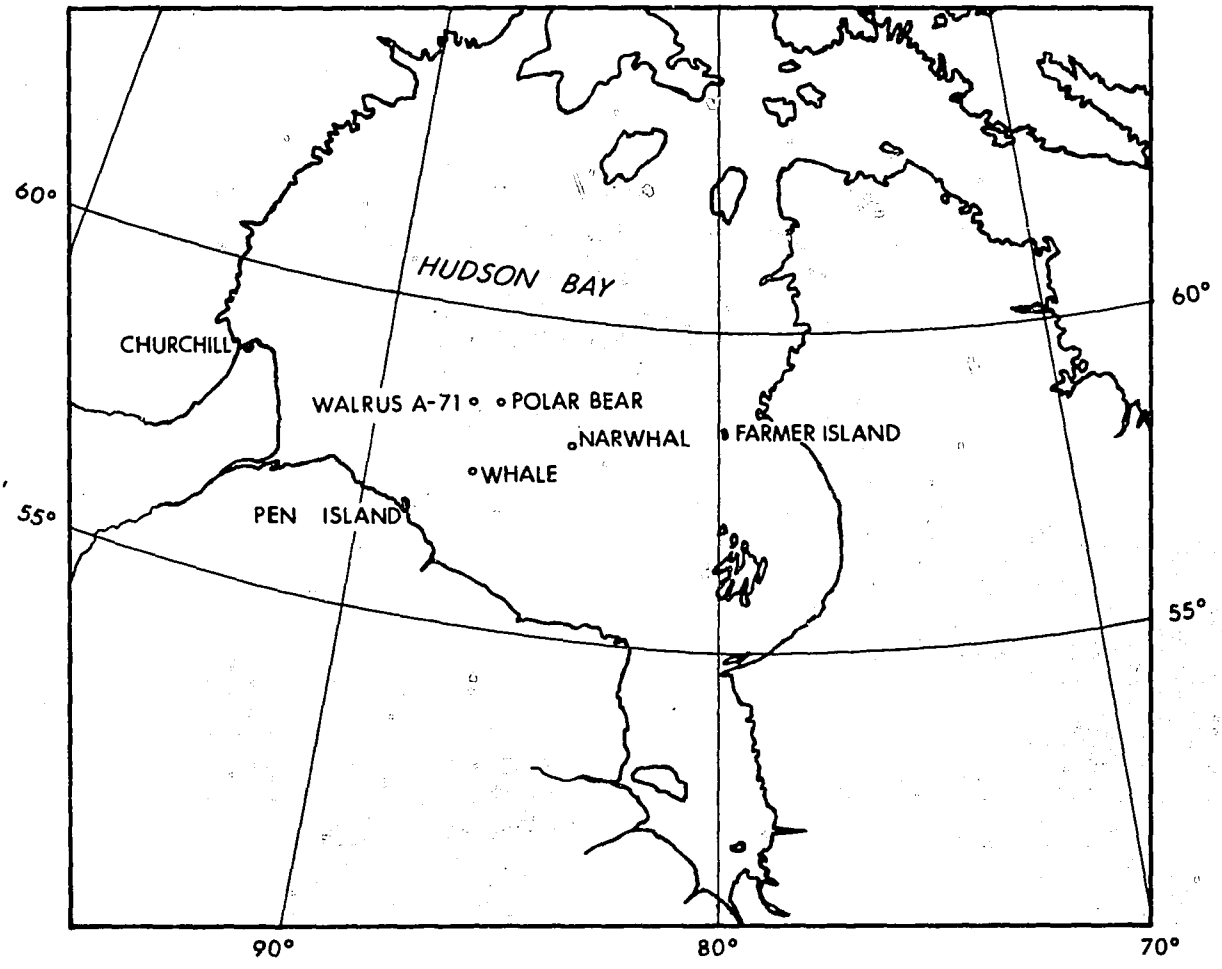
SUMMER 1974 HUDSON BAY CAMPAIGN

PROGRAM: 2 WELLS TO DRILL (POLAR BEAR AND NARWHAL OR WHALE) PLUS 1 WELL TO PLUG (WALRUS A-71)



	LAT.	LONG.	IN STATUTE MILES	
			NEAREST DISTANCE TO SHORE	DISTANCE TO CHURCHILL
POLAR BEAR	58°30'04.352N	86°47'18.489"W	138 TO PEN ISLAND	274
WALRUS A-71	58°30'02"N	87°11'51" W	131 TO PEN ISLAND	260
NARWHAL	58°07'59.758" N	84°08'02.963" W	189 TO PEN ISLAND 170 TO SHORE 131 TO FARMER ISLAND	370
PEN ISLAND	56°46'25"N	88°47'25"W	——	234
WHALE	57°28'49"N	87°09'00"W	81 TO PEN ISLAND 75 TO SHORE	276

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AQUIT ET AL NARWHAL SOUTH O-58

3. DRILLING DATA

3.1 Drilling Program

COMMENTS AND INSTRUCTIONS AS FOLLOWS:

AQUITAINE COMPANY
OF CANADA LTD.

HUDSON BAY

Drilling Program

(Comments and Instructions for all the wells)

AQUITAINE COMPANY
OF CANADA LTD.

CONTENTS

GENERAL INFORMATION

Two types of wells are anticipated in the 1974 drilling campaign:

- wells which are called "Medium" wells (T.D. 4,000 ft. to 5,000 ft.)
- and wells which are called "Deep" wells (T.D. around 8,000 ft.)

The contemplated well locations for 1974 are the following:

Well Name	Latitude	Longitude	Estimated T.D.	Water Depth
Aquit et al Sea Lion A85	58° 44' 00" N	87° 42' 20" W	8,000'	600'
Aquit et al Walrus C21	58° 30' 05" N	87° 19' 00" W	6,000'	600'
Aquit et al Polar Bear M20	58° 29' 50" N	86° 47' 45" W	6,500'	560'
Aquit et al Narwhal South M77	58° 06' 50" N	84° 11' 25" W	4,500'	500'
Aquit et al Narwhal North D44	58° 33' 01" N	83° 55' 29" W	4,500'	480'
Aquit et al Whale Center P69	57° 28' 49" N	87° 09' 00" W	4,200'	250'
Aquit et al Whale East P43	57° 21' 40" N	86° 21' 20" W	4,300'	220'

Two wells will be drilled during the 1974 campaign. If time permits a third well could be drilled.

Three locations are selected to have the possibility to anchor the rig on the first ice free location without any loss of time should Walrus A71 well be inaccessible. In order of priority, they are Polar Bear, Narwhal South or Whale Center.

TIME SCHEDULE

Operation	Time in Days: Medium Well	Deep Well
Rig move	1	1
Position and anchor rig	2	2
Drill 36" hole, Run & cement 30"	2	2
Drill 26" hole, Run & cement 20"	2	2
Run and test 20-3/4" - 2000 BOP stack	2	2
Drill 17-1/2" hole	1	3
Log	½	½
Run 13-7/8" casing, cement and test	1	1
Run and test 13-5/8" - 10000 BOP stack	1½	1½
Drill 12-1/4" hole	7	14
Log and evaluate	1	1
Plug and abandon	4	4
Desanchor	2	2
	27	36

If the 9-5/8 casing is run an additional 2 or 3 days will be necessary for each well.

HOLE AND CASING SIZES

Hole	Casing	Setting Depth	Cement
36"	30"	120' - 120' BML	To mudline (600 Sxs)
26"	20"	850' - 850' BML	To mudline (2500 Sxs)
17½"	13-3/8"	1300' - 2650'	To mudline (1200 - 2200 Sxs)
12¼"	9-5/8" (If required)	2950' - 4600'	700 - 850 Sxs

Water depth will be 250' for WHALE CENTER, 500' for NARWHAL SOUTH and 560' for POLAR BEAR.
KB to water 77'.

CASING DESCRIPTION

30" OD	1" wall with VETCO "ST" Squnch joints. (40').
20" OD	0.438 wall x52 with VETCO "L" joints (40').
13-7/8 OD	68 lb, K55 ST & C Range III
9-5/8 OD	47 lb, MM80 Buttress Range III

WELLHEAD EQUIPMENT

Wellhead is a VETCO Subsea System capable of setting 30", 20", 13-3/8", 9-5/8" and 7" from mudline to required depths: 20-3/4" x 2000 MSP and 13-5/8" x 10,000 MSP High profile subsea SG1.

The BOP stack system includes two stacks: 1 21¼ x 2000 and 1 13-5/8 x 10,000.

CASING CEMENTING PROGRAM

A. 30" Conductor:

1. Land temporary guide structure.
2. Drill 30" hole + -150' below mudline and spot viscous gel mud.
3. Run 30" casing with stringer and permanent guide base to bottom.
4. Cement through drill pipe with 100% excess neat cement Displace to within 20' of casing shoe with water.

B. 20" Conductor Casing:

1. Drill 26" hole to + -900' below mudline and spot viscous gel mud.
2. Run 20" casing and 20-3/4" housing with stringer on drill pipe. Latch into 30" housing.
3. Cement 20" casing with 100% excess neat cement. Displace to within 30' of casing shoe with water.
4. Install 21-1/4" x 2000 BOP stack and 22" Riser system. Test.

C. 13-3/8" Surface Casing

1. Drill 17½ hole and run required logs.
2. Run 13-3/8" casing with 13-3/8" x 10000 wellhead housing and latch into 20-3/4" housing.
3. Cement 13-3/8" with 15.5 slurry. Use sufficient volume to bring cement back to mudline.
4. Wash out excess cement and energize casing hanger seal.
5. Test BOP's and casing.

D. 9-5/8" Intermediate Casing: (If required)

1. Drill 12-1/4" hole. Coring and logging as required.
2. Run 9-5/8" casing with 13-3/8" x 9-5/8" hanger and latch into 13-3/8" housing.
3. Cement 9-5/8" casing.
4. Energise casing hanger seal.
5. Test BOP's and casing.

E. Drill to T.D.

Drill 8-1/2" hole to T.D. Log, run 7" liner and D.S.T. as required. Set cement plugs opposite pay zones, at the last casing shoe and below the mudline.

If the well is a keeper, set a three year life pinger and a corrosion cap after recovering the BOP stack.

MUD PROGRAM

For more details see Magcobar mud program.

1. Use sea water to drill 36" and 26" holes. Use high viscosity spotting fluid to clean the hole when necessary and before running conductor strings.

2. Use sea water, XC Polymer, pre-hydrated bentonite system to drill 17-1/2" hole. Use minimum weight (9 to 9.4) to control hole using desander and desilter to reduce solids. Viscosity and water loss control will be adjusted to provide optimum hole cleaning and hole stability.

3. Same criteria will be utilized in 12-1/4" intermediate hole. Mud weight should be increased as required at first evidence of overpressure conditions.

4. Continuously be alert for well Kicks and school crews until they react automatically.

   a) Follow a rigid procedure to see that hole is filled and taking the correct volume of fluid on trips or if circulation is

lost. If in doubt, go back to bottom and correct the situation. Kicks during trips are almost always caused by human error.

b) Check hole for flow during significant drilling rate increases, gas cut mud, signs of pit gains or whenever you are unsure of hole conditions. If there is any doubt, circulate out until hole stabilizes before proceeding.

5. Very close control of mud properties must be maintained. Mud weights and viscosity, in and out of hole, should be recorded at least every 15 minutes.

HYDRAULICS PROGRAM

Impact hydraulic principles should be used for jet disign until formations become firm. Jets should then be determined according to optimum hydraulic horsepower principles. Standpipe pressure should not exceed 3500 psi.

For more details see "Annular flow dynamics" in the Magcobar mud program.

CASING TEST PROCEDURE

1. Test 20" casing to 500 psi when testing the BOP's stack connections on 20-3/4 wellhead housing.

2. Test 13-3/8" casing to 1,500 psi just after setting the top plug on the float collar at the end of the cementing job.

3. Test 9-5/8" casing to 3000 psi as for the 13-3/8".

BOP TEST PROCEDURE

1. Test BOP stack 21-1/4 x 2000 or 13-5/8 x 10000 before running and and after setting each string of casing. During drilling test BOP's weekly. Record results of tests on tour reports. P-82 BOP testing procedure will be applied.

2. Wear bushing should be inspected carefully for direction on amount of wear to insure that well position indicator is working properly.

3. Drill crews on pit gain, inside BOP, hole fill up and kill procedures. Conduct pit drills daily and inside BOP drill on each trip until crews are proficient, then weekly for crew. Record reaction time on tour report.

4. Conduct accumulator drills during BOP test and operate BOP controls. Operate shear rams BOP on each trip.

5. Fill hole every 5 stands on trips in 12-1/4" hole. Check fillup with aid of filling tank and pit lever indicator. Do not continue to hoist pipe if hole fails to take proper amount of fluid. Go back to bottom and circulate out.

6. Well kicks will be handled with the constant drill pipe pressure method. The well supervisors should have a step by step plan worked out prior to a kick. A casing pressure profile and corresponding surface volumes must also be calculated. It is essential that priorities are placed on well killing operations and not with other operational problems such as sticking of drill pipe.

7. If a well kick is encountered, hang the drill pipe in the upper pipe rams as soon as practical after closing the hydril to minimize element wear from vessel motion. In fact the VETCO Motion Compensator System should avoid pipe stripping through the bag preventer.

   Drillers will have to know at all times the position of drill pipe tool joints relative to the BOP's to avoid closure on tool joints. It is not considered safe to drill ahead in an exploratory well when vessel heave exceeds 10', or pitch or roll exceeds 3°, if there is any possibility of a kick.

8. If adverse weather causes concern that the rig may blow off location, the drill pipe should be hung on the lower pipe rams or with the emergency hang off tool with an inside BOP installed, the shear rams closed and locked, and the riser disconnected.

9. Marker buoys should be attached to the guide lines, if they have to be cut and thrown overboard, to facilitate recovery of the lines and relocation over the well.

   Pipe can be hung on the lower pipe rams and cut off in the shear rams if time does not permit normal temporary abandonment procedures.

10. If the pressure integrity of any part of the casing, wellhead, BOP, riser or closing system is suspect, it should be corrected before drilling ahead including the extreme case of setting a cement or bridge plug and pulling the stack to repair the leak.

GENERAL SAFETY

1. For safety all well tests will be conducted inside casing using drill pipe with suitable Johnston DST equipment and an OTIS SSTT. Open well and pull out in favouable daylight weather conditions only.

2. An inside BOP and drill string safety valve, in the open position, shall be maintained on the rig floor at all times while drilling operations are being conducted. Separate valves shall be maintained on the floor to fit each pipe size in the drill string. A kelly cock shall be installed below the swivel, and an essentially full opening kelly cock shall be installed at the bottom of the kelly

of such design that it can be run through the blowout preventers.

3. Smoking is permitted only inside marked areas. There will be no BOP's during drilling of 36" and 26" hole. It is essential that the smoking regulations be enforced as soon as the rig is anchored.

4. Open fires will be permitted only under the supervision of the Tool Pusher or Drilling Engineer.

DETAILED DRILLING PROCEDURE

1. Survey well location with supply boat FEDNAV VI and Satellite positionning equipment. Set markers, buoys and conduct Fathometer Grid Survey around location to cover anchor pattern.

2. Tow rig to location approaching anchor pattern as programmed heading considering prevailing and maximum wind and sea conditions.

3. Anchor rig and re-survey location. Test and pretension anchor lines to P-82 specifications. Jump diver to determine that location is clear and reasonably level. Record and report anchor setting and line pulls and bottom conditions. Also record and report final location.

4. Land temporary guide base and check that it is level.

   Note: Maintain 1000 - 2000 pounds tension on each guide line while running the guide base.
   Extreme care should be exercised when pulling 36" hole opener back out through temporary guide base that shoulder of hole opener does not hang on temporary guide structure.

5. Drill 26" x 36" hole to ± 30' below shoe depth of 30" casing (approx. 120' below mudline). Drill with seawater without returns. Inject viscous mud plugs as necessary to clean the hole. When casing point is reached:

   - Fill hole with viscous mud.
   - Pull hole opener to temporary guide base
   - Run in to bottom
   - Spot full volume of hole with viscous mud
   - Take Totco and pull out of hole.

6. Run 30" casing with float shoe and drill pipe stringer on 30" housing and permanent guide structure. Land and check placement with T.V. Cement casing with neat cement. Displace cement with sea water. Leave ± 20' of cement in shoe joint. Back out and running tool and flush out excess cement thoroughly.

   Note: Use total slurry volume sufficient to cement to sea floors plus 100% excess.

7. Drill 26" hole to ± 30' below landed depth of 20" casing. Drill with water, using viscous gel slugs to clean hole. When casing joint is reached:

   - Fill hole with viscous mud
   - Pull bit to 30" casing shoe
   - Run in to bottom
   - Spot viscous mud, displace full hole volume.
   - Take totco and pull out of hole.

8. Run 20" casing with float shoe and drill pipe stringer on 20-3/4" housing and latch into 30" housing. Pull tension to assure latched in.

9. Cement 20" casing with 100% excess neat cement mixed with sea water. Displace cement with water and leave ± 30' of cement in shoe joint. Check for back flow. Back out running tools and thoroughly wash excess cement out of 20-3/4" housing.

   Note: After releasing running tools pick up approximately 2' - 3' in excess of heave before washing.

10. Pretest 21-1/4" x 2000 psi BOP stack on test stump using clear water.

11. Run BOP stack and 22" Riser (integrated kill line) and latch H4 connector.

    Note: Tension guide lines while running stack and check guide post and stack alignment with T.V. Tension riser according P-82 specifications.

12. Test H4 Connector - BOP and kill line (P-82 testing procedure).

13. Drill 17-1/2" hole using sea water/xc polymer/pre-hydrated bentronite mud. Totco survey before pulling out every bit. Interval not exceeding 300'. Dog leg maxi 1°/100'. Maximum deviation 3°. Stabilizers will be used if necessary.

14. Log hole as required.

15. Control trip before running casing. Remove bore protector from wellhead.

16. Run 13-3/8" casing with float shoe, float collar, centraliser and 13-5/8 x 10000 housing. Tack weld and tread lock bottom 3 joints. Hang casing ± 30' off bottom. Take strain to be sure hanger is locked in.

17. Cement casing using B.J. subsea cementing plug system, and cement mixed with fresh water. Use sufficient cement to bring cement back to mudline. Wash out excess cement through choke and kill lines with water.

    Note: Casing test at 1500 psi just after setting the top plug on the float collar.

18. Retrieve 21-1/4 x 2000 BOP stack and 22" riser.

19. Pretest 13-5/8" x 10000 BOP stack to 10000 psi on test stump using clear water.

20. Run BOP stack and riser 16". Latch H4 connector. Test H4 connector, BOP, kill and choke lines, choke manifold.
(See P-82 testing procedure)

Note: Retest BOP's weekly.

21. Drill 12-1/4" hole. Totco survey before pulling out every bit. Interval not exceeding 500'. Dog leg maxi: $1^{o}/100'$. Maximum deviation 5^{o}. 12-1/4 servco stabilizers will be used if necessary. If shows were encountered one drill float valve will be run at all times above the bit.

22. Use sea water/xc polymer/pre hydrated bentonite system.
See Magcobar drilling mud program

Note: P.H should be maintained at a minimum of 10 at all times to reduce the corrosive effect of the sea water.

23. Coring and logging is required.

24. Make short trip up into shoe of 13-3/8" casing and check for tight spots, bridges and fill on return to bottom. If any of above are encountered, condition hole and make another short trip. If not, circulate bottoms up and pull out to run 9-5/8" casing (if required).

25. Run 9-5/8" (if required) with float shoe, float collar and centralisers. Thread lock bottom three joints. Hang casing $\pm$ 30' off bottom. Take strain to be sure hanger is locked in.

26. Cement casing using BJ subsea cementing plug system. Cement mixed with fresh water. Slurry up 500' inside 13-3/8" casing.
Wash out head with water through choke and kill lines.

Note: Test casing at 3000 psi just after setting the top plug on the float collar.

27. Energize hanger packing and test packing. (see Vetco procedure). Don't collapse 9-5/8" casing. If there are indications of a seal leak, repair it rather than continuing to pressure up.

28. Run BOP test tool and test BOP's.
Retest BOP's weekly.

29. Run 13-5/8" Nominal Seat Protector.

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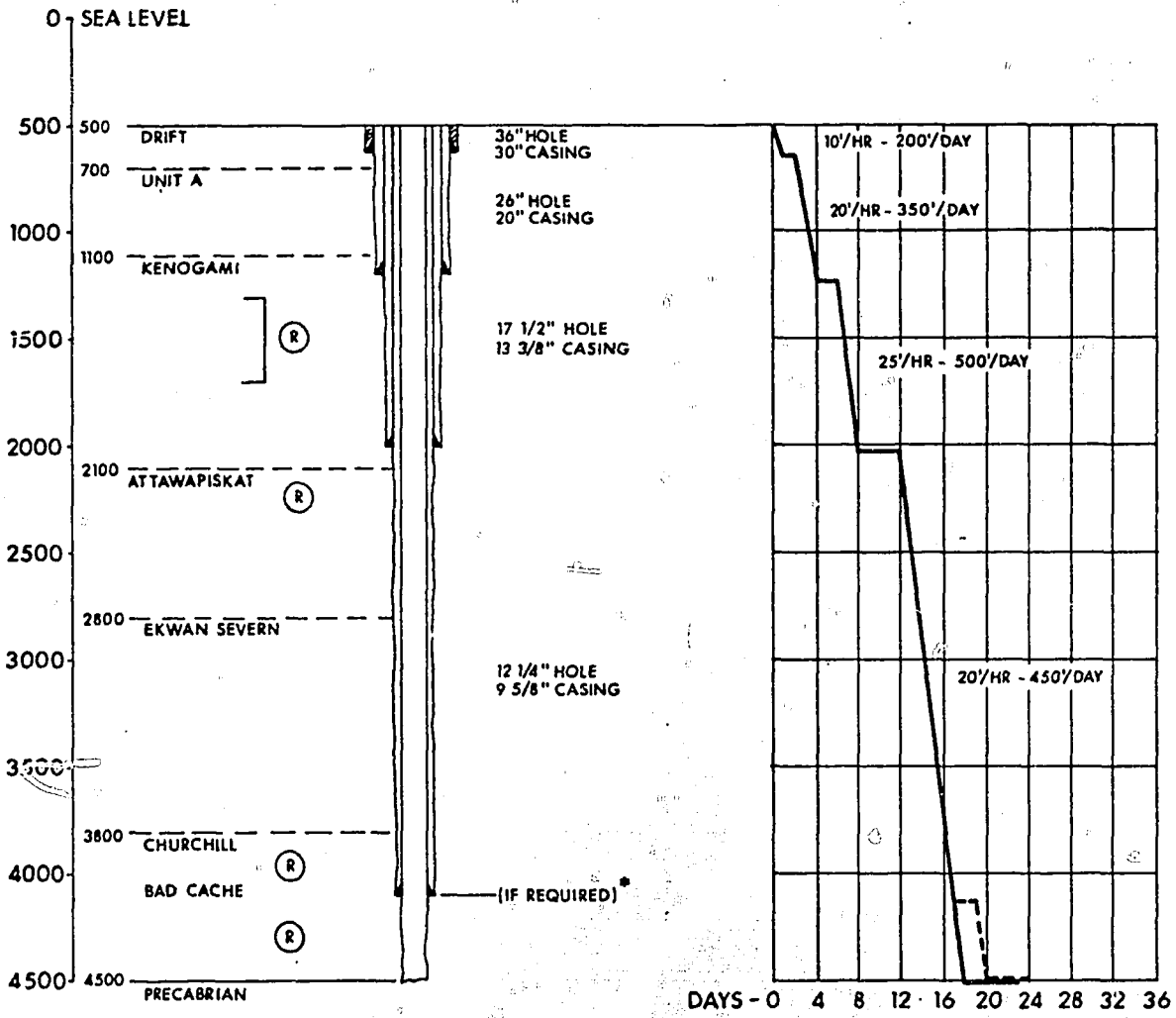
30. Drill 8-1/2" hole to T.D. coring and logging as required.
See Magcobar mud program.
At T.D. Log, Run 7" liner and DST if required.

31. Abandon well according to EMR specifications.

32. Remove wellhead (A-Z cutter and swivel)

AQUITAINE
COMPANY OF CANADA LTD

NARWHAL SOUTH M77



*FINAL DECISION NOT TO RUN 9 5/8" CASING MUST BE APPROVED BY E.M.R. (OTTAWA)

3.2 Position Keeping

10 Tension Mooring Sensors

Make: Martin Decker
Type: Dynaline

10 Winches

Make: Brissoneau & Lotz — 600 Kips Brake Capacity
340 Kips Low Gear Pull

10 Anchors

Type: 30,000 lbs. LWT

10 Anchor Lines

Size: 5,000' of 2-3/4" wire rope
Weight: 13.7 lbs/ft
Type: 6 x 41 galvanized

3.3 Subsea Equipment

- Vetco temporary guide base with: 4 main guide lines
- Vetco permanent guide base
- 30" housing with left hand running thread
- 20" housing with left hand running thread
- Vetco 22" single ball flex joint
- Vetco 22" Integral MR-IV marine riser
- 13-5/8", 10,000 MSP High Profile Type SG-1 two hanger housing with left hand running thread
- Vetco 16" single ball flex joint
- Vetco 16" Integral MR-IV marine riser

3.4 Drilling Plant

1 Drawworks

Make: Emsco 3000 HP
Model: With automatic catheads
Drum Type: Grooved for 1-1/2" line

1 Electromagnetic Brake

Make: Elmagco
Model: 7838

1 Sandreel Assembly Mounted on Drawworks

9/16" x 18,000 Sandline

3 Electric Motor Drive

Make: G.E.
Model: 752 R
Type: Shunt Wound DC
Power: 930 HP nom./1000 HP max.

Maximum line pull at the hook with safety factor minimum of 2 on the weakest part (line).

10 Lines Low Gear: 1,140,000 lbs
8 Lines Low Gear: 906,000 lbs

1 Drilling Line

1-1/2" x 5,000'
Type 6 x 19
Extra improved plow steel
Nominal breaking strength 103 tons

3.5 Derrick

Make: Continental Emsco
Size: 157' x 36' x 36'
Type: Dynamic, welded panels, bolted
Capacity: API 1,150,000 lbs
Hook Load: 685,000 lbs
Pipe Racked in Derrick: 425,000 lbs
Tensionners Load: 310,000 lbs

Provision for dynamic loading is included in excess of the above values.

3.6 Pumps

2 Hole Pumps #1 & 2

Make and Size: Emsco Triplex F 1600
Driven By: Two 800 HP cont. electric motors GE 752 R
Pulsation Dampener: Emsco 20 gallons
Strokes: From about 10 to 120 SPM
Continuous Max. Pressure Possible: 3423 psi with 7" liner
Centrifugal Supercharging Pump: Mission 5 x 6 R

1 Mixing Pump

Make and Size: Emsco D 375
Driven By: One 350 HP electric motor
Pulsation Dampener: Emsco 20 gallons

2 Mixing Transfer Pumps

Make and Size: Mission 5 x 6
Driven By: A.C. electric motor

3.7 Compressors

3 Main Air Compressors

Each powered by 120 HP electric motor c/w automatic control.
Free air delivery 540 CFM pressure range 125 - 150 psi.
Water cooled.

1 Twin Air Dryer

Capacity: 440 SCFM

3 Air Tanks 150 PSI

One 350 cu. ft. for general duty
One 210 cu. ft. for BOP unit
One 32 cu. ft. for remote controls

3.8 BOP Equipment

First BOP Stack: (21-1/4" x 2000)

1 Bag Preventer

Size: 21-1/4"
W.P.: 2000 psi

Make: Hydril
Type: MSP, studded on top, with CIW #18 clamp below

1 Surge Dampener

Make: Stewart & Stevenson
Type: Passive
Capacity: 10 gallons, 3000 psi on close side

1 Drilling Spool

Size: 21-1/4" ID, WP: 2000 psi
Outlets: 2 x 3-1/8" with CIW #4 clamp hub
Connections: CIW #18 clamp hub, top and bottom

2 Kill Line Valves

Size: 3-1/8" nom.
W.P.: 5000 psi
Make: Cameron
Type: "F" with style A hydraulic operator fail safe to close
Connections: CIW #4 clamp hub, top and bottom

1 Kill Line Connector

Size: 3-1/2" nom.
W.P.: 5000 psi
Make: Vetco
Type: Stab type welded

1 Riser Mandrel

Size: 20-3/4" ID
W.P.: 2000 psi
Make: Vetco
Connection: 20" API #6B flange below

1 Bottom Connector

Size: 20-3/4" ID
W.P.: 2000 psi
Make: Vetco
Type: H4 style "D"
Connection: CIW #18 clamp hub on top

AQUITAINE COMPANY
OF CANADA LTD.

Second BOP Stack: (13-5/8" x 10,000)

1 Bag Preventer

Size: 13-5/8" ID
W.P.: 5000 psi
Make: Shaffer
Type: Spherical
Connection: CIW #15 clamp hub below and 13-5/8" API - 6BX flange above

1 Surge Dampener

Make: Stewart & Stevenson
Capacity: 10 gallons 3000 psi on closing side

2 Ram Preventers

Size: 13-5/8" ID
W.P.: 10,000 psi
Make: Cameron
Type: Double U with pressure balanced wedge lock. One set of rams equipped with shear rams, the other three with 5" pipe rams.
Connections: CIW #15 clamp hub, top and bottom

4 Choke/Kill Line Valves

Size: 3-1/16"
W.P.: 10,000 psi
Make: Cameron
Type: F with style A hydraulic operator, fail safe to close
Connection: CIW #5 clamp hub, top and bottom

2 Choke/Kill Line Connectors

Size: 3-1/2" nom.
W.P.: 10,000 psi
Make: Vetco
Type: Stab type, welded

1 Riser Mandrel

Size: 13-5/8" ID
W.P.: 10,000 psi
Make: Vetco
Connection: 13-5/8" API - 6BX flange

1 Bottom Connector

Size: 13-5/8" ID
W.P.: 10,000 psi
Make: Vetco
Type: H4, style "D"
Connection: CIW #15 clamp hub

3.9 Well Kick Report

N/A

3.10 Hole Sizes and Depths

36" hole drilled to 713'
26" hole drilled to 1,123'
17-1/2" hole drilled to 1,756'
12-1/4" hole drilled to 4,341'

3.11 Casing and Cementing Record

30" set at 672'
20" set at 1,093'
13-3/8" set at 1,737'

See casing reports for further details.

3.12 Perforation and Shooting Record

N/A

3.13 Plug Back and Squeeze Cement Jobs

See plug back and abandonment report.

3.14 Drilling Fluid

See Magcobar mud report.

3.15 Fishing Operations

See fishing operation reports.

3.16 Lost Circulation and Gain Zones

See report.

3.17 Drill Cuttings

- The sampled intervals are as follows:

  Glazed vials: 1,130' to 4,340' in 10' intervals
  Unwashed samples: 1,700' to 4,341' in 10' intervals
  Canned samples: 1,130' to 4,341' in 30' intervals

- Companies receiving a complete set of canned samples are:

  Resource Management and Conservation Branch - Bedford, N.S.
  Aquitaine Company of Canada Ltd.

- Companies receiving a complete set of glazed vials and unwashed samples are:

  Aquitaine Company of Canada Ltd. (2 sets of unwashed samples)
  Atlantic Richfield Canada Ltd.
  Shell Canada Ltd.
  Elf Oil Exploration and Production Canada Ltd.
  Resource Management and Conservation Branch (7 dram vials)

- Companies receiving a complete set of glazed vials only are:

  Petrofina Canada Ltd.
  Sogepet Ltd.
  G.S.C. - Institute of Sedimentation and Petroleum (2 dram vials)

3.18 Cores

See report.

3.19 Bit Records and Hydraulics

See report.

3.20 Time Distribution

See Graphical Well Analysis and Time Analysis reports.

3.21 Penetration Rate Log

See Graphical Well Analysis.

3.22 Deviation Plot

See Deviation Survey report and Graphical Well Analysis.

3-18

MEMORANDUM

TO: G. Kuhn de Chizelle

DATE: May 26, 1975

FROM: B.A. Tillement

FILE: 825-02-08

RE: Letter 8710 - All - 4 - 1 sent by EMR on May 14, 1975

Please be advised that:

1. The Narwhal core was slabbed in three parts. 1/4 (ARCAN) is stored at STACS DATA Services Ltd., 801 - 10th Avenue S.W., Calgary.

1/4 (AQUITAINE) was sent to our lab in Pau, France.

1/2 (GOVERNMENT) was sent by Core Laboratories of Calgary to Atlantic Geosciences Center, Bedford Institute, Halifax, Nova Scotia.

BAT/vs

B.A. Tillement

AQUITAINE COMPANY
OF CANADA LTD.

3.23 Abandonment Plugs

See report.

3.24 Well Diagram

See Graphical Well Analysis.

DRILLING REPORT

AQUITAINE

1 WELL. Narwhal
RIG P 82

2 No. 29
DATE 2/9/74

PENETRATION

PHASES

Cross out which ever not applicable	DEPTH ft	DEPTH ins.	PENET. ft.	PENET. ins.	TIME h.	TIME min.
TOTAL	3		4		5	
Drilled-cored						
EACH BIT	6		7		8	
Drilled-cored						
Drilled-cored						
Drilled-cored						
Drilled-cored						

BITS

Make	Ø	Type	No.	Nozzles	Cumul
9	10	11	12	13	14

PARAMETERS

Weight	R.P.M.	Flow Rate	Mud Pressure
15	16	17	18

MUD

CHARACTERISTICS

19

Wt mini _____ Wt maxi _____ V mini _____ V maxi _____

F _____ VA _____ Vp _____ Yv _____

Gel 0 _____ 10 _____ S% _____ pH _____

Pf _____ Lc _____ Solid. _____ NaCL _____

LOSSES and GAINS

20	this day	cumul
Mud		
Water		

PRODUCTS ADDED

21

STRING

22 ELEMENTS _____

23 WEIGHT (in mud)	D.C.	D.P.	Wt M.D.

NOTES

24 FORMATION Type . Stage _____

25 CORES _____

26 DEVIATION _____

27

TIME LOG FROM	TO	ELAPSED TIME	
0	13:30	13:30	Pick up temporary guide base with 10000# on each guide line - picked up anchors .
13:30	24:00	10:30	On tow to Walrus location. (Supreme Tide - Towing at 2.5 knots)

TIME ANALYSIS 9 - Mis. op. 28

1 - R.U.D.		10 - W.C.	
2 - D		11 - Casing	
3 - Red		12 - Circ	
4 - D.T.		13 - Fishing	
5 - H.O.		14 - Aband	13:30
6 - Cor		15 - Rep	
7 - C.T.		16 - W.T.	
8 - Test		17 - Vac	

29 PROGRAMME
Towing

30 PEOPLE ON BOARD : _____

31 WEATHER

Wind/Kn	
Direction	
Waves /ft	
Slip jt.	
Current	
Swells/ft	
Direction	
Température	

32 Support Vessels

406

OM 102

DRILLING REPORT

AQUITAINE

1 WELL. Narwhal RIG P 82

2 No. 28 DATE 1/9/74

PENETRATION

PHASES

Cross out which ever not applicable	DEPTH ft.	DEPTH ins.	PENET. ft.	PENET. ins.	TIME h.	TIME min.
TOTAL	3		4		5	
Drilled-cored						

BITS / PARAMETERS

EACH BIT	Make	Ø	Type	No.	Nozzles	Cumul	Weight	R.P.M.	Flow Rate	Mud Pressure
	6	7	8	9	10	11	12	13	14	15	16	17	18
Drilled-cored													
Drilled-cored													
Drilled-cored													
Drilled-cored													

MUD

CHARACTERISTICS

19

Wt mini _____ Wt maxi _____ V mini _____ V maxi _____

F _____ VA _____ Vp _____ Yv _____

Gel 0 _____ 10 _____ S% _____ pH _____

Pf _____ Lc _____ Solid _____ NaCL _____

LOSSES and GAINS

20	this day	cumul
Mud		
Water		

PRODUCTS ADDED

21

STRING

22 ELEMENTS _____

23 WEIGHT (in mud)	D.C.	D.P.	W.M.D.

24 FORMATION Type . Stage _____

25 CORES _____

26 DEVIATION _____

NOTES

27 TIME LOG FROM	TO	ELAPSED TIME	
0	6:15	6:15	Cut off 20" and 30" casing - Try to pick up with stack and riser - O.K.
6:15	7:30	1:15	Retrieved seat protector - Start to pick up piggy back anchors.
7:30	13:00	5:30	Pull out 16" riser and 13 5/8 stack
13:00	16:30	3:30	Moved lower package 13 5/8 stack to test stump - lay down cutter assembly - start to pull out anchors
16:30	21:45	5:15	Pull out permanent guide base 13 3/8 - 20" and 30" housing with 13 3/8 casing spear
21:45	24:00	2:15	Try to pick up temporary guide base with 8000# on each guide line.

TIME ANALYSIS

1 - R.U.D.		9 - Mis. op.	28
2 - D		10 - W.C.	
3 - Red		11 - Casing	
4 - D.T.		12 - Circ	
5 - H.O.		13 - Fishing	
6 - Cor		14 - Aband	24
7 - C.T.		15 - Rep	
8 - Test		16 - W.T.	
		17 - Vac	

29 PROGRAMME: Abandon

30 PEOPLE ON BOARD : _____

31 WEATHER

Wind/Kn _____

Direction _____

Waves /ft _____

Slip jt. _____

Current _____

Swells/ft _____

Direction _____

Température _____

32 Support Vessels

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OM 102

DRILLING REPORT

AQUITAINE

1 WELL. Narwhal S RIG P 82

2 No. 27 DATE 31/8/74

PENETRATION

PHASES

Cross out which ever not applicable	DEPTH ft.	DEPTH ins.	PENET. ft.	PENET. ins.	TIME h.	TIME min.
TOTAL	3		4		5	
Drilled-cored						
EACH BIT	6		7		8	
Drilled-cored						
Drilled-cored						
Drilled-cored						
Drilled-cored						

BITS

Make	Ø	Type	No.	Nozzles	Cumul
9	10	11	12	13	14

PARAMETERS

Weight	R.P.M.	Flow Rate	Mud Pressure
15	16	17	18

MUD

CHARACTERISTICS

19

Wt mini _____ Wt maxi _____ V mini _____ V maxi _____

F _____ VA _____ Vp _____ Yv _____

Gel 0 _____ 10 _____ S% _____ pH _____

Pf _____ Lc _____ Solid. _____ NaCL _____

LOSSES and GAINS

20	this day	cumul
Mud		
Water		

PRODUCTS ADDED

21

STRING

22 ELEMENTS _____

23 WEIGHT (in mud)	D.C.	D.P.	W.M.D.

24 FORMATION Type . Stage _____

25 CORES _____

26 DEVIATION _____

NOTES

27 TIME LOG

ROM	TO	ELAPSED TIME	
0	8:30	8:30	Run continuous plug (5 stages) from TD to 700' (3 lower stages with 11% gel cement) 2 upper stages with neat cement).
			At 700' circulation to flush BOP stack. Displace stack and riser to sea water. Close blind rams.
8:30	16:45	8:15	Lay down 9½ DC + 8¼ DC +5" D.P.
16:45	24:00	7:15	Run in hole 13 3/8 casing cutter - Cut off 13 3/8 casing Pull out to change blades - run in hole to cut off 20" casing.

TIME ANALYSIS

1 - R.U.D.		9 - Mis. op.	28
2 - D		10 - W.C.	
3 - Red		11 - Casing	
4 - D.T.		12 - Circ	
5 - H.O.		13 - Fishing	
6 - Cor		14 - Aband	24:00
7 - C.T.		15 - Rep	
8 - Test		16 - W.T.	
		17 - Vac	

29 PROGRAMME _____

30 PEOPLE ON BOARD : _____

31 WEATHER

Wind/Kn _____

Direction _____

Waves /ft _____

Slip jt. _____

Current _____

Swells/ft _____

Direction _____

Température _____

32 Support Vessels

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OM 102

DRILLING REPORT

AQUITAINE

1 WELL: Narwhal S | RIG: P 82 | 2 No: 26 | DATE: 30/8/74

PENETRATION

PHASES

Cross out which ever not applicable	DEPTH ft.	ins.	PENET. ft.	ins.	TIME h.	min.
TOTAL Drilled-cored	3 4341		4 00		5	
EACH BIT	6		7		8	
Drilled-cored						
Drilled-cored						
Drilled-cored						
Drilled-cored						

BITS

Make	Ø	Type	No.	Nozzles	Cumul
9	10	11	12	13	14

PARAMETERS

Weight	R.P.M.	Flow Rate	Mud Pressure
15	16	17	18

MUD

CHARACTERISTICS

19

Wt mini	Wt maxi	V mini	V maxi
F	VA	Vp	Yv
Gel 0	10	S%	pH
Pf	Lc	Solid.	NaCL

LOSSES and GAINS

20	this day	cumul
Mud		
Water		

PRODUCTS ADDED

21 Stock on Board:

277 tons	Potable Water	83 tons	Cement
207 tons	Drilling water		
377 tons	Fuel		
528 gals	Turbo Fuel		
162 tons	Barite		

STRING

22 ELEMENTS

23 WEIGHT (in mud)	D.C.	D.P.	Wt M.D.

NOTES

24 FORMATION Type . Stage

25 CORES

26 DEVIATION

27 TIME LOG

FROM	TO	ELAPSED TIME	
0:00	20:00	20:00	Logging BHCS - GRC, CNL - FDC, DIL, S.R.S. HDT
			Rigged down Schlumberger material
20:00	22:30	2:30	Run in hole with open ended D.P. to 4,340'
22:30	23:30	1:00	Circulate and dump to sea 100 bbl. water
			plug. Top at 1900', bottom at 2800'
23:30	24:00	0:30	Start first plug: 500 sx Class B cement with 12%
			prehydrated gel.
			8:00 A.M. Status: Plugged back to 700' K.B., Rams
			closed, circulate riser to sea water, laying down drill
			dollars and drill pipe.

TIME ANALYSIS — 9 - Mis. op. 20:00

1 - R.U.D.	10 - W.C.
2 - D	11 - Casing
3 - Red	12 - Circ
4 - D.T.	13 - Fishing
5 - H.O.	14 - Aband 4:00
6 - Cor	15 - Rep
7 - C.T.	16 - W.T.
8 - Test	17 - Vac

29 PROGRAMME: Abandon well

30 PEOPLE ON BOARD: 64

31 WEATHER

Wind/Kn	10
Direction	NNW
Waves /ft	2'-3'
Slip jt.	
Current	
Swells/ft	
Direction	
Température	40°

32 Support Vessels

Giant Tide

Supreme Tide

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OM 102

DRILLING REPORT

AQUITAINE

1 WELL. Narwhal S RIG P 82 2 No. 25 DATE 28/8/74

PHASES

Cross out which ever not applicable	DEPTH ft.	DEPTH ins.	PENET. ft.	PENET. ins.	TIME h.	TIME min.
TOTAL	3 4236		4 105		5 8	15
Drilled-~~cored~~	4341					

PENETRATION — BITS / PARAMETERS

	6 DEPTH ft.	DEPTH ins.	7 PENET. ft.	PENET. ins.	8 TIME h.	TIME min.	9 Make	10 Ø	11 Type	12 No.	13 Nozzles	14 Cumul	15 Weight	16 R.P.M.	17 Flow Rate	18 Mud Pressure
EACH BIT	4236		105		8	15	SMITH	12¼	3JS	SR 662	3x13	239	70/ 85000	50	550 gal/ min.	2700
Drilled-~~cored~~	4341															
Drilled-cored																
Drilled-cored																
Drilled-cored																

MUD

CHARACTERISTICS

19
Wt 9.8 Wt 11.0 V 38 V 41
F mini 71 VA maxi 16 Vp mini 11 Yv maxi 10
Gel 0 5 10 17 S% 0 pH 11.5
Pf .5 Lc 0 Solid. 7% NaCL 270000

LOSSES and GAINS

20	this day	cumul
Mud		
Water		

PRODUCTS ADDED

21

6 sx	Salt Gel
45 sx	Magcogel
10 ton	Barite

STRING

22 ELEMENTS Bit / Bit Sub/(8) 9½ DC/Sub/(4) 8½DC/(2) 8" BS/(6) 8½ DC/Sub/(1) Flexwate/ Dropping Valve/(14) Flexwate/5" Drill Pipes

23 WEIGHT (in mud)	D.C.	D.P.	Wt M.D.
	90000	73000	243000

24 FORMATION Type. Stage

25 CORES

26 DEVIATION 4,335' = 1° 3/4

NOTES — TIME LOG

27 FROM	TO	ELAPSED TIME	
00:00	01:00	1:00	Waiting on Weather
01:00	06:00	5:00	Pull out Hang Off Tool. Rig up 2 x 8" B.S. R.I.H.
06:00	09:30	3:30	Drilling from 4236' to 4280'
09:30	10:15	0:45	Circulating for samples
10:15	15:00	4:45	Drilling from 4280' to 4341'
15:00	16:30	1:30	Circulated Bottom's up twice
16:30	16:45	0:15	Dropped Totco - Dry Job
16:45	17:45	1:00	Pull out Bit No. 11 to Shoe
17:45	18:30	0:45	Displaced Mud Wt. 11.3 W/Mud Wt. 13 lb./gal.
18:30	20:15	1:45	Pull Out of Hole Laying Down 8" Bumper Subs
20:15	24:00	3:45	Logging - C.N.L./FDC-G.R

TIME ANALYSIS

1 - R.U.D.		10 - W.C.	
2 - D	8:15	11 - Casing	
3 - Red		12 - Circ	3:00
4 - D.T.	7:45	13 - Fishing	
5 - H.O.		14 - Aband	
6 - Cor		15 - Rep	
7 - C.T.		16 - W.T.	1:00
8 - Test		17 - Vac	
9 - Mis. op.	4:00		

29 PROGRAMME: Logging

30 PEOPLE ON BOARD: 66

31 WEATHER

Wind/Kn 6
Direction SW
Waves /ft 4-7
Slip jt.
Current
Swells/ft
Direction SW
Température

32 Support Vessels

Giant Tide
Federal 6
[illegible]

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OM 102

DRILLING REPORT

AQUITAINE

WELL Narwhal S | No. 24 | RIG P 82 | DATE 28/8/74

PHASES

Cross out which ever not applicable	DEPTH ft	ins.	PENET. ft.	ins.	TIME h.	min.
TOTAL	3 4,102		4 134		5 14	45
Drilled-cored	4,236					

PENETRATION

	6		7		8	
EACH BIT	4,102		134		14	45
Drilled-cored	4,236					
Drilled-cored						
Drilled-cored						
Drilled-cored						

BITS

Make	Ø	Type	No.	Nozzles	Cumul
9 Smith	10 12¼	11 3JS	12 #11 R663	13 3x13	14 134

PARAMETERS

Weight	R.P.M.	Flow Rate	Mud Pressure
15 70000	16 45	17 550	18 2700

MUD

CHARACTERISTICS

19
Wt 10.7 Wt 10.9 V 36 V 39
F mini 75 VA maxi 14 Vp mini 10 Yv maxi 8
Gel 0 4 10 14 S% 0 pH 11.5
Pf 0.4 Lc 0 Solid 5.5 NaCL 260
Calcium 55000

LOSSES and GAINS

20	this day	cumul
Mud		
Water		

PRODUCTS ADDED

21

6 sx	Caustic Soda
60 sx	Salt Gel
3 sx	Magcogel

STRING

22 ELEMENTS Same as yesterday

23 WEIGHT (in mud)	D.C.	D.P.	Wt M.D.
	90000	60000	236000

24 FORMATION Type . Stage

25 CORES

26 DEVIATION

NOTES

27 TIME LOG

ROM	TO	ELAPSED TIME	
0	2:45	2:45	Running in hole with Bit #11
2:45	17:30	14:45	Drilling
17:30	17:45	0:15	Pumped pill (wind 83 mph, Heave 9', Waves 30' - 35')
17:45	20:15	2:30	Pulled to casing shoe. Hang off drill pipe.
20:15	21:00	0:45	Displace annulus with 12.5#/gal. mud
21:00	24:00	3:00	Waiting on weather

8:00 A.M. Status: drilling at 4,259'

Start drilling at 6:00 A.M.

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TIME ANALYSIS 28 — 9 - Mis. op.

1 - R.U.D.		10 - W.C.	
2 - D	14:45	11 - Casing	
3 - Red		12 - Circ	
4 - D.T.	2:45	13 - Fishing	
5 - H.O.		14 - Aband	
6 - Cor		15 - Rep	
7 - C.T.		16 - W.T.	6:30
8 - Test		17 - Vac	

29 PROGRAMME: Drilling

30 PEOPLE ON BOARD: 63

31 WEATHER

Wind/Kn	30
Direction	NW
Waves /ft	18'
Slip jt.	1'
Current	
Swells/ft	8'
Direction	NW
Température	44°

32 Support Vessels: Giant Tide

OM 102

DRILLING REPORT

AQUITAINE

1 WELL. Narwhal S RIG P-82

2 No. 23 DATE 27/8/74

PHASES

PENETRATION

Cross out which ever not applicable	DEPTH ft.	ins.	PENET. ft.	ins.	TIME h.	min.
TOTAL	3 3,880		4 222		5 21	00
Drilled	4,102					
EACH BIT	6 3,880		7 222		8 21	00
Drilled	4,102					
Drilled-cored						
Drilled-cored						
Drilled-cored						

BITS

Make	Ø	Type	No.	Nozzles	Cumul
9 Smith	10 12¼	11 4JS	12 #10 SN 120	13 3x13	14 771'/ 66:30

PARAMETERS

Weight	R.P.M.	Flow Rate	Mud Pressure
15 70000	16 45	17 550	18 2700

MUD

CHARACTERISTICS

19
Wt 10.7 Wt 10.9 V 35 V 40
F mini 73 VA maxi 14 Vp mini 10 Yv maxi 8
Gel 0 4 10 16 S% 0 pH 11.5
Pf 0.4 Lc 0 Solid. 6% NaCL 270

LOSSES and GAINS

20	this day	cumul
Mud		
Water		

PRODUCTS ADDED

21

5 sx	Caustic
50 sx	Salt gel
3 sx	Magcogel

STRING

22 ELEMENTS Same as yesterday

23 WEIGHT (in mud)	D.C.	D.P.	Wt M.D.
	90000	65000	235000

24 FORMATION Type. Stage

25 CORES

26 DEVIATION at 4,100' = 2°

NOTES

27 TIME LOG

ELAPSED ROM	TO	TIME	
0	21:00	21:00	Drilling from 3,880' to 4,102'
21:00	21:30	0:30	Circulation
21:30	21:45	0:15	Totco survey
21:45	24:00	2:15	Tripping to change bit
			8:00 A.M. status = drilling at 4,147'

TIME ANALYSIS 9 - Mis. op. 0:15

1 - R.U.D.		10 - W.C.	
2 - D	21:00	11 - Casing	
3 - Red		12 - Circ	0:30
4 - D.T.	2:15	13 - Fishing	
5 - H.O.		14 - Aband	
6 - Cor		15 - Rep	
7 - C.T.		16 - W.T.	
8 - Test		17 - Vac	

29 PROGRAMME Drilling

30 PEOPLE ON BOARD: 63

31 WEATHER

Wind/Kn	30/38
Direction	NW
Waves /ft	9/15'
Slip jt.	3'
Current	
Swells/ft	12'
Direction	NW
Température	48°

32 Support Vessels

Giant Tide

406

OM 102

DRILLING REPORT

AQUITAINE

1 WELL: Narwhal S | RIG: P 82

2 No: 22 | DATE: 26/8/71

PHASES

Cross out which ever not applicable	DEPTH ft.	ins.	PENET. ft.	ins.	TIME h.	min.
TOTAL	3 3,616		4 264		5 24	00
Drilled-cored	3,880					

PENETRATION

BITS / PARAMETERS

	6 DEPTH ft.	ins.	7 PENET. ft.	ins.	8 TIME h.	min.	9 Make	10 Ø	11 Type	12 No.	13 Nozzles	14 Cumul	15 Weight	16 R.P.M.	17 Flow Rate	18 M. Press
EACH BIT	3,616		264		24	00	Smith	12¼	4JS	SN 120	3x13	549' / 45:30	70000	45	550	2700
Drilled-cored	3,880															
Drilled-cored																
Drilled-cored																
Drilled-cored																

MUD

CHARACTERISTICS

19
Wt 10.5 Wt 10.9 V 36 V 40
F mini 75 VA maxi 13.5 Vp mini 9 Yv maxi 9
Gel 0 4 10 16 S% 0 pH 11.5
Pf 0.4 Lc 0 Solid 6 NaCL 290
Ca = 50,000

LOSSES and GAINS

20	this day	cumul
Mud		
Water		

PRODUCTS ADDED

21

160 sx	Barite
8 sx	Caustic
28 sx	Magogel
50 sx	Saltgel

STRING

22 ELEMENTS: Same as yesterday

23 WEIGHT (in mud)	D.C.	D.P.	W! M.D.

24 FORMATION Type . Stage

25 CORES

26 DEVIATION

NOTES

27 TIME LOG ROM	TO	ELAPSED TIME	
0:00	24:00	24:00	Drilling
			8 A.M. status - Drilling at 3,968'

TIME ANALYSIS

28

1 - R.U.D.		10 - W.C.	
2 - D	24:00	11 - Casing	
3 - Red		12 - Circ	
4 - D.T.		13 - Fishing	
5 - H.O.		14 - Aband	
6 - Cor		15 - Rep	
7 - C.T.		16 - W.T.	
8 - Test		17 - Vac	
9 - Mis. op.			

29 PROGRAMME: Drilling

30 PEOPLE ON BOARD: 63

31 WEATHER

Wind/Kn

Direction

Waves /ft

Slip jt.

Current

Swells/ft

Direction

Température

32 Support Vessels

406

OM 102

DRILLING REPORT

AQUITAINE

1 WELL. Narwhal S
RIG P 82

2 No : 21
DATE 25/8/74

PENETRATION

PHASES

Cross out which ever not applicable	DEPTH ft.	DEPTH ins.	PENET. ft.	PENET. ins.	TIME h.	TIME min.
TOTAL	3 3,331		4 285		5 21	30
Drilled-cored	3,616					

BITS / PARAMETERS

EACH BIT	Make	Ø	Type	No.	Nozzles	Cumul	Weight	R.P.M.	Flow Rate	Mud Pressure
	9	10	11	12	13	14	15	16	17	18
6 3,331 / 7 285 / 8 21 30	Smith	12 1/4	4JS	#10 SN 120	3x13	285/21:30	70000	45	550	2700
Drilled-cored 3,616										
Drilled-cored										
Drilled-cored										
Drilled-cored										

MUD

CHARACTERISTICS

19
Wt 10.6 Wt 10.9 V 36 V 41
F mini 70 VA maxi 14.5 Vp mini 10 Yv maxi 9
Gel 0 7 10 21 S% 0 pH 11.5
Pf 0.5 Lc 0 Solid. 5.5 NaCL 310
Ca = 35000

LOSSES and GAINS

20	this day	cumul
Mud		
Water		

PRODUCTS ADDED

21

6 sx	Caustic
223 sx	Salt
50 sx	Saltgel
20 sx	Magogel

STRING

22 ELEMENTS Same as yesterday, without junk sub

23 WEIGHT (in mud)	D.C.	D.P.	W! M.D.
	90000	62000	229000

24 FORMATION Tyr . . Stage

25 CORES

26 DEVIATION

NOTES

27

FROM	TO	ELAPSED TIME	
0	2:30	2:30	Running in Bit #10
2:30	24:00	21:30	Drilling from 3,331 to 3,616 with Salt saturated mud.
			8:00 A.M. Status - drilling at 3,705'

TIME ANALYSIS

1 - R.U.D.		10 - W.C.	
2 - D	21:30	11 - Casing	
3 - Red		12 - Circ	
4 - D.T.	2:30	13 - Fishing	
5 - H.O.		14 - Aband	
6 - Cor		15 - Rep	
7 - C.T.		16 - W.T.	
8 - Test		17 - Vac	
9 - Mis. op.	28		

29 PROGRAMME Drilling

30 PEOPLE ON BOARD : 63

31 WEATHER

Wind/Kn	24/30
Direction	SW
Waves /ft	4/6'
Slip jt.	0
Current	
Swells/ft	6'
Direction	WSW
Température	38°

32 Support Vessels

Supreme Tide

406

OM 102

DRILLING REPORT

AQUITAINE

1 WELL. Narwhal S RIG. P82

2 No. 20 DATE 24/8/74

PENETRATION

PHASES

Cross out which ever not applicable	DEPTH ft.	DEPTH ins.	PENET. ft.	PENET. ins.	TIME h.	TIME min.
TOTAL	3 3,163		4 168		5 11	15
Drilled-cored	3,331					
EACH BIT	6 3,163		7 168		8 11	15
Drilled-cored	3,331					
Drilled-cored						
Drilled-cored						
Drilled-cored						

BITS

Make	Ø	Type	No.	Nozzles	Cumul
9 Smith	10 $12\frac{1}{4}$	11 4JS	12 #9 TC 169	13 3x13	14 771'/55:15

PARAMETERS

Weight	R.P.M.	Flow Rate	Mud Pressure
15 70000	16 45	17 550	18 2600

MUD

CHARACTERISTICS

19
Wt 10.5 Wt 10.7 V 36 V 40
F mini 75 VA maxi 14 Vp mini 6 Yv maxi 16
Gel 0 5 10 21 S% 0.25 pH 11.5
Pf 0.5 Lc 0 Solid. 5 NaCL 185
Ca = 14000

LOSSES and GAINS

20	this day	cumul
Mud		
Water		

PRODUCTS ADDED

21
1.5 tons Barite
8 sx. Caustic

STRING

22 ELEMENTS Same as yesterday

23 WEIGHT (in mud)	D.C.	D.P.	W! M.D.
	90000	60000	225000

24 FORMATION Type . Stage

25 CORES

26 DEVIATION at 3325 = 0°

NOTES

27 TIME LOG

ROM	TO	ELAPSED TIME	
0	10:15	10:15	Drilled to 3,295'
10:15	11:00	0:45	Circulate for sample
11:00	12:00	1:00	Drilled to 3331'
12:00	12:45	0:45	Circulate for sample
12:45	13:00	0:15	Totco and pumped pill.
13:00	19:30	6:30	Pulling out Bit #9. Running in Shoe. Pumped 100 bbls. 13.0 mud weight. Pull out of hole.
19:30	24:00	4:30	Pull out seat protector - weekly BOP Test. Junction box on blue reel leaking. Repair Leak and flow meter. Well starting to flow. Stop Test -rerun seat protector. Status at 8:00 A.M. = drilling at 3,423'

TIME ANALYSIS 9 - Mis. op. 4:45

1 - R.U.D.		10 - W.C.	
2 - D	11:15	11 - Casing	
3 - Red		12 - Circ	1:30
4 - D.T.	6:30	13 - Fishing	
5 - H.O.		14 - Aband	
6 - Cor		15 - Rep	
7 - C.T.		16 - W.T.	
8 - Test		17 - Vac	

29 PROGRAMME Drilling

30 PEOPLE ON BOARD: 66

31 WEATHER

Wind/Kn	20
Direction	SW
Waves /ft	3/5'
Slip jt.	0
Current	
Swells/ft	2/5'
Direction	SW
Température	45°

32 Support Vessels

Supreme Tide

406

OM 102

DRILLING REPORT

AQUITAINE

WELL: Narwhal S | No: 19 | RIG: P 82 | DATE: 24/8/74

PENETRATION

PHASES

Cross out which ever not applicable	DEPTH ft.	DEPTH ins.	PENET. ft.	PENET. ins.	TIME h.	TIME min.
TOTAL	2800		363		24	00
Drilled ~~-cored~~	3163					
EACH BIT	2800		363		24	00
Drilled ~~-cored~~	3163					
Drilled-cored						
Drilled-cored						
Drilled-cored						

BITS

Make	Ø	Type	No.	Nozzles	Cumul
Smith	12¼	4JS	TC 169	3x13	603'/44:00

PARAMETERS

Weight	R.P.M.	Flow Rate	Mud Pressure
70000	45	550	2600

MUD

CHARACTERISTICS

Wt 10.3 | Wt 10.7 | V 36 | V 39

F mini 70 | VA maxi 15 | Vp mini 7 | Yv maxi 16

Gel 0 7 | 10 22 | S% .25 | pH 11.5

Pf .6 | Lc 0 | Solid 5 | NaCL 175

LOSSES and GAINS

	this day	cumul
Mud		
Water		

PRODUCTS ADDED

30 sx.	Salt gel	260 tons	Potable Water
22 sx.	Caustic Soda	285 tons	Fuel
8 sx.	Kelzan	600 gal.	Turbo Fuel
Products on Board		184 tons	Barite
390 tons	Drill water	102 tons	Cement

STRING

ELEMENTS

WEIGHT (in mud)	D.C.	D.P.	Wt M.D.

NOTES

FORMATION (Type . Stage)

CORES

DEVIATION

TIME LOG

ROM	TO	ELAPSED TIME	
0:00	24:00	24:00	Drilling
			8:00 A.M. Status - Drilling at 3,233 with Bit #9

TIME ANALYSIS

1 - R.U.D.		9 - Mis. op.	
2 - D	24:00	10 - W.C.	
3 - Red		11 - Casing	
4 - D.T.		12 - Circ	
5 - H.O.		13 - Fishing	
6 - Cor		14 - Aband	
7 - C.T.		15 - Rep	
8 - Test		16 - W.T.	
		17 - Vac	

PROGRAMME: Drilling

PEOPLE ON BOARD: 63

WEATHER

Wind/Kn	10
Direction	NNW
Waves /ft	2/3'
Slip jt.	0
Current	
Swells/ft	2/4'
Direction	NW
Température	45

Support Vessels: Supreme tide

406

OM 102

DRILLING REPORT

AQUITAINE

1 WELL. Narwhal S RIG. P 82

2 No. 18 DATE 22/8/74

PENETRATION

PHASES

Cross out which ever not applicable	DEPTH ft.	DEPTH ins.	PENET. ft.	PENET. ins.	TIME h.	TIME min.
TOTAL	3 2,560'		4 240		5 20	00
Drilled-cored	2,800'					

BITS / PARAMETERS

EACH BIT	6 DEPTH ft.	DEPTH ins.	7 PENET. ft.	PENET. ins.	8 TIME h.	TIME min.	9 Make	10 Ø	11 Type	12 No.	13 Nozzles	14 Cumul	15 Weight	16 R.P.M.	17 Flow Rate	18 Mud Pressure
	2,560		240		20	00	Smith	12 1/4	4JS	TC 169	3x13	240/20:00	70000	45	550	2500
Drilled-cored	2,800															
Drilled-cored																
Drilled-cored																
Drilled-cored																

MUD

CHARACTERISTICS

19
Wt 10.2 Wt 10.5 V 35 V 42
F mini 58 VA maxi 15 Vp mini 7 Yv maxi 16
Gel 0 6 10 18 S% 0.25 pH 10
Pf 0.1 Lc 0 Solid. 4.5 NaCL 175

LOSSES and GAINS

20	this day	cumul
Mud		
Water		

PRODUCTS ADDED

21

102 sx.	Salt gel
16 sx.	Caustic
2 sx.	Drispac
10 tons	Barite

STRING

22 ELEMENTS bit/junk sub/(8) DC 9½/(10) DC 8½/(1) flexwate/Drop in Valve/(14) flexwate/5" DP

23 WEIGHT (in mud) | D.C. | D.P. | W! M.D.

24 FORMATION Type . Stage

25 CORES

26 DEVIATION

NOTES

27 TIME LOG ROM	TO	ELAPSED TIME	
0	3:45	3:45	Finished pulling out Bit #8 - clean out junk sub.
			Running in Bit #9 - pickup (3) 8½ DC and slip 15' of drilling line
3:45	4:00	0:15	Working junk sub
4:00	24:00	20:00	Drilling

8:00 A.M. Status = Drilling at 2,908'

Recapitulation bits dullness:

#4	No. 4057	5-3-I	Ø	17½
#5	No. LX680	2-2-I	Ø	17½
#6	No. 57822	6-2-I	Ø	12¼
#7	No. 914367	7-7-I	Ø	12¼
#8	No. 497853	7-4-I	Ø	12¼

TIME ANALYSIS

1 - R.U.D.		9 - Mis. op.	28
2 - D	20	10 - W.C.	
3 - Red		11 - Casing	
4 - D.T.	3:45	12 - Circ	
5 - H.O.		13 - Fishing	0:15
6 - Cor		14 - Aband	
7 - C.T.		15 - Rep	
8 - Test		16 - W.T.	
		17 - Vac	

29 PROGRAMME: Drilling

30 PEOPLE ON BOARD: 59

31 WEATHER

Wind/Kn	12/16
Direction	NNE
Waves /ft	3
Slip jt.	0.5
Current	
Swells/ft	4/6
Direction	NNE
Température	44°

32 Support Vessels: Supreme Tide

406

OM 102

DRILLING REPORT

AQUITAINE

1 WELL. Narwhal S RIG P82 2 No. 17 DATE 21/8/74

PENETRATION

PHASES

Cross out which ever not applicable	DEPTH ft.	ins.	PENET. ft.	ins.	TIME h.	min.
TOTAL	3 2,272		4 288		5 21	30
Drilled-[illegible]	2,560					

BITS / PARAMETERS

EACH BIT	6		7		8		Make	Ø	Type	No.	Nozzles	Cumul	Weight	R.P.M.	Flow Rate	Mud Pressure
							9	10	11	12	13	14	15	16	17	18
Drilled-[illegible]	2,272		288		21	30	Security	12¼	S-88	497853	3x14	502'/33:45	60000	40	550	2000
	2,560															
Drilled-cored																
Drilled-cored																
Drilled-cored																

MUD

CHARACTERISTICS

19
Wt 10 Wt 10.4 V 39 V 45
F mini 68 VA maxi 19.5 Vp mini 9 Yv maxi 21
Gel 0 7 10 18 S% .25 pH 11.5
Pf 0.5 Lc 0 Solid. 4.5% NaCL 160
Ca = 7,500 ppm

LOSSES and GAINS

20	this day	cumul
Mud		
Water		

PRODUCTS ADDED

21
20 sxs Caustic Soda
10 sxs Magogel
55 gal Magonol
4 sxs Barite

STRING

22 ELEMENTS same as yesterday

23 WEIGHT (in mud)	D.C.	D.P.	Wt M.D.
	28000	45000	198000

24 FORMATION Type . Stage

25 CORES

26 DEVIATION at 2,555' = 0.5°

NOTES

27 TIME LOG

ROM	TO	ELAPSED TIME	
0	12:00	12:00	Drilling from 2,272' to 2,447'
12:00	12:15	0:15	Abandon Drillship drill
12:15	21:45	9:30	Drilling from 2,447' to 2,560'
21:45	22:15	0:30	Totco and circulated pill
22:15	23:00	0:45	Pulling out bit to 13 3/8 shoe - well flowing slightly
23:00	23:45	0:45	Pick up kelly - pumped 75 bbls of 12.4 mud
23:45	24:00	0:15	Pulling out bit No. 8
			8:00 A.M. Status = Drilling at 2,603'

TIME ANALYSIS

1 - R.U.D.		10 - W.C.	
2 - D	21:30	11 - Casing	
3 - Red		12 - Circ	1:15
4 - D.T.	1:00	13 - Fishing	
5 - H.O.		14 - Aband	
6 - Cor		15 - Rep	
7 - C.T.		16 - W.T.	
8 - Test		17 - Vac	
9 - Mis. op.	0:15		

29 PROGRAMME Drilling

30 PEOPLE ON BOARD : 59

31 WEATHER

Wind/Kn	35/45
Direction	W
Waves /ft	3
Slip jt.	0.5
Current	
Swells/ft	8
Direction	NW
Température	47

32 Support Vessels
Giant Tide

406

OM 102

DRILLING REPORT

AQUITAINE

WELL Narwhal S | No 16 | RIG P-82 | DATE 20/8/74

PHASES

Cross out which ever not applicable	DEPTH ft.	DEPTH ins.	PENET. ft.	PENET. ins.	TIME h.	TIME min.
TOTAL	2,033		239		17	30
Drilled-	2,272					

PENETRATION

EACH BIT	DEPTH ft.	DEPTH ins.	PENET. ft.	PENET. ins.	TIME h.	TIME min.
	2,033					
Drilled-	2,058		25		5	15
Drilled-	2,272		214		12	15
Drilled-cored						
Drilled-cored						

BITS / PARAMETERS

Make	Ø	Type	No.	Nozzles	Cumul	Weight	R.P.M.	Flow Rate	Mud Pressure
Security	12¼	S-88	914367	3x15	191/18:00	60000	60	540	1500
Security	12¼	S-88	497853	3x14	214/12:15	60000	40/45	540	2000

Note: = on bit 914367 the spear point on roll #1 was broken - several inserts lost.

MUD

CHARACTERISTICS

Wt 10.4 Wt 10.6 V 37 V 47

F mini 60 VA maxi 19 Vp mini 9 Yv maxi 18

Gel 0 7 10 19 S% .5 pH 10.5

Pf 4 Lc 0 Solid 11 NaCL 225

LOSSES and GAINS

	this day	cumul
Mud		
Water		

PRODUCTS ADDED

6 sx	Caustic Soda	
35 sx	Salt gel	
30 gal	Magonol	

STRING

ELEMENTS: Same as yesterday + junk sub above bit

WEIGHT (in mud)	D.C.	D.P.	W! M.D.
	78000	44000	197000

FORMATION (Type . Stage):

CORES:

DEVIATION: at 2,055' = 0.75°

NOTES

TIME LOG FROM	TO	ELAPSED TIME	
0	2:45	2:45	Drilling to 2,055'
2:45	3:45	1:00	Increase mud weight for pill - circulation
3:45	6:15	2:30	Drilling to 2,058'
6:15	7:15	1:00	Circulation Totco survey - pump pill
7:15	11:30	4:15	Pulling out bit #7 Running in bit #8
11:30	11:45	0:15	Working with junk sub
11:45	24:00	12:15	Drilling to 2,272'
			8:00 A.M. Status = Drilling at 2,395'

TIME ANALYSIS

1 - R.U.D.		9 - Mis. op.	
2 - D	17:30	10 - W.C.	
3 - Red		11 - Casing	
4 - D.T.	5:15	12 - Circ	1:00
5 - H.O.		13 - Fishing	0:15
6 - Cor		14 - Aband	
7 - C.T.		15 - Rep	
8 - Test		16 - W.T.	
		17 - Vac	

PROGRAMME: Drilling

PEOPLE ON BOARD:

WEATHER

Wind/Kn	12/18
Direction	NW
Waves /ft	0
Slip jt.	0.5
Current	
Swells/ft	2/4
Direction	NW
Température	49°

Support Vessels: Giant Tide

406

OM 102

DRILLING REPORT

AQUITAINE

1 WELL Narwhal S RIG P-82

2 No 15 DATE 19/8/74

PENETRATION

PHASES

Cross out which ever not applicable	DEPTH ft.	DEPTH ins.	PENET. ft.	PENET. ins.	TIME h.	TIME min.
TOTAL	3 1,837'		4 196		5 16	15
Drilled-cored	2,033'					
EACH BIT	6 1,837'		7 30		8 3	30
~~Drilled~~ cored	1,867'		166		12	45
Drilled ~~cored~~	2,033'					
Drilled-cored						
Drilled-cored						

BITS

Make	Ø	Type	No.	Nozzles	Cumul
9	10	11	12	13	14
Christ	8 15/32	C 20			
Security	12 1/4	S 88	914367	3x15	166/12:45

PARAMETERS

Weight	R.P.M.	Flow Rate	Mud Pressure
15	16	17	18
50/60000	40/60	540	1600

MUD

CHARACTERISTICS

19
Wt 10.5 Wt 10.8 V 39 V 44
F mini 53 VA maxi 17.5 Vp mini 9 Yv maxi 17
Gel 0 0 10 22 S% .75 pH 11
Pf 1 Lc 0 Solid 11 NaCl 275

LOSSES and GAINS

20	this day	cumul
Mud		
Water		

PRODUCTS ADDED

21

4 sx	Drispac	309 tons	Fuel
25 gal	Magonol	469 tons	Drilling water
Products on Board		357 gal.	Turbo fuel
327 tons	Potable water	254 tons	Barite
		106 tons	Cement

STRING

22 ELEMENTS

23 WEIGHT (in mud)	D.C.	D.P.	W! M.D.
	78000	35000	185000

24 FORMATION Type . Stage

25 CORES

26 DEVIATION

NOTES

27 TIME LOG FROM	TO	ELAPSED TIME	
0	3:30	3:30	Coring from 1,837' to 1,867'
3:30	3:45	0:15	Bumped pill
3:45	5:45	2:00	Pulling out core barrel
5:45	7:00	1:15	Recovered core (100% recovery) lay down core barrel
7:00	9:00	2:00	Running in Bit #7
9:00	11:15	2:15	Opening core hole
11:15	24:00	12:45	Drilling from 1,867' to 2,033'
			8:00 A.M. Status - Depth 2,062' Tripping out Bit #7

TIME ANALYSIS

28
9 - Mis. op. ____
1 - R.U.D. ____ 10 - W.C. ____
2 - D 12:45 11 - Casing ____
3 - Red ____ 12 - Circ ____
4 - D.T. 2:00 13 - Fishing ____
5 - H.O. 2:15 14 - Aband ____
6 - Cor 3:30 15 - Rep ____
7 - C.T. 3:30 16 - W.T. ____
8 - Test ____ 17 - Vac ____

WEATHER

31
Wind/Kn 15/30
Direction WNW
Waves /ft 3
Slip jt. 0
Current ____
Swells/ft 6
Direction N
Température 45

29 PROGRAMME
Drilling

30 PEOPLE ON BOARD : 62

32 Support Vessels
Giant Tide

406

OM 102

DRILLING REPORT

AQUITAINE

WELL. Narwhal S | No. 14
RIG P-82 | DATE 18/8/74

PENETRATION

PHASES

Cross out which ever not applicable	DEPTH ft.	DEPTH ins.	PENET. ft.	PENET. ins.	TIME h.	TIME min.
TOTAL	3 1,756'		4 81		5 4	00
Drilled-~~cored~~	1,837'					
EACH BIT	6 1,756'		7 81		8 4	00
Drilled-~~cored~~	1,837'					
Drilled-cored						
Drilled-cored						
Drilled-cored						

BITS

Make	Ø	Type	No.	Nozzles	Cumul
9	10	11	12	13	14
Hughes	12¼	X1G	57822	3x16	81'/4:00
Christ.	8 15/32	C 20	57424		
Bit #6	XIG:	T=6	B=2	G=I	

PARAMETERS

Weight	R.P.M.	Flow Rate	Mud Pressure
15	16	17	18
40/45000	60/90	650	1900 psi

MUD

CHARACTERISTICS

19
Wt 10.6 Wt 10.7 V 48 V 52
F mini 14.2 VA maxi 30 Vp mini 15 Yv maxi 30
Gel 0 7 10 24 S% 1 pH 11
Pf 1.7 Lc 0 Solid 11.5 NaCL 315

LOSSES and GAINS

20	this day	cumul
Mud		
Water		

PRODUCTS ~~ADDED~~ ON BOARD

21

281 tons	Potable water	66 tons cement
328 tons	Fuel	
497 tons	Drilling water	
357 gal.	Turbo	
155 tons	Barite	

STRING

22 ELEMENTS same as yesterday

23 WEIGHT (in mud)	D.C.	D.P.	Wt M.D.
	78000	32000	185000

24 FORMATION Type. Stage

25 CORES 8:00 A.M. Status Tripping in Bit #8 - Cored 30' Receovery 100% Time 3:30

26 DEVIATION at 1830' = 1°

NOTES

27 TIME LOG

ROM	TO	ELAPSED TIME	
0	3:00	3:00	Drilling out cement to 1,700'
			Casing pressure test at 1000 psi - 15 min. - OK
3:00	7:00	4:00	Drilling to 1,837
7:00	7:30	0:30	Circulating
7:30	8:30	1:00	Bit drill and breakdown formation test to gradient 1 psi/ft.
8:30	9:00	0:30	Totco survey
9:00	11:00	2:00	Bit #6
11:00	16:00	5:00	Check and made up core barrel, running in
16:00	20:30	4:30	Attempt to break circulation, no success, pulling out
20:30	21:30	1:00	Check core barrel
21:30	23:30	2:00	Running in hole to core
23:30	24:00	0:30	Drop ball.

TIME ANALYSIS

1 - R.U.D.		10 - W.C.	
2 - D	4:00	11 - Casing	3:00
3 - Red		12 - Circ	0:30
4 - D.T.	2:00	13 - Fishing	
5 - H.O.		14 - Aband	
6 - Cor	6	15 - Rep	
7 - C.T.	7	16 - W.T.	
8 - Test		17 - Vac	
9 - Mis. op.	1:30		

29 PROGRAMME Drilling

30 PEOPLE ON BOARD 62

31 WEATHER

Wind/Kn	2/3
Direction	WSW
Waves /ft	0
Slip jt.	0
Current	
Swells/ft	3'
Direction	NW
Température	44°

32 Support Vessels: Giant

406

OM 102

DRILLING REPORT

AQUITAINE

1 WELL Narwhal S RIG P 82

2 No 13 DATE 17/8/74

PENETRATION

PHASES

Cross out which ever not applicable	DEPTH ft.	DEPTH ins.	PENET. ft.	PENET. ins.	TIME h.	TIME min.
TOTAL Drilled-cored	3 1,756		4 0		5	
EACH BIT	6		7		8	
Drilled-cored						
Drilled-cored						
Drilled-cored						
Drilled-cored						

BITS / PARAMETERS

Make	Ø	Type	No.	Nozzles	Cumul	Weight	R.P.M.	Flow Rate	Mud Pressure
9 Hughes	10 $12\frac{1}{4}$	11 X1G	12	13 3x15	14	15	16	17	18

MUD

CHARACTERISTICS

19

	mini	maxi	mini	maxi
Wt		Wt	V	V
F		VA	Vp	Yv
Gel 0		10	S%	pH
Pf		Lc	Solid	NaCL

LOSSES and GAINS

20	this day	cumul
Mud		
Water		

PRODUCTS ADDED

21

STRING

22 ELEMENTS Bit/(8) $9\frac{1}{2}$ DC/(7) $8\frac{1}{2}$ DC/(1) Flexwate/Dropping Valve/(14) Flexwate/DP 5"

23 WEIGHT (in mud)	D.C.	D.P.	Wt M.D.
	78000	30000	183000

24 FORMATION Type . Stage

25 CORES

26 DEVIATION

NOTES

27 TIME LOG

ROM	TO	ELAPSED TIME	
0	6:30	6:30	WOW (Winds 32 knots swell 15')
6:30	14:00	7:30	Running in 13 5/8 BOP stack and riser
14:00	18:30	4:30	Running in Testing Tool - Test BOP stack O.K.
18:30	19:00	0:30	Pulling out testing tool
19:00	20:15	1:15	Running in Seal protector
20:15	23:15	3:00	Running in Bit #6
23:15	24:00	0:45	Drilling out Cement
			7 A.M. Stop Drilling at 1,837' for coring

TIME ANALYSIS 9 - Mis. op. 28

1 - R.U.D.		10 - W.C.	
2 - D		11 - Casing	17:30
3 - Red		12 - Circ	
4 - D.T.		13 - Fishing	
5 - H.O.		14 - Aband	
6 - Cor		15 - Rep	
7 - C.T.		16 - W.T.	6:30
8 - Test		17 - Vac	

29 PROGRAMME Drilling

30 PEOPLE ON BOARD : 64

31 WEATHER

Wind/Kn	16
Direction	NNW
Waves /ft	2'-3'
Slip jt.	0
Current	
Swells/ft	8' (7s)
Direction	NNW
Température	46°

32 Support Vessels

Giant Tide

406

OM 102

DRILLING REPORT

AQUITAINE

1 WELL: Narwhal S | 2 No: 12 | RIG: P-82 | DATE: 16/8/74

PENETRATION

PHASES

Cross out which ever not applicable	DEPTH ft.	DEPTH ins.	PENET. ft.	PENET. ins.	TIME h.	TIME min.
TOTAL Drilled-cored	3 1,756'		4 0'		5	
EACH BIT 6 / 7 / 8						
Drilled-cored						
Drilled-cored						
Drilled-cored						
Drilled-cored						

BITS

Make	Ø	Type	No.	Nozzles	Cumul
9	10	11	12	13	14

PARAMETERS

Weight	R.P.M.	Flow Rate	Mud Pressure
15	16	17	18

MUD

CHARACTERISTICS

19
Wt mini ____ Wt maxi ____ V mini ____ V maxi ____
F ____ VA ____ Vp ____ Yv ____
Gel 0 ____ 10 ____ S% ____ pH ____
Pf ____ Lc ____ Solid ____ NaCL ____

LOSSES and GAINS

20	this day	cumul
Mud		
Water		

PRODUCTS ADDED

21

STRING

22 ELEMENTS ____

23 WEIGHT (in mud)	D.C.	D.P.	Wt M.D.

24 FORMATION Type . Stage ____

25 CORES ____

26 DEVIATION ____

NOTES

27 TIME LOG ROM	TO	ELAPSED TIME	
0	0:30	0:30	Circulating
0:30	2:00	1:30	Cementing (1,520 sx. Class B + 3% $CaCl_2$ mixed with saturated Salt Water slurry weight 16.1)
			Displaced with 170 bbls.
2:00	3:00	1:00	Laydown cement head and lines
3:00	4:00	1:00	Displace riser with sea water
4:00	5:00	1:00	Pulling out running string
5:00	12:00	7:00	Pulling out 20 3/4 B.O.P.
12:00	13:30	1:30	Rigging up and test of the 13 5/8 stack on spider deck.
13:30	24:00	10:30	Waiting on weather.

TIME ANALYSIS

28
1 - R.U.D. ____ 9 - Mis. op. ____
2 - D ____ 10 - W.C. ____
3 - Red ____ 11 - Casing 13:30
4 - D.T. ____ 12 - Circ ____
5 - H.O. ____ 13 - Fishing ____
6 - Cor ____ 14 - Aband ____
7 - C.T. ____ 15 - Rep ____
8 - Test ____ 16 - W.T. 10:30
17 - Vac ____

31 WEATHER

Wind/Kn 23
Direction S
Waves /ft 15'
Slip jt. ____
Current ____
Swells/ft 10/12'
Direction SSE
Température ____

29 PROGRAMME: Test stack and drill out

30 PEOPLE ON BOARD: 65

32 Support Vessels: Supreme Tide

406

8:00 A.M. Status - running in 13 5/8 BOP stack.

OM 102

DRILLING REPORT

AQUITAINE

1 WELL. Narwhal S RIG P-82 2 No. 11 DATE 15/8/74

PHASES

PENETRATION

Cross out which ever not applicable	DEPTH ft.	DEPTH ins.	PENET. ft.	PENET. ins.	TIME h.	TIME min.
TOTAL	3 1,740		4 16		5 2	15
Drilled-cored	1,756					
EACH BIT	6 1,740		7 16		8 2	15
Drilled-cored	1,756					
Drilled-cored						
Drilled-cored						
Drilled-cored						

BITS

Make	Ø	Type	No.	Nozzles	Cumul
9 Hughes	10 17½	11 OSC 1G	12 LX 680	13 none	14 232/11:45

PARAMETERS

Weight	R.P.M.	Flow Rate	Mud Pressure
15 45000	16 100	17 1000gal	18 500

MUD

CHARACTERISTICS

19
Wt 10.6 Wt 10.7 V 51 V 52
F mini 35 VA maxi 32.5 Vp mini 20 Yv maxi 25
Gel 0 9 10 24 S% 1 pH 9
Pf ____ Le ____ Solid. 12 NaCL 315

LOSSES and GAINS

20	this day	cumul
Mud		
Water		

PRODUCTS ADDED

21
Products added
330 sx Salt
36 sx $CaCl_2$
Products on board
64 tons Cement

213 tons	Potable Water
351 tons	Fuel
355 tons	Drilling Water
457 gal.	Turbo fuel
156 tons	Barite

STRING

22 ELEMENTS

23 WEIGHT (in mud)	D.C.	D.P.	W! M.D.
	78000	20000	188000

24 FORMATION Type . Stage

25 CORES

26 DEVIATION

NOTES

27 TIME LOG FROM	TO	ELAPSED TIME	
0	2:45	2:45	Drilling from 1,740' to 1,756'
2:45	3:45	1:00	Circulation
3:45	5:00	1:15	Pulling out Bit #5
5:00	7:45	2:45	Logging sonic - GR
7:45	9:30	1:45	Rigging up housing 13 5/8
9:30	11:15	1:45	Running in Bit #5
11:15	12:30	1:15	Circulation
12:30	15:00	2:30	Pulling out Bit #5
15:00	23:15	8:15	Running in 13 3/8 casing shoe at 1,737' float at 1,670'
23:15	24:00	0:45	Circulating

TIME ANALYSIS 9 - Mis. op. 2:45

1 - R.U.D.		10 - W.C.	
2 - D	2:45	11 - Casing	18:30
3 - Red		12 - Circ	
4 - D.T.		13 - Fishing	
5 - H.O.		14 - Aband	
6 - Cor		15 - Rep	
7 - C.T.		16 - W.T.	
8 - Test		17 - Vac	

29 PROGRAMME
Cementing and Pull Out
20 3/4" BOP Stack

30 PEOPLE ON BOARD: 65

31 WEATH.

Wind/Kn	18
Direction	SSE
Waves /ft	1' to 3'
Slip jt.	0
Current	
Swells/ft	6' to 8'
Direction	S
Température	

32 Support Vessels
Supreme tide.

8:00 A.M. Status - cement job completed at 6:00 A.M. - Prepation 13 5/8 stack.

406

OM 102

DRILLING REPORT

AQUITAINE

WELL: Narwhal S | No: 10
RIG: P 82 | DATE: 14/8/74

PENETRATION

PHASES

Cross out which ever not applicable	DEPTH ft.	DEPTH ins.	PENET. ft.	PENET. ins.	TIME h.	TIME min.
TOTAL	1,703		37		3	15
Drilled-cored	1,740					
EACH BIT	1,703		37		3	15
Drilled-cored	1,740					
Drilled-cored						
Drilled-cored						
Drilled-cored						

BITS

Make	Ø	Type	No.	Nozzles	Cumul
Hughes	17½	OSC 1G	LX 680	none	216/9:30

PARAMETERS

Weight	R.P.M.	Flow Rate	Mud Pressure
40/45000	100	950	2,500

MUD

CHARACTERISTICS

Wt 10.6 Wt 10.7 V 50 V 52
F mini 30 VA maxi 32.5 Vp mini 20 Yv maxi 25
Gel 0 9 10 24 S% 1.2 pH 9
Pf 0 Lc ____ Solid 12 NaCl 310

LOSSES and GAINS

	this day	cumul
Mud		
Water		

PRODUCTS ADDED

2 sx. Drispac
443 sx. Salt

STRING

ELEMENTS: Same as yesterday

WEIGHT (in mud)	D.C.	D.P.	W! M.D.
	78000	20000	188000

FORMATION Type . Stage

CORES

DEVIATION

NOTES

TIME LOG

FROM	TO	ELAPSED TIME	
0	16:30	16:30	Waiting on salt (repair on Motion compensator)
16:30	19:30	3:00	Unloading salt and mixing mud
19:30	20:15	0:45	Run bit
20:15	20:45	0:30	Reaming from 1,559 to 1,703
20:45	24:00	3:15	Drilling from 1,703 to 1,740
			8:00 A.M. status - stop drilling at 1,756'
			ran sonic log
			preparation for 13/38" casing.

TIME ANALYSIS

1 - R.U.D.		9 - Mis. op.	
2 - D	3:15	10 - W.C.	
3 - Red	0:30	11 - Casing	
4 - D.T.	0:45	12 - Circ	
5 - H.O.		13 - Fishing	
6 - Cor		14 - Aband	
7 - C.T.		15 - Rep	
8 - Test		16 - W.T.	19:30
		17 - Vac	

PROGRAMME: Casing

PEOPLE ON BOARD: 69

WEATHER

Wind/Kn	10/12
Direction	NW
Waves /ft	4/5
Slip jt.	.5
Current	
Swells/ft	5
Direction	NW
Température	46/50

Support Vessels
Federal 6
Supreme Tide

406

OM 102

DRILLING REPORT

AQUITAINE

1 WELL. Narwhal S RIG. P-82 2 No. 9 DATE 13/8/74

PENETRATION

PHASES

Cross out which ever not applicable	DEPTH ft.	DEPTH ins.	PENET. ft.	PENET. ins.	TIME h.	TIME min.
TOTAL	3 1,703		4 0		5	
Drilled-cored						
EACH BIT	6		7		8	
Drilled-cored						
Drilled-cored						
Drilled-cored						
Drilled-cored						

BITS

Make	Ø	Type	No.	Nozzles	Cumul
9 Hughes	10 17½	11 OSC 1G	12 LX 680	13	14

PARAMETERS

Weight	R.P.M.	Flow Rate	Mud Pressure
15	16	17	18

MUD

CHARACTERISTICS

19

Wt mini	Wt maxi	V mini	V maxi
F	VA	Vp	Yv
Gel 0	10	S%	pH
Pf	Lc	Solid	NaCL

LOSSES and GAINS

20	this day	cumul
Mud		
Water		

PRODUCTS ~~ADDED~~ ON BOARD

21

417 tons	Drlg. Water	635 gal. Turbo fuel
364 tons	Fuel	
215 tons	Potable Water	400 bbl. of 14# liquid heavy mud.
114 tons	Cement	(Safety Stock)
156 tons	Barite	

STRING

22 ELEMENTS Bit/(8) 9½ DC/ (7) 8½ DC/Dropping valve/ 15 Flexwate/5" D.P.

23 WEIGHT (in mud)	D.C.	D.P.	Wt M.D.

24 FORMATION Type . Stage

25 CORES

26 DEVIATION at 1,703 1°

NOTES

27 TIME LOG ROM	TO	ELAPSED TIME	
0	0:45	0:45	Circulation
0:45	1:00	0:15	Totco Survey
1:00	2:30	1:30	Pulling out 4 stands and running in 4 stands: circulation and observation (aircut mud due to slip joint packing)
2:30	4:15	1:45	Pulling out Bit #5
4:15	10:00	5:45	Electrical logging (DIL CNL Density) (G.R. Caliper)
10:00	11:45	1:45	Running in Bit to 20" casing shoe
11:45	24:00	12:15	Wait on salt (repair on motion compensator)
			8:00 a.m. status = Waiting on salt (repair on motion compensator)

TIME ANALYSIS 9 - Mis. op. 6

1 - R.U.D.		10 - W.C.	
2 - D		11 - Casing	
3 - Red		12 - Circ	2
4 - D.T.	3:45	13 - Fishing	
H.O.		14 - Aband	
6 - Cor		15 - Rep	
7 - C.T.		16 - W.T.	12:15
8 - Test		17 - Vac	

28

29 PROGRAMME Drilling

30 PEOPLE ON BOARD: 64

31 WEATHER

Wind/Kn	25/30
Direction	NNW
Waves /ft	4/6'
Slip jt.	1/2'
Current	
Swells/ft	6'
Direction	NW
Température	46/49

32 Support Vessels

Fed. 6

406

OM 102

DRILLING REPORT

AQUITAINE

1 WELL. Narwhal S RIG P-82 — 2 No. 8 DATE 12/8/74

PENETRATION

PHASES

Cross out which ever not applicable	DEPTH ft.	DEPTH ins.	PENET. ft.	PENET. ins.	TIME h.	TIME min.
TOTAL	3 1286		4 417		5 18	30
Drilled-~~cored~~	1703					
EACH BIT	6 1,286		7 238		8 12	15
Drilled-~~cored~~	1,524		179		6	15
Drilled-~~cored~~	1,703					
Drilled-cored						
Drilled-cored						

BITS

Make	Ø	Type	No.	Nozzles	Cumul
9 Security	10 17½	11 M4N	12 4057	13 20/32	14 328/17:00
Hughes	17½	OSC 1G	LX 680	20/32	179/6:15

PARAMETERS

Weight	R.P.M.	Flow Rate	Mud Pressure
15 25/55000	16 60/110	17 1000	18 2000
45,000	80/110	900	2500

MUD

CHARACTERISTICS

19
Wt 9.4 Wt 10.4 V 40 V 53
F mini 36 VA maxi 23.5 Vp mini 15 Yv maxi 17
Gel 0 12 10 26 S% 1% pH 9.5
Pf 0.2 Lc ____ Solid. ____ NaCL 190

LOSSES and GAINS

20	this day	cumul
Mud		
Water		

PRODUCTS ADDED

21			
12 sx	XC Polymer	36 sx	Salt Gel
20 sx	CMC		
9 sx	Caustic Soda		
10 Tons	Barite		

STRING

22 ELEMENTS Same as yesterday + 1 stand of 8½ D.C.

23 WEIGHT (in mud)	D.C.	D.P.	W! M.D.
	78000	20000	185000

24 FORMATION Type . Stage

25 CORES

26 DEVIATION 1520 1°

NOTES

27 TIME LOG FROM	TO	ELAPSED TIME	
0	12:15	12:15	Drilling
12:15	12:30	0:15	Circulation
12:30	12:45	0:15	Totco Survey.
12:45	16:45	4:00	Pulling out bit #4 Running in Bit #5
16:45	17:00	0:15	Reaming from 1510 to 1524
17:00	23:15	6:15	Drilling
23:15	24:00	0:45	Circulation
			8:00 a.m. status = Electrical logging

TIME ANALYSIS

1 - R.U.D.		10 - W.C.	
2 - D	18:30	11 - Casing	
3 - Red	0:15	12 - Circ	1
4 - D.T.	4	13 - Fishing	
5 - H.O.		14 - Aband	
6 - Cor		15 - Rep	
7 - C.T.		16 - W.T.	
8 - Test		17 - Vac	
9 - Mis. op.	0:15		

29 PROGRAMME Logging

30 PEOPLE ON BOARD : 64

31 WEATHER

Wind/Kn	6/10
Direction	NE
Waves /ft	2/3
Slip jt.	0
Current	
Swells/ft	0
Direction	
Température	48 to 56°

32 Support Vessels: Fed. 6

106

OM 102

DRILLING REPORT

AQUITAINE

1 WELL. Narwhal S
RIG P-82

2 No. 7
DATE 11/8/74

PHASES

Cross out which ever not applicable	DEPTH ft.	ins.	PENET. ft.	ins.	TIME h.	min.
TOTAL	3 1,123		4		5	
Drilled-~~cored~~	1,286		163		11	15

PENETRATION

	6 DEPTH ft.	ins.	7 PENET. ft.	ins.	8 TIME h.	min.
EACH BIT	1,123		73		6	30
Drilled-~~cored~~	1,196		90		4	45
Drilled-~~cored~~	1,286					
Drilled-cored						
Drilled-cored						

BITS

Make	9 Ø	10 Type	11 No.	12 Nozzles	13 Cumul	14
Hughes	17½	OSC 1G	AJ 993	20/32	73/	6:30
Security	17½	M4N	4057	20/32	90/4:45	
					pounds	

PARAMETERS

15 Weight	16 R.P.M.	17 Flow Rate	18 Mud Pressure
15/ 50,000	50/70	1,000	2,400
15/50,000	50/70	1,000	2,400
		GPM	psi

MUD

CHARACTERISTICS

19
Wt 8.8 Wt 9.1 V 37 V 41
F mini 15.8 VA maxi 21 Vp mini 14 Yv maxi 14
Gel 0 3 10 12 S% 3/8 pH 9
Pf 0.1 Lc ____ Solid. 8% NaCL 48

LOSSES and GAINS

20	this day	cumul
Mud		
Water		

PRODUCTS ADDED

21

120 sx	Magcogel
4 sx	XC Polymer
10 sx	Caustic Soda
4 sx	CMC

STRING

22 ELEMENTS Bit/(1) 9½ DC/(1) Stab/ (2) 9½ DC/ (1) Stab/ (5) 9½ DC/ (4) 8½ DC/(1) Flexwate/ Dropping valve/ (14) Flexwate/5" D.P.

23 WEIGHT (in mud)	D.C.	D.P.	W! M.D.
	60,000	18,000	168,000

24 FORMATION Type. Stage Kenogami

25 ~~CORES~~
Aug.11 - status at 8 a.m. = drilling at 1480' rate 15'/hr.

26 DEVIATION at 1075' = 1°

NOTES

27 TIME LOG FROM	TO	ELAPSED TIME	
0	0:45	0:45	Test 20" casing
0:45	1:30	0:45	Pulling out junk catcher
1:30	4:00	2:30	Running in bit #3
4:00	7:15	3:15	Drilling out cement from 1070' to 1123'
7:15	13:45	6:30	Drilling from 1123' to 1196'
13:45	14:15	0:30	Circulation - Totco Survey
14:15	17:30	3:15	Pulling out bit #3 - running in bit #4 to 20" shoe
17:30	18:30	1:00	Repair (motion compensator)
18:30	19:00	0:30	Running in bit #4 to 1189'
19:00	19:15	0:15	Reaming from 1189' to 1196'
19:15	24:00	4:45	Drilling from 1196' to 1286'

406

TIME ANALYSIS

1 - R.U.D.		10 - W.C.	
2 - D	11:15	11 - Casing	7:15
3 - Red	0:15	12 - Circ	0:15
4 - D.T.	3:45	13 - Fishing	
5 - H.O.		14 - Aband	
6 - Cor		15 - Rep	1
7 - C.T.		16 - W.T.	
8 - Test		17 - Vac	
9 - Mis. op.	0:15		

29 PROGRAMME Drilling

30 PEOPLE ON BOARD 63

31 WEATHER

Wind/Kn	14/16
Direction	South
Waves /ft	2
Slip jt.	0
Current	
Swells/ft	3
Direction	South
Température	

32 Support Vessels
Giant

OM 102

DRILLING REPORT

AQUITAINE

1 WELL Narwhal S RIG P 82 2 No 6 DATE Aug. 10

PENETRATION

PHASES

Cross out which ever not applicable	DEPTH ft.	DEPTH ins.	PENET. ft.	PENET. ins.	TIME h.	TIME min.
TOTAL Drilled-cored	3 1,123		4 0		5	
EACH BIT	6		7		8	
Drilled-cored						
Drilled-cored						
Drilled-cored						
Drilled-cored						

BITS

Make	Ø	Type	No.	Nozzles	Cumul
9	10	11	12	13	14

PARAMETERS

Weight	R.P.M.	Flow Rate	Mud Pressure
15	16	17	18

MUD

CHARACTERISTICS

19

Wt mini ____ Wt maxi ____ V mini ____ V maxi ____

F ____ VA ____ Vp ____ Yv ____

Gel 0 ____ 10 ____ S% ____ pH ____

Pf ____ Lc ____ Solid ____ NaCl ____

LOSSES and GAINS

20	this day	cumul
Mud		
Water		

PRODUCTS ADDED

21

72 sx Magcogel	2 sx. Bicarbonate Soda
2 sx CMC	
6 sx Caustic Soda	
11.7 ton Barite	

STRING

22 ELEMENTS

23 WEIGHT (in mud)	D.C.	D.P.	W! M.D.

24 FORMATION Type . Stage

25 CORES

26 DEVIATION

NOTES

27 TIME LOG

FROM	TO	ELAPSED TIME	
			Additions to Report #5 - Cement returned to surface
			(Sampling done by Divers - Experimental dive under saturation O.K.)
0	0:45	0:45	POH 20" Running Tool (lost running Mandrel on BJ system)
0:45	16:30	15:45	Running in BOP stack and 22" riser
16:30	17:00	0:30	Running in Testing Tool
17:00	18:30	1:30	Test Stack, AX ring, pipe rams 2000 psi - O.K.
			Hydril 1000 psi - OK
18:30	20:00	1:30	Pulling out testing tool
20:00	23:00	3:00	Running in junk basket without success (attempt to retrieve running mandrel)
			Top cement at 1069'
23:00	24:00	1:00	Test 20" casing

TIME ANALYSIS 28

1 - R.U.D.		9 - Mis. op.	
2 - D		10 - W.C.	
3 - Red		11 - Casing	24
4 - D.T.		12 - Circ	
5 - H.O.		13 - Fishing	
6 - Cor		14 - Aband	
7 - C.T.		15 - Rep	
8 - Test		16 - W.T.	
		17 - Vac	

29 PROGRAMME: Drilling

30 PEOPLE ON BOARD: 66

31 WEATHER

Wind/Kn	18/20
Direction	SSE
Waves /ft	2/3
Slip jt.	
Current	
Swells/ft	5
Direction	South
Température	

32 Support Vessels

Giant

Supreme

406

Status at 8:00 a.m. = Drilling at 1,138' - 3/4 ft./hr.

OM 102

DRILLING REPORT

AQUITAINE

1 WELL Narwhal S | RIG P-82 | 2 No 5 | DATE 9/8/74

PENETRATION

PHASES

Cross out which ever not applicable	3 DEPTH ft.	ins.	4 PENET. ft.	ins.	5 TIME h.	min.
TOTAL	1,030		93		5	15
Drilled-~~cored~~	1,123					

BITS

EACH BIT	6		7		8		9 Make	10 Ø	11 Type	12 No.	13 Nozzles	14 Cumul
	1,030		93		5	15	SMF	26	TS25	1815		410/ 28.30
Drilled-~~cored~~	1,123											
Drilled-cored												
Drilled-cored												
Drilled-cored												

PARAMETERS

15 Weight	16 R.P.M.	17 Flow Rate	18 Mud Pressure
35000	100	1400/ 1600 GPM	1600 PSI

MUD

CHARACTERISTICS

19

Wt mini	Wt maxi	V mini	V maxi
F	VA	Vp	Yv
Gel 0	10	S%	pH
Pf	Lc	Solid.	NaCL

LOSSES and GAINS

20	this day	cumul
Mud		
Water		

PRODUCTS ADDED

21

73 sx $CaCl_2$	6 sx Drispac
54 sx Magcogel	6 sx XC
4 sx Caustic	

STRING

22 ELEMENTS: Same as yesterday

23 WEIGHT (in mud)	D.C.	D.P.	Wt M.D.
	60,000	15,000	165,000

24 FORMATION Type . Stage

25 CORES

26 DEVIATION 1,120' - 1-3/4°

NOTES

27 TIME LOG FROM	TO	ELAPSED TIME	
0	5:15	5:15	Drilling.
5:15	5:45	0:30	Circulating.
5:45	8:45	3:00	Short control trip - Totco - POOH.
8:45	14:30	5:45	Run 20" casing shoe at 1,093'.
14:30	18:30	4:00	Circulating and cementing (1700 sx Class B + 3% $CaCl_2$).
18:30	23:00	4:30	W.O.C. (top valve closed - float shoe not holding).
23:00	24:00	1:00	Pull out running tool.
			8:00 A.M. STATUS: Running 20-3/4" BOP + 22" Riser.

TIME ANALYSIS

1 - R.U.D.		9 - Mis. op.	28
2 - D	5:15	10 - W.C.	
3 - Red		11 - Casing	18:45
4 - D.T.		12 - Circ	
5 - H.O.		13 - Fishing	
6 - Cor		14 - Aband	
7 - C.T.		15 - Rep	
8 - Test		16 - W.T.	
		17 - Vac	

29 PROGRAMME: Running 20-3/4" BOP

30 PEOPLE ON BOARD: 66

31 WEATHER

Wind/Kn	10/12
Direction	SE
Waves /ft	3/4
Slip jt.	
Current	
Swells/ft	6
Direction	SE
Température	

32 Support Vessels: Supreme, Giant

406

OM 102

DRILLING REPORT

AQUITAINE

1 WELL Narwhal S RIG P-82

2 No 4 DATE 8/8/74

PENETRATION

PHASES

Cross out which ever not applicable	DEPTH ft.	ins.	PENET. ft.	ins.	TIME h.	min.
TOTAL	3 713		4 317		5 23	15
Drilled-~~cored~~	1,030					

BITS

EACH BIT	6 DEPTH		7 PENET.		8 TIME		9 Make	10 Ø	11 Type	12 No.	13 Nozzles	14 Cumul
	713		317		23	15	SMF	26	TS25	1815	Reg	317/ 23.15
Drilled-~~cored~~	1,030											
Drilled-cored												
Drilled-cored												
Drilled-cored												

PARAMETERS

15 Weight	16 R.P.M.	17 Flow Rate	18 Mud Pressure
15/ 35000	70/ 110	1100 GPM	1500 PSI

MUD

CHARACTERISTICS

19
Wt ____ Wt ____ V ____ V ____
mini maxi mini maxi
F ____ VA ____ Vp ____ Yv ____
Gel 0 ____ 10 ____ S% ____ pH ____
Pf ____ Lc ____ Solid ____ NaCl ____

LOSSES and GAINS

20	this day	cumul
Mud		
Water		

PRODUCTS ADDED

21

97 sx	Magcogel
6 sx	XC Polymer
4 sx	Caustic Soda

STRING

22 ELEMENTS Same as yesterday

23 WEIGHT (in mud)

D.C.	D.P.	Wt M.D.
60,000	15,000	165,000

24 FORMATION Type . Stage

25 CORES

26 DEVIATION

NOTES

27 TIME LOG

FROM	TO	ELAPSED TIME	
0	0:45	0:45	Drilling out cement.
0:45	24:00	23:15	Drilling from 713' to 1,030'.
			8:00 A.M. STATUS: Stopped drilling 26" hole at
			1,123'. Rigging up to run 20" casing.

TIME ANALYSIS 9 - Mis. op. 28

1 - R.U.D.	10 - W.C.
2 - D 23.15	11 - Casing 0.45
3 - Red	12 - Circ
4 - D.T.	13 - Fishing
5 - H.O.	14 - Aband
6 - Cor	15 - Rep
7 - C.T.	16 - W.T.
8 - Test	17 - Vac

29 PROGRAMME Casing

30 PEOPLE ON BOARD : 65

31 WEATHER

Wind/Kn	5
Direction	SE
Waves /ft	
Slip jt.	
Current	
Swells/ft	3
Direction	E
Température	

32 Support Vessels

Supreme

Giant

406

OM 102

DRILLING REPORT

AQUITAINE

1 WELL Narwhal S | RIG P-82 | 2 No : 3 | DATE 7/8/74

PENETRATION

PHASES

Cross out which ever not applicable	DEPTH ft.	DEPTH ins.	PENET. ft.	PENET. ins.	TIME h.	TIME min.
TOTAL Drilled-cored	3 713		4 0		5	
EACH BIT	6		7		8	
Drilled-cored						
Drilled-cored						
Drilled-cored						
lled-cored						

BITS

Make	Ø	Type	No.	Nozzles	Cumul
9 SMF	10 26	11 T525	12 1815	13 Reg	14

PARAMETERS

Weight	R.P.M.	Flow Rate	Mud Pressure
15 10,000	16 40/60	17 1100 GPM	18 1100 PSI

MUD

CHARACTERISTICS

19

Wt mini _____ Wt maxi _____ V mini _____ V maxi _____

F _____ VA _____ Vp _____ Yv _____

Gel 0 _____ 10 _____ S% _____ pH _____

Pf _____ Lc _____ Solid _____ NaCL _____

LOSSES and GAINS

20	this day	cumul
Mud		
Water		

PRODUCTS ADDED

21

160 sx	Magcogel
14 sx	Caustic Soda
8 sx	$CaCl_2$
6 sx	XC Polymer

STRING

22 ELEMENTS Bit - HO - (8) DC 9½" - (4) DC 8½" - Flexwate DP - 5" DP

23 WEIGHT (in mud)	D.C.	D.P.	W.M.D.
	60,000	10,000	160,000

24 FORMATION Type . Stage

25 CORES

26 DEVIATION

NOTES

TIME LOG FROM	TO	ELAPSED TIME	
0	7:00	7	Run 30" csg + permanent guide base shoe at 672' -
			csg cemented with 400 sx Class B + 3% $CaCl_2$ - return
			to surface OK.
7:00	22:00	15	W.O.C. - run 26" bit.
22:00	24:00	2	Drill out cement from 661' to 672'.
			8:00 A.M. STATUS: Drilling at 810' (15'/hr).

TIME ANALYSIS

1 - R.U.D.		10 - W.C.	
2 - D		11 - Casing	24
3 - Red		12 - Circ	
4 - D.T.		13 - Fishing	
5 - H.O.		14 - Aband	
6 - Cor		15 - Rep	
7 - C.T.		16 - W.T.	
8 - Test		17 - Vac	
9 - Mis. op.	28		

29 PROGRAMME Drilling

30 PEOPLE ON BOARD : 61

31 WEATHER

Wind/Kn	10
Direction	NNW
Waves /ft	
Slip jt.	
Current	
Swells/ft	2 - 3
Direction	N
Température	

32 Support Vessels

Supreme Tide

406

OM 102

DRILLING REPORT

AQUITAINE

1 WELL Narwhal S RIG P-82 | 2 No 2 DATE 6/8/74

PHASES

Cross out which ever not applicable	DEPTH ft.	DEPTH ins.	PENET. ft.	PENET. ins.	TIME h.	TIME min.
TOTAL	3 616	00	4		5	
Drilled-cored	713	00	97		9	45

PENETRATION

	6		7		8	
EACH BIT						
Drilled-cored						
Drilled-cored						
Drilled-cored						
Drilled-cored						

BITS

Make	Ø	Type	No.	Nozzles	Cumul
9 Hughes	10 26"	11 OSC	12 NL955	13	14 133'/ 13:15
Security	36"	S	Hole Opener		

PARAMETERS

Weight	R.P.M.	Flow Rate	Mud Pressure
15 7/ 25000	16 40/80	17 1000/ 1200 GPM	18 1500/ 1600 PSI

MUD

CHARACTERISTICS

19

Wt mini	Wt maxi	V mini	V maxi
F	VA	Vp	Yv
Gel 0	10	S%	pH
Pf	Lc	Solid.	NaCL

LOSSES and GAINS

20	this day	cumul
Mud		
Water		

PRODUCTS ADDED

21

639 sx	Magcogel
24 sx	$CaCl_2$
8 sx	XC Polymer
9 sx	Caustic Soda

STRING

22 ELEMENTS As Yesterday

23 WEIGHT (in mud)	D.C.	D.P.	W.M.D.
	35,000	18,000	128,000

24 FORMATION Type . Stage

25 CORES

26 DEVIATION

NOTES

27

TIME LOG FROM	TO	ELAPSED TIME	
0	5:45	5:45	Waiting on mud products (unloading Supreme Tide)
5:45	18:45	13:00	Drilling
18:45	21:45	3:00	Control trip - pull out of hole
21:45	24:00	2:15	Rigging up for 30" casing and running casing
			1:00 p.m. Status: 30" casing shoe at 672'
			Waiting on Cement

TIME ANALYSIS

1 - R.U.D.		9 - Mis. op.	28
2 - D	13:00	10 - W.C.	
3 - Red		11 - Casing	2:15
4 - D.T.	3:00	12 - Circ	
5 - H.O.		13 - Fishing	
6 - Cor		14 - Aband	
7 - C.T.		15 - Rep	
8 - Test		16 - W.T.	5:45
		17 - Vac	

29 PROGRAMME Casing

30 PEOPLE ON BOARD : 61

31 WEATHER

Wind/Kn	12 - 14
Direction	SE
Waves /ft	
Slip jt.	
Current	
Swells/ft	2 - 3
Direction	N
Température	

32 Support Vessels

Supreme

406

OM 102

DRILLING REPORT

AQUITAINE

1 WELL Narwhal S RIG P-82

2 No 1 DATE 5/8/74

PENETRATION

PHASES

Cross out which ever not applicable	DEPTH ft.	DEPTH ins.	PENET. ft.	PENET. ins.	TIME h.	TIME min.
TOTAL	3 580	00	4 36		5 3	30
Drilled-~~cored~~	616	00				
EACH BIT	6		7		8	
Drilled-cored						
Drilled-cored						
Drilled-cored						
Drilled-cored						

BITS

Make	Ø	Type	No.	Nozzles	Cumul
9 Hughes	10 26"	11 OSC	12 NL955	13	14 36'/3½

PARAMETERS

Weight	R.P.M.	Flow Rate	Mud Pressure
15 7/20	16 40/80	17 550/1000	18 500/1500

MUD

CHARACTERISTICS

19
Wt ____ Wt ____ V ____ V ____
mini maxi mini maxi
F ____ VA ____ Vp ____ Yv ____
Gel 0 ____ 10 ____ S% ____ pH ____
Pf ____ Lc ____ Solid ____ NaCL ____

LOSSES and GAINS

20	this day	cumul
Mud		
Water		

PRODUCTS on board P-82

21

90 T Barite	155 T Cement
252 T Fuel	170 T Pot Water
160 Imp Gal Kerosene	130 T Drilling Water

NOTE: No gel on board P-82. Attempt to drill 36" hole with water only has been stopped due to rough drilling - waiting for return of Supreme from Chur

STRING

22 ELEMENTS Bit - Hole Opener - 6"x 9½" D.C. - Heavy wate D.P. and 5" drill pipes

23 WEIGHT (in mud)	D.C.	D.P.	W! M.D.
	35,000	18,000	128,000

24 FORMATION Type . Stage

25 CORES

26 DEVIATION

NOTES

27 TIME LOG FROM	TO	ELAPSED TIME	
0	4:15	4:15	Running 26" Bit and 36" Hole Opener
4:15	7:45	3:30	Drilling to 616'
7:45	24:00	16:15	Waiting on mud products
			8:00 a.m. Status: Drilling at 628'
			Penetration Rate = 3'/hour

TIME ANALYSIS 28

1 - R.U.D.		9 - Mis. op.	
2 - D	3:30	10 - W.C.	
3 - Red		11 - Casing	
4 - D.T.	4:15	12 - Circ	
5 - H.O.		13 - Fishing	
6 - Cor		14 - Aband	
7 - C.T.		15 - Rep	
8 - Test		16 - W.T.	16:15
		17 - Vac	

29 PROGRAMME Drilling

30 PEOPLE ON BOARD : 61

31 WEATHER

Wind/Kn	10
Direction	N
Waves /ft	
Slip jt.	
Current	
Swells/ft	2'
Direction	N
Température	

32 Support Vessels

Supreme

406

OM 102

DRILLING REPORT

AQUITAINE

1 WELL Narwhal S RIG P-82

2 No · Anchor #3 DATE 4/8/74

PHASES

Cross out which ever not applicable	DEPTH ft.	DEPTH ins.	PENET. ft.	PENET. ins.	TIME h.	TIME min.
TOTAL	3		4		5	
Drilled-cored						
EACH BIT	6		7		8	
Drilled-cored						
Drilled-cored						
Drilled-cored						
Drilled-cored						

PENETRATION

BITS

Make	Ø	Type	No.	Nozzles	Cumul
9	10	11	12	13	14
Hughes	26	OSC	NL955	Reg	
Security	36	S	Hole Opener		

PARAMETERS

Weight	R.P.M.	Flow Rate	Mud Pressure
15	16	17	18

MUD

CHARACTERISTICS

19

Wt mini _____ Wt maxi _____ V mini _____ V maxi _____

F _____ VA _____ Vp _____ Yv _____

Gel 0 _____ 10 _____ S% _____ pH _____

Pf _____ Lc _____ Solid _____ NaCL _____

LOSSES and GAINS

20	this day	cumul
Mud		
Water		

PRODUCTS on board P-82

21		
80 T	Barite	
155 T	Cement	
160 Imp Gal	Turbo Fuel	
260 T	Fuel	
173 T	Potable Water	

STRING

22 ELEMENTS _____

23 WEIGHT (in mud)	D.C.	D.P.	W! M.D.

24 FORMATION Type . Stage _____

25 CORES _____

26 DEVIATION _____

NOTES

27 TIME LOG FROM	TO	ELAPSED TIME	
0	9:30	9:30	Set piggy back anchor on C_1 at 1:30 a.m.
			Set piggy back anchor on C_2 at 5:00 a.m.
			Anchor test at 100 Tons OK - approved by Lloyd's
			representative.
9:30	15:30	6	Rigging up 9-1/2" D.C. and D. Pipe
15:30	22:00	6:30	Ran temporary guide base
22:00	24:00	2	Ran drilling assembly
			Height: KB/Sea Level = 77'
			Sea Level/Mud line = 503'
			8:00 a.m. Status: Rough drilling at 612' - waiting on mud products (gel).

TIME ANALYSIS 9 - Mis. op. 28

1 - R.U.D. 22:00 10 - W.C. _____

2 - D _____ 11 - Casing _____

3 - Red _____ 12 - Circ _____

4 - D.T. 2:00 13 - Fishing _____

5 - H.O. _____ 14 - Aband _____

6 - Cor _____ 15 - Rep _____

7 - C.T. _____ 16 - W.T. _____

8 - Test _____ 17 - Vac _____

29 PROGRAMME Drilling

30 PEOPLE ON BOARD : 61

31 WEATHER

Wind/Kn 4 - 6

Direction N

Waves /ft _____

Slip jt. _____

Current _____

Swells/ft _____

Direction _____

Température 43°F

32 Support Vessels

Fed 6

Giant Tide

406

OM 102

DRILLING REPORT

AQUITAINE

1 WELL Narwhal S RIG P-82

2 No Anchor #2 DATE 3/8/74

PENETRATION

PHASES — Cross out which ever not applicable

	DEPTH ft.	DEPTH ins.	PENET. ft.	PENET. ins.	TIME h.	TIME min.
TOTAL Drilled-cored	3		4		5	
EACH BIT	6		7		8	
Drilled-cored						
Drilled-cored						
Drilled-cored						
Drilled-cored						

BITS

Make	Ø	Type	No.	Nozzles	Cumul
9	10	11	12	13	14

PARAMETERS

Weight	R.P.M.	Flow Rate	Mud Pressure
15	16	17	18

MUD

CHARACTERISTICS

19

Wt mini ____ Wt maxi ____ V mini ____ V maxi ____

F ____ VA ____ Vp ____ Yv ____

Gel 0 ____ 10 ____ S% ____ pH ____

Pf ____ Lc ____ Solid ____ NaCl ____

LOSSES and GAINS

20	this day	cumul
Mud		
Water		

PRODUCTS on board P-82

21

22 T	Barite
24 T	Cement
160 Imp Gal	Turbo Fuel
179 T	Potable Water

STRING

22 ELEMENTS ____

23 WEIGHT (in mud)	D.C.	D.P.	Wt M.D.

24 FORMATION Type . Stage ____

25 CORES ____

26 DEVIATION ____

NOTES

27 TIME LOG FROM	TO	ELAPSED TIME
0	24	24

Anchoring: Set anchors A_2 (04.55 h)

D_1 (04.55)

E_1 (6.45)

E_2 (7.35)

8:00 a.m. Status: End of anchor test

TIME ANALYSIS 28

1 - R.U.D. 24	9 - Mis. op.
2 - D	10 - W.C.
3 - Red	11 - Casing
4 - D.T.	12 - Circ
5 - H.O.	13 - Fishing
6 - Cor	14 - Aband
7 - C.T.	15 - Rep
8 - Test	16 - W.T.
	17 - Vac

29 PROGRAMME Test Anchor and Rig up

30 PEOPLE ON BOARD : 65

31 WEATHER

Wind/Kn	6 - 8
Direction	N
Waves /ft	1 - 2
Slip jt.	
Current	
Swells/ft	
Direction	
Température	52°F

32 Support Vessels

Fed 6

Giant Tide

406

OM 102

DRILLING REPORT

AQUITAINE

1 WELL Narwhal S RIG P-82

2 No Anchor #1 DATE 2/8/74

PENETRATION

PHASES

Cross out which ever not applicable	DEPTH ft.	DEPTH ins.	PENET. ft.	PENET. ins.	TIME h.	TIME min.
TOTAL Drilled-cored	3		4		5	
EACH BIT	6		7		8	
Drilled-cored						
Drilled-cored						
Drilled-cored						
Drilled-cored						

BITS

Make	Ø	Type	No.	Nozzles	Cumul
9	10	11	12	13	14

PARAMETERS

Weight	R.P.M.	Flow Rate	Mud Pressure
15	16	17	18

MUD

CHARACTERISTICS

19
Wt minj ____ Wt maxi ____ V mini ____ V maxi ____
F ____ VA ____ Vp ____ Yv ____
Gel 0 ____ 10 ____ S% ____ pH ____
Pf ____ Lc ____ Solid ____ NaCL ____

LOSSES and GAINS

20	this day	cumul
Mud		
Water		

PRODUCTS ADDED

21

STRING

22 ELEMENTS

23 WEIGHT (in mud)	D.C.	D.P.	Wt M.D.

24 FORMATION Type . Stage

25 CORES

26 DEVIATION

NOTES

27 TIME LOG

FROM	TO	ELAPSED TIME

Set first anchor E2 at 18:30 August 1, 1974.
Set anchors E1, D1, D2, A1, B2 and C1.
Tow line released by Supreme Tide at 22:30.

Present Status:
All anchors are set.
P-82 is within 100' of theoretical co-ordinates of Narwhal
(Positioning with Decca Lambda)
Supreme Tide in route to Churchill.
ETA August 3rd at 06:00.

TIME ANALYSIS 28

1 - R.U.D.	5:30	10 - W.C.	
2 - D		11 - Casing	
3 - Red		12 - Circ	
4 - D.T.		13 - Fishing	
5 - H.O.		14 - Aband	
6 - Cor		15 - Rep	
7 - C.T.		16 - W.T.	
8 - Test		17 - Vac	
9 - Mis. op.			

29 PROGRAMME Anchor Test

30 PEOPLE ON BOARD : 65

31 WEATHER

Wind/Kn	16
Direction	N
Waves /ft	2 - 3
Slip jt.	
Current	
Swells/ft	Nil
Direction	
Température	10°C

32 Support Vessels
Fed 6
Giant Tide

406

OM 102

DRILLING REPORT

AQUITAINE

1 WELL. Narwhal
RIG P-82

2 No D - Moving
DATE 1/8/74

PENETRATION

PHASES

Cross out which ever not applicable	DEPTH ft.	DEPTH ins.	PENET. ft.	PENET. ins.	TIME h.	TIME min.
TOTAL Drilled-cored	3		4		5	
EACH BIT	6		7		8	
Drilled-cored						
Drilled-cored						
Drilled-cored						
Drilled-cored						

BITS

Make	Ø	Type	No.	Nozzles	Cumul
9	10	11	12	13	14

PARAMETERS

Weight	R.P.M.	Flow Rate	Mud Pressure
15	16	17	18

MUD

CHARACTERISTICS

19
Wt mini _____ Wt maxi _____ V mini _____ V maxi _____
F _____ VA _____ Vp _____ Yv _____
Gel 0 _____ 10 _____ S% _____ pH _____
Pf _____ Lc _____ Solid _____ NaCL _____

LOSSES and GAINS

20	this day	cumul
Mud		
Water		

PRODUCTS ADDED

21

STRING

22 ELEMENTS _____

23 WEIGHT (in mud)	D.C.	D.P.	Wt M.D.

24 FORMATION Type . Stage _____

25 CORES _____

26 DEVIATION _____

NOTES

27 TIME LOG

ROM	TO	ELAPSED TIME

P-82 three to four miles South of NARWHAL location with Supreme Tide on tow line.
Anchor E2 set. Attempt to unload 20,000# anchor off Fed 6 without success, due to bad weather.
Side Scan Sonar and Sounder completed with approval from Captain Mann.
Present status: 20,000# anchor unloading in process.

TIME ANALYSIS

1 - R.U.D.		9 - Mis. op.	28
2 - D		10 - W.C.	
3 - Red		11 - Casing	
4 - D.T.		12 - Circ	
5 - H.O.		13 - Fishing	
6 - Cor		14 - Aband	
7 - C.T.		15 - Rep	
8 - Test		16 - W.T.	
		17 - Vac	

29 PROGRAMME
Marking location with 20,000# anchor

30 PEOPLE ON BOARD : 61

31 WEATHER

Wind/Kn	16 - 22
Direction	North
Waves /ft	2' - 3'
Slip jt.	
Current	?
Swells/ft	8' - 12'
Direction	North
Température	17°C

32 Support Vessels
Fed 6, Giant & Supreme Tide

406

OM 102

DRILLING REPORT

AQUITAINE

1 WELL. Narwhal RIG. P-82

2 No. C - Moving DATE 31/7/74

PENETRATION

PHASES

Cross out which ever not applicable	DEPTH ft.	DEPTH ins.	PENET. ft.	PENET. ins.	TIME h.	TIME min.
TOTAL	3		4		5	
Drilled-cored						

BITS

EACH BIT	6	7	8	Make 9	Ø 10	Type 11	No. 12	Nozzles 13	Cumul 14
Drilled-cored									
Drilled-cored									
Drilled-cored									
Drilled-cored									

PARAMETERS

Weight 15	R.P.M. 16	Flow Rate 17	Mud Pressure 18

MUD

CHARACTERISTICS

19

Wt mini _____ Wt maxi _____ V mini _____ V maxi _____

F _____ VA _____ Vp _____ Yv _____

Gel 0 _____ 10 _____ S% _____ pH _____

Pf _____ Lc _____ Solid _____ NaCL _____

LOSSES and GAINS

20	this day	cumul
Mud		
Water		

PRODUCTS ADDED

21

STRING

22 ELEMENTS _____

23 WEIGHT (in mud)	D.C.	D.P.	Wt M.D.

NOTES

24 FORMATION Type . Stage _____

25 CORES _____

26 DEVIATION _____

27 TIME LOG

ROM	TO	ELAPSED TIME	
			P-82 seven to eight miles off NARWHAL SOUTH location.
			Ice flows and foggy conditions on location.
			Flight Decca Lambda spare parts on Federal 6.
			Federal 6 proceeding with Side Scan Sonar and Sounder.

TIME ANALYSIS 28

1 - R.U.D.		9 - Mis. op.	
2 - D		10 - W.C.	
3 - Red		11 - Casing	
4 - D.T.		12 - Circ	
5 - H.O.		13 - Fishing	
6 - Cor		14 - Aband	
7 - C.T.		15 - Rep	
8 - Test		16 - W.T.	
		17 - Vac	

29 PROGRAMME

Marking of Location

30 PEOPLE ON BOARD : _____

31 WEATHER

Wind/Kn	
Direction	
Waves /ft	
Slip jt.	
Current	
Swells/ft	
Direction	
Température	

32 Support Vessels

Giant Tide

Supreme Tide

Federal 6

406

OM 102

DRILLING REPORT

AQUITAINE

1 WELL Narwhal RIG P-82

2 No B DATE 30/7/74

PENETRATION

PHASES

Cross out which ever not applicable	DEPTH ft.	DEPTH ins.	PENET. ft.	PENET. ins.	TIME h.	TIME min.
TOTAL	3		4		5	
Drilled-cored						
EACH BIT	6		7		8	
Drilled-cored						
Drilled-cored						
Drilled-cored						
Drilled-cored						

BITS

Make	Ø	Type	No.	Nozzles	Cumul
9	10	11	12	13	14

PARAMETERS

Weight	R.P.M.	Flow Rate	Mud Pressure
15	16	17	18

MUD

CHARACTERISTICS

19

Wt mini _____ Wt maxi _____ V mini _____ V maxi _____

F _____ VA _____ Vp _____ Yv _____

Gel 0 _____ 10 _____ S% _____ pH _____

Pf _____ Lc _____ Solid. _____ NaCL _____

LOSSES and GAINS

20	this day	cumul
Mud		
Water		

PRODUCTS ADDED

21

STRING

22 ELEMENTS _____

23 WEIGHT (in mud)	D.C.	D.P.	Wt M.D.

24 FORMATION Type . Stage _____

25 CORES _____

26 DEVIATION _____

NOTES

27 TIME LOG

ROM	TO	ELAPSED TIME

- Connected anchors to anchor lines on board P-82.
- Replacement of FED 6 by GIANT on the satellite position.
- Attempt to mark NARWHAL SOUTH location with FED 6 (positioning through GIANT's radar).
- Stop marking due to loss of buoys (probably taken away by ice flows).
- Preparation of new buoys and ice recco with supply vessels.
- No helicopter flight due to foggy conditions at Churchill - Pen Island - P-82.

TIME ANALYSIS 28

1 - R.U.D.		9 - Mis. op.	
2 - D		10 - W.C.	
3 - Red		11 - Casing	
4 - D.T.		12 - Circ	
5 - H.O.		13 - Fishing	
6 - Cor		14 - Aband	
7 - C.T.		15 - Rep	
8 - Test		16 - W.T.	
		17 - Vac	

29 PROGRAMME

Ice recco

30 PEOPLE ON BOARD : _____

31 WEATHER

Wind/Kn	
Direction	
Waves /ft	5
Slip jt.	
Current	
Swells/ft	
Direction	
Température	

32 Support Vessels

406

OM 102

DRILLING REPORT

AQUITAINE

1 WELL. Narwhal RIG P-82 | 2 No. A DATE 29/7/74

PENETRATION

PHASES — Cross out which ever not applicable

	DEPTH ft.	DEPTH ins.	PENET. ft.	PENET. ins.	TIME h.	TIME min.
TOTAL Drilled-cored	3		4		5	
EACH BIT	6		7		8	
Drilled-cored						
Drilled-cored						
Drilled-cored						
Drilled-cored						

BITS

Make	Ø	Type	No.	Nozzles	Cumul
9	10	11	12	13	14

PARAMETERS

Weight	R.P.M.	Flow Rate	Mud Pressure
15	16	17	18

MUD

CHARACTERISTICS

19

Wt mini ____ Wt maxi ____ V mini ____ V maxi ____

F ____ VA ____ Vp ____ Yv ____

Gel 0 ____ 10 ____ S% ____ pH ____

Pf ____ Lc ____ Solid. ____ NaCL ____

LOSSES and GAINS

20	this day	cumul
Mud		
Water		

PRODUCTS ADDED

21

STRING

22 ELEMENTS

23 WEIGHT (in mud)	D.C.	D.P.	Wt M.D.

24 FORMATION Type. Stage

25 CORES

26 DEVIATION

NOTES

27 TIME LOG

ROM	TO	ELAPSED TIME	
			P-82 position: 57°50'N; 84°17'W
			- within 13 miles of Narwhal South location since July 27th
			Federal 6 position: 58°08.5794 N; 84°08.9046 W since
			July 25th. 1220 meters off Narwhal South location.
			Actual Satellite accuracy = 60'.
			Weather foggy - no flights possible to bring Decca Lambda
			equipment on board F6. All anchors transferred from
			Supreme and Giant Tide on board P-82.

406

TIME ANALYSIS 28

1 - R.U.D.	9 - Mis. op.
2 - D	10 - W.C.
3 - Red	11 - Casing
4 - D.T.	12 - Circ
5 - H.O.	13 - Fishing
6 - Cor	14 - Aband
7 - C.T.	15 - Rep
8 - Test	16 - W.T.
	17 - Vac

29 PROGRAMME Marking of Narwhal location with Satellite and Radar

30 PEOPLE ON BOARD : 58

31 WEATHER

Wind/Kn 10

Direction

Waves /ft

Slip jt.

Current

Swells/ft

Direction

Température

32 Support Vessels

Giant

Supreme

OM 102

CASING REPORT

'AQUITAINE

Signature Tool Pusher	Signature Drilling Superintendent	Documents Attached	
	D.B. Flic	CSG Inorder	Well Narwhal South OST. Rig P82 Heightable 575.83 — Ø 30" Shoe 672" Date 6-8-74

CASING DESIGN

No.	THREAD	Grade	Coupling	Thickness	LENGTH Ft.	LENGTH "
1	Shoe Joint	8	3'	1"	51	42
1	Housing + extension	6			44	75

TOTAL: 96 17

~~ABOVE~~ TABLE: 575. 83

SHOE: 672. 00

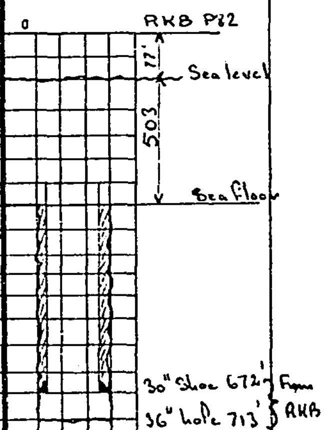
CHARACTERISTICS: LENGTH Ft	LENGTH "	DEPTH FROM Ft.	DEPTH FROM "	DEPTH TO Ft.	DEPTH TO "	Wt lbs/Ft.	Burst Psi	WEIGHT Section	WEIGHT Cum.	COLLAPSE Psi	Reduct. Due To Tension	At Setting Depth W.T	At Setting Depth S.F.	TENSION lbs	TENSION S.F
96	17	575	83	672	00										
												Set on temporary			
												Base Plate			

OBJECT OF CASING: Surface CSG

ACCESSORIES

TYPE	Qty.	PLACE AND NOTES	TYPE	Qty.	PLACE AND NOTES

DRAWING



CASING

MUD CHARACTERISTICS: Drilling with sea water no return

WELD OR BAKERLOK: Squnch Joints AND BB

MAKE UP TORQUE:

TYPE OF LUBRICANT:

FILL UP: Sea Water

PUMP PRESSURE END OF JOB:

STATIC PRESSURE END OF JOB:

CEMENT TOP: THEOR Sea Level

TEMP. SURVEY No

INSIDE CASING: Yes at 12" from shoe

HANGING: On temporary Base Plate

PRESSURE CASING TEST: No

RECIPROCATING: No

SLURRY W.T 15.3 to 15.6 VOL 80 lbs

TYPE OF CEMENT Class B Qty. 400 sx

VOL. MUD BEHIND CEMENT Displaced with 18 bbls of Sea Water (+ 3% CaCL2 additive)

ORDER OF OPERATIONS

	HOUR	TIME	ORDER OF OPERATIONS
Aug5	24:00		Resume 36" Drlg- Rig up to Run 30" Csg
Aug6	7:00	7:00	Run 30 csg and Permanent Guide Base
			Cement Job- Displacement O.K.
Aug7	22:00	11:00	~~Waiting on cement~~
'	0:45	24:45	Drilling out cement and shoe
Aug.			Drilling 26" Hole

OM 110

CASING REPORT

AQUITAINE

Signature Tool Pusher	Signature Drilling Superintendent	Documents Attached		
	D.B. Flic	CSG Inorder	Well Narwhal South 651. Rig 182 Heightable 575.83	ø 30" Shoe 672" Date 6-8-74

CASING DESIGN

No.	THREAD	Grade	Coupling	Thickness	LENGTH Ft.	LENGTH "
1	Shoe Joint	B	3'	1"	51	42
1	Housing + extension	B			44	75

CHARACTERISTICS: LENGTH Ft.	LENGTH "	DEPTH FROM Ft.	FROM "	TO Ft.	TO "	Wt lbs/Ft.	Burst Psi	WEIGHT Section	WEIGHT Cum.	COLLAPSE Psi	Reduct Due To Tension	At Setting Depth W T	At Setting Depth S.F.	TENSION lbs	TENSION S.F.
96	17	575	83	672	00										
												Set on temporary			
												Base Plate			

TOTAL: 96 17

~~ABOVE~~ TABLE: 575. 83

SHOE: 672. 00

OBJECT OF CASING: Surface CSG

ACCESSORIES

TYPE	Qty.	PLACE AND NOTES	TYPE	Qty.	PLACE AND NOTES

CASING

MUD CHARACTERISTICS: Drilling with sea water no return

WELD OR BAKERLOK: Squnch Joints AID RB

MAKE UP TORQUE:

TYPE OF LUBRICANT:

FILL UP: Sea Water

PUMP PRESSURE END OF JOB:

STATIC PRESSURE END OF JOB:

CEMENT TOP: THEOR. Sea Level

TEMP. SURVEY: No

INSIDE CASING: Yes at 12" from shoe

HANGING: On temporary Base Plate

PRESSURE CASING TEST: No

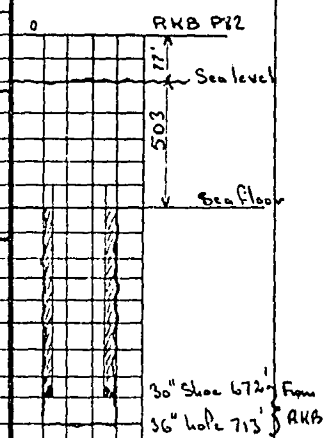
RECIPROCATING: No

SLURRY W.T. 15.3 to 15.6 VOL. 82 lbs.

TYPE OF CEMENT: Class E Qty. 400 sx

VOL. MUD BEHIND CEMENT: Displaced with 18 bbl of Sea Water

(+ 3% CaCL2 additive)



ORDER OF OPERATIONS

	HOUR	TIME	ORDER OF OPERATIONS
Aug5	24:00		Resume 36" Drlg- Rig up to Run 30" Csg
Aug6	7:00	7:00	Run 30 csg and Permanent Guide Base
			Cement Job- Displacement O.K.
Aug7	22:00	11:00	Waiting on cement
"	0:45	24:45	Drilling out cement and shoe
Aug.			Drilling 26" Hole

OM 110

AQUITAINE

WELL: Narwhal South- ~~N58~~ O-58

DM 111

CASING RUNNING IN ORDER: ø 30"

DATE: August 8/74

No.	LENGTH	ACCUM. LENGTH	NOTES (WALL-GRADE - NEW OR USED)	No.	LENGTH	ACCUM. LENGTH	NOTES (WALL-GRADE - NEW OR USED)
			Vetco RB ATD				
Shoe 1	51.42		News				
			30"X1"				
1	44.75	96.17					

Narwhal South

CASING REPORT

· AQUITAINE

Signature Tool Pusher

Signature Drilling Superintendant: P.B. File

Documents Attached: CSG Running in order

Well: N-4 O-58 | Rig: T82 | Heightable: | 6 20" | Shoe 1093' | Date 8/8/74

CASING DESIGN

No.	THREAD	Grade	Coupling	Thickness	LENGTH Ft.	"
1	Housing Vetco	X55	St	0.438	22	20
1	Joint x over	X52	st/L	0.438	43	90
1	Int. Joint	X52	L	0.438	41	31
		X52	L	0.438	43	73
		X52	L	0.438	39	70
		X52	L	0.438	36	90
		X52	L	0.438	43	44
		X52	L	0.438	41	54
		X52	L	0.438	37	63
		X52	L	0.438	41	85
		X52	L	0.438	40	90
		X52	L	0.438	42	69
1	Shoe Joint	X52	L	0.438	42	86
					518.	65
Below	TOTAL:				574.	35
	ABOVE TABLE:					
	SHOE:				1093.	00

CHARACTERISTICS

LENGTH Ft.	"	DEPTH FROM Ft.	"	TO Ft.	"	Wt lbs/Ft.
518	65	574	35	1093	00	

Burst Psi | WEIGHT: Section, Cum. | COLLAPSE: Psi, Reduct Due To Tension, At Setting Depth WT, SF | TENSION: lbs, SF

OBJECT OF CASING: Surface and Technical Csg

ACCESSORIES

TYPE	Qty.	PLACE AND NOTES	TYPE	Qty.	PLACE AND NOTES

CASING

MUD CHARACTERISTICS: Drilling without Returns

WELD OR BAKERLOK: 3 Firsts joints

MAKE UP TORQUE:

TYPE OF LUBR CANT: Api grease sealing with O rings

FILL UP: Every Joint

PUMP PRESSURE END OF JOB:

STATIC PRESSURE END OF JOB: 200 psi

CEMENT TOP: THEOR. Sea Bed

TEMP. SURVEY No

INSIDE CASING: At 1069

HANGING: On 30' Housing

PRESSURE CASING TEST: 500 psi

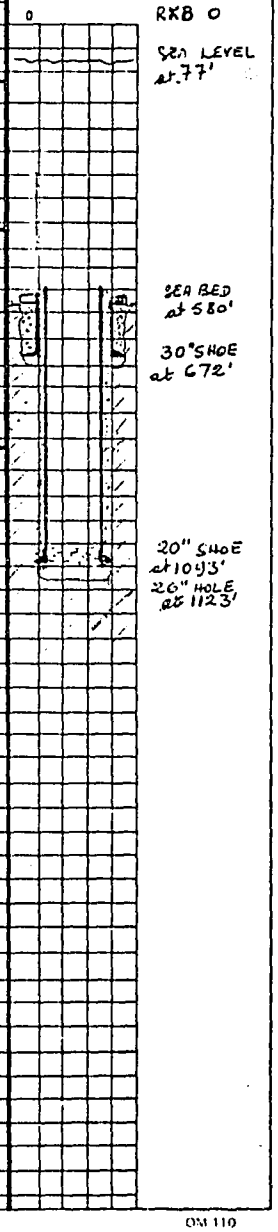
RECIPROCATING: No

SLURRY WT 15.8 | VOL 1700 cuft

TYPE OF CEMENT Class E | Qty 1700 sx

VOL MUD BEHIND CEMENT Displaced with 185 bbls of sea water Mix slurry with 190bbls of preheated sea water 75° F and 3% CACL 2

DRAWING



HOUR	TIME	ORDER OF OPERATIONS
8/8/74 5:15		Resume 26" Drilling
8:45	3:30	Circulating- Short trip- Spot mud P.O.H
14:30	5:45	Run in casing
18:30	4:00	Circulating and cement job
10/8/74 7:15	36:45	W.O.C.-P.O. running tool- run stack 20 3/4 and 22" riser- test stack up to 2000 psi ok bag preventer up to 1000 psi ok run junk catcher- run bit 17 1/2 - drill out cement Drilling 17 1/2 hole

OM 110

AQUITAINE

WELL: Narwhal South- ~~#58~~ O-58

OM 111

CASING RUNNING IN ORDER: ø

DATE: 8/8/74 — 20"

No.	LENGTH	ACCUM. LENGTH	NOTES (WALL-GRADE - NEW OR USED)	No.	LENGTH	ACCUM. LENGTH	NOTES (WALL-GRADE - NEW OR USED)
1	42 86		shoe new				
2	42 64	85.55	.438- K55-X52				
3	40 90	126.45					
4	41 85	168.30					
5	37 63	205.93					
6	41 54	247.47					
7	43 44	290.91					
8	36 90	327.81					
9	39 70	367.51					
10	43 73	411.24					
11	41 31	452.55					
12	43 90	496.45	Cross over: ST	squnch x	"L"		
13	22 20	518.65	(Housing)				

CASING REPORT

AQUITAINE

Signature Tool Pusher	Signature Drilling Superintendent	Documents Attached		
	Lou Pajak	Casing Tally Cementing Report	Well: ~~N=B~~ O-58 (Narwhal South) Rig: P82 KB-SF Heightable: 580	ø 13 3/8" Shoe: 1738.76 Date: Aug 15/74

CASING DESIGN

No.	THREAD	Grade	Coupling	Thickness	LENGTH Ft.	LENGTH "
1	Float shoe	Baker			1	92
2	Jts-68#-13 3/8	K55	St+C		66	20
1	Float collar	Baker			1	70
29	Jts -68#-13 3/8	K55	St+C		1033	14
1	X-over(st+cxbut)	K55	but		15	20
1	Jt 68#-13 3/8"	K55	but		31	70
1	13 5/8 Housing	Vetco			19	90

TOTAL: 1169 76

Below ~~ABOVE~~ TABLE: 569 00

SHOE: 1738 76

CHARACTERISTICS

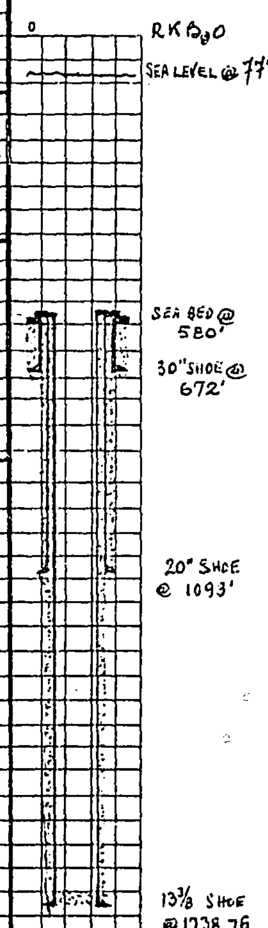
LENGTH Ft.	LENGTH "	DEPTH FROM Ft.	DEPTH FROM "	DEPTH TO Ft.	DEPTH TO "	Wt lbs/Ft.	Burst Psi	WEIGHT Section	WEIGHT Cum.	COLLAPSE Psi	COLLAPSE Reduct. Due To Tension	COLLAPSE At Setting Depth W T	COLLAPSE At Setting Depth S.F.	TENSION lbs	TENSION S.F.
1169	76	569	00	1738	76	68#	3450								

OBJECT OF CASING: 1St intermediate Protective

ACCESSORIES

TYPE	Qty.	PLACE AND NOTES	TYPE	Qty.	PLACE AND NOTES
Centralizers (Baker)	3	Jts #1,2,20			

DRAWING



CASING

MUD CHARACTERISTICS: Salt saturated- visc 50 sec/qt wt- 10.6 ppg

WELD OR BAKERLOK: Jt#1,2,3- collars spot black welded

MAKE UP TORQUE:

TYPE OF LUBRICANT:

FILL UP:

PUMP PRESSURE END OF JOB: 550 psi

STATIC PRESSURE END OF JOB: Bleed off

CEMENT TOP: THEOR. top of 20"housing - 574' RT

TEMP SURVEY: 88F@ 1756 RT

INSIDE CASING: set @ 1738- FC@ 1672"

HANGING: In 20" housing

PRESSURE CASING TEST: No test- Plug did not bump

RECIPROCATING: No

SLURRY W.T.: 10.1 VOL.: 1072

TYPE OF CEMENT: class3-Salt Sat QTY.: 1520 sxs

VOL. MUD BEHIND CEMENT: 172.5 bbls

Pressure increase observed after pumping 46 bbls mud suggests dart was late in launching top plug. Decision was made to under displace by 2.5 bbls instead of bumping plug.

ORDER OF OPERATIONS

Date	HOUR	TIME	ORDER OF OPERATIONS
14/8/74	12:30		
	15:00	2+30	Trip out to run casing
	23:15	8+15	Rig and run 13 3/8"csg- lowered and latched into 20" housing
15/8/74	0:30	1+15	Circ casing
	02:15	1+45	Mix cement and displace with mud- floats held ok
	03:00	0+45	Backout running tool - flush stack and riser with sea water
			Note: Observed 10-20 bbls cement returns in flush

OM 110

AQUITAINE

WELL: Narwhal South O-58

OM 111

CASING RUNNING IN ORDER: ø

DATE: August 15/74

13 3/8"-68# K55 S and C

No.	LENGTH	ACCUM. LENGTH	NOTES (WALL-GRADE - NEW OR USED)	No.	LENGTH	ACCUM. LENGTH	NOTES (WALL-GRADE - NEW OR USED)
Float	1.92						
1	33.26	35.18					
2	32.94	68.12					
Collar	1.70	69.82					
3	30.60	100.42					
4	32.65	133.07					
5	30.15	163.22					
6	32.91	196.13					
7	32.43	228.56					
8	27.90	256.46					
9	40.45	296.91					
10	27.97	324.88					
11	32.40	357.28					
12	28.07	385.35					
13	33.38	418.73					
14	29.65	448.38					
15	3037	478.75					
16	40.53	519.28					
17	35.94	555.22					
18	43.34	598.56					
19	40.68	639.24					
20	37.28	676.52					
21	37.26	713.78					
22	39.11	752.89					
23	35.94	788.83					
24	39.27	828.10					
25	39.76	867.86					
26	38.69	906.55					
27	40.84	947.39					
28	33.89	981.28					
29	39.78	1021.06					
30	40.95	1062.01					
31	40.95	1102.96					
X-over	15.20	1118.16					
Buttress	31.70	1149.86					
13 5/8 housing	19.90	1169.76					

5112-2

BIT RECORD

AQUITAINE
COMPANY OF CANADA LTD.

PAGE ___ OF ___

WELL NAME Aquit et al Narwhal South O-58
LOCATION Hudson Bay
CONTRACTOR Sea and Land
RIG No. P 82
DATE SPUDDED August 5, 1974
DATE RIG RELEASED Rig on tow to Walrus September 2, 1974

DRILL PIPE : SIZE O.D. 5" WT. 19.50 lbs. TYPE T.J. 4-1/2 IF FW
SIZE O.D. ___ WT. ___ TYPE T.J. ___
DRILL COLLARS : No. 8 O.D. 9-1/2 I.D. 3" TYPE T.J. ___
No. 13 O.D. 8-1/2 I.D. 3" TYPE T.J. ___
No. ___ O.D. ___ I.D. ___ TYPE T.J. ___
No. ___ O.D. ___ I.D. ___ TYPE T.J. ___

BIT NO.	SIZE	MAKE	TYPE	SERIAL NO.	NOZZLE SIZES	DEPTH OUT	FEET	HOURS	CUM. HOURS	NO. of D.C.'s	WT. 1000#	RPM	DULL COND T	DULL COND B	DULL COND G	REMARKS
1	26"	HTC	OSC	NL955	Reg.	713	133	13:15	13:15	6	7/25	40/80	2	1	I	Rough drilling
	36	SEC	Hole	- Opener									2	1	I	
2	26	SMF	TS25	1815	Reg.	1123	410	28:30	41:45	12	10/35	40/100	3	2	I	
3	17-1/2	HTC	OSC1G	AJ993	20/32	1196	73	6:30	48:15	12	15/50	50/70	7	2	I	
4	17-1/2	SEC	M4N	4057	20/32	1524	328	17:00	65:15	15	25/55	60/110	5	3	I	
5	17-1/2	HTC	OSC1G	LX680	20/32	1756	232	11:45	77:00	15	45	100	2	2	I	
6	12-1/4	HTC	X1G	57822	15/32	1837	81	4:00	81:00	15	40/45	60/90	6	2	I	
/	8-15/32	Christ.	C-20	57424	/	1867	30	3:30	84:30	15	20/25	80	0	K		Still good
7	12-1/4	SEC	S88	914367	15/32	2058	191	18:00	102:30	15	60	40	7	7	I	Spear point broken
8	12-1/4	SEC	S88	497853	14/32	2560	502	33:45	136:15	15	60	40	7	4	I	
9	12-1/4	Smith	4JS	TC169	13/32	3331	771	55:15	191:30	18	70	45	2	2	I	
10	12-1/4	Smith	4JS	SN120	13/32	4102	771	66:30	258:00	18	70	45	2	2	I	
11	12-1/4	Smith	3JS	SR663	13/32	4341	239	23:00	281:00	18	70/85	45/50	2	2	I	

FORM 5113-1

PAGE ___ OF ___

BIT HYDRAULICS

AQUITAINE COMPANY OF CANADA LTD.

WELL NAME Narwhal South O-58
LOCATION Hudson Bay
CONTRACTOR Sea and Land
RIG No. P 82
DATE SPUDDED August 5, 1974
DATE RIG RELEASED Rig on tow to Walrus Sept. 2, 1974

PUMP No. 1
MAKE EMSCO - Triplex TYPE F 1600

PUMP No. 2
MAKE EMSCO - Triplex TYPE F 1600

BIT NO.	PUMP No. 1		PUMP No. 2		G.P.M.	PUMP PRESSURE	ANNULAR VELOCITY	MUD				HHP AT BIT	REMARKS
	LINER	SPM	LINER	SPM				WT	VIS.	YP	PV		
1	7"	95	7"	95	1000/1200	1500/1600		SEA WATER					Drilling with sea water - Mud plug every single to clean hole - (no returns)
2	7"	95	7"	95	1100	1500		SEA WATER					Drilling with sea water - Mud plug every single to clean hole - (no returns)
3	7"	85	7"	85	1000	2400	100	8.8	37	14	14		
4	7"	85	7"	85	1000	2000	100	9.4	40	17	15		
5	7"	85	7"	85	1000	500	100	10.6	50	25	20		
6	7"	/	7"	110	650	1900	130	10.6	48	30	15		
/	7"	/	7"	50	280	1200		10.5	39	15	9		Coring
7	7"	/	7"	94	550	1500	115	10.4	37	18	9		
8	7"	/	7"	94	550	2000	115	10	39	21	9		
9	7"	/	7"	94	550	2600	115	10.3	36	16	7		
10	7"	/	7"	94	550	2700	115	10.7	35	8	10		
11	7"	/	7"	94	550	2700	115	10.7	36	8	10		

FORM 5162-1

DEVIATION SURVEY REPORT

AQUITAINE
COMPANY OF CANADA LTD

WELL NAME: Aquit et al Narwhal South O-58 LOCATION: Hudson Bay

DEPTH	DEVIATION	DEPTH	DEVIATION
1,075'	1°		
1,120'	1-3/4°		
1,520'	1°		
1,703'	1°		
1,830'	1°		
2,055'	3/4°		
2,555'	1/2°		
3,325'	0°		
4,100'	2°		
4,335'	1-3/4°		

AQUITAINE HUDSON BAY PROJECT

TECHNICAL SECTION

The accompanying Mud Summaries include the following for each respective well:

1. Individual mud checks.
2. Weekly summary, including comments from Mud Engineers
3. Product consumption and cost summary for each well.

General Remarks

The original Drilling Mud Program as proposed by Craig Willis was basically followed, keeping the mud system quite simple and flexible.

The primary hole problem was intrusion from the calcium chloride water flows as were encountered during the drilling of Walrus in 1969. The drilling mud system was able to control the hole conditions. However, complete containment of the problem was not achieved.

Hole stability did not appear to be a problem and in all probability was due to the high chloride and calcium content throughout along with the special attention given to the hydraulics program.

On two occasions, during the drilling of the Polar Bear test, hole cleaning problems were encountered. The first section at approximately 1500 - 2000 feet when mud shale was encountered and again at about 3700 feet trying to drill with sea water. The system proved sufficiently flexible on both occasions to control the problem.

Further discussions are necessary for future planning on how best to contain the salt water flows. However, due to the high calcium chloride flows, a similar system would again be recommended.

DRESSER MACCOBAR CANADA, DIVISION OF DRESSER INDUSTRIES INC.
525, 404 - 6th Ave. S.W., CALGARY, ALBERTA T2P 0R9

Maccobar CANADA

OILFIELD PRODUCTS DIVISION
SECURITY-SWACO-GUIBERSON-MACCOBAR

MUD SUMMARY

FOR

AQUITAINE NORWAL SOUTH M77

DRESSER MAGCOBAR CANADA, DIVISION OF DRESSER INDUSTRIES INC.
525, 404 - 6th AVENUE S. W., CALGARY 1, ALBERTA

Magcobar CANADA
OILFIELD PRODUCTS DIVISION
SECURITY-BWACO-GUIBEMBON-MAGCOBAR

LIST OF MUD COSTS FOR MUD USED RE AQUITAINE

NORWHAL SOUTH M77

As taken from Weekly Summary-

PRODUCT	PRODUCT USED	PRICE PER Sx	TOTAL AMOUNT
Magcobar (Note)	3178	6.23	19,798.94
Magcogel	1227	5.85	7,177.95
Caustic Soda	148	14.23	2,106.04
Kelzan XC	64	190.93	12,219.52
Calcium Chloride	141	16.61	2,342.01
Drispac	48	115.46	5,542.08
Salt	996	5.19	5,169.24
Magconol	110	11.01 gal	1,211.10
Salt Gel	423	5.18	2,191.14
		TOTAL MUD COST	$57,758.02
		MUD ENGINEERING SERVICES	4,000.00
			$61,758.02

NOTE: Approximately 50 tons of Barite (1,000 Sxs) were lost due to cement contamination

1–MAGCOBAR CALGARY OFFICE
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4–MUD ENGINEER COPY

Magcobar

OILFIELD PRODUCTS DIVISION (SECURITY — SWACO — GUIBERSON — MAGCOBAR)

WEEKLY SUMMARY

Well Name & L.S.D. AQUITAINE ET AL HUDSON BAY NORWHAL SOUTH Contractor PENTAGONE #82 Page 1 of

MUD PROPERTIES AND SUMMARY

1974 Date AUGUST	Depth	Mud Weight	Fun Vis.	V.G. Temp	App. Vis.	Plas. Vis.	Yield Pt.	Gels. 0	Gels. 10	W.L.	H.T. H.P. F.L.	M.B.T.	P.H.	Alkalinities PF	Alkalinities MF	CHL M	CAL. PPM	Percent Oil	Percent Solids	Sand Cont
4																				
Day No 1	SPUD IN 503' - WATER - NO MUD PRODUCTS ON BOARD - SPUD 36" HOLE -																			
	W/SEAWATER - DRILL 103' - SHUT DOWN WAIT ON MUD																			
5																				
Day No 2	MIX 1200' - BBL - MUD AT 50#/BBL GEL - 3/4#/BBL XC - 1/3#/BBL CAUSTIC																			
	USING CONTAMINATED WATER 12 - 16 m. ppm Cl - VISC. 50 - 75 SEC/QT - SLUG WHILE DRILLING																			
6	713	9.1	62		35	21	27	12	23	14.0			10.0	.2		13	800		5	Ni
Day No 3	RUN 30" CASING AT 672' ON CEMENT JOB - FOUND ALL CEMENT & BARITE TANKS -																			
	MIXED - W.O.C. 12 HRS - MIXED 400 BBL MUD W/CONTAM. IND. WATER - SLUG WHILE DRILLING																			
7	DRILL OUT 30" W/26" BIT																			
Day No 4	DRILLING AHEAD - SLUG WHILE DRILLING - 50 BBL EACH SINGLE - WATER 6000 CL																			
	30#/BBL GEL - BUILT 400 BBL - VISCOSITY 60 - 70 SEC/QT																			
8																				
Day No 5	DRILLING 26" HOLE - SPOTTING MUD - 50 BBL EACH CONNECTION - FISH 26" HOLE																			
	SPOT 350 BBL MUD - P.O.H. - R.I.H. SPOT 350 BBL - P.O.H. TO RUN 20" CASING																			
9																				
Day No 6	BUILD - 1100 BBL MUD TO DISPLACE HOLE - 20 LBS/BBL GEL - ½ CAUSTIC - ½#																			
	DRISPAC & 1#/BBL KELZAN - WEIGHT UP 400 BBL TO 14#/GAL																			
10																				
Day No 7	DRILL OUT CEMENT - DISPLACE HOLE - BUILD - 800 BBL RESERVE VOLUME																			

MATERIALS USED AND COSTS

MAGCOBAR	MAGCOGEL								Estimated Daily Cost $	Estimated Accum. Cost $
	600	9	18	24					7479	7479
	168	9	6	8					2390	9869
	96	4	8						2146	12015
	54	4	6	73	6				3420	15435
265	72	6	2		2				2665	18100
975	120	10	4		4				7500	25600
1240	1110	42	44	105	12				$ 25600	
1240	1110	12	44	150	12					$ 25600

WEEK ENDING: AUGUST 10, 1974 — WEEK ENDING TOTALS

MUD ENGINEER: Ken Schmidt — ACCUMULATIVE TRANS. TO DATE $ _____ — ACCUMULATED TOTALS

1–MAGCOBAR CALGARY OFFICE
2–MAGCOBAR CALGARY OFFICE
3–CUSTOMER COPY
4–MUD ENGINEER COPY

Magcobar

OILFIELD PRODUCTS DIVISION (SECURITY — SWACO — GUIBERSON — MAGCOBAR)

WEEKLY SUMMARY

Well Name & L.S.D. AQUITAINE ET AL HUDSON BAY NORWHAL SOUTH Contractor PENTAGONE #82 Page 1 of

MUD PROPERTIES AND SUMMARY

MATERIALS USED AND COSTS

1974 Date AUGUST	Depth	Mud Weight	Fun Vis.	V.G. Temp	App. Vis	Plas. Vis.	Yield Pt.	Gels. 0	Gels. 10	W.L.	H.T. H.P. F.L.	M.B.T.	P.H.	Alkalinities PF	Alkalinities MF	CHL M	CAL. PPM	Percent Oil	Percent Solids	Sand Cont	MAGCOBAR	MAGCOGEL									Estimated Daily Cost $	Estimated Accum. Cost $
4																																
Day No 1	SPUD IN 503' - WATER - NO MUD PRODUCTS ON BOARD - SPUD 36" HOLE -																															
	W/SEAWATER - DRILL 103' - SHUT DOWN WAIT ON MUD																															
5																						600	9	18	24						7479	7479
Day No 2	MIX 1200' - BBL - MUD AT 50#/BBL GEL - 3/4#/BBL XC - 1/3#/BBL CAUSTIC																															
	USING CONTAMINATED WATER 12 - 16 m. ppm Cl - VISC. 50 - 75 SEC/QT - SLUG																				WHILE	DRILLING										
6	713	9.1	62		35	21	27	12	23	14.0			10.0	.2		13	800		5	Ni		168	9	6	8						2390	9869
Day No 3	RUN 30" CASING AT 672' ON CEMENT JOB - FOUND ALL CEMENT & BARITE TANKS -																															
	MIXED - W.O.C. 12 HRS - MIXED 400 BBL MUD W/CONTAM. IND. WATER - SLUG WH																				LE DRILLING											
7	DRILL OUT 30" W/26" BIT																					96	4	8							2146	12015
Day No 4	DRILLING AHEAD - SLUG WHILE DRILLING - 50 BBL EACH SINGLE - WATER 6000 CL																															
	30#/BBL GEL - BUILT 400 BBL - VISCOSITY 60 - 70 SEC/QT																															
8																						54	4	6	73	6					3420	15435
Day No 5	DRILLING 26" HOLE - SPOTTING MUD - 50 BBL EACH CONN. TION - FISH 26" HOLE																															
	SPOT 350 BBL MUD - P.O.H. - R.I.H. SPOT 350 BBL - P.O.H. TO RUN 20" CASING																															
9																					265	72	6	2		2				2665	18100
Day No 6	BUILD - 1100 BBL MUD TO DISPLACE HOLE - 20 LBS/BBL GEL - ½ CAUSTIC - ½#																															
	DRISPAC & ½#/BBL KELZAN - WEIGHT UP 400 BBL TO 14#/GAL																															
10																					975	120	10	4		4				7500	25600
Day No 7	DRILL OUT CEMENT - DISPLACE HOLE - BUILD - 800 BBL RESERVE VOLUME																															

WEEK ENDING: AUGUST 10, 1974	WEEK ENDING TOTALS	1240	1110	42	44	105	12				$ 25600	
MUD ENGINEER: Ken Schmidt ACCUMULATIVE TRANS. TO DATE $ _____	ACCUMULATED TOTALS	1240	1110	42	44	150	12					$ 25600

Magcobar

OILFIELD PRODUCTS DIVISION (SECURITY — SWACO — GUIBERSON — MAGCOBAR)

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4–MUD ENGINEER COPY

WEEKLY SUMMARY

Well Name & L.S.D. AQUITAINE ET AL HUDSON BAY NORWHAL SOUTH Contractor PENTAGONE #82 Page 2 of

MUD PROPERTIES AND SUMMARY

1974 Date AUGUST	Depth	Mud Weight	Fun Vis.	V.G. Temp	App. Vis.	Plas. Vis	Yield Pt.	Gels. 0	Gels. 10	W.L.	H.T. H.P. F.L.	M.B.T.	P.H.	Alkalinities PF	Alkalinities MF	CHL M	CAL. PPM	Percent Oil	Percent Solids	Sand Cont
11																				
Day No 8	CL INCREASED TO 48 M. PPM AT 1300' - LOST 75 BBL AT 1200' - SLOWLY GAINING																			
	VOLUME - 5 BBL/HR AT 1500' - CL - INCR. TO 90M PPM																			
12																				
Day No 9	LOG - SHOWS 100' - SALT SECTION WAIT ON SALT																			
13	1763	10.7	50	82	33	20	25	9	24	28			9.5	.2		315	3200		11	1
Day No 10	ADD SALT AND DRILL 50' TO LOG																			
14	1763	10.7	52	82	33	20	25	9	21	35			9.0	.1		315	3300		12	1.2
Day No 11	RUN 13 3/8" CASING																			
15																				
Day No 12	TRIP STACK AND SET SMALL STACK - W.O.C.																			
16	W.O.W. PRESSURE TEST																			
Day No																				
17	1770	10.7	52	55	33	20	25	11	27	41			10.5	.3		315	3400		12	1
Day No 14	DRILLING 200 ' CEMENT - DRILL TO CORE POINT - RUN CORE																			

MATERIALS USED AND COSTS

	MAGCOBAR	MAGCOGEL								Estimated Daily Cost $	Estimated Accum. Cost $
11	440		9	12		20	36			8095	33695
Day No 8											
12											
Day No 9		NO	ADDITIONS								
13											
Day No 10											
14						4		443		2761	36456
Day No 11											
15								330	36	2256	38712
Day No 12											
16											
Day No											
17											38712
Day No 14											
WEEK ENDING TOTALS	440		9	12		24	36	773	36	$	
ACCUMULATED TOTALS	1680	1110	51	56		36		773	36		$ 38712

WEEK ENDING: AUGUST 17, 1974

MUD ENGINEER: Kellsey

ACCUMULATIVE TRANS. TO DATE $ _____

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OILFIELD PRODUCTS DIVISION (SECURITY — SWACO — GUIBERSON — MAGCOBAR)

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4–MUD ENGINEER COPY

WEEKLY SUMMARY

Well Name & L.S.D. AQUITAINE ET AL HUDSON BAY NORWHAL SOUTH Contractor PENTAGONE #82 Page 3 of

MUD PROPERTIES AND SUMMARY

MATERIALS USED AND COSTS

1974 Date AUGUST	Depth	Mud Weight	Fun Vis.	V.G. Temp	App. Vis.	Plas. Vis.	Yield Pt.	Gels. 0	Gels. 10	W.L.	H.T. H.P. F.L.	M.B.T.	P.H.	Alkalinities PF	Alkalinities MF	CHL M	CAL. PPM	Percent Oil	Percent Solids	Sand Cont	MAGCOBAR	MAGCOGEL								Estimated Daily Cost $	Estimated Accum. Cost $
18	2000	10.5	40	62	18	9	14	8	22	53			11.0	.9		275	4250		11	3/4			25	4						731	30543
Day No 15	DRILLING - NO FILL ON TRIP = RECOVERED 30' CORE IN 30' BARRELL																														
19	2296	10.6	40	69	19	9	8	7	19	60			10.5	.4		225	6000		11	½		6	30		35	6				632	40175
Day No 16	TRIPPED FOR BIT - HOLE GOOD - DRILLING - APPEAR TO BE TAKING ON SOME $CaCl_2$ WATER AT TIMES																														
20	2554	10.0	42	70	18	9	18	6	17	70			11.5	.5		165	7500		4½	½	44	10	55			20				1223	41398
Day No 17	DRILLING - RUNNING DESILTING TO BRING WT. 10.0#/GAL - CORRECTED SOLIDS FOR (PUMPED 50T CEMENT & BAITS MIX OVERBOARD) NaCl, - Ca^{++} KEEPS RISING MAYBE FORMATION COMING IN SLIGHTLY WHILE DRILLING																														
21	2800	10.4	38	69	15	7	15	6	18	65			10.0	.2		165	14000		4½	--	220			2	102	16				2357	43756
Day No 18	TRIPPED FOR BIT ENCOUNTERED $CaCl_2$ FLOW WHILE TRIPPING 30 BBLS - DRILLING 5 BBL GAIN FROM HOLE PER HOUR																														
22	3166	10.5	39	70	15	7	15	7	22	70			11.5	.6		175	25000		5	½					30	22	8			1980	45736
Day No 19	DRILLING - STILL TAKING ON $CaCl_2$ WATER FROM FRACTURE																														
23	3331	10.5	39	75	14	6	18	5	21	75			11.5	.5		185	25000		5	½	33					8				318	46054
Day No 20	DRILLING - TRIPPED - NO FILL - TESTED STACK = WELL FLOWED																														
24	3610	10.7	38	70	15	10	9	5	22	70			11.5	.4		310	35000		5½	--		20			50	6		223		1619	47673
Day No 21	DRILLING - ADDED SALT TO SATURATE - STILL TAKING 10 BBLS PER HR OF INTRUSION																														

WEEK ENDING: AUGUST 24, 1974	WEEK ENDING TOTALS	297	36	110	6	217	78	8	223		$
MUD ENGINEER: D. Kellsey ACCUMULATIVE TRANS TO DATE $ _____	ACCUMULATED TOTALS	1977	1146	1104	2	253			1000		$ 47673

Magcobar

OILFIELD PRODUCTS DIVISION (SECURITY — SWACO — GUIBERSON — MAGCOBAR)

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4–MUD ENGINEER COPY

WEEKLY SUMMARY

Well Name & L.S.D. AQUITAINE ET AL HUDSON BAY NORWHAL SOUTH Contractor PENTAGONE #82 Page 4 of ____

MUD PROPERTIES AND SUMMARY

1974 Day AUGUST	Depth	Mud Weight	Fun Vis.	V.G. Temp	App. Vis.	Plas. Vis.	Yield Pt.	Gels. 0	Gels. 10	W.L.	H.T. H.P. F.L.	M.B.T.	P.H.	Alkalinities PF	Alkalinities MF	CHL M	CAL. PPM	Percent Oil	Percent Solids	Sand Cont
25	3890	10.8	38	72	14	9	9	4	16	75			11.5	.4		290	50000		6	--
Day No 22	DRILLING - STILL TAKING ON VOL. FROM FORMATION AT 5 BBLS PER HR.																			
26	4102	10.7	39	72	14	10	8	4	16	73			11.5	.4		270	55000		6	
Day No 23	DRILLING LIMESTONE - SLIGHT GAIN IN VOL. AT WTS. BELOW 10.9#/GAL - TRIP																			
	OUT FOR BIT - HOLE GOOD COMING OUT																			
27	4185	10.7	38	75	14	10	8	4	14	75			11.5	.4		260	60000		5½	
Day No 24	TRIP IN - NO FILL - DRILL 100' - PUL TO HANGOFF - DISPLACE 13 3/8" CASING																			
	WITH 12#/GAL - W.O.W.																			
28	4341	11.0	41	72	16	11	10	5	17	71			11.5	.5		270	60000		7	
Day No 25	DRILLING TO T.D. 4341' - PREPARING TO LOGG - FILLING CASING WITH 13#/GAL																			
	MUD WHILE LOGGING - FOR DOWELL CEMENTING 45 BAGS CEMENT																			
29																				
Day No																				
30																				
Day No																				
Day No																				

MATERIALS USED AND COSTS

	MAGCOBAR	MAGCOGEL								Estimated Daily Cost $	Estimated Accum. Cost $
25		28		6	50	8				1230	48903
26		3			50	5				348	49251
27		5			60	6				425	49676
28	201(M)				10					2793	52469
29	50T(M) PUMPED OVER BOARD ON 20 AUG									6230	58699
	POSSIBILITY OF 30 - 50% CEMENT SO FAR										
	COST FIGURING 100%										
30		45								263	58962
WEEK ENDING TOTALS		81		6	170	19				$	
ACCUMULATED TOTALS	3000	1227	110	48	423	97	64	1000	141		$ 58962

WEEK ENDING: AUGUST 31, 1974

MUD ENGINEER: Kellsey ACCUMULATIVE TRANS. TO DATE $ _____

Magcobar CANADA — FIELD DRILLING MUD REPORT

OILFIELD PRODUCTS DIVISION (SECURITY • SWACO • GUIBERSON • MAGCOBAR)

CHECK No. ____ Date ____

Well Name ____ Legal Description ____

Company ____ Contractor ____

Report For Mr. ____ Report For Mr. ____

Address ____ Address ____

Sample From: Pit ☐ Flow Line ☐ Flowline Temp. ____ °F.	Mud Properties			Hole and Circulation Data		Swaco Equipment	
Time Sample Taken				Spud Date		☐	D. Silter
Depth				Fill Last Trip	Ft.	☐	D. Sander
Weight Flow Line				Surface Casing In. @	Ft.	☐	Super Screen
Weight Suction				Intermediate Casing In. @	Ft.	☐	Centrifuge
Funnel Viscosity (Sec./Qt.)				Bit Type / Bit Size	In.	☐	D-Gasser
V.G. Temp. Reading - ° F.				Mud in Hole bbls. Tanks	bbls.	☐	Adjustable Choke
Fann Viscosity (Cps.)				Total Mud in System	bbls.	☐	Super Choke
Plastic Viscosity (Cps.)				#1 Pump Size x In. Strokes Min.		☐	Monitor
Yield Point (lbs./100 Sq. Ft.)				#2 Pump Size x In. Strokes Min.		☐	Trip Guard
Gel Strength (Initial)				Bbls./Stroke Output	Bbls. Min.	☐	P.V.T.
Gel Strength (10 Min.)				Mud Cycle	Min.	☐	Mud Weigher
API Water Loss (cc. in 30 min.)				Circulating BTM Up	Min.	☐	Flo-Sensor
Cake Thickness (32nds.)				Drill Pipe In. Ann. Vel.	Ft./Min.		
API HT-HP Fluid Loss (CC/30 min.)				Drill Collar In. Ann. Vel.	Ft./Min.		
CEC (API Equiv. #/bbl. Bent.)				Drill Collar In. Ann. Vel.	Ft./Min.		
pH. Strip ☐ Beckman ☐				Circ. Pressure PSI Hydrostatic Press	PSI		
P. Alkalinity (Pf)				REMARKS – (Give operation, hole condition, and nature of any problems.)			
M. Alkalinity (Mf)							
Salt ☐ PPM Chloride ☐ PPM							
Calcium PPM ☐							
Oil Content (% by Vol.)							
Solids Content (% by Vol.)							
Sand Content (% by Vol.)							

SUGGESTIONS – (To be followed only if the operator deems advisable.)

1

MAGCOBAR WAREHOUSE		MAGCOBAR ENGINEER	
ADDRESS	PHONE	ADDRESS	PHONE / MOBILE

In consideration of the furnishing of this report and oral suggestions, it is agreed that DRESSER MAGCOBAR CANADA, DIVISION OF DRESSER INDUSTRIES INC. shall not be liable for any damage resulting from same and it is to be held harmless.

NOT LEGIBLE
ILLISIBLE

Magcobar CANADA — FIELD DRILLING MUD REPORT

OILFIELD PRODUCTS DIVISION (SECURITY • SWACO • GUIBERSON • MAGCOBAR)

CHECK No. _____ Date _____

Well Name _____ Legal Description _____

Company _____ Contractor _____

Report For Mr. _____ Report For Mr. _____

Address _____ Address _____

Sample From: Pit ☐ Flow Line ☐ Flowline Temp. _____ ° F.	Mud Properties			Hole and Circulation Data		Swaco Equipment	
Time Sample Taken				Spud Date		☐	D. Silter
Depth				Fill Last Trip	Ft.	☐	D. Sander
Weight Flow Line				Surface Casing In. @	Ft.	☐	Super Screen
Weight Suction				Intermediate Casing In. @	Ft.	☐	Centrifuge
Funnel Viscosity (Sec./Qt.)				Bit Type Bit Size	In.	☐	D-Gasser
V.G. Temp. Reading ° F.				Mud in Hole bbls. Tanks	bbls.	☐	Adjustable Choke
Fann Viscosity (Cps.)				Total Mud in System	bbls.	☐	Super Choke
Plastic Viscosity (Cps.)				#1 Pump Size x In. Strokes Min.		☐	Monitor
Yield Point (lbs./100 Sq. Ft.)				#2 Pump Size x In. Strokes Min.		☐	Trip Guard
Gel Strength (Initial)				Bbls./ Stroke Output	Bbls. Min.	☐	P.V.T.
Gel Strength (10 Min.)				Mud Cycle	Min.	☐	Mud Weigher
API Water Loss (cc. in 30 min.)				Circulating BTM Up	Min.	☐	F/C Sensor
Cake Thickness (32nds.)				Drill Pipe In.	Ann. Vel. Ft./Min.		
API HT-HP Fluid Loss (CC/30 min.)				Drill Collar In.	Ann. Vel. Ft./Min.		
CEC (API Equiv. #/bbl. Bent.)				Drill Collar In.	Ann. Vel. Ft./Min.		
pH. Strip ☐ Beckman ☐				Circ. Pressure PSI	Hydrostatic Press PSI		
P. Alkalinity (Pf)				REMARKS — (Give operation, hole condition, and nature of any problems.)			
M. Alkalinity (Mf)							
Salt ☐ PPM Chloride ☐ PPM							
Calcium PPM ☐							
Oil Content (% by Vol.)							
Solids Content (% by Vol.)							
Sand Content (% by Vol.)							

SUGGESTIONS — (To be followed only if the operator deems advisable.)

MAGCOBAR WAREHOUSE		MAGCOBAR ENGINEER	
ADDRESS	PHONE	ADDRESS	PHONE MOBILE

In consideration of the furnishing of this report and oral suggestions, it is agreed that DRESSER MAGCOBAR CANADA, DIVISION OF DRESSER INDUSTRIES INC. shall not be liable for any damage resulting from same and it is to be held harmless.

ILLISIBLE

Magcobar CANADA — FIELD DRILLING MUD REPORT

OILFIELD PRODUCTS DIVISION (SECURITY • SWACO • GUIBERSON • MAGCOBAR)

CHECK No. #2. Date AUG. 11/14.

Well Name [illegible] Legal Description [illegible]

Company [illegible] Contractor [illegible]

Report For Mr. [illegible] Report For Mr. [illegible]

Address [illegible] Address [illegible]

Sample From: Pit ☐ Flow Line ☐ Flowline Temp. ____ °F.	Mud Properties			Hole and Circulation Data		Swaco Equipment
Time Sample Taken	6:30 PM			Spud Date AUG. 4/14.		☐ D. Silter
Depth	14402			Fill Last Trip Ft.		☐ D. Sander
Weight Flow Line	15			Surface Casing 10 In. @ 672 Ft.		☐ Super Screen
Weight Suction	14			Intermediate Casing 20 In. @ 1123 Ft.		☐ Centrifuge
Funnel Viscosity (Sec./Qt.)	114			Bit Type M4N. Bit Size 17½ In.		☐ D. Gasser
V.G. Temp. Reading - ° F.				Mud in Hole 530 bbls. Tanks 255 bbls.		☐ Adjustable Choke
Fann Viscosity (Cps.)	21			Total Mud in System 785 bbls.		☐ Super Choke
Plastic Viscosity (Cps.)	14			#1 Pump Size 7 x 12 In. Strokes Min. 138		☐ Monitor
Yield Point (lbs./100 Sq. Ft.)	14			#2 Pump Size 7 x 12 In. Strokes Min. 100		☐ Trip Guard
Gel Strength (Initial)	3			Bbls./ Stroke .134 Output 274 Bbls. Min.		☐ P.V.T.
Gel Strength (10 Min.)	12			Mud Cycle 2[illegible] Min.		☐ Mud Weigher
API Water Loss (cc. in 30 min.)	15.8			Circulating BTM Up Min.		☐ Flo-Sensor
Cake Thickness (32nds.)	2			Drill Pipe 4½ In. Ann. Vel. 101 Ft./Min.		
API HT-HP Fluid Loss (CC/30 min.)				Drill Collar 8½ In. Ann. Vel. 120 Ft./Min.		
CEC (API Equiv. #/bbl. Bent.)				Drill Collar 9½ In. Ann. Vel. 132. Ft./Min.		
pH. Strip ☐ Beckman ☐	10			Circ. Pressure PSI Hydrostatic Press PSI		
P. Alkalinity (Pf)	.1			REMARKS – (Give operation, hole condition, and nature of any problems.)		
M. Alkalinity (Mf)						
Salt ☐ PPM Chloride ☐ PPM	[illegible]			LOST- 75 BBL. TO FORMATION.		
Calcium PPM ☐	[illegible]			GAIN- 100 BBL. CaCl2 WATER.		
Oil Content (% by Vol.)						
Solids Content (% by Vol.)	8%					
Sand Content (% by Vol.)	[illegible]					

SUGGESTIONS – (To be followed only if the operator deems advisable.)

1. MAINTAIN- VISC- 40- 50 SEC/QT.
W.L- 15 C.C OR LESS W/DRISPAC.
5 SK. QUEB ONE DIKE.
pH- 10.0 - 10.5 W/CAUSTIC.
WT: INCREASE ON ORDER.

THANKS.

MAGCOBAR WAREHOUSE		MAGCOBAR ENGINEER LEN. STEWART	
ADDRESS	PHONE	ADDRESS	PHONE MOBILE

In consideration of the furnishing of this report and oral suggestions, it is agreed that DRESSER MAGCOBAR CANADA, DIVISION OF DRESSER INDUSTRIES INC. shall not be liable for any damage resulting from same and it is to be held harmless.

ILLISIBLE

Magcobar CANADA — FIELD DRILLING MUD REPORT

OILFIELD PRODUCTS DIVISION (SECURITY • SWACO • GUIBERSON • MAGCOBAR)

CHECK No. #2. Date AUG. 11/14.

Well Name [illegible] Legal Description [illegible]

Company [illegible] Contractor [illegible]

Report For Mr. DENIS FILE. Report For Mr. [illegible]

Address T.C. Address [illegible]

Sample From: Pit ☐ Flow Line ☐ Flowline Temp. ____ °F.	Mud Properties			Hole and Circulation Data		Swaco Equipment
Time Sample Taken	6:30 PM			Spud Date AUG. 4/14.		☐ D. Silter
Depth	14162			Fill Last Trip ____ Ft.		☐ D. Sander
Weight Flow Line	15			Surface Casing 10 In. @ 672 Ft.		☐ Super Screen
Weight Suction	14			Intermediate Casing 20 In. @ 1123 Ft.		☐ Centrifuge
Funnel Viscosity (Sec./Qt.)	44			Bit Type HI4N. Bit Size 17½ In.		☐ D. Gasser
V.G. Temp. Reading - ° F.				Mud in Hole 530 bbls. Tanks 255 bbls.		☐ Adjustable Choke
Fann Viscosity (Cps.)	21			Total Mud in System 785 bbls.		☐ Super Choke
Plastic Viscosity (Cps.)	14			#1 Pump Size 7 x 12 In. Strokes Min. 120		☐ Monitor
Yield Point (lbs./100 Sq. Ft.)	14			#2 Pump Size 7 x 12 In. Strokes Min. 100		☐ Trip Guard
Gel Strength (Initial)	5			Bbls./ Stroke .134 Output 274 Bbls. Min.		☐ P.V.T.
Gel Strength (10 Min.)	12			Mud Cycle 31 Min.		☐ Mud Weigher
API Water Loss (cc. in 30 min.)	15.6			Circulating BTM Up ____ Min.		☐ Flo-Sensor
Cake Thickness (32nds.)	2			Drill Pipe 4½ In. Ann. Vel. 101 Ft./Min.		
API HT-HP Fluid Loss (CC/30 min.)				Drill Collar 8½ In. Ann. Vel. 120 Ft./Min.		
CEC (API Equiv. #/bbl. Bent.)				Drill Collar 9½ In. Ann. Vel. 132. Ft./Min.		
pH. Strip ☐ Beckman ☐	10			Circ. Pressure ____ PSI Hydrostatic Press ____ PSI		
P. Alkalinity (Pf)	.1			REMARKS – (Give operation, hole condition, and nature of any problems.)		
M. Alkalinity (Mf)						
Salt ☐ PPM Chloride ☐ PPM	[illegible]			LOST- 75 BBL. TO FORMATION.		
Calcium PPM ☐	[illegible]			GAIN.- 100 BBL. CaCl2 WATER.		
Oil Content (% by Vol.)						
Solids Content (% by Vol.)	8%					
Sand Content (% by Vol.)	[illegible]					

SUGGESTIONS – (To be followed only if the operator deems advisable.)

1. MAINTAIN- VISC- 40- 50 SEC/QT.
W.L- 15 c.c OR LESS W/DRISPAC.
5 lb. OVER ONE PIPE.
pH- 10.0 - 10.5 W/CAUSTIC.
WT. INCREASE ON ORDER.

THANKS.

MAGCOBAR WAREHOUSE		MAGCOBAR ENGINEER LEN. SCHMIDT	
ADDRESS	PHONE	ADDRESS	PHONE MOBILE

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NOT LEGIBLE
ILLISIBLE

Magcobar CANADA — FIELD DRILLING MUD REPORT

OILFIELD PRODUCTS DIVISION (SECURITY • SWACO • GUIBERSON • MAGCOBAR)

CHECK No. _____ Date _____

Well Name _____ Legal Description _____

Company _____ Contractor _____

Report For Mr. _____ Report For Mr. _____

Address _____ Address _____

Sample From: Pit ☐ Flow Line ☐ Flowline Temp. ____ ° F.	Mud Properties		
Time Sample Taken			
Depth			
Weight Flow Line			
Weight Suction			
Funnel Viscosity (Sec./Qt.)			
V.G. Temp. Reading - ° F.			
Fann Viscosity (Cps.)			
Plastic Viscosity (Cps.)			
Yield Point (lbs./100 Sq. Ft.)			
Gel Strength (Initial)			
Gel Strength (10 Min.)			
API Water Loss (cc. in 30 min.)			
Cake Thickness (32nds.)			
API HT-HP Fluid Loss (CC/30 min.)			
CEC (API Equiv. #/bbl. Bent.)			
pH. Strip ☐ Beckman ☐			
P. Alkalinity (Pf)			
M. Alkalinity (Mf)			
Salt ☐ PPM Chloride ☐ PPM			
Calcium PPM ☐			
Oil Content (% by Vol.)			
Solids Content (% by Vol.)			
Sand Content (% by Vol.)			

Hole and Circulation Data				
Spud Date				
Fill Last Trip				Ft.
Surface Casing		In. @		Ft.
Intermediate Casing		In. @		Ft.
Bit Type		Bit Size		In.
Mud in Hole	bbls.	Tanks		bbls.
Total Mud in System				bbls.
#1 Pump Size	x	In.	Strokes Min.	
#2 Pump Size	x	In.	Strokes Min.	
Bbls./ Stroke		Output		Bbls. Min.
Mud Cycle				Min.
Circulating BTM Up				Min.
Drill Pipe		In.	Ann. Vel.	Ft./Min.
Drill Collar		In.	Ann. Vel.	Ft./Min.
Drill Collar		In.	Ann. Vel.	Ft./Min.
Circ. Pressure	PSI	Hydrostatic Press		PSI

Swaco Equipment	
☐	D. Silter
☐	D. Sander
☐	Super Screen
☐	Centrifuge
☐	D. Gasser
☐	Adjustable Choke
☐	Super Choke
☐	Monitor
☐	Trip Guard
☐	P.V.T.
☐	Mud Weigher
☐	Flo-Sensor

REMARKS – (Give operation, hole condition, and nature of any problems.)

SUGGESTIONS – (To be followed only if the operator deems advisable.)

MAGCOBAR WAREHOUSE		MAGCOBAR ENGINEER	
ADDRESS	PHONE	ADDRESS	PHONE MOBILE

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Magcobar CANADA — FIELD DRILLING MUD REPORT

OILFIELD PRODUCTS DIVISION (SECURITY • SWACO • GUIBERSON • MAGCOBAR)

CHECK No. #4 Date Aug 14

Well Name Aga Taine et al Hudson Bay Legal Description Nanwhal 5

Company Aga Taines Contractor Pentagone #82

Report For Mr. Denis Fiset Report For Mr. C. McBeag

Address Rig Address Rig

Sample From: Pit ☐ Flow Line ☐ Flowline Temp. ____ °F.	Mud Properties			Hole and Circulation Data		Swaco Equipment
Time Sample Taken	11:30PM	1:00	2:45	Spud Date Aug 4/74		☐ D. Silter
Depth			1756	Fill Last Trip N.C.	Ft.	☐ D. Sander
Weight Flow Line	10.6	10.6	10.7	Surface Casing 30 In. @ 672	Ft.	☐ Super Screen
Weight Suction			10.6	Intermediate Casing 20 In. @ 1123	Ft.	☐ Centrifuge
Funnel Viscosity (Sec./Qt.)	52	50	50	Bit Type mW Bit Size 17½	In.	☐ D. Gasser
V.G. Temp. Reading - ° F.			29°C	Mud in Hole 640 bbls. Tanks 320	bbls.	☐ Adjustable Choke
Fann Viscosity (Cps.)	32.5		37.5	Total Mud in System 960	bbls.	☐ Super Choke
Plastic Viscosity (Cps.)	20		20	#1 Pump Size 7 x 12 In. Strokes Min. 198		☐ Monitor
Yield Point (lbs./100 Sq. Ft.)	25		25	#2 Pump Size x In. Strokes Min.		☐ Trip Guard
Gel Strength (Initial)	9		9	Bbls./Stroke .134 Output 27.4	Bbls. Min.	☐ P.V.T.
Gel Strength (10 Min.)			24	Mud Cycle 3 4/8	Min.	☐ Mud Weigher
API Water Loss (cc. in 30 min.)	28	30	35	Circulating BTM Up	Min.	☐ Flo-Sensor
Cake Thickness (32nds.)	2/32	2/32	2/32	Drill Pipe 5 In. Ann. Vel. 101	Ft./Min.	
API HT-HP Fluid Loss (CC/30 min.)				Drill Collar 8½ In. Ann. Vel. 120	Ft./Min.	
CEC (API Equiv. #/bbl. Bent.)				Drill Collar 9 In. Ann. Vel. 132	Ft./Min.	
pH. Strip ☐ Beckman ☐	9.5	9.0	9.0	Circ. Pressure 550 PSI Hydrostatic Press 960	PSI	
P. Alkalinity (Pf)			.0	REMARKS — (Give operation, hole condition, and nature of any problems.)		
M. Alkalinity (Mf)	~~3~~			Drilling		
Salt ☐ PPM Chloride ☐ PPM	315M	300M	310M			
Calcium PPM ☐	3300	3200	3300			
Oil Content (% by Vol.)			0%			
Solids Content (% by Vol.)			12%			
Sand Content (% by Vol.)			1.5%			

SUGGESTIONS — (To be followed only if the operator deems advisable.)

① adding Salt to stabilize system

MAGCOBAR WAREHOUSE		MAGCOBAR ENGINEER Del J Kellam	
ADDRESS	PHONE	ADDRESS	PHONE MOBILE

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ILLISIBLE

Magcobar CANADA — FIELD DRILLING MUD REPORT

OILFIELD PRODUCTS DIVISION (SECURITY • SWACO • GUIBERSON • MAGCOBAR)

CHECK No. #5 Date 17

Well Name Quintana et a Hundred Bay — Legal Description Nanwhal 5

Company Quintana — Contractor Pentagone #82

Report For Mr. Lou Pajak — Report For Mr. C Malone

Address — Address R.3

Sample From: Pit ☐ Flow Line ☐ Flowline Temp. ____ ° F.

	Mud Properties			Hole and Circulation Data		Swaco Equipment
Time Sample Taken	4:30 P.M.		3:00	Spud Date 4 Aug.		☐ D. Silter
Depth	1770		1867	Fill Last Trip No F.U. Ft.		☐ D. Sander
Weight Flow Line	10.7		10.7	Surface Casing 20' In. @ 1123 Ft.		☐ Super Screen
Weight Suction	10.7		10.6	Intermediate Casing 13 3/8 In. @ 1738 Ft.		☐ Centrifuge
Funnel Viscosity (Sec./Qt.)	50		48	Bit Type 12 1/4 Bit Size In.		☐ D. Gasser
V.G. Temp. Reading - ° F.				Mud in Hole 300 bbls. Tanks 362 bbls.		☐ Adjustable Choke
Fann Viscosity (Cps.)	32.5		30	Total Mud in System 662 bbls.		☐ Super Choke
Plastic Viscosity (Cps.)	20		15	#1 Pump Size 7 x 12 In. Strokes Min.		☐ Monitor
Yield Point (lbs./100 Sq. Ft.)	2.5		15	#2 Pump Size x In. Strokes Min.		☐ Trip Guard
Gel Strength (Initial)	11		7	Bbls./ Stroke .140 Output 16.5 Bbls. Min.		☐ P.V.T.
Gel Strength (10 Min.)	27		24	Mud Cycle 40. Min.		☐ Mud Weigher
API Water Loss (cc. in 30 min.)	41		42	Circulating BTM Up Min.		☐ Flo-Sensor
Cake Thickness (32nds.)	2/32		2/32	Drill Pipe 5" In. Ann. Vel. 130		Ft./Min.
API HT-HP Fluid Loss (CC/30 min.)				Drill Collar 8 1/2 In. Ann. Vel. 210		Ft./Min.
CEC (API Equiv. #/bbl. Bent.)				Drill Collar 9 1/2 In. Ann. Vel. 265' Tools		Ft./Min.
pH. Strip ☑ Beckman ☐	10.5		11.0	Circ. Pressure PSI Hydrostatic Press		PSI
P. Alkalinity (Pf)	.3		.7	REMARKS – (Give operation, hole condition, and nature of any problems.)		
M. Alkalinity (Mf)	—		—	① Drilling out shoe		
Salt ☐-PPM Chloride ☐ PPM	315m		315m	& Drilling ahead.		
Calcium PPM ☐	3400		3400	Pull to core at 1875'		
Oil Content (% by Vol.)	0			③ Core barrel Lined.		
Solids Content (% by Vol.)	12%		11½			
Sand Content (% by Vol.)	1%		1%			

SUGGESTIONS – (To be followed only if the operator deems advisable.)

① Holding mud. 45-55 wt/ft.

② If Volume gets low add water to Active Tanks

③ When back Drilling start Bank of Desilters.

MAGCOBAR WAREHOUSE		MAGCOBAR ENGINEER Dave Collins	
ADDRESS	PHONE	ADDRESS	PHONE MOBILE

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Magcobar CANADA — FIELD DRILLING MUD REPORT

OILFIELD PRODUCTS DIVISION (SECURITY • SWACO • GUIBERSON • MAGCOBAR)

CHECK No. #6 Date 18 Aug

Well Name	Aquitaine et al Hudson Bay	Legal Description	[illegible]
Company	Aquitaine	Contractor	Peter Lyons #82
Report For Mr.	Lou Pajak	Report For Mr.	C. Madison
Address	R.C.	Address	Rig

Sample From: Pit ☐ Flow Line ☐ Flowline Temp. ____ °F.	Mud Properties		
Time Sample Taken	17:00		11:30
Depth	1850		2000
Weight Flow Line	10.8		10.5
Weight Suction	10.8		10.5
Funnel Viscosity (Sec./Qt.)	44		40
V.G. Temp. Reading - °F.	55		62
Fann Viscosity (Cps.)	15		17.5
Plastic Viscosity (Cps.)	10		9
Yield Point (lbs./100 Sq. Ft.)	10		14
Gel Strength (Initial)	7		8
Gel Strength (10 Min.)	19		22
API Water Loss (cc. in 30 min.)	53		53
Cake Thickness (32nds.)	2		2
API HT-HP Fluid Loss (CC/30 min.)			
CEC (API Equiv. #/bbl. Bent.)			
pH. Strip ☑ Beckman ☐	11.0		11.0
P. Alkalinity (Pf)	.9		.9
M. Alkalinity (Mf)			
Salt ☐ PPM Chloride ☐ PPM	390 m		375 m
Calcium PPM ☐	4200		4250
Oil Content (% by Vol.)	0		0
Solids Content (% by Vol.)	12.5		11%
Sand Content (% by Vol.)	1½		¾

Hole and Circulation Data			
Spud Date			
Fill Last Trip	N.L. Ft.		
Surface Casing	20 In. @ 1123 Ft.		
Intermediate Casing	13⅜ In. @ 1738 Ft.		
Bit Type	S #88	Bit Size	12¼ In.
Mud in Hole	340 bbls.	Tanks	350 bbls.
Total Mud in System	690 bbls.		
#1 Pump Size	7 x 12 In.	Strokes Min.	
#2 Pump Size	x In.	Strokes Min.	
Bbls./Stroke		Output	13.4 Bbls./Min.
Mud Cycle	52 Min.		
Circulating BTM Up	23 Min.		
Drill Pipe	5½ In.	Ann. Vel.	118 Ft./Min.
Drill Collar	8½ In.	Ann. Vel.	190 Ft./Min.
Drill Collar	9½ In.	Ann. Vel.	200 Ft./Min.
Circ. Pressure	1630 PSI	Hydrostatic Press	1120 PSI

Swaco Equipment
☐ D. Silter
☐ D. Sander
☐ Super Screen
☐ Centrifuge
☐ D. Gasser
☐ Adjustable Choke
☐ Super Choke
☐ Monitor
☐ Trip Guard
☐ P.V.T.
☐ Mud Weigher
☐ Flo-Sensor

REMARKS — (Give operation, hole condition, and nature of any problems.)

(1) Drilling
(2) Hole appears to be cleaning well.
(3)

SUGGESTIONS — (To be followed only if the operator deems advisable.)

(1) Holding Vis 40-50 sec/qt.
(2) adding Pre mix to hold Vis
(3) added 25 gal Magcobar [illegible] for Foaming
(4) [illegible] Wt. add from tank number 5
if climbs over 10.7 #/gal start Desilter.
(5) [illegible] add 5 sxs Caustic Soda
to hold Pf at 1.0 cc.

MAGCOBAR WAREHOUSE		MAGCOBAR ENGINEER [illegible signature]	
ADDRESS	PHONE	ADDRESS	PHONE MOBILE

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Magcobar CANADA — FIELD DRILLING MUD REPORT

OILFIELD PRODUCTS DIVISION (SECURITY • SWACO • GUIBERSON • MAGCOBAR)

CHECK No. #7 Date 19 Aug

Well Name [illegible] Legal Description [illegible]

Company [illegible] Contractor [illegible]

Report For Mr. [illegible] Report For Mr. [illegible]

Address [illegible] Address [illegible]

Sample From: Pit ☐ Flow Line ☐ Flowline Temp. ____ °F.	Mud Properties			Hole and Circulation Data		Swaco Equipment	
Time Sample Taken	12:30	2nd		Spud Date 4 Aug 74		☐	D. Silter
Depth	2296			Fill Last Trip N.D.	Ft.	☐	D. Sander
Weight Flow Line	10.6			Surface Casing 20 In. @ 1123	Ft.	☐	Super Screen
Weight Suction	10.6			Intermediate Casing 13 3/8 In. @ 1736	Ft.	☐	Centrifuge
Funnel Viscosity (Sec./Qt.)	40			Bit Type S 88 Bit Size 12 1/4	In.	☐	D. Gasser
V.G. Temp. Reading - ° F.	69			Mud in Hole 360 bbls. Tanks 400	bbls.	☐	Adjustable Choke
Fann Viscosity (Cps.)	19			Total Mud in System 760	bbls.	☐	Super Choke
Plastic Viscosity (Cps.)	9			#1 Pump Size 7 x 12 In. Strokes Min.		☐	Monitor
Yield Point (lbs./100 Sq. Ft.)	18			#2 Pump Size x In. Strokes Min.		☐	Trip Guard
Gel Strength (Initial)	7			Bbls./ Stroke .142 Output 13.4	Bbls. Min.	☐	P.V.T.
Gel Strength (10 Min.)	19			Mud Cycle 57	Min.	☐	Mud Weigher
API Water Loss (cc. in 30 min.)	20			Circulating BTM Up 34	Min.	☐	Flo-Sensor
Cake Thickness (32nds.)	2			Drill Pipe 5 1/2 In. Ann. Vel.	120		Ft./Min.
API HT-HP Fluid Loss (CC/30 min.)	—			Drill Collar 6 1/2 In. Ann. Vel.	190		Ft./Min.
CEC (API Equiv. #/bbl. Bent.)	—			Drill Collar 9 1/2 In. Ann. Vel	700		Ft./Min.
pH. Strip ☐ Beckman ☐	10.5			Circ. Pressure 2074 PSI Hydrostatic Press			PSI
P. Alkalinity (Pf)	.4			REMARKS – (Give operation, hole condition, and nature of any problems.)			
M. Alkalinity (Mf)				1. Drl. Ahead –			
Salt ☐ PPM Chloride ☐ PPM	2250						
Calcium PPM ☐	[illegible]			(2) Running 16 cuts Desilter			
Oil Content (% by Vol.)	0						
Solids Content (% by Vol.)	11%			(3) appears to be Taking in CaCl water.			
Sand Content (% by Vol.)	1/2						

SUGGESTIONS – (To be followed only if the operator deems advisable.)

(1) Add 10 sx. Caustic Soda

(2) Hold Vis 40-50 sec/qt.

(3) For Vol. Loss add Envirotemic Tank #4

(4) add qts Magcobar if Mud foams.

MAGCOBAR WAREHOUSE		MAGCOBAR ENGINEER Del Hollis	
ADDRESS	PHONE	ADDRESS	PHONE MOBILE

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NOT LEGIBLE
ILLISIBLE

Magcobar CANADA — FIELD DRILLING MUD REPORT

OILFIELD PRODUCTS DIVISION (SECURITY • SWACO • GUIBERSON • MAGCOBAR)

CHECK No. #8 Date 20 Aug

Well Name Aquitaine et al Hunicard Ba Legal Description Hunicard

Company Aquitaine Contractor Pantagone

Report For Mr. Jean Paquet Report For Mr. C. Hutchins

Address R.S Address R.S

Sample From: Pit ☐ Flow Line ☐ Flowline Temp. ____ o F.

Mud Properties			
Time Sample Taken	15:00		
Depth	2400		2554
Weight Flow Line	10.2		10.0
Weight Suction	10.2		10.0
Funnel Viscosity (Sec./Qt.)	41		42
V.G. Temp. Reading - o F.	69°		70
Fann Viscosity (Cps.)	19.5		18
Plastic Viscosity (Cps.)	9		9
Yield Point (lbs./100 Sq. Ft.)	21		18
Gel Strength (Initial)	7		6
Gel Strength (10 Min.)	18		17
API Water Loss (cc. in 30 min.)	65		70
Cake Thickness (32nds.)	2		2
AP. HT-HP Fluid Loss (CC/30 min.)	—		—
CEC (API Equiv. #/bbl. Bent.)	—		—
pH. Strip ☐ Beckman ☐	11.5		11.5
P. Alkalinity (Pf)	.3		.9
M. Alkalinity (Mf)	—		—
Salt ☐ PPM Chloride ☐ PPM	160m		165m
Calcium PPM ☐	4500		7400
Oil Content (% by Vol.)	0		0
Solids Content (% by Vol.)	4½	corrected	3½
Sand Content (% by Vol.)	¼		¼

Hole and Circulation Data					Swaco Equipment
Spud Date	Aug 4/74				☐ D. Silter
Fill Last Trip	N.A.	Ft.			☐ D. Sander
Surface Casing	8.0	In. @	1123	Ft.	☐ Super Screen
Intermediate Casing	13 3/8	In. @	1733'	Ft.	☐ Centrifuge
Bit Type	S 88	Bit Size	12 1/4	In.	☐ D. Gasser
Mud in Hole	390	bbls. Tanks	400	bbls.	☐ Adjustable Choke
Total Mud in System	780	bbls.			☐ Super Choke
#1 Pump Size	7 x 12	In. Strokes Min.			☐ Monitor
#2 Pump Size	x	In. Strokes Min.			☐ Trip Guard
Bbls./ Stroke		Output 13.4		Bbls. Min.	☐ P.V.T.
Mud Cycle	54			Min.	☐ Mud Weigher
Circulating BTM Up	26			Min.	☐ Flo-Sensor
Drill Pipe	5 1/2	In.	Ann. Vel.	120	Ft./Min.
Drill Collar	8 1/2	In.	Ann. Vel.	190	Ft./Min.
Drill Collar	9 1/2	In.	Ann. Vel.	200	Ft./Min.
Circ. Pressure	2074	PSI	Hydrostatic Press		PSI

REMARKS – (Give operation, hole condition, and nature of any problems.)

① Drilling

(2) Running Pac Mix & Desilter to bring Wt. to 10.0

SUGGESTIONS – (To be followed only if the operator deems advisable.)

① Con't Pac mix add 10 Sxs + 60 sxs Salt Gel.

(2) Run 6 sxs Caustic per Tour.

(3) Hold Wt. 9.8 to 10.0 ± gal.

(4) Add 5 gals Magcomul for Loss

MAGCOBAR WAREHOUSE

ADDRESS PHONE

MAGCOBAR ENGINEER Don Kelly

ADDRESS PHONE MOBILE

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Magcobar CANADA — FIELD DRILLING MUD REPORT

OILFIELD PRODUCTS DIVISION (SECURITY • SWACO • GUIBERSON • MAGCOBAR)

CHECK No. F9 Date 21 Aug.

Well Name Dynamic et al Hudson Bay Legal Description Narwhal

Company Dynamic Contractor Pentagone

Report For Mr. J. W. Payne Report For Mr. C. Malhoux

Address Address Rig

Sample From: Pit ☐ Flow Line ☐ Flowline Temp. ____ ° F.

Mud Properties			
Time Sample Taken			11:30
Depth	2600		2900
Weight Flow Line	10.4		10.4
Weight Suction	10.4		10.4
Funnel Viscosity (Sec./Qt.)	38		38
V.G. Temp. Reading - ° F.	69		69
Fann Viscosity (Cps.)	14		15
Plastic Viscosity (Cps.)	8		7
Yield Point (lbs./100 Sq. Ft.)	12		15
Gel Strength (Initial)	7		6
Gel Strength (10 Min.)	19		12
API Water Loss (cc. in 30 min.)	7.8		6.5
Cake Thickness (32nds.)	2		2
API HT-HP Fluid Loss (CC/30 min.)	—		
CEC (API Equiv. #/bbl. Bent.)	—		
pH. Strip ☐ Beckman ☐	10.0		10.0
P. Alkalinity (Pf)	.2		.1
M. Alkalinity (Mf)	—		
Salt ☐ PPM Chloride ☑ PPM	170 m		175,000
Calcium PPM ☐	14,000		12,000
Oil Content (% by Vol.)	0		0
Solids Content (% by Vol.)	4 1/2		4 1/2
Sand Content (% by Vol.)	1/4		0

Hole and Circulation Data					
Spud Date	Aug 4/74				
Fill Last Trip	Nil	Ft.			
Surface Casing	20	In. @	1123	Ft.	
Intermediate Casing	13 3/8	In. @	1738	Ft.	
Bit Type	S 88	Bit Size	12 1/4	In.	
Mud in Hole	400	bbls. Tanks	400	bbls.	
Total Mud in System	800	bbls.			
#1 Pump Size	7 x 6	In. Strokes Min.			
#2 Pump Size	x	In. Strokes Min.			
Bbls./ Stroke	Output	13.4	Bbls. Min.		
Mud Cycle	60	Min.			
Circulating BTM Up	29	Min.			
Drill Pipe	5 1/2	In.	Ann. Vel.	120	Ft./Min.
Drill Collar	8 1/2	In.	Ann. Vel.	190	Ft./Min.
Drill Collar	9 1/2	In.	Ann. Vel.	200	Ft./Min.
Circ. Pressure	2764	PSI	Hydrostatic Press	1540	PSI

Swaco Equipment	
☐	D. Silter
☐	D. Sander
☐	Super Screen
☐	Centrifuge
☐	D. Gasser
☐	Adjustable Choke
☐	Super Choke
☐	Monitor
☐	Trip Guard
☐	P.V.T.
☐	Mud Weigher
☐	Flo-Sensor

REMARKS — (Give operation, hole condition, and nature of any problems.)

(1) Drilling

(2) Taking Gain 5 bbls hr.

(3) Last Trip Took 35 bbl gain

SUGGESTIONS — (To be followed only if the operator deems advisable.)

1) Add 10 sxs Caustic Soda

2) Run D.S. Evaluate add Pac M.V.

3) If Gain occurs add 5 gals Magconal.

MAGCOBAR WAREHOUSE		MAGCOBAR ENGINEER Del Allen	
ADDRESS	PHONE	ADDRESS	PHONE / MOBILE

In consideration of the furnishing of this report and oral suggestions, it is agreed that DRESSER MAGCOBAR CANADA, DIVISION OF DRESSER INDUSTRIES INC. shall not be liable for any damage resulting from same and it is to be held harmless.

ILLEGIBLE

FIELD DRILLING MUD REPORT

Magcobar CANADA

OILFIELD PRODUCTS DIVISION (SECURITY • SWACO • QUIBERSON • MAGCOBAR)

CHECK No. #10 Date 22 Dec

Well Name Aquitaine et al Hudson Bay	Legal Description Manitoba
Company Aquitaine	Contractor Pentagone
Report For Mr. [illegible] Pasnik	Report For Mr. C. [illegible]
Address N/A	Address N/A

Sample From: Pit ☐ Flow Line ☐ Flowline Temp. ___ °F.	Mud Properties			Hole and Circulation Data	Swaco Equipment
Time Sample Taken			1:30	Spud Date Aug 4	☐ D. Silter
Depth	3000		3160	Fill Last Trip N.C. Ft.	☐ D. Sander
Weight Flow Line	10.6		10.5	Surface Casing 20 In. @ 1125 Ft.	☐ Super Screen
Weight Suction	10.6		10.5	Intermediate Casing 13 3/8 In. @ 1735 Ft.	☐ Centrifuge
Funnel Viscosity (Sec./Qt.)	36		37	Bit Type 455 Bit Size 12 1/4 In.	☐ D. Gasser
V.G. Temp. Reading °F.	70		70	Mud in Hole 420 bbls. Tanks 380 bbls.	☐ Adjustable Choke
Fann Viscosity (Cps.) 600R	30		30	Total Mud in System 800 bbls.	☐ Super Choke
Plastic Viscosity (Cps.)	8		7	#1 Pump Size 7 x 12 In. Strokes Min.	☐ Monitor
Yield Point (lbs./100 Sq. Ft.)	12		15	#2 Pump Size x In. Strokes Min.	☐ Trip Guard
Gel Strength (Initial)	9		7	Bbls./Stroke Output 13.4 Bbls./Min.	☐ P.V.T.
Gel Strength (10 Min.)	21		22	Mud Cycle 60 Min.	☐ Mud Weigher
API Water Loss (cc. in 30 min.)	75		70	Circulating BTM Up 29 Min.	☐ Flo-Sensor
Cake Thickness (32nds.)	2		2	Drill Pipe 5 1/2 In. Ann. Vel. 120 Ft./Min.	
API HT-HP Fluid Loss (CC/30 min.)	—		—	Drill Collar 8 1/2 In. Ann. Vel. 190 Ft./Min.	
CEC (API Equiv. #/bbl. Bent.)	—		—	Drill Collar 9 1/2 In. Ann. Vel. 200 Ft./Min.	
pH. Strip ☐ Beckman ☑	10.5		11.5	Circ. Pressure [illegible] PSI Hydrostatic Press 1728 PSI	
P. Alkalinity (Pf)	.2		.6	REMARKS — (Give operation, hole condition, and nature of any problems.)	
M. Alkalinity (Mf)	—		—	(1) Drilling	
Salt ☑ PPM Chloride ☐ PPM	175,000		175,000		
Calcium PPM	70,000		75,000	(2) Taking on CaCl2 from	
Oil Content (% by Vol.)				High Pressure Fractures	
Solids Content (% by Vol.)	5 1/2		5%		
Sand Content (% by Vol.)	1/4		1/4		

SUGGESTIONS — (To be followed only if the operator deems advisable.)

(1) Adding Caustic Soda to hold PH over 11

(2) Low Vol [illegible] control use Pit #4

(3) [illegible] flow Tank on Trip use Tank #1

MAGCOBAR WAREHOUSE	MAGCOBAR ENGINEER [illegible]
ADDRESS / PHONE	ADDRESS / PHONE MOBILE

In consideration of the furnishing of this report and oral suggestions, it is agreed that DRESSER MAGCOBAR CANADA, DIVISION OF DRESSER INDUSTRIES INC. shall not be liable for any damage resulting from same and it is to be held harmless.

NOT LEGIBLE
ILLISIBLE

Magcobar CANADA — FIELD DRILLING MUD REPORT

OILFIELD PRODUCTS DIVISION (SECURITY • SWACO • GUIBERSON • MAGCOBAR)

CHECK No. #11 Date 23 Aug.

Well Name Pan Canadian et al Hudson Bay	Legal Description Narwhal
Company Pantango	Contractor Pantango
Report For Mr. Low Parker	Report For Mr. Wark
Address	Address Rig

Sample From: Pit ☐ Flow Line ☐ Flowline Temp. ____ °F.	Mud Properties			Hole and Circulation Data				Swaco Equipment	
Time Sample Taken			11:30	Spud Date	Aug 4/74			☐	D. Silter
Depth			3331	Fill Last Trip	N.L	Ft.		☐	D. Sander
Weight Flow Line			10.5	Surface Casing	20 In. @ 1123	Ft.		☐	Super Screen
Weight Suction			10.5	Intermediate Casing	13 3/8 In. @ 1738	Ft.		☐	Centrifuge
Funnel Viscosity (Sec./Qt.)			39	Bit Type	47S	Bit Size	12 1/4 In.	☐	D. Gasser
V.G. Temp. Reading - ° F.			75	Mud in Hole	450 bbls.	Tanks	300 bbls.	☐	Adjustable Choke
Fann Viscosity (Cps.)			11	Total Mud in System	730 bbls.			☐	Super Choke
Plastic Viscosity (Cps.)			6	#1 Pump Size	7 x 10 In.	Strokes Min.		☐	Monitor
Yield Point (lbs./100 Sq. Ft.)			18	#2 Pump Size	x In.	Strokes Min.		☐	Trip Guard
Gel Strength (Initial)			5	Bbls./ Stroke	Output 13.4	Bbls. Min.		☐	P.V.T.
Gel Strength (10 Min.)			21	Mud Cycle	52	Min.		☐	Mud Weigher
API Water Loss (cc. in 30 min.)			7.5	Circulating BTM Up	33	Min.		☐	Flo-Sensor
Cake Thickness (32nds.)			2	Drill Pipe	5 1/2 In.	Ann. Vel.	120	Ft./Min.	
API HT-HP Fluid Loss (CC/30 min.)				Drill Collar	8 1/2 In.	Ann. Vel.	190	Ft./Min.	
CEC (API Equiv. #/bbl. Bent.)				Drill Collar	9 1/2 In.	Ann. Vel.	200	Ft./Min.	
pH. Strip ☐ Beckman ☐			11.5	Circ. Pressure	2775 PSI	Hydrostatic Press	1010	PSI	
P. Alkalinity (Pf)			.5	REMARKS — (Give operation, hole condition, and nature of any problems.)					
M. Alkalinity (Mf)			1.85 ca	Drilling					
Salt ☐ PPM Chloride ☐ PPM			10 mm						
Calcium PPM ☐			24	Pulled Bit No fill in bottom					
Oil Content (% by Vol.)			0						
Solids Content (% by Vol.)			5%						
Sand Content (% by Vol.)			1						

SUGGESTIONS — (To be followed only if the operator deems advisable.)

1) Hold PH 11 & 12 with Caustic

2) Hold V.i 40-45 sec/qt.
Use Pac Mix for Vol + V.i

3) Add 3T wt to Pit # 2

MAGCOBAR WAREHOUSE		MAGCOBAR ENGINEER	
ADDRESS	PHONE	ADDRESS	PHONE MOBILE

In consideration of the furnishing of this report and oral suggestions, it is agreed that DRESSER MAGCOBAR CANADA, DIVISION OF DRESSER INDUSTRIES INC. shall not be liable for any damage resulting from same and it is to be held harmless.

NOT LEGIBLE
ILLISIBLE

Magcobar CANADA

FIELD DRILLING MUD REPORT

OILFIELD PRODUCTS DIVISION (SECURITY • SWACO • GUIBERSON • MAGCOBAR)

CHECK No. 12 Date 24 Aug.

Well Name [illegible] Legal Description [illegible]

Company [illegible] Contractor [illegible]

Report For Mr. [illegible] Report For Mr. [illegible]

Address [illegible] Address [illegible]

Sample From: Pit ☐ Flow Line ☐ Flowline Temp. ____ °F.	Mud Properties			Hole and Circulation Data		Swaco Equipment
Time Sample Taken	2 00		11:30	Spud Date 4 Aug./74		☐ D. Silter
Depth	3500		3610	Fill Last Trip N. C Ft.		☐ D. Sander
Weight Flow Line	10.6		10.7	Surface Casing 20 In. @ 1123 Ft.		☐ Super Screen
Weight Suction	10.6		10.7	Intermediate Casing 13 3/8 In. @ 1758 Ft.		☐ Centrifuge
Funnel Viscosity (Sec./Qt.)	37		38	Bit Type 455 Bit Size 12 1/4 In.		☐ D. Gasser
V.G. Temp. Reading - ° F.	60		65	Mud in Hole 430 bbls. Tanks 240 bbls.		☐ Adjustable Choke
Fann Viscosity (Cps.)	15		14.5	Total Mud in System 670 bbls.		☐ Super Choke
Plastic Viscosity (Cps.)	9		10	#1 Pump Size 7 x 12 In. Strokes Min.		☐ Monitor
Yield Point (lbs./100 Sq. Ft.)	12		9	#2 Pump Size x In. Strokes Min.		☐ Trip Guard
Gel Strength (Initial)	5		7	Bbls./ Stroke Output 13.4 Bbls. Min.		☐ P.V.T.
Gel Strength (10 Min.)	17		22	Mud Cycle Min.		☐ Mud Weigher
API Water Loss (cc. in 30 min.)	70		70	Circulating BTM Up Min.		☐ Flo-Sensor
Cake Thickness (32nds.)	2		2	Drill Pipe 5 In. Ann. Vel. 115 Ft./Min.		
API HT-HP Fluid Loss (CC/30 min.)	—		—	Drill Collar 8 1/2 In. Ann. Vel. 185 Ft./Min.		
CEC (API Equiv. #/bbl. Bent.)	—		—	Drill Collar 9 1/2 In. Ann. Vel. 202 Ft./Min.		
pH. Strip ☐ Beckman ☐	12.0		11.5	Circ. Pressure 3774 PSI Hydrostatic Press PSI		
P. Alkalinity (Pf)	.6		.4	REMARKS – (Give operation, hole condition, and nature of any problems.)		
M. Alkalinity (Mf)	—		—	(1) Drilling		
Salt ☐ PPM Chloride ☐ °PPM	195 000		310,000			
Calcium PPM ☐	3000		35 000	(2) Spinning 5 bbls per hr.		
Oil Content (% by Vol.)	—		—			
Solids Content (% by Vol.)	5%		5 1/2			
Sand Content (% by Vol.)	—		—			

SUGGESTIONS – (To be followed only if the operator deems advisable.)

(1) Drilling & Saturate add ~~add~~ 223 bags salt

(2) Hold Vis 40-45 sec/qt

(3) Hold PH 10.5 - 12. with Caustic

(4) While adding Salt add Sqal Defoamer

MAGCOBAR WAREHOUSE		MAGCOBAR ENGINEER [illegible]	
ADDRESS	PHONE	ADDRESS	PHONE MOBILE

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NOT LEGIBLE
ILLISIBLE

Magcobar CANADA — FIELD DRILLING MUD REPORT

OILFIELD PRODUCTS DIVISION (SECURITY • SWACO • GUIBERSON • MAGCOBAR)

CHECK No. 15 Date 26 Aug

Well Name Cominco et al Hudson Bay — Legal Description Narwhal C

Company Cominco — Contractor Pantagon 482

Report For Mr. Lou Papik — Report For Mr. C. Wasekin

Address PC — Address RS

Sample From: Pit ☐ Flow Line ☐ Flowline Temp. ____ ° F.	Mud Properties			Hole and Circulation Data		Swaco Equipment
Time Sample Taken	1:00 pm		3390	Spud Date 4 Aug		☐ D. Silter
Depth	3740		3870	Fill Last Trip N.C	Ft.	☐ D. Sander
Weight Flow Line	10.8		10.8	Surface Casing 20 In. @ 1123	Ft.	☐ Super Screen
Weight Suction	10.8		10.8	Intermediate Casing 13 3/8 In. @ 1738	Ft.	☐ Centrifuge
Funnel Viscosity (Sec./Qt.)	39		38	Bit Type 455 Bit Size 12 1/4	In.	☐ D. Gasser
V.G. Temp. Reading - ° F.	70		72	Mud in Hole 440 bbls. Tanks 300	bbls.	☐ Adjustable Choke
Fann Viscosity (Cps.)	14		13.5	Total Mud in System 740	bbls.	☐ Super Choke
Plastic Viscosity (Cps.)	9		9	#1 Pump Size 7 x 12 In. Strokes Min.		☐ Monitor
Yield Point (lbs./100 Sq. Ft.)	10		9	#2 Pump Size x In. Strokes Min.		☐ Trip Guard
Gel Strength (Initial)	5		4	Bbls./ Stroke Output 13.4	Bbls. Min.	☐ P.V.T.
Gel Strength (10 Min.)	17		16	Mud Cycle 55	Min.	☐ Mud Weigher
API Water Loss (cc. in 30 min.)	70		75	Circulating BTM Up 3:0	Min.	☐ Flo-Sensor
Cake Thickness (32nds.)	2		2	Drill Pipe 5" In.	Ann. Vel. 112	Ft./Min.
API HT-HP Fluid Loss (CC/30 min.)	—		—	Drill Collar 8 1/2 In.	Ann. Vel. 185	Ft./Min.
CEC (API Equiv. #/bbl. Bent.)	—	—	—	Drill Collar 9 1/2 In.	Ann. Vel. 208	Ft./Min.
pH. Strip ☐ Beckman ☐	11.5		11.5	Circ. Pressure 2900 PSI	Hydrostatic Press 5164	PSI
P. Alkalinity (Pf)	.4		.4	REMARKS – (Give operation, hole condition, and nature of any problems.)		
M. Alkalinity (Mf)	—		—	Drilling - still taking		
Salt ☐ PPM Chloride ☐ PPM	300,000		290,000	on Gel from hole		
Calcium PPM ☐	45,000		50,000	5-8 bbls per hr.		
Oil Content (% by Vol.)						
Solids Content (% by Vol.)	6%		6%			
Sand Content (% by Vol.)	—		0			

SUGGESTIONS – (To be followed only if the operator deems advisable.)

(1) Hold PH 11 to 12 with Caustic

(2) Hold Vis 40-45 sec/qt.

(3) Use Pt #4 for Gel and Vis

MAGCOBAR WAREHOUSE		MAGCOBAR ENGINEER Ted Kovacs	
ADDRESS	PHONE	ADDRESS	PHONE / MOBILE

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NOT LEGIBLE
ILLISIBLE

Magcobar CANADA — FIELD DRILLING MUD REPORT

OILFIELD PRODUCTS DIVISION (SECURITY • SWACO • GUIBERSON • MAGCOBAR)

CHECK No. 141 Date 26 Aug

Well Name Aquitaine et al Hudson Bay | Legal Description Norwhal

Company Aquitaine | Contractor Pentagone 492

Report For Mr. Lou Pozak | Report For Mr. C. Martin

Address R.C | Address R.C

Sample From: Pit ☐ Flow Line ☐ Flowline Temp ____ °F.

Mud Properties		
Time Sample Taken	1:00	8:00
Depth	4026	4070
Weight Flow Line	10.9	10.8
Weight Suction	10.9	10.7
Funnel Viscosity (Sec./Qt.)	36	39
V.G. Temp. Reading - ° F.	70	72
Fann Viscosity (Cps.)	13	14
Plastic Viscosity (Cps.)	9	10
Yield Point (lbs./100 Sq. Ft.)	8	8
Gel Strength (Initial)	4	4
Gel Strength (10 Min.)	15	16
API Water Loss (cc. in 30 min.)	7.5	7.3
Cake Thickness (32nds.)	2	2
API HT-HP Fluid Loss (CC/30 min.)	—	
CEC (API Equiv. #/bbl. Bent.)	—	
pH. Strip ☐ Beckman ☐	11.5	11.5
P. Alkalinity (Pf)	.3	.4
M. Alkalinity (Mf)	—	
Salt ☐ PPM Chloride ☐ PPM	29,000	270,000
Calcium PPM ☐	[illegible]	15,000
Oil Content (% by Vol.)	0	0
Solids Content (% by Vol.)	6 1/2	6
Sand Content (% by Vol.)	0	0

Hole and Circulation Data	
Spud Date	Aug 4/76
Fill Last Trip	N.L Ft.
Surface Casing	20 In. @ 112.3 Ft.
Intermediate Casing	13 3/8 In. @ 1738 Ft.
Bit Type	12 1/4 Bit Size 4.5 < In.
Mud in Hole	410 bbls. Tanks 3 1/2 bbls.
Total Mud in System	900 bbls.
#1 Pump Size	7 x 12 In. Strokes Min.
#2 Pump Size	x In. Strokes Min.
Bbls./ Stroke	Output 13.4 Bbls. Min.
Mud Cycle	60 Min.
Circulating BTM Up	43 Min.
Drill Pipe	5 " In. Ann. Vel. 115 Ft./Min.
Drill Collar	8 1/2 In. Ann. Vel. 185 Ft./Min.
Drill Collar	9 1/2 In. Ann. Vel. 205 Ft./Min.
Circ. Pressure	2825 PSI Hydrostatic Press 2302 PSI

Swaco Equipment	
☐	D. Silter
☐	D. Sander
☐	Super Screen
☐	Centrifuge
☐	D. Gasser
☐	Adjustable Choke
☐	Super Choke
☐	Monitor
☐	Trip Guard
☐	P.V.T.
☐	Mud Weigher
☐	Flo-Sensor

REMARKS – (Give operation, hole condition, and nature of any problems.)

Drilling -
preparing to Trip for bit

SUGGESTIONS – (To be followed only if the operator deems advisable.)

1) Hold V.S 40-45 with Salt G.L

2) Add 6 sxs Caustic Soda

3) Run Desilter as Vol permits

MAGCOBAR WAREHOUSE | MAGCOBAR ENGINEER Lloyd Kelsey

ADDRESS | PHONE | ADDRESS | PHONE MOBILE

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NOT LEGIBLE
ILLISIBLE

Magcobar CANADA — FIELD DRILLING MUD REPORT

OILFIELD PRODUCTS DIVISION (SECURITY • SWACO • GUIBERSON • MAGCOBAR)

CHECK No. F 15 Date 27 Aug

Well Name [illegible] Hudson Bay | Legal Description Yakeuh 36

Company [illegible] | Contractor Pentagon

Report For Mr. [illegible] Pajak | Report For Mr. C. Wenker

Address [illegible] | Address R.G

Sample From Pit ☐ Flow Line ☐ Flow Line Temp ____ °F.	Mud Properties		
Time Sample Taken	1/1845		
Depth	4/1175'		
Weight Flow Line	10.7		
Weight Suction	10.7		
Funnel Viscosity (Sec/Qt.)	59		
V.G. Temp. Reading - ° F.	75°		
Fann Viscosity (Cps.)	14		
Plastic Viscosity (Cps.)	10		
Yield Point (lbs/100 Sq. Ft.)	8		
Gel Strength (Initial)	4		
Gel Strength (10 Min.)	14		
API Water Loss (cc. in 30 min.)	7.5		
Cake Thickness (32nds.)	2		
API HT-HP Fluid Loss (CC 30 min.)	—		
CEC (API Equiv. # bbl. Bent.)	—		
pH. Strip ☐ Beckman ☐	11.5		
P. Alkalinity (Pf)	.4		
M. Alkalinity (Mf)	—		
Salt ☐ PPM Chloride ☐ PPM	2600 mg		
Calcium PPM ☐	120 mg		
Oil Content (% by Vol.)	0		
Solids Content (% by Vol.)	5 1/2		
Sand Content (% by Vol.)	0		

Hole and Circulation Data				
Spud Date	Aug 4/74			
Fill Last Trip	N.L	Ft.		
Surface Casing	10"	In. @	1123	Ft.
Intermediate Casing	13 3/8	In. @	1758	Ft.
Bit Type	455	Bit Size	12 1/4	In.
Mud in Hole	4170	bbls. Tanks	330	bbls.
Total Mud in System	300	bbls.		
#1 Pump Size	7 x 12	In. Strokes Min.		
#2 Pump Size	x	In. Strokes Min.		
Bbls./ Stroke	Output	13.4	Bbls. Min.	
Mud Cycle	60	Min.		
Circulating BTM Up	4 1/4	Min.		
Drill Pipe	5"	In. Ann. Vel.	115'	Ft./Min.
Drill Collar	8 1/2	In. Ann. Vel.	195'	Ft./Min.
Drill Collar	9 1/2	In. Ann. Vel.	205'	Ft./Min.
Circ. Pressure	2800	PSI Hydrostatic Press		PSI

Swaco Equipment	
☐	D. Silter
☐	D. Sander
☐	Super Screen
☐	Centrifuge
☐	D. Gasser
☐	Adjustable Choke
☐	Super Choke
☐	Monitor
☐	Trip Guard
☐	P.V.T.
☐	Mud Weigher
☐	Flo-Sensor

REMARKS — (Give operation, hole condition, and nature of any problems.)

Drilling

(1) Last Trip no C.U.

(2) Hang off for weather

SUGGESTIONS — (To be followed only if the operator deems advisable.)

1) Build V.S 40-45" wt.

2) DJ 11-12 with Caustic

3) Build mud wt. 10.6# & 10.9# gal

MAGCOBAR WAREHOUSE		MAGCOBAR ENGINEER	
ADDRESS	PHONE	ADDRESS	PHONE / MOBILE

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NOT LEGIBLE
ILLISIBLE

Magcobar CANADA — FIELD DRILLING MUD REPORT

OILFIELD PRODUCTS DIVISION (SECURITY • SWACO • GUIBERSON • MAGCOBAR)

CHECK No. 16 [illegible] Date 28 Aug.

Well Name [illegible] Bay	Legal Description [illegible]
Company [illegible]	Contractor [illegible]
Report For Mr. [illegible]	Report For Mr. [illegible] Watkins
Address [illegible]	Address Rig

Sample From: Pit ☐ Flow Line ☐ Flowline Temp ____ °F.

Mud Properties			
Time Sample Taken	3:00 [illegible]		
Depth	4341		
Weight Flow Line	11.0		
Weight Suction	11.0		
Funnel Viscosity (Sec./Qt.)	41		
V.G. Temp. Reading - °F.	—		
Fann Viscosity (Cps.)	16		
Plastic Viscosity (Cps.)	11		
Yield Point (lbs./100 Sq. Ft.)	10		
Gel Strength (Initial)	5		
Gel Strength (10 Min.)	17		
API Water Loss (cc. in 30 min.)	7.1		
Cake Thickness (32nds.)	2		
API HT-HP Fluid Loss (CC/30 min.)	—		
CEC (API Equiv. #/bbl. Bent.)	—		
pH. Strip ☐ Beckman ☐	11.5		
P. Alkalinity (Pf)	.5		
M. Alkalinity (Mf)	—		
Salt ☐ PPM Chloride ☐ PPM	2700		
Calcium PPM	40 [illegible]		
Oil Content (% by Vol.)	0		
Solids Content (% by Vol.)	7%		
Sand Content (% by Vol.)	[illegible]		

Hole and Circulation Data	
Spud Date	[illegible] Aug 4/7[illegible]
Fill Last Trip	Nil Ft.
Surface Casing	20 In. @ 1123 Ft.
Intermediate Casing	13 3/8 In. @ 1735 Ft.
Bit Type	[illegible] Bit Size 12 1/4 In.
Mud in Hole	480 bbls. Tanks 350 bbls.
Total Mud in System	830 bbls.
#1 Pump Size	7 x 12 In. Strokes Min.
#2 Pump Size	x In. Strokes Min.
Bbls./Stroke	Output 13.4 Bbls./Min.
Mud Cycle	61 Min.
Circulating BTM Up	Min.
Drill Pipe	5 In. Ann. Vel. 115 Ft./Min.
Drill Collar	8 1/2 In. Ann. Vel. 185 Ft./Min.
Drill Collar	9 1/2 In. Ann. Vel. 205 Ft./Min.
Circ. Pressure	2908 PSI Hydrostatic Press 2483 PSI

Swaco Equipment
☐ D. Silter
☐ D. Sander
☐ Super Screen
☐ Centrifuge
☐ D. Gasser
☐ Adjustable Choke
☐ Super Choke
☐ Monitor
☐ Trip Guard
☐ P.V.T.
☐ Mud Weigher
☐ Flo-Sensor

REMARKS — (Give operation, hole condition, and nature of any problems.)

(1) Drilling to T.D.

(2) Preparing to Log

SUGGESTIONS — (To be followed only if the operator deems advisable.)

(1) Hold V.is 40-45 sec/L.

(2) Bring Tank # 2 up to 13.5 gal

MAGCOBAR WAREHOUSE	MAGCOBAR ENGINEER [illegible]
ADDRESS / PHONE	ADDRESS / PHONE MOBILE

In consideration of the furnishing of this report and oral suggestions, it is agreed that DRESSER MAGCOBAR CANADA, DIVISION OF DRESSER INDUSTRIES INC. shall not be liable for any damage resulting from same and it is to be held harmless.

AQUITAINE COMPANY
OF CANADA LTD.

FISHING OPERATION REPORT

Aquit et al Narwhal South O-58

Narwhal South O-58 was drilled with almost no trouble.

No major problems were experienced.

August 9, 1974

Loss of the Mandrel Assembly on the B.J. Subsea Cementing System

Well situation: 26" hole at 1,123'
20" casing shoe at 1,093'

After pulling out the 20" casing running tool, the crew realized they had lost the mandrel assembly. We assume the thread was broken when the mandrel hit the 20" housing (this was due to the rig heave after releasing the casing running tool).

One recovery attempt was made, with the 14-1/2" OD Globe Junk Catcher, without success.

A 17-1/2" OSC 1G bit was run, to drill out the cement and mandrel assembly.

Four hours later, normal operations were resumed.

August 19 and 21, 1974

Well situation: #7 bit (12-1/4"; S88) pulled out at 2,058'
Bit condition: T.7 - B.7 - G.I

The junk sub was run with bits #8 and #9, to clean the hole after loss of the bearing rollers on bit #7.

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LOST CIRCULATION AND GAIN ZONES

Aquit et al Narwhal South O-58

Lost Circulation

A partial loss of 75 bbls of mud was recorded around 1,270' (siltstone and mudstone). As a steady gain (5 - 6 bbls/hour) of $CaCl_2$ was recorded at 1,335', a few hours later, it is unknown whether the thief formation was continuing to take mud.

Gain

The first gain was recorded at 1,335', in the Middle Kenogami formation (siltstone and mudstone). A steady 5 - 6 bbls/hour of heavy calcium chloride water (see water analysis) was flowing into the well until the 13-3/8" casing was set at 1,737'.

The second gain of calcium chloride water was recorded at 2,732', in the Severn River formation (dolomite and limestone) and lasted until T.D.

Remarks: Varied mud weights, between 9.8 and 10.6, seemed to have no apparent effect on the influx rate of the $CaCl_2$ water.

AQUITAINE COMPANY
OF CANADA LTD.

ABANDONMENT REPORT

Aquit et al Narwhal South O-58

Well Situation

30" casing shoe at 713'
20" casing shoe at 1,093'
13-3/8" casing shoe at 1,737'
T.D. 12-1/4" hole at 1,341' (W)

Plugging

To avoid a loss of time having to feel the cement plugs, a continuous cement plug was run in five stages, from T.D. to 700'.

First Stage

4,340' - 3,534' (806'): 500 sx of Oilwell Class B cement + 10% pre-hydrated gel. Slurry weight 13.6.

Second Stage

3,534' - 2,728' (806'): 540 sx of Oilwell Class B cement + 10% pre-hydrated gel. Slurry weight 13.6.

Third Stage

2,728' - 1,922' (806'): 540 sx of Oilwell Class B cement + 10% pre-hydrated gel. Slurry weight 13.6.

Fourth Stage

1,922' - 1,116' (806'): 540 sx of Oilwell Class B cement + 10% pre-hydrated gel. Slurry weight 13.5.

Fifth Stage

1,116' - 700' (416'): 350 sx of Oilwell Class B cement + 3% $CaCl_2$.

Wellhead Recovery

Cutting Operation

The casings were cut 30' below the casing head, using the following AZ equipment:

- AZ MS10A Marine Swivel 12" OD
- AZ Three Bladed C13 Marine Cutter - 11-3/4" OD with C13-8-19 Cutter Arms to cut the 13-3/8", 68# casing.
- AZ C13 Marine Cutter with C-13-8-36 Cutter Arms to cut the 20", 94# casing.
- AZ C13 Marine Cutter with C13-8-52 Cutter Arms to cut the 30" - 1" wall, casing.

Riser BOP Stack and Wellhead Recovery

The 16" riser and 13-5/8" BOP stack were pulled first, followed by the permanent guide base and 13-5/8", 20" - 30" housings, using an AZ Marine casing spear RSP 13. The temporary guide base was pulled using the conventional running retrieving tool. (An unsuccessful attempt was made using only the 4 guide lines).

An inspection of the recovered wellhead showed that the 13-3/8" casing was cemented up to mud line. No trace of cement in the 20" x 30" annulus.

Timing

A total of 52 hours were spent from the time the drill pipes were run in the hole to plug, until the temporary guide base was on the spider deck and the sea bed was completely cleared.

Plugging: 20.45 hours (including laying down D.P. and D.C.)

Cutting: 14 hours

Recovery: 17.15 hours

AQUITAINE COMPANY
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TIME ANALYSIS

Aquit et al Narwhal South O-58

1.	Rigging Up and Tearing Down:	65.00 hrs	8.79%
2.	Drilling:	281.00 hrs	38.02%
3.	Re-drilling:	1.00 hrs	0.13%
4.	Drilling Trip:	57.15 hrs	7.74%
5.	Hole Opening:	2.15 hrs	0.29%
6.	Coring:	3.30 hrs	0.44%
7.	Coring Trip:	16.45 hrs	2.26%
8.	Testing:	Nil	
9.	Miscellaneous Operations:	40.00 hrs	5.41%
10.	Well Completion:	Nil	
11.	Casing:	129.30 hrs	17.52%
12.	Circulation:	11.00 hrs	1.48%
13.	Fishing Job:	0.30 hrs	0.04%
14.	Abandon:	52.00 hrs	7.03%
15.	Repairs:	1.00 hrs	0.13%
16.	Waiting Time:	78.15 hrs	10.58%
	Total:	739.00 hrs	

AQUITAINE COMPANY
OF CANADA LTD.

TIME ANALYSIS

Aquit et al Narwhal South O-58

1. Rigging Up and Tearing Down

This consumed 8.79% of time. 39.00 hours were spent for the anchoring. Four anchors were slipping at the 100 ton test and had to be picked up and re-located. Two piggy-back anchors were used on C1 and C2 anchor lines.

There were no problems in retrieving anchors and this was accomplished in 11.30 hours.

2. Drilling

281.00 hours or 38.02% of the total time.

Average drilling rate 4,341'/281' = 15.44'/hour on all diameters.

The selection of the drilling bits was good. The heavy $CaCl_2$ water, flowing into the well and keeping the mud weight over 10 ppg, certainly impaired the penetration rate.

3. Re-drilling

0.13% - mainly for checking the hole.

4. Drilling Trip

57.15 hours for 11 bits.

A better performance could have been accomplished, if the crews (particularly the floormen) were experienced.

5. Hole Opening

2.15 hours to open 30' of cored hole, from 8-15/32" to 12-1/4".

6. Coring

3.30 hours or 0.44%.

Only one core was cut. The C-20 Christensen diamond corehead was well adapted to the limestone. 100% recovery.

7. Coring Trip

16.45 hours or 2.26%.

One extra trip was made due to circulation problems. The core barrel was plugged by some rubber pieces coming from the Dowell cement plugs.

8. Testing

None.

9. Miscellaneous Operations

40.00 hours or 5.41% of total time for electrical surveys, velocity survey and 10 deviation surveys.

10. Well Completion

None.

11. Casing

129.30 hours or 17.52% of total time for 20", 30" and 13-3/8" casings. Same as for "Drilling Trip", a better performance could have been given if the crews (particulary the floormen) were experienced.

12. Circulation

11.00 hours or 1.48%.

The circulations were reduced to their minimum as the hole conditions were very good at all times.

13. Fishing Job

0.30 hours or 0.04% was spent working the junk sub on bottom, to recover the bearing rollers lost from the #7 bit. Actually, an additional 3.45 hours were spent on this, but they are included in the casing time when the B.J. subsea mandrel assembly was lost during the 20" casing job.

14. Abandon

52.00 hours or 7.03% of total time.

This time involved plugging the well, cutting the 20", 30" and 13-3/8" casings, recovering all of the wellhead, and laying down drill pipes and drill collars.

15. Repairs

1.00 hour or 0.13%, due to a hydraulic fluid leak on the drilling motion compensator.

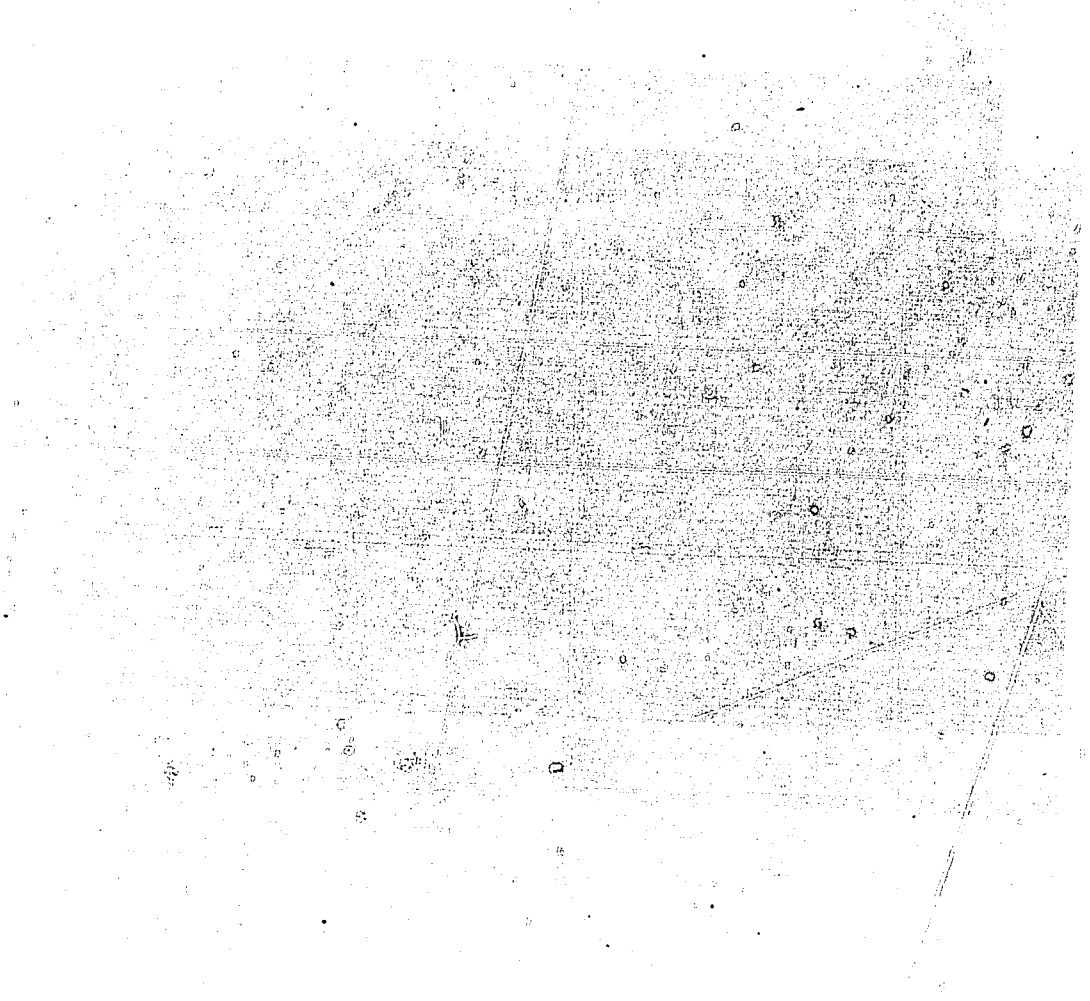
16. Waiting Time

78.15 hours or 10.58% of total time.

53.45 hours were lost waiting on mud products (gel and salt). As the rig arrived (from the North Sea) without any mud products on board, 22 hours were lost waiting on products to build the spudding mud. An attempt was made to spud with only sea water, but some hole cleaning problems caused a halt to the attempt.

Another 31.45 hours were spent waiting on salt, due to a lack of storage capability on the P-82 and an unexpected thickness of salt formation.

24.30 hours were lost waiting on weather and in such a rough sea, we believe that any other drilling unit would have stopped more frequently and for longer periods of time.



WELL REPORT

NARWHAL SOUTH-1

GEOLOGY

1. Prognosis and Programme

2. Drilling Ticket
   Cutting Description

3. Geological Daily Reports

4. Core Study
   a) geological description
   b) colour picture
   c) porosity permeability analysis

5. Water Analysis

6. Logging
   a) logging record
   b) log evaluation
   c) Logs (in pocket)
      - Composite Wellsite Log - (Ex-log)
      - Pressure Log - (Ex-log)
      - Off Line Utilities, 2 different scales - (Ex-log)
      - Interpretative log
      - Schlumberger
        DIL
        FDC-CNL
        SLC-GR
        HDT
        CORIBAND INTERPRETED LOG

1. PROGNOSIS AND PROGRAMME

AQUITAINE ET AL NARWHAL SOUTH NO. 1 N-58

Co-ordinates:

58°07'56.28"N
84°08'16.78"W

PROGNOSIS

GEOLOGICAL AND LOGGING PROGRAM

AQUIT ET AL NARWHAL SOUTH NO. 1 N-58

PROGNOSIS AND PROGRAM

1. Section

	Sea bottom	drift	530'
Middle Devonian	Kenogami	carbonates, shale, evaporites	800'
~~Unconformity~~~			
Middle Silurian	Attawapiskat	reefal limestone	1,700'
	Ekwan-Severn	fine grained tight carbonates	2,000'
Ordovician	Churchill River Bad Cache Rapids	mainly limestone	3,100'
Pre-Cambrian	Basement		4,500'

2. Sampling

Cutting samples will be collected every 5 feet unless it is physically impossible because of the penetration rate.

3. Coring

Two to three cores will be taken in the main reservoirs of the section:

- One in the middle Kenogami, only if there is a sufficient and adequate caprock and if hydrocarbon shows are detected.
- One in the Attawapiskat, at 1,700'.
- One in any significant reservoir below 3,100'.

Normally, 30 feet will be cut if the penetration rate is good or fair. Below 5 feet/hour, the total length will not exceed 15 feet.

(If a significant hydrocarbon bearing reservoir is encountered the total amount of footage cored will be increased).

A final 9 foot core will be taken in the apparent basement unless an unquestionable crystalline or metamorphosed rock can be detected in the cuttings. A minimum of 30 feet of basement rocks will be penetrated.

4. Mud Logging (Exploration Logging Inc.)

The following parameters will be continuously recorded:

- penetration rate (min/foot)
- total gas content with a continuous gas detector
- chromatographic analysis of the gas: C_1, C_2, C_3, C_4, pentanes, CO_2, H_2
- mud weight in and mud weight out
- pits volume
- Mano-calcimetry on every 10 foot cutting sample.

Thin sections will be prepared at intervals selected by the geologist.

5. Testing

All significant reservoirs will be tested with the Schlumberger F.I.T. after logging and before running casing. The F.I.T. will have to be equipped with two Amerada pressure gauges. If necessary, full D.S.T.'s will be run after completion of the well, through casing perforations.

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D.S.T.'s could be run also after setting casing, in case of encountering a significant reservoir at a short distance below the shoe.

Detailed instructions for sampling the fluids will be available in the P-82 geological Lab.

6. Master Log Reports

A daily report will be passed on to the base of Churchill at 8:00 a.m. local time, either in clear if the scrambler is operating or coded if not. A weekly report will be prepared and sent to Calgary with a copy of the

- cutting descriptions
- core descriptions
- up-dated master log
- up-dated gas log prepared under the responsibility of Ex-Logging.

7. Velocity Survey

SSC Tulsa will be notified 10 days in advance of the expected completion of the well. The operator will stand-by in Churchill until requested.

8. Casing Program (All Footages include water depth)

36" hole	30"	casing to 650'
26" hole	20"	casing to 1,010'
17½" hole	13 3/8"	casing to 1,600'

9. Schlumberger Logging Program

RUN NO. 1 (Just prior to 13-3/8" casing, in 17-1/2" hole)

DIL (Dual Induction Log):

2" = 100', linear scale, 100 ohm-meters, 0-500-1000 millimhos
5" = 100', log scale

The 2" and 5" from T.D. to 100' into 20" casing.

DLL (Dual Laterolog):

2" = 100', log scale, T.D. to 100' into 20" casing
5" = 100', log scale, T.D. to 100' into 20" casing

This log will be run in an attempt to record accurate high resistivity values in the high resistivity range. The simultaneous equipment is not available but sequential equipment is. Shallow log will be recorded going in the hole and the deep laterolog will be recorded coming out.

BHC-SGR (Borehole Compensated-Sonic Gamma Ray):

2" & 5" = 100', T.D. to 100' into 20" casing

Sonic horizontal scale of 40-90-140 with selected carbonate sections of interest re-logged on a 40-60-80 scale. Gamma Ray on 0 - 100 API scale. Integrate 2" sonic. A caliper will not be run because the tool will be decentralized.

FDC/CNL/GR (Formation Density/Compensated Neutron/Gamma Ray):

5" = 100', T.D. to 100' into 20" casing, CNL/GR to top of 30"

Record 5" FDC with correction and caliper and GR on one film and record 5" CNL/FDC on limestone index on second film. CNL horizontal scale will be 3 porosity units per log division.

GR on 0 - 100 API scale.

Log data can be converted to 2" scale from taped data at some later date, if necessary.

PL/MLL (Proximity Log or Microlaterolog):

5" = 100', over porous horizons

Run only if other data indicates the presence of hydrocarbons. Pads will be provided for the PL and MLL, run the MLL for thin mud cakes, less than 1/4", and run the PL for thick mud cakes. Run in conjunction with the ML.

RUN NO. 2 (At Total Depth or prior to setting casing below the 13-3/8")

DIL:

Same program as for Run No. 1.

DLL:

Same program as for Run No. 1.

BHC-SGRC:

Same program as for Run No. 1, but horizontal scales will be different. Log on a 40-60-80 scale and re-log on a 40-90-140 scale if travel time is such that log curve does not stay on one track with the 40-60-80 scale.

FDC/CNL/GR:

Same program as for Run No. 1. Record to 100' into 13-3/8" casing.

.....6

PL/MLL:

5" = 100', T.D. to 13-3/8" casing

PL or MLL in conjunction with ML. Choice of logs will depend upon mud cake thickness.

HDT:

Log from T.D. to 13-3/8" casing.

GRN (Gamma Ray Neutron):

A set of this equipment is provided in 1-11/16" size in case it is necessary to log in limited hole or pipe sizes.

FIT (Formation Interval Tester):

A set of this equipment will be provided and can be run in hole sizes of 7" to 12-1/4". Test intervals below 13-3/8" casing will be based on log evaluation and other related data.

MCT (Multi Core Tool):

A set of this equipment will be provided and can be run in hole sizes of 6-1/8" to 15". Core intervals will be decided upon after logging.

The Run No. 2 program immediately above will occur prior to running any casing below the 13-3/8" casing and will be repeated at total depth if such is the case.

Each log run will contain a 200 foot repeat section.

All log data will be taped.

A wave train recorder, to be run in conjunction with the sonic log, to determine cement bonding or fracturing will be flown to the Hudson Bay if required. This equipment weighs 100 lbs.

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Sidewall core equipment is not provided because conditions are not suitable for core recovery. Core recovery depends upon hole size, type of material and porosity. Recovery is poor when the hole size is in excess of 12-1/4" and when sandstones have a porosity of less than 10%. However, this equipment does not weigh much and can be flown to the rig if a decision is taken, prior to reaching logging point, to acquire sidewall cores.

NOTE: The logging program will be reviewed with Exploration prior to each run to determine whether or not any changes are necessary based on information obtained while drilling.

2. DRILLING TICKET
CUTTING DESCRIPTION

AQUITAINE — DRILLING TICKET

WELL NAME: NARWHAL S-058

RIG	CO-ORDINATES	TIMING	CASING	LOGS
Pentagone 82	X 58°07' 56.28"	Commenced Aug 4, /74	ø 30" at 672'	DIL 1088 - 4340
GEOLOGIST	Y 84°08' 16.78"	Temporary Halt	ø 20" at 1093'	FDC - CNL - GR 500-4340
B. Tillement	Z	Resumption of Drilling	ø 13 3/8" at 1737'	BHCS - GR 1088-4340
A. Pochitaloff	Z KB 77 A.M.S.L.	Temporary Halt	ø at	HDT 1750-4340
	Hudson Bay	Resumption of Drilling	ø at	
Brought up to date on	PROVINCE			
November 1974	Federal waters	Completed Aug 28/74		

AGE	Formation	SCALE 1"=500' or 1/6,000 DEPTH	LOG	CORE	DIP	Porosity TYPE	Porosity GRADE	SHOW-TEST	GAIN AND LOSS	LITHOLOGY
	WATER	500								water
		580								580
?	?									no samples
		1000								
MID. DEVON.	MID. KENOG	1112							Partial loss; 90bbls	1112 Siltstone, mudstone, reddish, greenish, slightly dolo. - local fine grained ss - gypsum
		1500							gain 5bbls/h	1500 - Shaly dolomite, light grey - halite and anhydrite
SILURIAN	LOWER KENOG	1780		1837						1780 Limest., coarse, arenitic, laminated, algal, vuggy. Voids filled by salt and anhyd.
	EKWAN	2000		1867 C# 1 100% Rec.	flat lay	inter crystall. micro vugs no significant porous interval		NONE		Limest. brown, tight, hard Thin salt stringers
		2500								2550
	SEVERN	2550							steady gain; max 439 g/l of Cl_2Ca	Limestone, light grey, brown, cryptox to microx, hard, tight Anhydrite interbed. with dolo. limestone
		3000								Limestone, buff, local oolithic, microx, local porous Limestone, buff, cream, brown, microx. tight
		3285								3285 Halite Limestone
ORDOVIC.	READ HEAD	3500								Dolo. limestone, lo[illegible] laceous
	CHURCHILL	3608								3608 Anhydrite Limestone, [illegible], brown, microx., tight
UPPER	Bad Cache	3980								3980 Limestone, buff, brown, white, microx. to cryptox, hard, tight
		4000								4262 clean sand
		4262								4277 granite
		4277	T.D. 4341'							
PRECAMBRIAN	Basal Clastics	4500								

FORM 5121-1

CONFIDENTIAL

AUGUST 10 1974

AQUITAINE
COMPANY OF CANADA LTD.

NARWHAL SOUTH #1

GEOLOGICAL SAMPLE DESCRIPTION

Sheet No. 1

From	To	Core C Ditch D	No. of Ft. Porous	No. of Ft. Non-Porous	Showings O.G.W.		
1125	1130		5			70%	Reddish, rarely greyish siltstone to very fine grained ss, to soft mudstone
						20%	Cryptox, Whitish to light grey limestone
						10%	Cement
1130	1135		5				As above plus
							white, soft gypsum
1135	1140			5		30%	Reddish to greyish siltstone to mudstone as above, slightly dolomitic
						10%	Whitish to light grey cryptox limestone
						60%	Cement
1140	1145			5		60%	Siltstone and mudstone as above
						10%	cryptox limestone as above
						30%	Cement
1145	1150			5			As above
1150	1155			5		90%	Variegated reddish and greyish mudstone to siltstone
							dark grey anhydrite
						10%	cement
							No more limestone
1155	1160			5		100%	Variegated siltstone as above
1160	1165			5		100%	Mostly reddish, to grey-greenish sometimes variegated siltstone (Slightly dolomitic)
1165	1170			5		100%	Reddish to grey-greenish siltstone to very fine grained ss, slightly dolomitic (25%)
1170	1175			5		100%	Reddish to light grey micaceous fine grained ss, locally conglomeratic (Slightly dolomitic)
1175	1180			5		100%	Reddish to light grey siltstone and mudstone, locally with fine sands, slightly dolomitic plus cement
1180	1185			5		20%	Red-grey siltstone as above
						80%	grey cryptocrystalline, silty dolomite to dolomitic siltstone

SAMPLES NOT LAGGED

SAMPLES LAGGED AT 8 ~~MXPLX~~ MIN.

(Delete as Appropriate)

CONFIDENTIAL

FORM 5121-1

CONFIDENTIAL

AUGUST 10, 1974

AQUITAINE COMPANY OF CANADA LTD.

NARWHAL SOUTH #1

GEOLOGICAL SAMPLE DESCRIPTION

Sheet No. 2

From	To	Core C Ditch D	No. of Ft. Porous	No. of Ft. Non-Porous	Showings O.G.W.		
1185	1190			5			as above
1190	1195			5		70%	Red-grey siltstone as above
						20%	grey, cryptox, silty dolomite
						-------	Tripping out at 1196 to change bit

SAMPLES NOT LAGGED

SAMPLES LAGGED AT FT. PER MIN.

(Delete as Appropriate)

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GEOLOGICAL SAMPLE DESCRIPTION

Sheet No. 3

CONFIDENTIAL

From	To	Core C Ditch D	No. of Ft. Porous	No. of Ft. Non-Porous	Showings O.G.W.	
1,195	1,200			5		95% reddish to green-greyish slightly dolo siltstone to fine grained ss. 5% white gypsum
1,200	1,205			5		95% as above 5% as above
1,205	1,210			5		95% as above 5% as above
1,210	1,215			5		100% Mostly reddish to green-greyish siltstone to mudstone dolomitic (47%), no more gypsum
1,215	1,220			5		100% Half-half reddish and light greyish very dolomitic siltstone & gypsum (soft and white)
1,220	1,225			5		100% Mostly reddish, soft, shaly and slightly dolomitic siltstone to very fine grained ss. & gypsum
1,225	1,230					90% as above 10% white, soft gypsum
1,230	1,235					95% as above 5% as above
1,235	1,240					95% as above 5% as above

SAMPLES NOT LAGGED

SAMPLES LAGGED AT ____ FT. PER MIN.

(Delete as Appropriate)

August 10, 1974

GEOLOGICAL SAMPLE DESCRIPTION

Sheet No. 4

10:00 p.m.

CONFIDENTIAL

From	To	Core C Ditch D	No. of Ft. Porous	No. of Ft. Non-Porous	Showings O.G.W.	
1,245	1,250			5		90% reddish siltstone a/a (to greenish) 10% white soft gypsum
1,250	1,255			5		100% reddish to green-greyish slightly dolomitic siltstone to very fine grained ss. Locally rich in heavy minerals and micas & gypsum
1,255	1,260			5		as above Heavy minerals mostly in light grey intercalations
1,260	1,265			5		as above
1,265	1,270			5		as above
1,270	1,275			5		as above
1,275	1,280			5		as above
1,280	1,285			5		as above, but the colour is mainly green-greyish to blue-greyish
1,285	1,290			5		as above
1,290	1,300			5		Reddish to greenish... as above
1,300	1,310					as above Mainly siltstone and mudstone.
1,310	1,320					as above
1,320	1,330					as above
1,330	1,340					as above with 5% Gypsum, white soft

SAMPLES NOT LAGGED

SAMPLES LAGGED AT ..... FT. PER MIN.

(Delete as Appropriate)

August 11, 1974

GEOLOGICAL SAMPLE DESCRIPTION

Sheet No. 5

CONFIDENTIAL

From	To	Core C Ditch D	No. of Ft. Porous	No. of Ft. Non-Porous	Showings O.G.W.	early morning
1,340	1,350					100% reddish brown and greenish grey siltstone to vf sandstone. (Minor mudstone) v. sl dolomitic, locally micaceous, & Gypsum, soft, white
1,350	1,360					as above, sl incr in very fine sandstone, reddish brown, friable, subangular - subrounded grains, moderate to well sorted, lt brn grains, argillaceous
1,360	1,370					as above, 70% siltstone to 20% vf sandstone 10% gypsum, white, soft
1,370	1,380					as above but only trace gypsum
1,380	1,390					as above with 10% sandstone. Abundant loose sd grains vf - silt size in sample
1,390	1,400					as above
1,400	1,410					reddish to greenish siltstone and mudstone with good trace very fine sandstone. Small trace gypsum
1,410	1,420					as above becoming slight to moderately dolomitic, locally very dolomitic
1,420	1,430					reddish to greenish siltstone and increasing mudstone (50%) as above. Occ gyp.
1,430	1,440					90% mostly reddish siltstone 10% grey dolomitic shaly siltstone & gypsum (36% dolo)
1,440	1,450					100% reddish to greyish dolomitic shaly siltstone to very fine grained ss.
1,450	1,460					Mostly reddish
1,460	1,470					70% reddish, a/a 30% light grey shaly dolomitic siltstone

SAMPLES NOT LAGGED

SAMPLES LAGGED AT FT. PER MIN.

(Delete as Appropriate)

August 11, 1974

GEOLOGICAL SAMPLE DESCRIPTION

Sheet No. 6

CONFIDENTIAL

From	To	Core C Ditch D	No. of Ft. Porous	No. of Ft. Non-Porous	Showings O.G.W.	
1,470	1,480					Red to grey siltstone to claystone to very fine ss., dolomitic
1,480	1,490					as above
1,490	1,500					as above, but the grey fraction is more dolomitic
1,500	1,505					70% reddish to greenish as above
						20% shaly cryptox, grey dolomite
						10% gypsum
1,505	1,510					as above
1,510	1,520					10% reddish, as above
						90% whitish to light grey shaly cryptox dolomite & gypsum
1,520	1,525					as above
						change of bit
1,525	1,530					5% reddish siltstone (cavings?) & gypsum
						95% light grey to beige argillaceous cryptox dolomite
1,530	1,535					100% light grey to beige argillaceous cryptox, dolo

SAMPLES NOT LAGGED

SAMPLES LAGGED AT ..... FT. PER MIN.

(Delete as Appropriate)

August 11, 1974

GEOLOGICAL SAMPLE DESCRIPTION

Sheet No. 7

evening

CONFIDENTIAL

From	To	Core C Ditch D	No. of Ft. Porous	No. of Ft. Non-Porous	Showings O.G.W.	
1,535	1,540			5		as above & anhydrite
1,540	1,545			5		100% as above
1,545	1,550			5		as above & gypsum, anhydrite
1,550	1,555			5		100% as above
1,555	1,560			5		100% as above & gypsum
1,560	1,565			5		95% as above
						5% white gypsum
1,565	1,570			5		anhydrite & as above
1,570	1,575			5		50% grey cryptox argillaceous dolo
			2	3		50% buff cryptox to calcarenitic limestone
1,575	1,580		1	4		70% grey to buff cryptocrist, argill. dolo
						30% buff cryptox to calear and/or succronic
						lims, slightly porous
1,580	1,590		2	8		85% dolo, as above
						15% lims, as above
1,590	1,600			10		85% dolo, as above
						15% lims, tight. No more calcarenite
1,600	1,610			10		90% dolo, as above
						10% lims, as above, tight
						Anhydrite, blueish

SAMPLES NOT LAGGED

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(Delete as Appropriate)

FORM 5121-1

NARWHAL SOUTH NO. 1 - N58

COMPANY OF CANADA LTD.

August 11, 1974

GEOLOGICAL SAMPLE DESCRIPTION

Sheet No. 8

11:00 p.m.

CONFIDENTIAL

From	To	Core C Ditch D	No. of Ft. Porous	No. of Ft. Non-Porous	Showings O.G.W.	
1,610	1,620			10		30% dolo, as above, buff to grey
						15% lims, as above, (tight)
						50% bluish anhydrite
						5% whitish gypsum
1,620	1,630		1	9		20% dolo, as above
						40% lims, buff, cryptox to calcarenitic, slightly porous
						35% bluish anhydrite
						5% gypsum
1,630	1,640			10		70% light grey argillaceous dolomite
						30% buff cryptox tight limestone
						anhydrite and gypsum
1,640	1,650			10		60% buff to light grey argil. dolo
						40% lims, as above
1,650	1,660			10		65% dolo, as above
						35% lims, as above, rarely calcarenitic
1,660	1,670					50% dolo, as above
				10		45% lims, as above
						5% anhydrite
1,670	1,680			10		60% mostly light grey, locally tan, argellaceous
						cryptox dolo.
						40% buff, cryptox, tight limestone

SAMPLES NOT LAGGED

SAMPLES LAGGED AT ..... FT. PER MIN.

(Delete as Appropriate)

August 11, 1974

GEOLOGICAL SAMPLE DESCRIPTION Sheet No. 9

CONFIDENTIAL

From	To	Core C Ditch D	No. of Ft. Porous	No. of Ft. Non-Porous	Showings O.G.W.	
1,680	1,685			5		60% light grey to buff argill. dolo. 30% buff cryptox lims, locally fragmental to pelletoidal 10% anhydrite and gypsum .
1,685	1,690			5		as above
1,690	1,695			5		75% dolo, as above 20% lims, cryptox to fragmental, as above 5% anhy. and gypsum
1,695	1,700			5		65% dolo, as above 20% lims, as above 15% anhydrite and gypsum
1,700	1,705			5		60% grey dolo, argillaceous 10% grey dolomitic shale 10% buff homogeneous, cryptox, tight lims 10% buff, fragmental to bioclastic, locally slightly porous lims. 10% bluish anhydrite & gypsum
						Midnight! Logging, running casing 13 3/8"

SAMPLES NOT LAGGED

SAMPLES LAGGED AT ..... FT. PER MIN.

(Delete as Appropriate)

FORM 5121-1

AQUITAINE
COMPANY OF CANADA LTD

Sheet No. 10

From	To	Core C Ditch D	No. of Ft. Porous	No. of Ft. Non-Porous	Showings O.G.W.	GEOLOGICAL SAMPLE DESCRIPTION
1,710	1,715			5		50% Dolomite, light buff, argillaceous, hard, massive, microcr.
						30% Limest. white to buff, cryptocr. locally calcarenitic and slightly vuggy
						20% Anhydrite and gypsum
1,715	1,720			5		60% Dolomite a/a
						20% Limestone a/a
						20% Anhydrite
1,720	1,725			5		70% Dolomite a/a
						20% Limestone a/a
						10% Anhydrite
1,725	1,730			5		60% Dolomite a/a
						10% Limestone a/a
						30% Anhydrite
1,730	1,735			5		50% Dolomite a/a
						10% Limestone
						40% Anhydrite a/a
1,735	1,740			5		50% Dolomite a/a
						20% Limestone a/a
						30% Anhydrite
1,740	1,745					60% Limestone, buff, cryptocr. to microcr.
						20% Dolomite a/a, occasion. vuggy or intergran porosity (5%)
						20% Anhydrite
1,745	1,750					60% Limestone a/a
						10% Anhydrite
						30% Dolomite a/a
1,750	1,755					60% Limestone a/a
						30% Dolomite
						10% Anhydrite a/a
1,755	1,765					90% Dolomite, buff to light brown, microcr. tight
						10% Anhydrite
1,765	1,775					70% Dolomite
						30% Anhydrite
1,775	1,780					80% Limest. buff to light brown, microcr, ocasionally porous
						20% Dolomite, buff, microcr. tight

SAMPLES NOT LAGGED

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(Delete as Appropriate)

FORM 5121-1

AQUITAINE
COMPANY OF CANADA LTD.

Sheet No. 11

From	To	Core C Ditch D	No. of Ft. Porous	No. of Ft. Non-Porous	Showings O.G.W.	GEOLOGICAL SAMPLE DESCRIPTION
1,780	1,790					90% Limest. light brown, microcr. algal, tight
						10% Dolomite a/a
1,790	1,795					As above.
1,795	1,800					100% Limest., light brown, microcr., tight, occas. porous
1,800	1,810			3		Limest., light brown, reefal w/stromat, granular, coarse
						Porosity to 30%
1,810	1,820			6		40% Limest., white to buff, microcr. occas. porous
						60% Limest., brown, reefal w/stromat, granular and coarse
1,820	1,825			3		50% Limest., white, a/a
						50% Limest., brown, a/a
1,825	1,830			3		30% Limest., white, a/a
						70% Limest., brown, a/a
						CORE NO. 1 1,837 - 1,867 Rec. 100%
1,870	1,875					Limest., dark buff, microcr., tight, occas. porous
1,875	1,880					Limestone a/a
1,880	1,890					Limestone a/a
1,890	1,895					Limestone, white, microcr., occas. porous, (traces)
1,895	1,900					60% Limest., white, a/a
						40% Limest., dark buff, a/a
1,900	1,905			3		80% Limest., buff, microcr.
						20% Limest., dark buff, microcr. tight
1,905	1,910					50% Limest., white to buff, occas. porous
						50% Limest., dark brown, tight
1,910	1,915					90% Limest., white to buff, a/a
						10% Limest., dark brown, a/a
1,915	1,920					90% Limest., white to buff, a/a
						10% Limest., dark brown, a/a
1,920	1,925			3		80% Limest., white to buff, occas. very porous (30%)
						20% Limest., dark brown, a/a
1,925	1,930			2		60% Limest., white to buff, a/a
						40% Limest., dark brown, a/a

SAMPLES NOT LAGGED

SAMPLES LAGGED AT ..... FT. PER MIN.

(Delete as Appropriate)

FORM 5121-1

AQUITAINE
COMPANY OF CANADA LTD.

Sheet No. 12

From	To	Core C Ditch D	No. of Ft. Porous	No. of Ft. Non-Porous	Showings O.G.W.	GEOLOGICAL SAMPLE DESCRIPTION
1,930	1,935					30% Limest., white to buff, a/a
						70% Limest., dark brown, a/a
1,935	1,940		1			30% Limest., white to buff, a/a
						70% Limest., dark brown, a/a
1,940	1,945					40% Limest., white to buff, a/a
						60% Limest., dark brown, a/a
1,945	1,950					70% Limest., buff to white, microcr., mostly tight with rare vuggy porosity
						30% Limest., brown, micro- to cryptocr. tight
1,950	1,955		2			50% Limest., buff, a/a, porosity around 5%
						50% Limest., brown, a/a
1,955	1,960		2			70% Limest., buff, a/a, porosity up to 10%
						30% Limest., buff, a/a
1,960	1,965					80% Limest., buff to white, microcr. with rare porosity
						20% Limest., brown, tight
1,965	1,970					80% Limest., buff, a/a
						20% Limest., brown, a/a
1,970	1,975					80% Limest., buff, a/a
						20% Limest., brown, a/a
1,975	1,980					70% Limest., buff, a/a
						30% Limest., brown, a/a
1,980	1,985					50% Limest., buff, a/a
						50% Limest., brown, a/a
1,985	1,990					40% Limest. buff, a/a
						60% Limest., brown, a/a
1,990	1,995					20% Limest., buff, a/a
						80% Limest., brown, a/a
1,995	2,005					30% Limest., buff, a/a
						70% Limest., brown, a/a
2,005	2,010					40% Limest., buff, a/a
						60% Limest., brown, a/a

SAMPLES NOT LAGGED

SAMPLES LAGGED AT .. .. FT. PER MIN.

(Delete as Appropriate)

AQUITAINE
COMPANY OF CANADA LTD.

Sheet No. 13

From	To	Core C Ditch D	No. of Ft. Porous	No. of Ft. Non-Porous	Showings O.G.W.	GEOLOGICAL SAMPLE DESCRIPTION
2,010	2,015					60% Limest., buff, a/a
						40% Limest., brown, a/a
2,015	2,020					Limest., white, very pure, microcr. hard, some corals.
						Occas. buff fragments. Calcite with vugs and bioclasts
2,020	2,025					a/a
2,025	2,030					a/a
2,030	2,035					a/a
2,035	2,040					60% Limest., white, a/a
						40% Limest., brown, bioclastic and vuggy. Porous to 5%
2,040	2,045		3			60% Limest., white, a/a
						40% Limest., brown a/a. Porosity to 25%
2,045	2,050					80% Limest., white a/a
						20% Limest., brown a/a, rare porosity
2,050	2,055					60% Limest., white a/a
						40% Limest., brown a/a
2,055	2,060					20% Limest., white a/a
						80% Limest., brown a/a
2,060	2,065					50% Limest., white, a/a, trace calcite
						50% Limest., brown, a/a, rare pyrite
2,065	2,070					70% Limest., white, a/a
						30% Limest, brown, a/a, trace calcite
2,070	2,075					70% Limest., white to buff, microcr. cherty, very hard, local bioclastic
						30% Limest., brown a/a
						Calcite
2,075	2,080					70% Limest., white, microcr. to cryptocr., non porous, occasion. bioclastic
						30% Limest., brown, microcr. very hard, tight
						Calcite, translucide
2,080	2,085					60% Limest., white a/a
						40% Limest. brown a/a
						Coral fauna; no porosity

SAMPLES NOT LAGGED

SAMPLES LAGGED AT ..... FT. PER MIN.

(Delete as Appropriate)

AQUITAINE
COMPANY OF CANADA LTD.

Sheet No. 14

From	To	Core C Ditch D	No. of Ft. Porous	No. of Ft. Non-Porous	Showings O.G.W.	GEOLOGICAL SAMPLE DESCRIPTION
2,085	2,090					----------do----------
2,090	2,095					----------do----------
2,095	2,100					90% Limest., white a/a
						10% Limest., brown a/a
2,100	2,105					----------do----------
2,105	2,110					----------do----------
						Abundant fauna
2,110	2,115					----------do----------
2,115	2,120					100% Limest., white, a/a Coral fauna
2,120	2,125					----------do----------
2,125	2,130					----------do----------
2,130	2,135					----------do----------
2,135	2,140					----------do----------
2,140	2,145					----------do----------
2,145	2,150					70% Limest., white, very pure, moder. hard, microcr. no porosity
						30% Limest., brown, microcr. hard, non porous
						Calcite
2,150	2,155					----------do----------
2,155	2,160					----------do----------
2,160	2,165					90% Limest., white, a/a
						10% Limest., brown, a/a
2,165	2,170					----------do----------
2,170	2,175					----------do----------
2,175	2,180					100% Limest., white, a/a
2,180	2,185					----------do----------
2,185	2,190					----------do----------
2,190	2,195					----------do----------
2,195	2,200					80% Limest., white, a/a, no porosity
						20% Limest., brown, a/a
2,200	2,205					----------do----------
2,205	2,210					60% Limest., white, a/a
						40% Limest., brown, a/a

SAMPLES NOT LAGGED

SAMPLES LAGGED AT ..... FT. PER MIN.

(Delete as Appropriate)

Sheet No. 15

From	To	Core C Ditch D	No. of Ft. Porous	No. of Ft. Non-Porous	Showings O.G.W.	GEOLOGICAL SAMPLE DESCRIPTION
2,210	2,215					----------do----------
2,215	2,220					----------do----------
2,220	2,225					----------do----------
2,225	2,230					----------do----------
2,230	2,235					75% Limest., white, very pure, microcr., non porous 25% Limest., brown, traces of porosity Corals
2,235	2,240					----------do----------
2,240	2,245					----------do----------
2,245	2,250					----------do----------
2,250	2,255					----------do----------
2,255	2,260					----------do----------
2,260	2,265					----------do----------
2,265	2,270					----------do----------
2,270	2,275					----------do----------
2,275	2,280					90% Limest. white, a/a 10% Limest., brown, a/a Corals
2,280	2,285					----------do----------
2,285	2,290					----------do----------
2,290	2,295					----------do----------
2,295	2,300					----------do---------- slight porosity
2,300	2,305					----------do---------- slight porosity
2,305	2,310					----------do---------- no porosity
2,310	2,315					70% Limestone., shite, very pure, predomin. microcr., locally transluc., occasion. buff and cherty. Traces of calcilutite. Rare corals. 30% Limest., brown, a/a
2,315	2,320					----------do----------
2,320	2,325					----------do----------
2,325	2,330					----------do----------
2,330	2,335					----------do----------

SAMPLES NOT LAGGED

SAMPLES LAGGED AT ..... FT. PER MIN.

(Delete as Appropriate)

AQUITAINE
COMPANY OF CANADA LTD.

GEOLOGICAL SAMPLE DESCRIPTION — Sheet No. 16

From	To	Core C Ditch D	No. of Ft. Porous	No. of Ft. Non-Porous	Showings O.G.W.	
2,335	2,340					----------do----------
2,340	2,345					80% Limest., white, a/a
						20% Limest., brown, a/a
2,345	2,350					----------do----------
2,350	2,355					----------do----------
2,355	2,360					90% Limest., white, a/a
						10% Limest., brown, a/a
2,360	2,365					80% Limest., white, a/a
						20% Limest., brown, a/a Traces of porosity. Corals
2,365	2,370					----------do----------
2,370	2,380					----------do----------
2,380	2,390					----------do----------
2,390	2,395					70% Limest., white, a/a
						30% Limest., brown, a/a
2,395	2,400					60% Limest., white, a/a
						40% Limest., brown, a/a
2,400	2,410					----------do----------
2,410	2,415					70% Limest., white, a/a
						30% Limest., brown, a/a
2,415	2,420					80% Limest., white, a/a
						20% Limest., brown, a/a
2,420	2,430					60% Limest., white, a/a
						40% Limest., brown, a/a
2,430	2,435					70% Limest., white, a/a
						30% Limest., brown, a/a
2,435	2,440					80% Limest., white, some rhombs of calcite, local vugs. Rare corals. No primary porosity
						20% Limest., brown to dark buff, microcr., tight
2,440	2,450					60% Limest., white, a/a
						40% Limest., brown, a/a
						Pyrite

SAMPLES NOT LAGGED

SAMPLES LAGGED AT ..... FT. PER MIN.

(Delete as Appropriate)

FORM 5121 - 1

AQUITAINE
COMPANY OF CANADA LTD.

Sheet No. 17

From	To	Core C Ditch D	No. of Ft. Porous	No. of Ft. Non-Porous	Showings O.G.W.	GEOLOGICAL SAMPLE DESCRIPTION
2,450	2,460					60% Limest., white, a/a
						40% Limest., brown, a/a
						Some grey, cryptocr. limestone
2,460	2,470					50% Limest., white, a/a
						50% Limest., brown, a/a
2,470	2,480					----------do----------
2,480	2,490					----------do----------
2,490	2,500					60% Limest., white, a/a
						40% Limest., brown to dark buff, a/a
2,500	2,510					65% Limest., white, a/a
						35% Limest., brown to dark buff, a/a
2,510	2,520					60% Limest., white, a/a
						40% Limest., brown to dark buff, a/a
2,520	2,530					----------do----------
2,530	2,540					50% Limest., white, a/a
						50% Limest., brown, a/a
2,540	2,545					60% Limest., white, a/a Traces of light grey limest., tight, hard
2,545	2,550					50% Limest., white to buff, microcr. tight
						50% Limest., grey, microcr., tight, hard
2,550	2,555					20% Limest., white, a/a
						80% Limest., grey, a/a
						Corals
2,555	2,560					20% Limest., white
						80% Limest., grey/buff, very hard, microcr. glauconitic, porous, fractures, tight
2,560	2,565					40% Limest., grey, glauconitic traces of pyrite
						40% Limest., dark grey to brown, thinly banded, microcr., hard
						20% Limest., dark brown, soft, argilaceous
2,565	2,570					20% Limest, grey, a/a
						60% Limest., dark brown banded
						20% Limest., brown argillaceous

SAMPLES NOT LAGGED

SAMPLES LAGGED AT ..... FT. PER MIN.

(Delete as Appropriate)

AQUITAINE
COMPANY OF CANADA LTD.

Sheet No. 18

From	To	Core C Ditch D	No. of Ft. Porous	No. of Ft. Non-Porous	Showings O.G.W.	GEOLOGICAL SAMPLE DESCRIPTION
2,570	2,575					40% Limest., grey/buff
						50% Limest., dark brown, locally banded
						10% Limest., brown, argillaceous
2,575	2,580					100% Limest., predominantly light brown, locally buff, moder. hard, microcr. non porous
2,580	2,585					----------do----------
2,585	2,590					----------do----------
2,590	2,595					----------do----------
2,595	2,600					80% Limest., light brown to buff, a/a
						20% Limest., brown, soft, argillaceous
2,600	2,610					Limest., buff to brown, microcr., to cryptocr., hard, tight
						Some argillaceous limest., a/a
2,610	2,620					----------do----------
2,620	2,630					----------do----------
2,620	2,640					----------do----------
2,640	2,650					Limest., buff to brown, a/a, with some mud balls
2,650	2,660					Limest., buff to light brown, moder. hard, microcr., non porous, locally mud balls and bioclasts
						Pyrite
2,660	2,670					----------do----------
2,670	2,680					----------do----------
2,680	2,690					Limest., buff to brown, micro- to cryptocr., hard, tight occasion. bioclastic
2,690	2,700					----------do----------
2,700	2,710					----------do----------
2,710	2,720					----------do----------
2,720	2,730					----------do----------
2,730	2,740					----------do----------
2,740	2,745					Limest., a/a, with gravels
2,745	2,750					60% Dolomite, light to med. grey, hard, microcr. tight
						40% Limest., buff, a/a

SAMPLES NOT LAGGED

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(Delete as Appropriate)

FORM 5121 - 1

AQUITAINE
COMPANY OF CANADA LTD.

GEOLOGICAL SAMPLE DESCRIPTION — Sheet No. 19

From	To	Core C Ditch D	No. of Ft. Porous	No. of Ft. Non-Porous	Showings O.G.W.	
2,750	2,755					50% Dolomite a/a
						50% Limest., a/a
						Traces of anhydrite
2,755	2,760					20% Dolomite, a/a
						20% Limest., a/a
						60% Anhydrite, brown, translucide
2,760	2,765					10% Dolomite, a/a
						60% Limest., a/a
						30% Anhydrite
2,765	2,770					10% Anhydrite
						10% Dolomite
						80% Limest.,
2,770	2,775					Limest., buff to cream, microcr., locally porous
						Traces of dolomite and anhydrite
2,775	2,780		2			80% Limest., a/a, slightly porous
						10% Anhydrite, a/a
						10% Dolomite, a/a
2,780	2,785					40% Limest., buff, microcr.
						30% Dolomite, grey
						30% Anhydrite
2,785	2,790					Traces of Limest.
						30% Dolomite, a/a
						70% Anhydrite
2,790	2,795					----------do----------
2,795	2,800					80% Limest., buff to light brown, hard, microcr., blocky, non unporous
						10% Dolomite, a/a
						10% Anhydrite a/a
2,800	2,805					100% Limest, a/a
						Traces of dolomite and anhydrite
2,805	2,810					----------do----------
2,810	2,815					----------do----------

SAMPLES NOT LAGGED

SAMPLES LAGGED AT ..... FT. PER MIN.

(Delete as Appropriate)

2 AQUITAINE COMPANY OF CANADA LTD.

Sheet No. 20

From	To	Core C Ditch D	No. of Ft. Porous	No. of Ft. Non-Porous	Showings O.G.W.	GEOLOGICAL SAMPLE DESCRIPTION
2,815	2,820					----------do----------
2,820	2,830					----------do----------
2,830	2,840					Limest., cream to buff, cryptocr., fauna of lamelli, corals
						Some calcite
2,840	2,850					----------do----------
2,850	2,860					----------do----------
2,860	2,865					40% Limest., a/a
						60% Anhydrite, buff, translucide
2,865	2,870					40% Limest., a/a
						60% Anhydrite, a/a
2,870	2,875					30% Limest., a/a
						70% Anhydrite, a/a
2,875	2,880					40% Limest., a/a
						60% Anhydrite, a/a
2,880	2,885					70% Limest., buff-to-cream, microcr., tight
						30% Anhydrite
2,885	2,890					50% Limest., a/a
						50% Anhydrite, a/a
2,890	2,895					60% Dolomite, grey, crystalline.with veins of limest., tight
						20% Anhydrite, a/a
						20% Limest., a/a
2,895	2,900					80% Limest., a/a
						20% Dolomite, a/a
2,900	2,910					Limest., a/a
2,910	2,915					30% Limest., a/a
						40% Dolomite, a/a
						30% Anhydrite, a/a
2,915	2,920					60% Limest., buff, oolitic, microcr., occasion. friable and granular, some porosity
						10% Dolomite, a/a
						30% Anhydrite

SAMPLES NOT LAGGED

SAMPLES LAGGED AT ..... FT. PER MIN.

(Delete as Appropriate)

AQUITAINE
COMPANY OF CANADA LTD.

Sheet No. 21

From	To	Core C Ditch D	No. of Ft. Porous	No. of Ft. Non-Porous	Showings O.G.W.	GEOLOGICAL SAMPLE DESCRIPTION
2,920	2,930					85% Limest., a/a 15% Anhydrite, a/a
2,930	2,940					----------do--------
2,940	2,950					Limest., buff, microcr. to cryptocr., tight, locally porous oolitic
2,950	2,960					Limest., a/a
2,960	2,970					90% Limest., a/a 10% Anhydrite
2,970	2,980					Limest., a/a
2,980	2,990					----------do-------
2,990	3,000					Limest., buff, to light brown, microcr., bioclastic, med. hard, tight
3,000	3,010					Limest. a/a, interbedded with Limest., light to med. grey, microcr., moder. hard, non porous
3,010	3,020					----------do----------
3,020	3,030					Limest., buff to light brown, microcr., crystal, moder. hard, non porous
3,030	3,040					----------do--------
3,040	3,050					Limest, buff to light brown, microcr. to crystal, occasion. oolitic, tight
3,050	3,060					-
3,060	3,070					Limest., a/a Intercalations of grey limest., microcr. tight
3,070	3,080					----------do--------
3,080	3,090					----------do--------
3,090	3,095					Limest., medium brown to grey, microcr. dolomitic, hard, tight
3,095	3,100		2			Limest., brown to yellowish, microcr., dolomitic, tight locally porous
3,100	3,110					----------do----------
3,110	3,120					Limest., cream to buff, microcr., slightly dolomitic, hard, rare traces of porosity
3,120	3,130					----------do----------

SAMPLES NOT LAGGED

SAMPLES LAGGED AT ..... FT. PER MIN.

(Delete as Appropriate)

AQUITAINE
COMPANY OF CANADA LTD.

GEOLOGICAL SAMPLE DESCRIPTION Sheet No. 22

From	To	Core C Ditch D	No. of Ft. Porous	No. of Ft. Non-Porous	Showings O.G.W.	
3,130	3,140					----------do--------
3,140	3,150					----------do--------
3,150	3,160					----------do--------
3,160	3,170					70% Limest. a/a 30% Limest., med. brown, dolomitic, microcr. granular, occasion. fine grained, little porosity
3,170	3,180					50% Limest., cream to buff, a/a 50% Limest., brown, a/a
3,180	3,185					----------do--------
3,185	3,190					70% Limest., cream 30% Limest., brown, porous
3,190	3,200					----------do--------
3,200	3,205					80% Limest., cream, a/a 20% Limest., brown, a/a
3,205	3,210					Limest., cream to buff, microcr., to finely crystal, rarely sucrosic, tight, but occasion. traces of porosity
3,210	3,220					----------do---------
3,220	3,230					----------do--------
3,230	3,240					Same lithology - Presence of fossils
3,240	3,250					----------do--------
3,250	3,260					Limest., cream to buff, micro.- to cryptocr. tight
3,260	3,270					Same lithology - Presence of fossils
3,270	3,275					----------do--------
3,275	3,280					60% Limest., light grey, slightly argillaceous, slightly dolomitic, brittle 40% Limest., cream a/a
3,280	3,290					70% Limest., grey, a/a 30% Limest., cream a/a Traces of anhydrite
3,290	3,300					50% Limest., grey, a/a 40% Limest., cream, a/a 10% Anhydrite, buff, translucent

SAMPLES NOT LAGGED

SAMPLES LAGGED AT ..... FT. PER MIN.

(Delete as Appropriate)

AQUITAINE
COMPANY OF CANADA LTD.

Sheet No. 23

From	To	Core C Ditch D	No. of Ft. Porous	No. of Ft. Non-Porous	Showings O.G.W.	GEOLOGICAL SAMPLE DESCRIPTION
3,300	3,310					----------do----------
3,310	3,320					----------do----------
3,320	3,330					----------do----------
3,330	3,340					60% Limest. Poor cuttings recovery. Dried samples salt 30% Dolomite encrusted. 10% Anhydrite
3,340	3,350					----------do----------
3,350	3,360					----------do----------
3,360	3,370					Limest., light brown to cream, microcr. to cryptocr. slightly dolomitic. No porosity. Traces of anhydrite.
3,370	3,375					----------do----------
3,375	3,380					Limest., cram to buff, microcr. tight, occasion. slightly dolo.
3,380	3,385					Limest., cream
3,385	3,390					Limest., cream to white, rare porosity Traces of Anhydrite
3,390	3,400					----------do----------
3,400	3,410					----------do----------
3,410	3,420					----------do----------
3,420	3,425					----------do----------
3,425	3,430					80% Limest., a/a 20% Limest., medium grey, microcr., hard, dolomitic
3,430	3,435					20% Limest., cream, a/a 80% Limest., grey, a/a
3,435	3,440					80% Limest., cream 20% Limest., grey
3,440	3,445					30% Limest., grey 70% Limest., cream Anhydrite
3,445	3,450					10% Limest. grey, 70% Limest. cream 20% Anhydrite
3,450	3,460		2			Limest., cream to buff, microcr. to cryptocr. hard, locally porous

SAMPLES NOT LAGGED

SAMPLES LAGGED AT ..... FT. PER MIN.

(Delete as Appropriate)

From	To	Core C Ditch D	No. of Ft. Porous	No. of Ft. Non-Porous	Showings O.G.W.	GEOLOGICAL SAMPLE DESCRIPTION
3,460	3,470					----------do----------
3,470	3,480					Alternating:
						Limest., slightly dolomitic, cream to light brown and Limest.,
						grey, microcr, no porosity, tight
3,480	3,490					----------do----------
3,490	3,495					90% Limest., grey
						10% Limest., cream
3,495	3,500					70% Limest., grey
						30% Limest., cream
3,500	3,505					60% Limest., grey
						40% Limest., cream
3,505	3,510					80% Limest., cream to light brown, dolomitic, microcr. no porosity
						20% Limest., grey, a/a
3,510	3,520					60% Limest., cream
						40% Limest., grey
3,520	3,530					Limest., buff to brown, med. hard, no porosity, microcr. to
						cryptocr.
3,530	3,540					----------do----------
3,540	3,550					----------do----------
3,550	3,555					60% Limest., cream, a/a
						30% Limest., grey, dolo
						10% Anhydrite
3,555	3,560					20% Limest., cream
						20% Limest. grey, dolo
						60% Anhydrite
3,560	3,565					30% Limest., cream
						70% Anhydrite
3,565	3,570					30% Limest., cream
						40% Limest., grey, dolo.
						30% Anhydrite
3,570	3,575					40% Limest.,cream
						20% Limest., grey, dolo.
						40% Anhydrite

SAMPLES NOT LAGGED

SAMPLES LAGGED AT ..... FT. PER MIN.

(Delete as Appropriate)

AQUITAINE
COMPANY OF CANADA LTD.

Sheet No. 25

From	To	Core C Ditch D	No. of Ft. Porous	No. of Ft. Non-Porous	Showings O.G.W.	GEOLOGICAL SAMPLE DESCRIPTION
3,575	3,580					90% Limest., cream to brown, dolomitic, cryptocr., medium hard, non porous
						10% Anhydrite
3,580	3,590					Limest., buff to light brown, dol., microcr., tight, hard
3,590	3,600					----------do----------
3,600	3,605					40% Limest., buff a/a
						60% Limest., medium grey, dol., microcr., hard, tight
3,605	3,610					20% Limest., buff a/a
						80% Limest., medium grey, a/a
3,610	3,615					20% Limest., buff a/a
						60% Limest., medium grey a/a
						20% Anhydrite
3,615	3,620					30% Limest., a/a
						70% Anhydrite
3,620	3,625		1			60% Anhydrite
						30% Limest., buff to brown, microcr., slightly argillaceous, occas. porous
						10% Limest., grey a/a
3,625	3,630		1			20% Anhydrite, clear, transluc.
						50% Limest., buff to brown, non porous
						20% Limest., cream, porous
						10% Limest., grey a/a
3,630	3,635					30% Anhydrite
						60% Limest., buff to brown, a/a
						10% Limest., cream, porous
3,635	3,640		1			50% Anhydrite
						30% Limest., buff to brown and cream, porous
						20% Limest., light brown, hard, microcr., dolomitic, tight
3,640	3,645					50% Limest., buff to brown, microcr. occasion. porous
						20% Limest., light brown, dolomitic
						30% Anhydrite
3,645	3,650					70% Limest., buff to brown, microcr. locally porous

SAMPLES NOT LAGGED

SAMPLES LAGGED AT ..... FT. PER MIN.

(Delete as Appropriate)

From	To	Core C Ditch D	No. of Ft. Porous	No. of Ft. Non-Porous	Showings O.G.W.	GEOLOGICAL SAMPLE DESCRIPTION
3,645	3,650	(contd)				20% Limest., brown, dolomitic 10% Anhydrite
3,650	3,660					Limest., buff to brown, microcr, occasion. cryptocr., hard, tight
3,660	3,670					Same lithology, but darker rock
3,670	3,680					----------do----------
3,680	3,685					Same lithology with light brown fossils
3,685	3,690					Same lithology. No fossils.
3,690	3,700					----------do----------
3,700	3,710					Limest., light brown, microcr., hard, tight, locally brecciated and slightly porous.
3,710	3,715					Limest., buff to brown, microcr. or cryptocr., little pores
3,715	3,720					Same lithology, locally brecciated, with rare pores
3,720	3,730					----------do----------
3,730	3,735					----------do----------
3,735	3,740					Limest., buff to brown, micro.- to cryptocr.
3,740	3,750					----------do----------
3,750	3,755					Limest., dark brown, micro.- to cryptocr.
3,755	3,760					----------do----------
3,760	3,765					----------do----------
3,765	3,770					Limest., medium grey, microcr., or crypto., hard, tight
3,770	3,780					----------do----------
3,780	3,790					----------do----------
3,790	3,795					----------do----------
3,795	3,800					Limest., buff to medium grey, microcr., or cryptocr., slightly translucent, hard, tight, non porous
3,800	3,810					----------do----------
3,810	3,820					----------do----------
3,820	3,830					----------do----------
3,830	3,840					----------do----------
3,840	3,850					----------do----------

SAMPLES NOT LAGGED

SAMPLES LAGGED AT ..... FT. PER MIN.

(Delete as Appropriate)

Sheet No. 27

From	To	Core C Ditch D	No. of Ft. Porous	No. of Ft. Non-Porous	Showings O.G.W.	GEOLOGICAL SAMPLE DESCRIPTION
3,850	3,860					Limest., buff, light grey to brown varicoloured and mottled, micro.- or cryptocr., hard, tight, black minor, specks of (MnO_2)
3,860	3,870					Limest. brown to buff or white, microcr. tight
3,870	3,880					Limest., light brown, buff or white, micro- to cryptocr.
3,880	3,890					----------do----------
3,890	3,900					Limest., dark brown or buff, micro- to cryptocr., tight
3,900	3,910					----------do----------
3,910	3,915					----------do----------
3,915	3,920					Limest., medium grey, micro- to cryptocr., tight
3,920	3,930					Limest., brown, micro- to cryptocr.,tight
3,930	3,940					Limest., buff to light brown, micro- to cryptocr., slightly translucide
3,940	3,945		2			Limest., light brown, microcr., locally slightly porous (30%)
3,945	3,950		1			Limest., light grey to buff, microcr., locally slightly porous (20%)
3,950	3,955		1			70% Limest., brown to buff or grey, microcr. tight 30% Limest., light brown, microcr., slightly porous
3,955	3,960					Limest., brown to brown - grey, microcr., tight
3,960	3,965					Limest., light grey, microcr., slightly dolomitic, tight
3,965	3,970					Limest., a/a interbedded with Limest., buff, cryptocr. tight
3,970	3,980					----------do----------
3,980	3,990					----------do----------
3,990	4,000					Same lithology - Traces of Limest., light brown, cryst. and slightly porous
4,000	4,010					Limest., medium brown to buff-brown, micro- to cryptocr., tight
4,010	4,015					Same lithology, locally white
4,015	4,020					----------do----------
4,020	4,030					----------do----------
4,030	4,040					Same lithology, but about 30% is becoming dark brown
4,040	4,050					40% Limest., dark brown, microcr. medium hard, tight black specks. 60% Limest., buff to light brown or white, crypto- to microcr. non porous

SAMPLES NOT LAGGED

SAMPLES LAGGED AT ..... FT. PER MIN.

(Delete as Appropriate)

FORM 5121 - 1

AQUITAINE
COMPANY OF CANADA LTD.

Sheet No. 28

From	To	Core C Ditch D	No. of Ft. Porous	No. of Ft. Non-Porous	Showings O.G.W.	GEOLOGICAL SAMPLE DESCRIPTION
4,050	4,055					50% Limest., dark brown a/a
						50% Limest., buff to light brown a/a
4,055	4,060					40% Limest., dark brown a/a
						60% Limest., brown to buff a/a
4,060	4,065					----------do----------
4,065	4,070					30% Limest., dark brown a/a
						70% Limest., brown to buff a/a
4,070	4,080					20% Limest., dark brown a/a
						80% Limest., buff to brown a/a
4,080	4,085					----------do----------
4,085	4,090					10% Limest., dark brown a/a
						90% Limest. buff to light brown a/a
4,090	4,100					----------do----------
4,100	4,110					Limest., buff-white, chalky, cryptocr., occas. microcr. hard, tight
4,110	4,120					----------do----------
4,120	4,125					The Limest. becomes light brown
4,125	4,130					Limest., white, buff-brown, crypto- or microcr., tight, hard, presence of fossils
4,130	4,140					----------do----------
4,140	4,150					----------do----------
4,150	4,160					Limest., buff, cryptocr. tight. Minor white limestone
4,160	4,170					----------do----------
4,170	4,180					Limest., buff to brown, cryptocr., tight Minor white to cream limestone
4,180	4,190					----------do----------
4,190	4,200					----------do----------
4,200	4,210					Same lithology. The brown limestone is predominant
4,210	4,220					----------do----------
4,220	4,230					----------do----------

SAMPLES NOT LAGGED

SAMPLES LAGGED AT ..... FT. PER MIN.

(Delete as Appropriate)

AQUITAINE
COMPANY OF CANADA LTD.

Sheet No. 29

From	To	Core C Ditch D	No. of Ft. Porous	No. of Ft. Non-Porous	Showings O.G.W.	GEOLOGICAL SAMPLE DESCRIPTION
4,230	4,240					Limest., buff-light brown or white-cream, crypto- microcr. slightly translucid, hard, tight
4,240	4,250					----------do----------
4,250	4,260					----------do----------
4,260	4,270					----------do----------
4,270	4,280					90% Limest., white-cream, crypto- to microcr., soft, tight 10% Quartz, rounded,
4,280	4,285					Traces of pyrite Quartz, rounded, mica, pink and white feldspar, pyrite
4,285	4,290					Angular Quartz, mica, feldspar: granite
4,290	4,300					Angular Quartz, mica, feldspar: granite
4,300	4,310					Granite
4,310	4,320					----------do----------
4,320	4,330					----------do----------
4,341	4,341					----------do----------

August 28, 1974
T.D. reached at 4:30 p.m.

SAMPLES NOT LAGGED

SAMPLES LAGGED AT ..... FT. PER MIN.

(Delete as Appropriate)

3. GEOLOGICAL DAILY REPORTS

FORM 6104

AQUITAINE
COMPANY OF CANADA LTD.

DATE	No.	DAILY REPORT GEOLOGY - SHOWS	FOOTAGE		LAST DEPTH	WELL NAME
1 29/8/74	2 25		3 105 Ft.	4 Hr.	5 4341 Ft.	6 NARWHAL S

From	To	Drilling Rate	CARBONATE W.UW 1 min	3 min	15 min	POROSITY Type	Grade	LITHOLOGY
7	8	9 min/ft	10	11	12	13	14	15
4236	4273	5	90	95				Limestone - buff, white, cryptoxln, tight;
								from 4273 to 4285 rate 2, rounded, quartz;
								4285 to TD precamb. granite
								Formation - Bad Cache or Cambrian

TYPE OF DRILLING | TYPE OF BIT | 16 AGE/FORMATION 17

OIL SHOWS

Depth or Time	Colour	Odour	Fluorescence Direct Mud	Direct Cuttings	Extr.	Colour Intensity
18	19	20	21	22	23	24

25 Oil/Bitumen/Fluid-Heavy-Pasty-Dry

GAS SHOWS

Gas Background

26 Constant / Increasing / Decreasing / Regularly / Irregularly

From	To	%	Ratio C_1/C_2	Ratio C_1/C_3
27	28	29	30	31

Gas Shows (Kicks)

Depth or Time	% Max.	Nature	Ratio C_1/C_2	Ratio C_1/C_3	Duration /Choke	Duration Kick	Density Suct.	Density Comp.	Sample
32	33	34	35	36	37	38	39	40	41

MUD

42 D ___ V ___ F ___ NaCl ___ % Fuel ___

Gain From	Gain To	Gain bbl/h	Loss From	Loss To	Loss bbl/h
43	44	45	47	48	49
Total 46			Daily Total 50		

REMARKS 51

Program Plug? 52

Position at 8 A.M. 53

CONFIDENTIAL

FORM 6104

AQUITAINE COMPANY OF CANADA LTD	DATE (1)	No. (2)	DAILY REPORT GEOLOGY - SHOWS	FOOTAGE (3)	(4)	LAST DEPTH (5)	WELL NAME (6)
	28/8/74	24		134 Ft.	14:45 Hr.	4236 Ft.	NARWHAL S

From (7)	To (8)	Drilling Rate (9) min/ft	CARBONATE W.UW 1 min (10)	3 min (11)	15 min (12)	POROSITY Type (13)	Grade (14)	LITHOLOGY (15)
4102	4236	5-7	78	90	100			Limestone - buff, light brown, crptoxln or fine xln tight, hard, trace methane.

TYPE OF DRILLING | TYPE OF BIT | (16) AGE/FORMATION (17)

OIL SHOWS

Depth or Time (18)	Colour (19)	Odour (20)	Fluorescence Direct Mud (21)	Direct Cuttings (22)	Extr. Cuttings (23)	Colour Intensity (24)

(25) Oil/Bitumen/Fluid-Heavy-Pasty-Dry

GAS SHOWS

Gas Background

(26) Constant / Increasing / Decreasing / Regularly / Irregularly

From (27)	To (28)	% (29)	Ratio C_1/C_2 (30)	Ratio C_1/C_3 (31)

Gas Shows (Kicks)

Depth or Time (32)	% Max. (33)	Nature (34)	Ratio C_1/C_2 (35)	Ratio C_1/C_3 (36)	Duration /Choke (37)	Duration Kick (38)	Density Suct. (39)	Density Comp. (40)	Sample (41)

MUD

(42) D / V / F / NaCl / % Fuel

Gain From (43)	Gain To (44)	Gain bbl/h (45)	Loss From (47)	Loss To (48)	Loss bbl/h (49)

Total (46) | Daily Total (50)

REMARKS (51)

Program (52)

Position at 8 A.M. (53): Drilling at 4259'

FORM 6104

AQUITAINE COMPANY OF CANADA LTD	DATE 1	No. 2	DAILY REPORT GEOLOGY - SHOWS	FOOTAGE 3	4	LAST DEPTH 5	WELL NAME 6
	27/08/74	23		3182 Ft.	21 Hr.	4102 Ft.	

From 7	To 8	Drilling Rate 9 min/ft	CARBONATE W.UW 1 min 10	3 min 11	15 min 12	POROSITY Type 13	Grade 14	LITHOLOGY 15
3880	4102	4-7	83	95	96			Predominantly limestone - buff, brown, grey or white; cryptoxln sl. dolomitic, tight, hard; minor limestone light brown, fn xln, local porosity; limestone - dark brown, fn xln, tight. From 4035 to 4085, trace methane.

TYPE OF DRILLING | TYPE OF BIT 16 | AGE/FORMATION 17

OIL SHOWS

Depth or Time 18	Colour 19	Odour 20	Fluorescence Direct Mud 21	Direct Cuttings 22	Extr. 23	Colour Intensity 24

25 Oil/Bitumen/Fluid-Heavy-Pasty-Dry

GAS SHOWS

Gas Background 26

Constant
Increasing
Decreasing
Regularly
Irregularly

From 27	To 28	% 29	Ratio C_1/C_2 30	Ratio C_1/C_3 31

Gas Shows (Kicks)

Depth or Time 32	% Max. 33	Nature 34	Ratio C_1/C_7 35	Ratio C_1/C_3 36	Duration /Choke 37	Duration Kick 38	Density Suct. 39	Density Comp. 40	Sample 41

MUD

42 D — V — F — NaCl — % Fuel —

Gain From 43	Gain To 44	Gain bbl/h 45	Loss From 47	Loss To 48	Loss bbl/h 49

Total 46 | Daily Total 50

REMARKS 51

Program Drlg. 4147 52

Position at 8 A.M. 53

CONFIDENTIAL

FORM 6104

AQUITAINE COMPANY OF CANADA LTD

DAILY REPORT GEOLOGY - SHOWS

DATE	No.	FOOTAGE		LAST DEPTH	WELL NAME
1 26/8/74	2 22	3 264 Ft.	4 24 Hr.	5 3880 Ft.	6 NARWHAL S

From	To	Drilling Rate	CARBONATE W.UW 1 min	3 min	15 min	POROSITY Type	Grade	LITHOLOGY
7	8	9 min/ft	10	11	12	13	14	15
3616	3655	4-6	19	34	42			Anhydrite limestone - dolomitic, grey, micrite, hard, tight
								Limestone - buff, brown, slightly dolomitic, tight, locally porous
								Limestone - dolomitic light brown, hard, tight
3655	3880	4-7	83	90	95			Limestone - buff, brown or medium grey, micrite, slightly dolomitic,
								tight, hard, trace methane

TYPE OF DRILLING | TYPE OF BIT | 16 | AGE/FORMATION 17

OIL SHOWS

Depth or Time	Colour	Odour	Fluorescence Direct Mud	Direct Cuttings	Extr. Cuttings	Colour Intensity
18	19	20	21	22	23	24

25 Oil/Bitumen/Fluid-Heavy-Pasty-Dry

GAS SHOWS

Gas Background — 26

Constant
Increasing
Decreasing
Regularly
Irregularly

From	To	%	Ratio $C1/C2$	Ratio $C1/C3$
27	28	29	30	31

Gas Shows (Kicks)

Depth or Time	% Max.	Nature	Ratio $C1/C2$	Ratio $C1/C3$	Duration /Choke	Duration Kick	Density Suct.	Density Comp.	Sample
32	33	34	35	36	37	38	39	40	41

MUD

42 D — V — F — NaCl — % Fuel —

Gain From	Gain To	Gain bbl/h	Loss From	Loss To	Loss bbl/h
43	44	45	47	48	49

Total 46 | Daily Total 50

REMARKS 51

Program 52

Position at 8 A.M. 3970' 53

FORM 6104

CONFIDENTIAL

AQUITAINE COMPANY OF CANADA LTD	DATE 1	No. 2	DAILY REPORT GEOLOGY - SHOWS	FOOTAGE 3	4	LAST DEPTH 5	WELL NAME 6
	25/8/74	21		285 Ft.	21 30 Hr.	3616 Ft.	NARWHAL S

From 7	To 8	Drilling Rate 9 min/ft	CARBONATE W.UW 1 min 10	3 min 11	15 min 12	POROSITY Type 13	Grade 14	LITHOLOGY 15
3290	3360	1-2						Salt
3360	3616	3-7						Limestone - cream, buff, micrite, tight hard Minor limestone - dolomitic brown or grey, micrite, tight hard Anhydrite especially from 3550' to 3575' - Trace methane ~~increasing progressively~~

TYPE OF DRILLING | TYPE OF BIT | 16 AGE/FORMATION 17

OIL SHOWS

Depth or Time 18	Colour 19	Odour 20	Fluorescence Direct Mud 21	Direct Cuttings 22	Extr. 23	Colour Intensity 24

25 Oil/Bitumen/Fluid-Heavy-Pasty-Dry

GAS SHOWS

Gas Background 26

Constant
Increasing
Decreasing
Regularly
Irregularly

From 27	To 28	% 29	Ratio C_1/C_2 30	Ratio C_1/C_3 31

Gas Shows (Kicks)

Depth or Time 32	% Max. 33	Nature 34	Ratio C_1/C_2 35	Ratio C_1/C_3 36	Duration /Choke 37	Duration Kick 38	Density Suct. 39	Density Comp. 40	Sample 41

MUD

42 D — V — F — NaCl — % Fuel —

Gain From 43	Gain To 44	Gain bbl/h 45	Loss From 47	Loss To 48	Loss bbl/h 49
Total 46			Daily Total 50		

REMARKS 51

Program 52

Position at 8 A.M. Drilling at 3705' 53

FORM 6104

CONFIDENTIAL

AQUITAINE COMPANY OF CANADA LTD	DATE	No.	DAILY REPORT GEOLOGY - SHOWS	FOOTAGE		LAST DEPTH	WELL NAME
	1 24/8/74	2 20		3 168 Ft	4 11^{15} Hr.	5 3331 Ft.	6 NARWHAL S

From	To	Drilling Rate	CARBONATE W.IJW 1 min	3 min	15 min	POROSITY Type	Grade	LITHOLOGY
7	8	9 min/ft	10	11	12	13	14	15
3115	3270	3-6	75	87	90			Limestone- buff, brown, micrite or cryptoxln, hard limestone slightly dolomitic, medium brown, finexln, slightly porous
3270	3290	5	87	93	95			Limestone as above and limestone shaly, light grey and anhydrite
3290	3331	1-2						Salt probable trace methane

TYPE OF DRILLING | TYPE OF BIT 16 | AGE/FORMATION 17

OIL SHOWS

Depth or Time	Colour	Odour	Fluorescence Direct Mud	Direct Cuttings	Extr.	Colour Intensity
18	19	20	21	22	23	24

25 Oil/Bitumen/Fluid-Heavy-Pasty-Dry

GAS SHOWS

Gas Background

26

Constant
Increasing
Decreasing
Regularly
Irregularly

From	To	%	Ratio C_1/C_2	Ratio C_1/C_3
27	28	29	30	31

Gas Shows (Kicks)

Depth or Time	% Max.	Nature	Ratio C_1/C_2	Ratio C_1/C_3	Duration /Choke	Duration Kick	Density Suct.	Density Comp.	Sample
32	33	34	35	36	37	38	39	40	41

MUD

42 D — V — F — NaCl — % Fuel —

Gain From	Gain To	Gain bbl/h	Loss From	Loss To	Loss bbl/h
43	44	45	47	48	49
Total 46			Daily Total 50		

REMARKS 51

Program 52

Position at 8 A.M. Drilling at 3423' 53

FORM 6104

AQUITAINE COMPANY OF CANADA LTD

DATE (1)	No. (2)	DAILY REPORT GEOLOGY - SHOWS	FOOTAGE (3)	(4)	LAST DEPTH (5)	WELL NAME (6)
23/8/74	19		363 Ft.	24 Hr.	3163 Ft.	NARWHAL S

From (7)	To (8)	Drilling Rate min/Ft (9)	CARBONATE W.UW 1 min (10)	3 min (11)	15 min (12)	POROSITY Type (13)	Grade (14)	LITHOLOGY (15)
2745	2920	3-5	78	85	86			Dolomite - med. grey, micritic, hard, tight
								Anhydrite - limestone, buff-cream, micritic, tight, locally porous
2920	3000	2-4	98	100	100			Dolomite - buff, oolitic or micritic, tight, locally porous
3000	3095	3-7	94	97	100			Trace anhydrite and dolomite
								Predominantly limestone, cream, buff, oolitic or micritic,
								tight or minor limestone, grey, micritic, tight
3095	3115	3-6	80	85	85			Limestone, dolomitic, brown cream micritic, tight, locally porous
3115	3163	3-5	74	85	100			Limestone buff - brown, micritic, hard
								Limestone not dolomitic, medium brown, fine XLN, slightly porous
								(from 3165 and 3185)

TYPE OF DRILLING | TYPE OF BIT | 16 AGE/FORMATION 17

OIL SHOWS

Depth or Time (18)	Colour (19)	Odour (20)	Fluorescence Direct Mud (21)	Direct Cuttings (22)	Extr. Cuttings (23)	Colour Intensity (24)

25 Oil/Bitumen/Fluid-Heavy-Pasty-Dry

GAS SHOWS

Gas Background (26)

From (27)	To (28)	% (29)	Ratio C_1/C_2 (30)	Ratio C_1/C_3 (31)

Constant
Increasing
Decreasing
Regularly
Irregularly

Gas Shows (Kicks)

Depth or Time (32)	% Max. (33)	Nature (34)	Ratio C_1/C_2 (35)	Ratio C_1/C_3 (36)	Duration /Choke (37)	Duration Kick (38)	Density Suct. (39)	Density Comp. (40)	Sample (41)

MUD

42 D / V / F / NaCl / % Fuel

Gain From (43)	Gain To (44)	Gain bbl/h (45)	Loss From (47)	Loss To (48)	Loss bbl/h (49)
Total 46			Daily Total 50		

REMARKS 51

Program 52

Position at 8 A.M. 3268' 53

FORM 6104

AQUITAINE
COMPANY OF CANADA LTD

DATE	No.	DAILY REPORT GEOLOGY - SHOWS	FOOTAGE		LAST DEPTH	WELL NAME
1 22/8/74	2 18		3 290 Ft.	4 20 Hr.	5 2800 Ft.	6 NARWHAL S

From	To	Drilling Rate	CARBONATE W.UW 1 min	3 min	15 min	POROSITY Type	Grade	LITHOLOGY
7	8	9 min/ft	10	11	12	13	14	15
2560	2605	4-6	79	83	83			Light grey to buff micritic limestone, tight and hard
								Dark grey brown finely laminated micritic tight and hard limestone
								Minor dark brown soft, argillaceous dolomite
2605	2745	3-5	96	100	100			Buff to brown, tight and hard, micritic to fine.crystal.limestone
								locally organic
2745	2800	3-6						Limestone as above
								tight and hard dolomite

TYPE OF DRILLING | TYPE OF BIT | 16 AGE/FORMATION 17

OIL SHOWS

Depth or Time	Colour	Odour	Fluorescence Direct Mud	Direct Cuttings	Extr.	Colour Intensity
18	19	20	21	22	23	24

25 Oil/Bitumen/Fluid-Heavy-Pasty-Dry

GAS SHOWS

Gas Background — 26

Constant
Increasing
Decreasing
Regularly
Irregularly

From	To	%	Ratio C_1/C_2	Ratio C_1/C_3
27	28	29	30	31
2560	2800	Traces	of	C_1

Gas Shows (Kicks)

Depth or Time	% Max.	Nature	Ratio C_1/C_2	Ratio C_1/C_3	Duration /Choke	Duration Kick	Density Suct.	Density Comp.	Sample
32	33	34	35	36	37	38	39	40	41

MUD

42 D — V — F — NaCl — % Fuel

Gain From	Gain To	Gain bbl/h	Loss From	Loss To	Loss bbl/h
43	44	45	47	48	49
Total 46			Daily Total 50		

REMARKS 51

Program 52

Position at 8 A.M. Drilling at 2908' 53

FORM 6104

CONFIDENTIAL

AQUITAINE COMPANY OF CANADA LTD	DATE 1: 21/8/74	No. 2: 17	DAILY REPORT GEOLOGY - SHOWS	FOOTAGE 3: 288 Ft.	4: 21 30 Hr.	LAST DEPTH 5: 2560 Ft.	WELL NAME 6: NARWHAL S.

From 7	To 8	Drilling Rate 9 min/ft	CARBONATE W.UW 1 min 10	3 min 11	15 min 12	POROSITY Type 13	Grade 14	LITHOLOGY 15
2272	2545	3-5	100					White to buff micritic limestone. Spar calcite
								Occassional porous coral
2545	2560	8	100					Light grey, tight, hard micritic limestone

TYPE OF DRILLING | TYPE OF BIT | 16 AGE/FORMATION | 17

OIL SHOWS

Depth or Time 18	Colour 19	Odour 20	Fluorescence Direct Mud 21	Direct Cuttings 22	Extr. 23	Colour Intensity 24

25 Oil/Bitumen/Fluid-Heavy-Pasty-Dry

GAS SHOWS

Gas Background 26: Constant / Increasing / Decreasing / Regularly / Irregularly

From 27	To 28	% 29	Ratio C_1/C_2 30	Ratio C_1/C_3 31
2525	2560	Traces of C_1		

Gas Shows (Kicks)

Depth or Time 32	% Max. 33	Nature 34	Ratio C_1/C_2 35	Ratio C_1/C_3 36	Duration /Choke 37	Duration Kick 38	Density Suct 39	Density Comp 40	Sample 41

MUD

42	Gain From 43	Gain To 44	Gain bbl/h 45	Loss From 47	Loss To 48	Loss bbl/h 49
D						
V						
F						
NaCl						
% Fuel	Total 46			Daily Total 50		

REMARKS 51

Program 52

Position at 8 A.M. Drilling 53

FORM 6104

AQUITAINE
COMPANY OF CANADA LTD

DATE	No.	DAILY REPORT GEOLOGY - SHOWS	FOOTAGE		LAST DEPTH	WELL NAME
1 August 20/74	2 16		3 239 Ft.	4 17:30 Hr.	5 2,272 Ft.	6 Narwhal S

From	To	Drilling Rate	CARBONATE W.UW 1 min	3 min	15 min	POROSITY Type	Grade	LITHOLOGY
7	8	9	10	11	12	13	14	15
2,033	2,272	2'-4'	88	100	100			Predominantly limestone, white, micrite or spar calc.
								Occasionally porosity, corals.
								Minor limestone, dark buff brown, thin, tight.

TYPE OF DRILLING | TYPE OF BIT | 16 AGE/FORMATION 17

OIL SHOWS

Depth or Time	Colour	Odour	Fluorescence Direct Mud	Fluorescence Direct Cuttings	Fluorescence Extr.	Colour Intensity
18	19	20	21	22	23	24

25 Oil/Bitumen/Fluid-Heavy-Pasty-Dry

GAS SHOWS

Gas Background

26 Constant / Increasing / Decreasing / Regularly / Irregularly

From	To	%	Ratio C_1/C_2	Ratio C_1/C_3
27	28	29	30	31

Gas Shows (Kicks)

Depth or Time	% Max.	Nature	Ratio C_1/C_2	Ratio C_1/C_3	Duration /Choke	Duration Kick	Density Suct.	Density Comp.	Sample
32	33	34	35	36	37	38	39	40	41

MUD

42 D / V / F / NaCl / % Fuel

Gain From	Gain To	Gain bbl/h	Loss From	Loss To	Loss bbl/h
43	44	45	47	48	49

Total 46 | Daily Total 50

REMARKS 51

Program: Drilling 52

Position at 8 A.M.: Depth = 2,395' 53

FORM 6104

AQUITAINE COMPANY OF CANADA LTD

DATE	No.	DAILY REPORT GEOLOGY - SHOWS	FOOTAGE		LAST DEPTH	WELL NAME
1 August 19/74	2 15		3 196 Ft	4 16:15 Hr.	5 2033 Ft.	6 Narwhal S

From	To	Drilling Rate	CARBONATE W.UW 1 min	3 min	15 min	POROSITY Type	Grade	LITHOLOGY
7	8	9 min/ft	10	11	12	13	14	15
1837	1867							Core #1 - recovery 30' (100%)
1867	1937	3'to17'	92	97	99			Reefal micrite white buff irregular; Limestone
								Brown white buff tight often hard

TYPE OF DRILLING | TYPE OF BIT | 16 AGE/FORMATION 17

OIL SHOWS

Depth or Time	Colour	Odour	Fluorescence Direct Mud	Direct Cuttings	Extr.	Colour Intensity
18	19	20	21	22	23	24

25 Oil/Bitumen/Fluid-Heavy-Pasty-Dry

GAS SHOWS

Gas Background

26

Constant
Increasing
Decreasing
Regularly
Irregularly

From	To	%	Ratio C_1/C_2	Ratio C_1/C_3
27	28	29	30	31

Gas Shows (Kicks)

Depth or Time	% Max.	Nature	Ratio C_1/C_2	Ratio C_1/C_3	Duration /Choke	Duration Kick	Density Suct.	Density Comp.	Sample
32	33	34	35	36	37	38	39	40	41

MUD

42 D ___ V ___ F ___ NaCl ___ % Fuel ___

Gain From	Gain To	Gain bbl/h	Loss From	Loss To	Loss bbl/h
43	44	45	47	48	49
Total 46			Daily Total 50		

REMARKS 51

Core #1 description = see Annex I

Program 52

Position at 8 A.M. 53

ANNEX I TO GEOLOGICAL REPORT NO. 15

DESCRIPTION OF CORE #1

- from 1837' to 1867' recovery 30'

1% from 1837' to 1840 — Limestone reefal brown buff, local anhydrite Filled vugs finely laminated fine crystalline sucrosic structure.

2% from 1840' to 1851' — Limestone brown buff, predominantly micro-breccia Core massive bioclastic--anhydrite filled vugs and occasional intercalations (parting). Good upper 30% - Occasional fine tight beds. Interlaminated with good traces of salt still poor - dip max. 10.

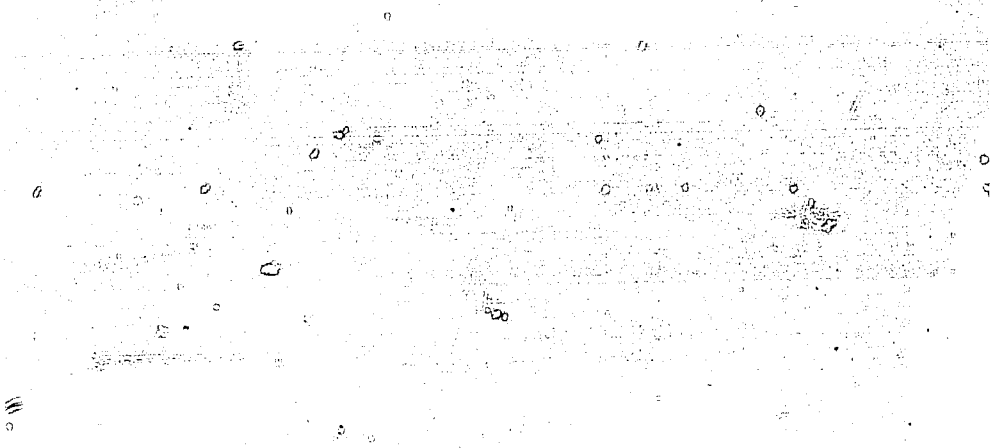
3% from 1851' to 1853' — Limestone brown reefal finely laminated algae, structure tight dip max. 10.

4% from 1853' to 1856' — Limestone brown core massive bioclastic, salt filled pores, horizontal fractures. Bugs filled with anhydrite occasional tight finely laminated fine crystalline dip max. 20.

5% from 1856' to 1863' — Limestone predominantly micro-breccia consisting of large cream buff block eyes to ∅ 1.5". Cement dark brown bioclastic anhydrite veining and filling cavities. dip max 20

6% from 1863' to 1865.5' — Limestone grading from micro-breccia to tight reefal, vertical fracture. Dip horizontal.

7% from 1865.5' to 1867' — Limestone grading from reefal to bioclastic, salt often filled pores. Dip horizontal.



CONFIDENTIAL

FORM 6104

AQUITAINE COMPANY OF CANADA LTD

DATE	No.	DAILY REPORT GEOLOGY - SHOWS	FOOTAGE		LAST DEPTH	WELL NAME
1 August 18/74	2 14		3 81 Ft.	4 4 Hr.	5 1,837 Ft.	6 Narwhal S

From	To	Drilling Rate	CARBONATE W.UW 1 min	3 min	15 min	POROSITY Type	Grade	LITHOLOGY
7	8	9 min/ft	10	11	12	13	14	15
1,760	1,780	2'to 3'	17	73	91			- Buff tight dolomite anhydrite
1,780	1,837	2'to 4'	74	78	80			- Brown thin tight good reefal limestone
			80	86	90			- Limestone buff micrite irregular

TYPE OF DRILLING | TYPE OF BIT | 16 AGE/FORMATION 17

OIL SHOWS

Depth or Time	Colour	Odour	Fluorescence Direct Mud	Fluorescence Direct Cuttings	Fluorescence Extr.	Colour Intensity
18	19	20	21	22	23	24

25 Oil/Bitumen/Fluid-Heavy-Pasty-Dry

GAS SHOWS

Gas Background — 26

Constant
Increasing
Decreasing
Regularly
Irregularly

From	To	%	Ratio C_1/C_2	Ratio C_1/C_3
27	28	29	30	31

Gas Shows (Kicks)

Depth or Time	% Max.	Nature	Ratio C_1/C_2	Ratio C_1/C_3	Duration /Choke	Duration Kick	Density Suct.	Density Comp	Sample
32	33	34	35	36	37	38	39	40	41

MUD

42 D — V — F — NaCl — % Fuel —

Gain From	Gain To	Gain bbl/h	Loss From	Loss To	Loss bbl/h
43	44	45	47	48	49

Total 46 | Daily Total 50

REMARKS 51

Program 52

Position at 8 A.M. 53

CONFIDENTIAL

FORM 6104

AQUITAINE COMPANY OF CANADA LTD	DATE 1: Aug. 15, 1974	No. 2: 11	DAILY REPORT GEOLOGY - SHOWS	FOOTAGE 3: 16 Ft. 4: 2:15 Hr.	LAST DEPTH 5: 1,756 Ft.	WELL NAME 6: Narwhal S

From 7	To 8	Drilling Rate 9	CARBONATE W.UW 1 min 10	3 min 11	15 min 12	POROSITY Type 13	Grade 14	LITHOLOGY 15
								Sonic - GR from 1,088' to 1,756'

TYPE OF DRILLING | TYPE OF BIT | 16 AGE/FORMATION 17

OIL SHOWS

Depth or Time 18	Colour 19	Odour 20	Fluorescence Direct Mud 21	Direct Cuttings 22	Extr. 23	Colour Intensity 24

25 Oil/Bitumen/Fluid-Heavy-Pasty-Dry

GAS SHOWS

Gas Background

26 Constant / Increasing / Decreasing / Regularly / Irregularly

From 27	To 28	% 29	Ratio C_1/C_2 30	Ratio C_1/C_3 31

Gas Shows (Kicks)

Depth or Time 32	% Max. 33	Nature 34	Ratio C_1/C_2 35	Ratio C_1/C_3 36	Duration /Choke 37	Duration Kick 38	Density Suct 39	Density Comp 40	Sample 41

MUD

42 D / V / F / NaCl / % Fuel

Gain From 43	Gain To 44	Gain bbl/h 45	Loss From 47	Loss To 48	Loss bbl/h 49

Total 46 | Daily Total 50

REMARKS 51

Program 52

Position at 8 A.M. 53

CONFIDENTIAL

FORM 6104

AQUITAINE COMPANY OF CANADA LTD	DATE 1 Aug. 14	No. 2 10	DAILY REPORT GEOLOGY - SHOWS	FOOTAGE 3 37 Ft. 4 Hr.	LAST DEPTH 5 1740 Ft.	WELL NAME 6 Narwhal S.

From 7	To 8	Drilling Rate 9 min/ft	CARBONATE W.U.W. 1 min 10	3 min 11	15 min 12	POROSITY Type 13	Grade 14	LITHOLOGY 15
1703	1710	1'-3'						Salt
1710	1740	2'-7'	12	43	60(min)			Alternating grey anhydrite & dolomite with black cryptoxin to
			21	49	65(max)			calcarenite limestone.
								Since Midnight
1740	1756	2'-7'	25	48	66	intergran.	5	Buff cryptocrystalline limestone.
			53	71	80			
								NOTE: Trace of methane from 1703' to 1756'.

TYPE OF DRILLING | TYPE OF BIT | 16 AGE/FORMATION 17

OIL SHOWS

Depth or Time 18	Colour 19	Odour 20	Fluorescence Direct Mud 21	Direct Cuttings 22	Extr. 23	Colour Intensity 24

25 Oil/Bitumen/Fluid-Heavy-Pasty-Dry

GAS SHOWS

26 Constant / Increasing / Decreasing / Regularly / Irregularly

Gas Background From 27	To 28	% 29	Ratio C_1/C_2 30	C_1/C_3 31

Gas Shows (Kicks) Depth or Time 32	% Max. 33	Nature 34	Ratio C_1/C_2 35	C_1/C_3 36	Duration / Choke 37	Kick 38	Density Suct 39	Comp 40	Sample 41

MUD

42 D / V / F / NaCl / % Fuel

Gain From	To	bbl/h	Loss From	To	bbl/h
43	44	45	47	48	49

Total 46 | Daily Total 50

REMARKS 51

Ran SONIC-G.R. from 1756' to surface after midnight.

Program 52

Position at 8 A.M. 1756 - preparing to run casing. 53

FORM 6104

CONFIDENTIAL

AQUITAINE COMPANY OF CANADA LTD	DATE 1: 13/8/74	No. 2: 9	DAILY REPORT GEOLOGY - SHOWS	FOOTAGE 3: 0 Ft. 4: Hr.	LAST DEPTH 5: 1703 Ft.	WELL NAME 6: NARWHAL S

From 7	To 8	Drilling Rate 9 min/ft	CARBONATE W.U/W 1 min 10	3 min 11	15 min 12	POROSITY Type 13	Grade 14	LITHOLOGY 15

TYPE OF DRILLING | TYPE OF BIT 16 | AGE/FORMATION 17

OIL SHOWS

Depth or Time 18	Colour 19	Odour 20	Fluorescence Direct Mud 21	Direct Cuttings 22	Extr 23	Colour Intensity 24

25 Oil/Bitumen/Fluid Heavy-Pasty-Dry

GAS SHOWS

Gas Background — 26

	From 27	To 28	% 29	Ratio C_1/C_2 30	Ratio C_1/C_3 31
Constant					
Increasing					
Decreasing					
Regularly					
Irregularly					

Gas Shows (Kicks)

Depth or Time 32	% Max. 33	Nature 34	Ratio C_1/C_2 35	Ratio C_1/C_3 36	Duration /Choke 37	Duration Kick 38	Density Suct. 39	Density Comp. 40	Sample 41

MUD

42 D / V / F / NaCl / Fuel

Gain From 43	Gain To 44	Gain bbl/h 45	Loss From 47	Loss To 48	Loss bbl/h 49
Total 46			Daily Total 50		

REMARKS 51

Waiting for Salt

Program: Saturate mud - Resume drilling 52

Position at 8 A.M. 53

FORM 6104

AQUITAINE COMPANY OF CANADA LTD	DATE (1)	No. (2)	DAILY REPORT GEOLOGY - SHOWS	FOOTAGE (3)	(4) Hr.	LAST DEPTH (5)	WELL NAME (6)
	12/8/74	8		421 Ft		1707 Ft.	NARWHAL S.

From (7)	To (8)	Drilling Rate (9) min/ft	CARBONATE W.U.W. 1 min (10)	3 min (11)	15 min (12)	POROSITY Type (13)	Grade (14)	LITHOLOGY (15)
1286	1465	1'-3'	1	3	9			Red siltstones with minor fine grained sandstones
			8	17	35			
1465	1510	4'-6'	10	20	40			Red siltstones as above
1510	1707	1'-3'	7	24	53			Salt with micritic dolomite and anhydrite - total of 12'
			43	67	77			of very poor intergranular porosity
								Caliper log and Gamma log indicate salt between the
								following intervals:
								1112 - 1164 - hole size greater than 22"
								1544 - 1572 - hole size 21"
								1583 - 1611 - hole size 20"
								1640 - 1705 (Logged TD)- hole size 19"

TYPE OF DRILLING | TYPE OF BIT (16) | AGE/FORMATION KENOGAMI (17)

OIL SHOWS

Depth or Time (18)	Colour (19)	Odour (20)	Fluorescence Direct Mud (21)	Fluorescence Extr. Cuttings (22)	Colour Intensity (23)	(24)

(25) Oil/Bitumen/Fluid-Heavy-Pasty-Dry

GAS SHOWS

Gas Background (26)

	From (27)	To (28)	% (29)	Ratio C_1/C_2 (30)	Ratio C_1/C_3 (31)
Constant					
Increasing					
Decreasing					
Regularly					
Irregularly					

Gas Shows (Kicks)

Depth or Time (32)	% Max. (33)	Nature (34)	Ratio C_1/C_2 (35)	Ratio C_1/C_3 (36)	Duration /Choke (37)	Duration Kick (38)	Density Suct (39)	Density Comp (40)	Sample (41)

MUD

(42)

	Gain From (43)	Gain To (44)	Gain bbl/h (45)	Loss From (47)	Loss To (48)	Loss bbl/h (49)
D						
V						
F	1320		5			
NaCl						
Fuel						

Total (46) | Daily Total (50)

REMARKS (51)

Trace of methane 1510' - TD

Program (52)

Position at 8 A.M. Waiting on mud products at 1707' (53)

FORM 6104

CONFIDENTIAL

AQUITAINE COMPANY OF CANADA LTD

DATE	No.	DAILY REPORT GEOLOGY - SHOWS	FOOTAGE		LAST DEPTH	WELL NAME
1 11/8/74	2 7		3 163 Ft.	4 Hr.	5 1286 Ft.	6 NARWHAL S.

From	To	Drilling Rate	CARBONATE W.UW 1 min	3 min	15 min	POROSITY Type	Grade	LITHOLOGY
7	8	9 min/ft	10	11	12	13	14	15
1123	1165	3'-4'	7	12	25			Red to grey shaley siltstone, minor fine grained siltstone
1165	1185	6'-10'						Siltstone as above
1185	1286	2'-4'						Siltstone as above

TYPE OF DRILLING | TYPE OF BIT | 16 AGE/FORMATION 17

OIL SHOWS

Depth or Time	Colour	Odour	Fluorescence Direct Mud	Direct Cuttings	Extr.	Colour Intensity
18	19	20	21	22	23	24

25 Oil/Bitumen/Fluio-Heavy-Pasty-Dry

GAS SHOWS

Gas Background

26 Constant / Increasing / Decreasing / Regularly / Irregularly

From	To	%	Ratio $C1/C2$	Ratio $C1/C3$
27	28	29	30	31

Gas Shows (Kicks)

Depth or Time	% Max.	Nature	Ratio $C1/C2$	Ratio $C1/C3$	Duration /Choke	Duration Kick	Density Suct.	Density Comp	Sample
32	33	34	35	36	37	38	39	40	41

MUD

42 D / V / F / NaCl / % Fuel

Gain From	Gain To	Gain bbl/h	Loss From	Loss To	Loss bbl/h
43	44	45	47	48	49
Total 46			Daily Total 50		

REMARKS 51

Program 52

Position at 8 A.M. Drilling at 1480' 53

FORM 6104

CONFIDENTIAL

AQUITAINE COMPANY OF CANADA LTD

1 DATE	2 No.	DAILY REPORT GEOLOGY - SHOWS	3 FOOTAGE	4	5 LAST DEPTH	6 WELL NAME
9/8/74	6		0 Ft.	Hr.	1123 Ft.	NARWHAL S

From	To	Drilling Rate	CARBONATE W.UW 1 min	3 min	15 min	POROSITY Type	Grade	LITHOLOGY
7	8	9	10	11	12	13	14	15

TYPE OF DRILLING TYPE OF BIT 16 AGE/FORMATION 17

OIL SHOWS

Depth or Time	Colour	Odour	Fluorescence Direct Mud	Fluorescence Extr. Cuttings		Colour Intensity
18	19	20	21	22	23	24

25 Oil/Bitumen/Fluid-Heavy-Pasty-Dry

GAS SHOWS

Gas Background 26

Constant
Increasing
Decreasing
Regularly
Irregularly

From	To	%	Ratio $C1/C2$	Ratio $C1/C3$
27	28	29	30	31

Gas Shows (Kicks)

Depth or Time	% Max.	Nature	Ratio $C1/C2$	Ratio $C1/C3$	Duration /Choke	Duration Kick	Density Suct	Density Comp	Sample
32	33	34	35	36	37	38	39	40	41

MUD

42

	Gain From	Gain To	Gain bbl/h	Loss From	Loss To	Loss bbl/h
D						
V	43	44	45	47	48	49
F						
NaCl						
% Fuel	Total 46			Daily Total 50		

REMARKS 51

Setting stack
running the raiser

Program 52

Position at 8 A.M. 53

FORM 6104

AQUITAINE COMPANY OF CANADA LTD	DATE 1	No. 2	DAILY REPORT GEOLOGY - SHOWS	FOOTAGE 3	Hr. 4	LAST DEPTH 5	WELL NAME 6
	12/8/74	5		93 Ft.		1123 Ft.	NARWHAL S.

From 7	To 8	Drilling Rate 9 min/ft	CARBONATE W.UW 1 min 10	3 min 11	15 min 12	POROSITY Type 13	Grade 14	LITHOLOGY 15
1030	1055	2.8/4.6						No returns
1055	1123	2/3.4						on the bit, at 1121'
								Mostly: red siltstone and mudstone
								some greenish siltstone
								some gypsum, anhydrite
								cryptocrystalline buff to greyish limestone

TYPE OF DRILLING | TYPE OF BIT | 16 AGE/FORMATION Possible Kenogami, western facies 17

OIL SHOWS

Depth or Time 18	Colour 19	Odour 20	Fluorescence Direct Mud 21	Direct Cuttings 22	Extr. 23	Colour Intensity 24

25 Oil/Bitumen/Fluid-Heavy-Pasty-Dry

GAS SHOWS

Gas Background 26

Constant
Increasing
Decreasing
Regularly
Irregularly

From 27	To 28	% 29	Ratio C_1/C_2 30	Ratio C_1/C_3 31

Gas Shows (Kicks)

Depth or Time 32	% Max. 33	Nature 34	Ratio C_1/C_2 35	Ratio C_1/C_3 36	Duration /Choke 37	Duration Kick 38	Density Suct 39	Density Comp 40	Sample 41

MUD

42 D ___ V ___ F ___ NaCl ___ Fuel ___

Gain From 43	Gain To 44	Gain bbl/h 45	Loss From 47	Loss To 48	Loss bbl/h 49
Total 46			Daily Total 50		

REMARKS 51

running 20" casing, shoe at 1093'

Program 52

Position at 8 A.M. 53

CONFIDENTIAL

FORM 6104

AQUITAINE COMPANY OF CANADA LTD	DATE 1	No. 2	DAILY REPORT GEOLOGY - SHOWS	FOOTAGE 3	Hr.	LAST DEPTH 5	WELL NAME 6
	7/8/74	4		317 Ft.		1030 Ft.	NARWHAL S.

From 7	To 8	Drilling Rate 9 min/ft	CARBONATE W.U.W 1 min 10	3 min 11	15 min 12	POROSITY Type 13	Grade 14	LITHOLOGY 15
713	730	6/10.4						
730	820	2.2/5.2						No returns
820	905	1.8/2.6						
905	1030	1.8/6.8						

TYPE OF DRILLING | TYPE OF BIT | 16 AGE/FORMATION 17

OIL SHOWS

Depth of Tube 18	Colour 19	Odour 20	Fluorescence Direct Mud 21	Direct Cuttings 22	Extr. 23	Colour Intensity 24

25 Oil/Bitumen/Fluid-Heavy-Pasty-Dry

GAS SHOWS

Gas Background

26 Constant / Increasing / Decreasing / Regularly / Irregularly

From 27	To 28	% 29	Ratio C_1/C_2 30	Ratio C_1/C_3 31

Gas Shows (Kicks)

Depth or Time 32	% Max. 33	Nature 34	Ratio C_1/C_2 35	Ratio C_1/C_3 36	Duration / Choke 37	Duration Kick 38	Density Suct 39	Density Comp 40	Sample 41

MUD

42 D / V / F / NaCl / % Fuel

Gain From 43	Gain To 44	Gain bbl/h 45	Loss From 47	Loss To 48	Loss bbl/h 49

Total 46 | Daily Total 50

REMARKS 51

Drilling 26" hole from 713'

Program 52

Position at 8 A.M. 53

FORM 6104

CONFIDENTIAL

AQUITAINE COMPANY OF CANADA LTD	DATE (1)	No. (2)	DAILY REPORT GEOLOGY - SHOWS	FOOTAGE (3) / (4)	LAST DEPTH (5)	WELL NAME (6)
	6/8/74	3		0 Ft. / Hr.	713 Ft.	NARWHAL S.

From (7)	To (8)	Drilling Rate (9) min/ft	CARBONATE W.I.U.W. 1 min (10)	3 min (11)	15 min (12)	POROSITY Type (13)	Grade (14)	LITHOLOGY (15)

TYPE OF DRILLING | TYPE OF BIT | (16) AGE/FORMATION (17)

OIL SHOWS

Depth or Time (18)	Colour (19)	Odour (20)	Fluorescence Direct Mud (21)	Fluorescence Direct Cuttings (22)	Fluorescence Extr (23)	Colour Intensity (24)

(25) Oil/Bitumen/Fluid-Heavy-Pasty-Dry

GAS SHOWS

Gas Background (26): Constant / Increasing / Decreasing / Regularly / Irregularly

From (27)	To (28)	% (29)	Ratio C1/C2 (30)	Ratio C1/C3 (31)

Gas Shows (Kicks)

Depth or Time (32)	% Max. (33)	Nature (34)	Ratio C1/C2 (35)	Ratio C1/C3 (36)	Duration /Choke (37)	Duration Kick (38)	Density Gust (39)	Density Comb (40)	Sample (41)

MUD

(42) D / V / F / N.C.l / Fuel

Gain From (43)	Gain To (44)	Gain bbl/h (45)	Loss From (47)	Loss To (48)	Loss bbl/h (49)

Total (46) | Daily Total (50)

REMARKS (51)

Running casing
Cementation

Program (52)

Position at 8 A.M. (53)

FORM 6103

CONFIDENTIAL

AQUITAINE COMPANY OF CANADA LTD	1 DATE 5/8/74	2 No 2	DAILY REPORT GEOLOGY - SHOWS	3 FOOTAGE 97 Ft.	4 Hr.	5 LAST DEPTH 713 Ft.	6 WELL NAME NARWHAL S.

From	To	Drilling Rate	CARBONATE W.U/W 1 min	3 min	15 min	POROSITY Type	Grade	LITHOLOGY
7	8	9 min/ft	10	11	12	13	14	15
616	635	7/15						No returns
635	665	3.4/3.4						
665	695	4/7.2						
695	713	9.8/13.2						713'- on the bit Soft white gypsum (80%) buff, cryptocrystalline, dolomite anhydrite (20

TYPE OF DRILLING TYPE OF BIT 16 AGE FORMATION Paleozoic at 713' 17

OIL SHOWS

Depth or Time	Colour	Odour	Fluorescence Direct Mud	Direct Cuttings	Extr.	Colour Intensity
18	19	20	21	22	23	24

25 Oil/Bitumen-Fluid-Heavy-Pasty-Dry

GAS SHOWS

Gas Background

26

Constant
Increasing
Decreasing
Regularly
Irregularly

From	To	%	Ratio C1/C2	Ratio C1/C3
27	28	29	30	31

Gas Shows - Kicks

Depth of Time	% Max.	Nature	Ratio C1/C2	Ratio C1/C3	Duration Choke	Duration Kick	Density Cut	Density Comp	Temp °F
32	33	34	35	36	37	38	39	40	41

MUD

42 CD, V, F, NaCl, % Fuel

Gain From	Gain To	Gain bbl/h	Loss From	Loss To	Loss bbl/h
43	44	45	47	48	49
Total 46			Daily Total 50		

REMARKS 51

36" hole to 713'
30" casing set at 672'

Program 52

Position at 8 A.M. 53

FORM 6104

CONFIDENTIAL

AQUITAINE COMPANY OF CANADA LTD.

DATE	No.	DAILY REPORT GEOLOGY - SHOWS	FOOTAGE		LAST DEPTH	WELL NAME
1 4/8/74	2 1		3 36 Ft	4 Hr.	5 616 Ft.	6 NARWHAL S.

From	To	Drilling Rate	CARBONATE W.U.W 1 min	3 min	15 min	POROSITY Type	Grade	LITHOLOGY
7	8	9 min/ft	10	11	12	13	14	15
								Sea bottom - 503' KB - 580'
								No returns
580	585	11.8						
585	616	2.4/3.8						614'- on the bit Rounded pebbles and pellets - limestone, dolomite, granite clay

TYPE OF DRILLING TYPE OF BIT 16 AGE FORMATION Glacial Drift (?) At 614' 17

OIL SHOWS

Depth or Time	Colour	Odour	Fluorescence Direct Mud	Direct Cuttings	Extr	Colour Intensity
18	19	20	21	22	23	24

25 Oil/Bitumen/Fluid-Heavy-Pasty-Dry

GAS SHOWS

Gas Background

26 Constant / Increasing / Decreasing / Regularly / Irregularly

From	To	%	Ratio C1/C2	Ratio C1/C3
27	28	29	30	31

Gas Shows (Kicks)

Depth or Time	% Max.	Nature	Ratio C1/C2	Ratio C1/C3	Duration /Circ	Duration Kick	Density Gust	Density Comp	Sample
32	33	34	35	36	37	38	39	40	41

MUD

42

	Gain From	Gain To	Gain bbl/h	Loss From	Loss To	Loss bbl/h
D	43	44	45	47	48	49
V						
F						
NaCl						
% Fuel	Total 46			Daily Total 50		

REMARKS 51

Drilling 36" hole, with sea water

Program 52

Position at 8 A.M. 53

4. CORE STUDY (1837-1867)

AQUITAINE COMPANY
OF CANADA LTD.

CONFIDENTIAL

MEMORANDUM

TO: W. W. Taylor DATE: September 20, 1974

FROM: G. E. Tebbutt FILE: EE 825.03.07

RE: Narwhal Core

In my opinion, the laminated features noted in preliminary examinations are not stromatoporoids but result from intimate interlayering of blue-green algal encrustations and inorganic, chemically precipitated crusts; the latter are comparable with those found in caves and on other near-surface subaerially exposed rocks traversed by fresh ground waters in the vadose zone of weathering. Although each feature can, in some cases, be distinguished (algal vs. vadose) in the Narwhal core, more typically the affinities of portions of the laminated sequences cannot be readily resolved; interlayering of the two crusts is common, and fractures in algal hummocks are commonly lined with vadose coatings.

I concur with Machielse in interpreting a supratidal to shallow subtidal depositional environment; the scanty biotope seems to have been dominated by supratidal blue-green algal growth, with a few gastropods, perhaps thrown in from the sea, being the only obvious faunal constituents. By the nature of their position above mean sea level, these sediments were exposed, for substantial periods of time, to the effects of subaerial dessication and of percolation of ground waters which deposited surficial crusts as well as linings within gaps and cavernous voids. Such crusts are now being deposited in tropical carbonate terrains as normal marginal marine (e.g. island) sequences, and crusts of caliche incorporating some of these features are common in hot arid regions today. Typical in the laminated zones of the Narwhal core are heterogeneous assortments of broken fragments of laminated crusts which have been torn up and redeposited within subsequent laminations. Near the bottom of the core, several large blocks of dolomite (penecontemporaneous?) have been broken up and redeposited within spongy algal limestone. These features reveal that the crusts were accessible to surficial environmental stresses during their development (i.e. not appreciably buried). Appearance of septarian-like polygonal fractures where fragments are not rotated or greatly disturbed indicates dessication, i.e. above sea level, in the vadose zone. A thin interval of reverse graded bedding appears at the base of a laminated and nodular sequence near the top of the core; this too is common in modern caliche.

Approximately one half of the total 29 feet of core consists of medium and coarse grained lime arenites of moderately well sorted, subangular to subrounded nonskeletal grains; these grains may be termed "lumps" or intraclasts, and normally appear to be clastic rather than accretionary. They rest in part in a micritic matrix which sporadically has either been removed by early washing or never deposited, leaving voids. Some of these voids have been modified by secondary leaching, many are lined with drusy calcite or dolomite, and some are true fenestrae, forming a fenestral or laminoid-fenestral fabric with high potential porosity (10-15%). In this core, most pores, whatever their genesis, have been plugged by halite, or less commonly anhydrite, which reduces

2.....

effective porosity to a very low value. Dolomite appears throughout the core, generally in small proportions as disseminated or locally concentrated small crystals which have selectively replaced certain calcitic features, in some cases clearly outlining laminations or bedding surfaces. The only recognized fauna in these intraclastic arenites (intramicrite/sparite, or intraclastic packstone/grainstone) were a few high-spired gastropods and a few algal flakes, either of which could have originated either in the marine or terrestrial environment and furthermore could have been transported from one to the other, in either direction. Since the intraclastic arenites seem to be fairly extensive, one can favour the assumption that they were deposited under shallow subtidal marine conditions, possibly in submarine sand banks. The presence of fenestral voids in parts of the arenitic sequence suggest intertidal deposition, where variable conditions of hydraulic pressure, winnowing effects, and perhaps algal intercalations permitted preservation of anomalously large "unsupported" fenestrae. Because the halite and anhydrite crystals appear to be dominantly simple infillings of pre-existing pores rather than primary (e.g. nodular) accretions, there seems no strong necessity to elicit a "sebkha" explanation for the deposit. These salts could have been introduced at some later time unrelated to primary deposition. Incipient replacement crystals of anhydrite which transect the surrounding limestone are normal diagenetic features which could develop at any time after lithification where introduction of highly saline brines elevate salinity of formation fluids to such an extent that calcite is dissolved and gypsum or anhydrite immediately deposited in its place.

In conclusion, the entire sequence represented in the core appears to have been deposited and diagenetically modified within a few feet of sea level, with several cyclic oscillations evident.

G. E. Tebbutt

GET/cg
attach.

c.c. B. A. Tillement

AQUITAINE COMPANY
OF CANADA LTD.

CONFIDENTIAL

Narwhal Core Description

Feet from top

0 - 5	Limestone, vadose pisolite (to ½cm) alternating w/laminated crusts (spongy algae + vadose cavern fill); interpiso salt plugging 10 - 15%; variable concentrations dolomite, minor interstitial anhydrite; nuclei of pisoliths are commonly broken frags of laminated crusts which in turn are encrusted and are accompanied by small flakes and chips of microcrystalline material; laminated crusts are part algal (blue-green), part inorganic vadose; interpisolith drusy rims; anhydrite felted grey fill & dark amber secondary blades
5 - 11.5	Thin zone of reverse graded bedded vadose aggregates at top of sequence of medium brown lst, detrital aggregate of consolidated mg-cg amorphous grains (lumps, intraclasts), apparently nonskeletal & subangular, cemented by microcrystalline calcite, fenestral & l-f voids are common, lined w/druse which is partly dolomite, & generally filled w/halite; tr small gastropod; shows intergranular leaching & later drusification; arenite bcms finer (mg) & better sorted downward, also lighter brown; few algal flakes & plates, toward base more nearly pelletoidal, then less porous & less distinct grains, few blades 2ndary anhydrite
11.5 - 13.5	Becomes med. brown, more porous (leached?) & slightly more coarsely grained w/salt fill
13.5 - 13.9	Zone of fine vadose (?) lamination, broken & recemented crusts
13.9 - 14.5	Buff milky calcareous dolomite w/v hazy ghosts of ~2-5 mm lumps, lg patches anhydrite.
14.5 - 15	Disturbed & recemented laminated crusts, lst w/laminae outlined by minute dol crystals, etc.
15. - 18.5	Becomes mg crust-arenite w/common fenestral & laminoid - fenestral fabric (salt plugged), leached in part, w/microcryst mx & subsequent vugs coated w/laminae & druse; some zones dense & well cemented, others have matrix removed erratically (or non dep?); includes minor fill & replacement anhydrite @ 18'
18.5 - 19.5	Grades into darker brown, strongly laminated blue-green algae with evident tufts & columns, etc.
19.5 - 22	Zone of "case-hardened" septarian-like heterogeneous frags of crusts & amorphous material, cemented in situ by vadose crusts; lg patches coarse felted dark grey anhydrite

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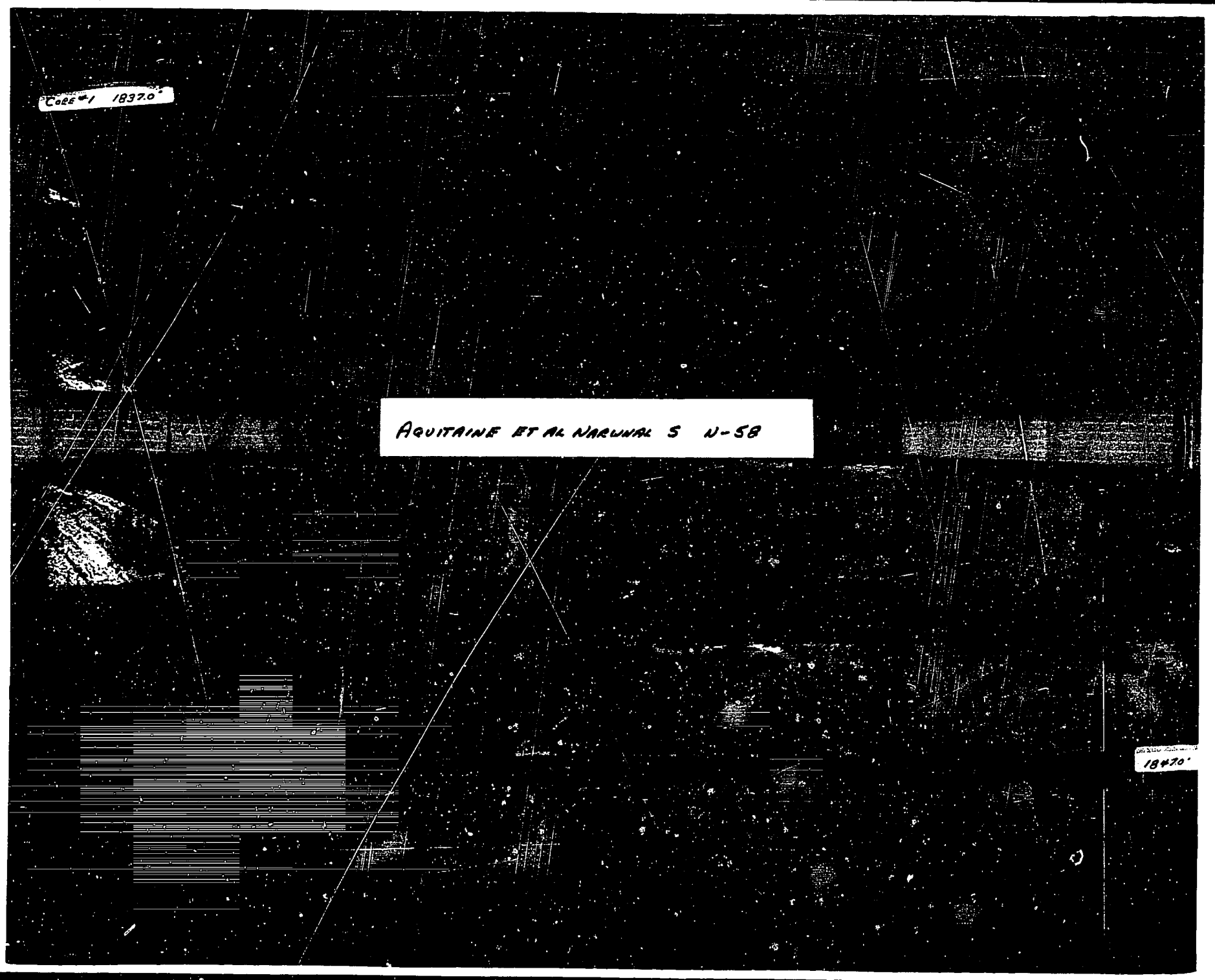
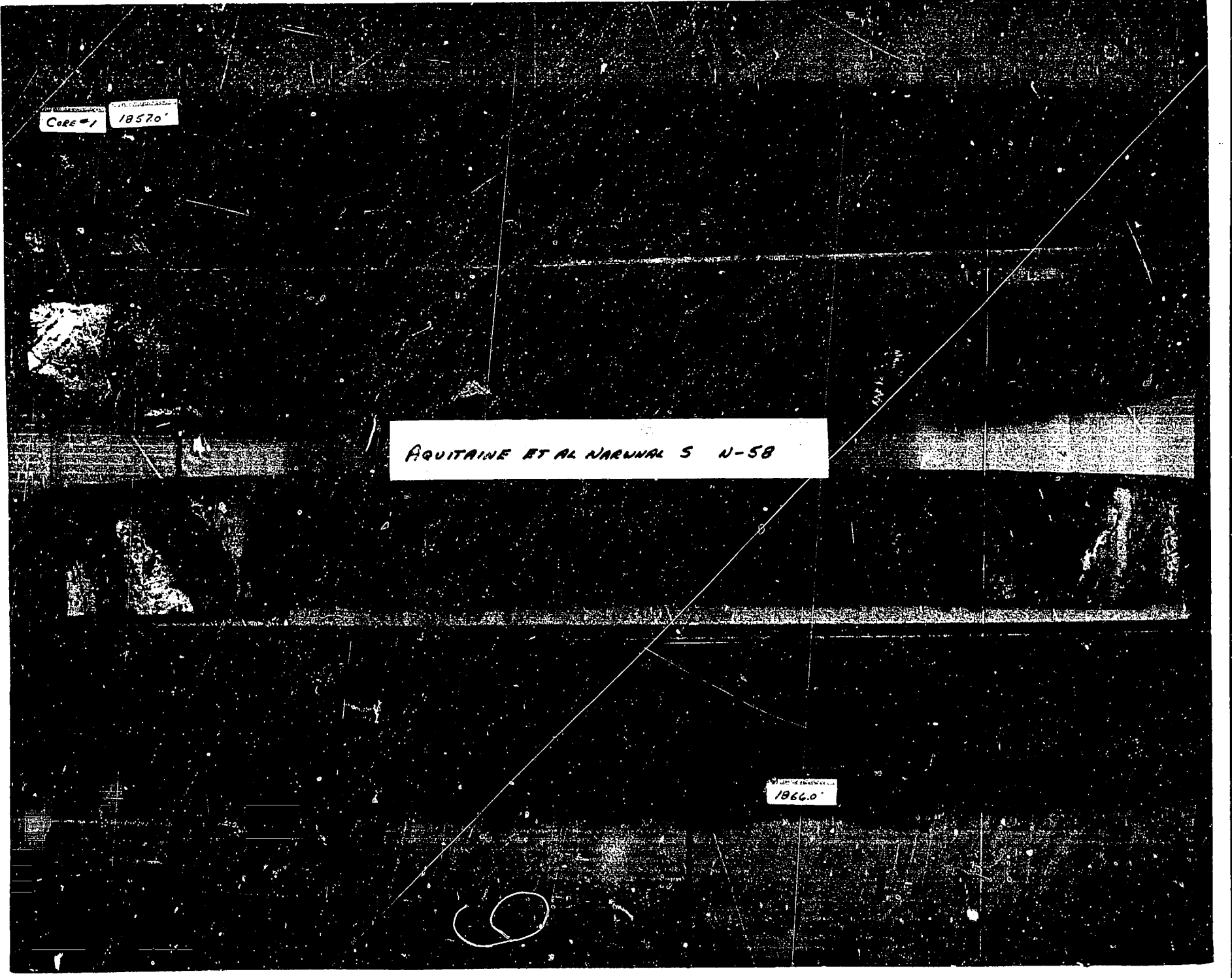
22 - 23	Zone highly chaotic & heterog; variable crusts & vadose pisoliths, uncertain algal (?) laminations, breccia
23 - 24	Mottled, spongy, algal (?) material & interspersed vadose crusts
24 - 25	"Megabreccia", incorporating blocks of dolomite (lt gy microcryst w/lg clasts & crusts) in spongy dark brown mottled crusts; anhydrite fills voids & grows beyond
25 - 26	Chaotic light grey calcareous dolomite w/fracture fillings & crusts of spongy dark brown mottled lsts, caliche nodules
26 - 27	Caliche crusts & dolomite crusts (calcareous), nodules, etc., v. heterogeneous
27 - 28	Dark brown spongy, mottled lst crusts, strongly modified by calichification; lumps & granules
28 - 29	Medium brown limestone, mg-cg, granular, variable fenestrae - some leached, etc.; salt plugging, weak bedding


COBE #1 18370°
AQUITAINE ET AL NARWHAL S N-58
18470°


CORE #1
18570'
AQUITAINE ET AL NARWHAL S N-58
1866.0'

CORE LABORATORIES - CANADA, LTD.

Company	AQUITAINE COMPANY OF CANADA LTD.	Formation		Page	1 of 2
Well	AQUITAINE ET AL NARWHAL S N-58	Drilling Fluid	WATER BASE MUD	File	7004-4479
Field	WILDCAT - NARWHAL SOUTH	Elevation		Date Report	SEPT. 30/74
Location	58° 07' 56.00" N. LAT.	Analysis	FULL DIAMETER	Analysts	SP NR
	84° 08' 16.00" W. LONG.	Remarks			

AST - APPEARS SIMILAR TO; * - BROKEN CORE (REQUIRED FOR SPECIAL PURPOSES); ** - PERMEABILITY > 30000 MD

- - PERMEABILITY < 1; FS - FINE SAND; MS - MEDIUM SAND; CS - COARSE SAND

CONG - CONGLOMERATE; DOL - DOLOMITE; SH - SHALE; LMY - LIMY

SHY - SHALY; /BK - BREAK; BIT - PYROBITUMEN; CARB - CARBONACEOUS

A - ANHYDRITE; FOSS - FOSSILIFEROUS; XLN - CRYSTALLINE; LAM - LAMINATIONS

V - VUGULAR; LV - LARGE VUGS; SV - SMALL VUGS; PPV - PIN POINT VUGS

I - INTERGRANULAR; STY - STYLOLITIC; HF - HORIZONTAL FRACTURE; VF - VERTICAL FRACTURE

SP - SMALL PLUG SAMPLE; CV - CLAY; V - VUGGY; m - MATRIX

Sample Number	Interval Represented, Feet		Permeability to Air, Millidarcys			Permeability Feet	Porosity, Per Cent	Porosity Feet	Density, gm./cc.		PLUG LENGTH	Visual Examination
	Depth	Thick	K Max	K90°	KV				Bulk	Grain	IN CM.	
	CORED INTERVAL 1837' - 1867'											
	CORE NO. 1 1837' - 1867' (REC. 29') (11 BOXES)											
1	1837.0-37.7	0.7	-0.1	-0.1	-0.1	-	1.2	0.84	2.63	2.67	13.46	FEW SV PPV STROM
2	1837.7-38.6	0.9	1.72	0.32	-0.1	1.55	2.5	2.25	2.59	2.66	20.29	SV PPV
3	1838.6-39.7	1.1	4.90	3.84	-0.1	5.39	1.4	1.54	2.63	2.67	13.04	FEW SV PPV
4	1839.7-40.7	1.0	0.02	-0.1	-0.1	0.02	1.8	1.80	2.60	2.65	15.55	SV PPV STROM
5	1840.7-41.5	0.8	-0.1	-0.1	-0.1	-	0.8	0.64	2.65	2.68	17.51	FEW SV FEW PPV
6	1841.5-42.4	0.9	-0.1	-0.1	-0.1	-	1.0	0.90	2.67	2.70	18.82	SV PPV
7	1842.4-43.4	1.0	-0.1	-0.1	-0.1	-	1.4	1.40	2.62	2.65	14.13	SV PPV
8	1843.4-44.2	0.8	47.70	38.20	-0.1	38.16	2.9	2.32	2.55	2.62	14.13	SV PPV
9	1844.2-44.9	0.7	492.00	339.00	54.20	344.40	2.8	1.96	2.50	2.57	11.71	SV PPV
10	1844.9-45.7	0.8	206.00	187.00	15.70	164.80	2.6	2.08	2.51	2.57	19.48	FEW SV PPV
11	1845.7-46.8	1.1	226.00	208.00	152.00	248.60	2.7	2.97	2.49	2.56	23.56	FEW SV PPV
12	1846.8-47.9	1.1	0.29	0.29	-0.1	0.32	1.7	1.87	2.57	2.61	23.13	PPV
13	1847.9-48.9	1.0	-0.1	-0.1	-0.1	-	0.6	0.60	2.61	2.62	14.20	DENSE
14	1848.9-49.7	0.8	2.93	1.65	-0.1	2.34	1.4	1.12	2.58	2.62	20.70	FEW SV PPV
15	1849.7-50.7	1.0	208.00	193.00	73.80	208.00	2.8	2.80	2.50	2.58	11.72	SV PPV
16	1850.7-51.2	0.5	13.30	8.45	-0.1	6.65	2.0	1.00	2.59	2.64	9.78	SV PPV
17	1851.2-52.0	0.8	0.42	0.24	-0.1	0.34	2.5	2.00	2.63	2.70	8.85	FEW SV PPV
18	1852.0-52.9	0.9	-0.1	-0.1	-0.1	-	0.9	0.81	2.65	2.68	21.04	PPV
19	1852.9-53.8	0.9	2390.00	534.00	94.40	2151.00	3.5	3.15	2.47	2.56	19.20	SV PPV
20	1853.8-54.5	0.7	376.00	198.00	5.01	263.20	2.8	1.96	2.52	2.60	17.15	SV PPV
21	1854.5-55.8	1.3	1420.00	1200.00	-0.1	1846.00	3.2	4.16	2.48	2.56	20.47	SV PPV
22	1855.8-57.3	1.5	19.10	0.18	-0.1	28.65	0.9	1.35	2.63	2.65	24.68	FEW SV FEW PPV
23	1857.3-58.7	1.4	-0.1	-0.1	-0.1	-	1.4	1.96	2.64	2.67	15.70	FEW SV FEW PPV
24	1858.7-60.0	1.3	0.06	-0.1	-0.1	0.08	1.2	1.56	2.65	2.68	28.05	FEW SV FEW PPV

Company AQUITAINE COMPANY OF CANADA LTD. Formation
Well AQUITAINE ET AL NARWHAL S N-58 Drilling Fluid WATER BASE MUD

File 7004-4479

Sample Number	Interval Represented, Feet		Permeability to Air, Millidarcys			Permeability Feet	Porosity, Per Cent	Porosity Feet	Density, gm./cc.		PLUG LENGTH	Visual Examination
	Depth	Thick	K Max	K90°	KV				Bulk	Grain	IN CM.	
	CORE NO. 1 (CONT'D)											
25	1860.0-60.6	0.6	135.00	82.40	10.00	81.00	3.4	2.04	2.49	2.58	13.36	SV PPV
26	1860.6-61.5	0.9	1.67	-0.1	-0.1	1.50	0.8	0.72	2.61	2.63	17.69	SV PPV
27	1861.5-63.2	1.7	-0.1	-0.1	-0.1	-	0.6	1.02	2.66	2.68	27.81	SV PPV
28	1863.2-64.4	1.2	-0.1	-0.1	-0.1	-	0.9	1.08	2.62	2.65	14.36	SV PPV
29	1864.4-65.0	0.6	-0.1	-0.1	-0.1	-	0.7	0.42	2.58	2.60	12.52	FEW SV PPV
30	1865.0-65.5	0.5	290.00	120.00	0.06	145.00	3.3	1.65	2.49	2.57	12.57	SV PPV
31	1865.5-66.0	0.5	0.42	-0.1	-0.1	0.21	1.9	0.95	2.57	2.62	12.23	SV PPV
-	1866.0-67.0	1.0	-1.0	-1.0	-1.0	-	-1.0	-1.0	-1.0	-1.0	-	LOST CORE

NOTE: SALT WASHED OUT DURING CORING HAS ADDED TO THE PORE VOLUME OF THESE SAMPLES. THEREFORE POROSITIES REPORTED MAY NOT REPRESENT TRUE RESERVOIR VALUES.

5. WATER ANALYSIS

CORE LABORATORIES - CANADA LTD.
Petroleum Reservoir Engineering
CALGARY ALBERTA

WATER ANALYSIS

Plastic — CONTAINER IDENTITY

7021-41202 — LABORATORY NUMBER

Aquitaine Company of Canada Ltd. — OPERATOR

1 of 2 — PAGE

58° 07' 56.00 N.L.
84° 08' 16.00 W.L. — LOCATION

Aquitaine et al Narwhal S N-58 — WELL OR SAMPLE LOCATION NAME

77' — KB ELEV.

503' — GND. ELEV.

Narwhal South, Atlantic Offshore — FIELD OR AREA

POOL OR ZONE

KB - Sea Level Water depth — SAMPLER

TEST TYPE & NO.

TEST RECOVERY

Water Flow (Base) — POINT OF SAMPLE

AMT. & TYPE CUSHION

@ °F — MUD RESISTIVITY

1700' - 2300' — TEST INTERVALS OR PERFS.

PUMPING FLOWING GAS LIFT SWAB

WATER BBLS/D. OIL BBLS/D. GAS MFC/D.

SEPARATOR RESERVOIR — @ °F CONTAINER WHEN SAMPLED — @ °F CONTAINER WHEN RECEIVED — SEPARATOR

PRESSURES, PSIG — TEMPERATURES, °F

Sept. 6/74 — DATE SAMPLED (D/M/Y)

Sept. 9/74 — DATE RECEIVED (D/M/Y)

AA — DATE ANALYSED (D/M/Y) — ANALYST

REMARKS

ION	MG/L	MG%	MEQ/L
Na+K	6864	1.6	298.6
K			
Ca	118364	28.4	5906.4
Mg	18112	4.3	1488.7
Ba			
Sr			
Fe		TRACE	

ION	MG/L	MG%	MEQ/L
Cl	272146	65.3	7676.2
Br			
I			
HCO_3	1167	0.3	19.1
SO_4	0	0.0	0.0
CO_3	0	0.0	0.0
OH	0	0.0	0.0
H_2S	NOT DETECTED		

TOTAL SOLIDS MG/L

BY EVAPORATION @ 110°C

BY EVAPORATION @ 180°C

AT IGNITION

416653 — CALCULATED

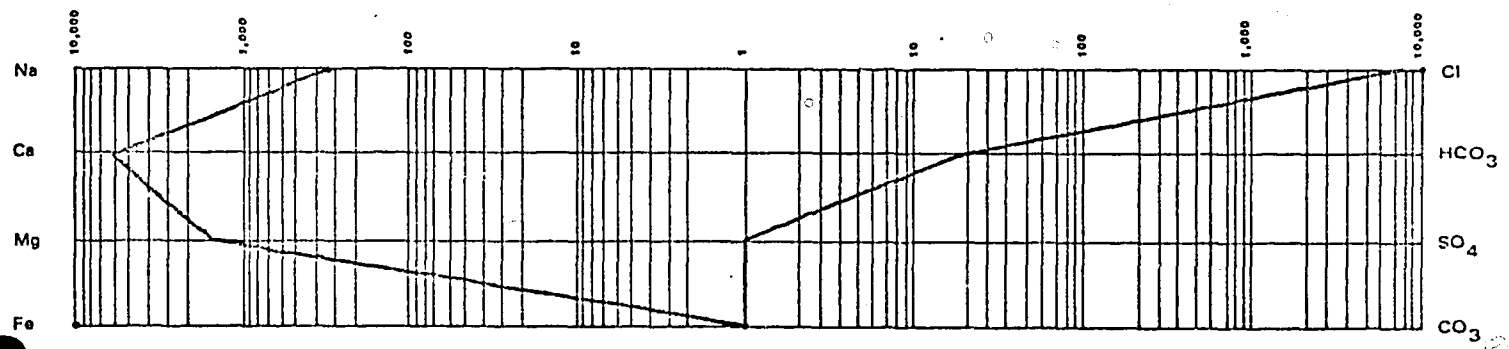
1.3267 @ 60°F — SPECIFIC GRAVITY

1.4211 @ 21°C — REFRACTIVE INDEX

6.6 — pH

0.084 @ 25°C — RESISTIVITY (OHM/METERS)

LOGARITHMIC PATTERN MEQ PER LITER



REMARKS

NaCl equiv 427995

CORE LABORATORIES - CANADA LTD.
Petroleum Reservoir Engineering
CALGARY ALBERTA

WATER ANALYSIS

Plastic — CONTAINER IDENTITY

7021-41202 — LABORATORY NUMBER

Aquitaine Company of Canada Ltd. — OPERATOR

2 of 2 — PAGE

58° 07' 56.00 N.L.
84° 08' 16.00 W.L. — LOCATION

Aquitaine et al Narwhal S N-58 — WELL OR SAMPLE LOCATION NAME

77' — MD ELEV.

503' — GRD ELEV.

Narwhal South, Atlantic Offshore — FIELD OR AREA

POOL OR ZONE

KB - Sea Level Water depth. — SAMPLER

TEST TYPE & NO.

TEST RECOVERY

Water Flow (Top) — POINT OF SAMPLE

AMT. & TYPE CUSHION

@ °F — MUD RESISTIVITY

1700' - 2300' — TEST INTERVALS OR PERFS.

PUMPING FLOWING GAS LIFT SWAB

WATER BBLS/D. OIL BBLS/D. GAS MFC/D.

SEPARATOR RESERVOIR PRESSURES, PSIG

@ °F CONTAINER WHEN SAMPLED

@ °F CONTAINER WHEN RECEIVED

SEPARATOR TEMPERATURES, °F

Sept. 6/74 — DATE SAMPLED (D/M/Y)

Sept. 9/74 — DATE RECEIVED (D/M/Y)

AA — ANALYST

REMARKS

ION	MG/L	MG%	MEQ/L
Na+K	24864	5.1	1081.5
K			
Ca	127951	26.5	6384.8
Mg	16547	3.4	1360.1
Ba			
Sr			
Fe		TRACE	

ION	MG/L	MG%	MEQ/L
Cl	312298	64.7	8808.8
Br			
I			
HCO_3	1162	0.2	19.0
SO_4	6	0.0	0.1
CO_3	0	0.0	0.0
OH	0	0.0	0.0
H_2S	NOT DETECTED		

TOTAL SOLIDS MG/L

BY EVAPORATION @ 110°C

BY EVAPORATION @ 180°C

482828 — CALCULATED

AT IGNITION

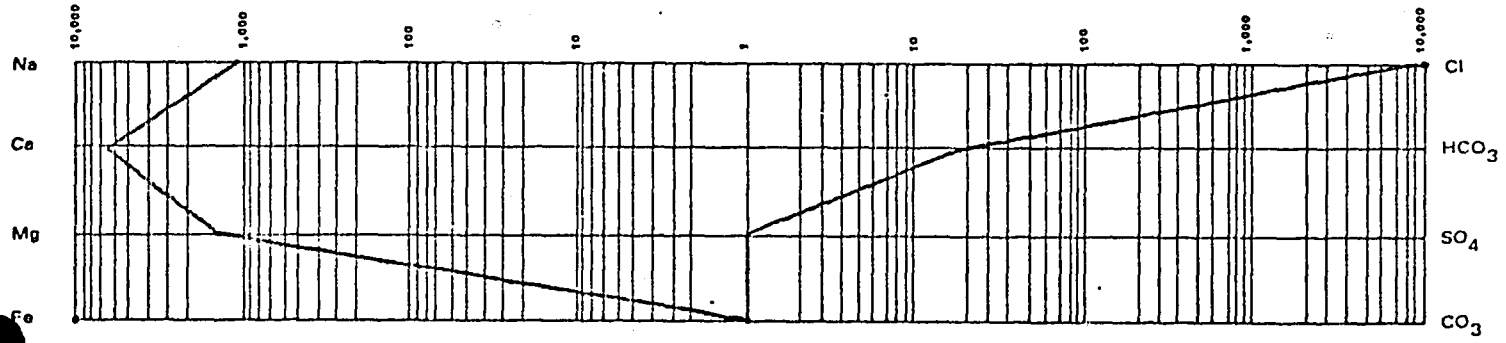
1.3446 @ 60°F — SPECIFIC GRAVITY

1.4256 @ 21°C — REFRACTIVE INDEX

5.8 — pH

0.085 @ 25°C — RESISTIVITY (OHM/METERS)

LOGARITHMIC PATTERN MEQ PER LITER



REMARKS NaCl equiv 492127

6. LOGGING

FORM 5105

LOGGING RECORD

AQUITAINE
COMPANY OF CANADA LTD.

TYPE (ABBREVIATE)	DATE	DEPTH LOGGED		RUN No.	REMARKS (LOGGING CO. ETC.)
		FROM	TO		
DIL	8.12.74	1088	1700	1	Schlumberger - Frontier
	8.29.74	1731	4334	2	
FDC-CNL	8.12.74	500	1705	1	
	8.29.74	1731	4339	2	
SLC-GR	8.14.74	980	1752	1	
	8.29.74	1731	4338	2	
HDT	8.28.74	1731	4340	1	

AQUITAINE COMPANY
OF CANADA LTD.

MEMORANDUM

TO: M. E. Hriskevich

DATE: September 10, 1974

FROM: A. J. Brinker

FILE: W. F. (Narwhal N-58)

RE: Aquitaine et al Narwhal N-58
Log Evaluation

CONFIDENTIAL

Well Data

Elevation, K.B.:	77'
K.B. to Sea Floor:	580'
Casing:	30" to 672' K.B.
	20" to 1093' K.B.
	13 3/8" to 1,737' K.B.
Total Depth:	4,341'
Logs:	DIL, CNL/FDC to 1,706'
	BHC-SGR to 1,756'
	DIL, CNL/FDC, BHC-SGRC, HDT to 4,341'

Summary of Log Evaluation

A complete suite of logs were run with the exception of a DLL and MLL. The DLL equipment failed at the time of running and delay in bringing in another tool made it necessary to waive the operation. The MLL was not run because there did not appear to be any potential hydrocarbon reservoirs and it would not be of much value anyway without the DLL.

A GR and CNL was run through 20" casing with the GR indicating increasing shaliness below 797'. The CNL is useless because of casing/large hole effect.

Logs of 17½" intermediate hole indicate: shale, 1,090' - 1,112'. Salt 1,112 - 1,165'. Shale/Siltstone 1,165 - 1,495' with a band of Sandstone 1,350 - 1,370, porosity of 5-8%, logs indicate some salt or gypsum within the sandstone. Shaly dolomite 1,495 - 1,544'. Salt 1,544 - 1,710' with bands of salt infilled dolomite. Dolomite 1,710' - 1,752' (sonic log only).

Logs for the 12¼" hole from 1,756 to 4,262 indicate the interval to be primarily a tight limestone with bands of dolomite, anhydrite, salt and shaly material, some salt and gypsum infilling. Porosity is intermittent and generally in the dolomitic rock. Complex mixtures of rock make it difficult, in some cases, to determine the difference between porosity and lithology change. Resistivities are low and are generally depressed opposite effective porous intervals indicating all effective porosity to be water bearing. The interval 4,262 to total depth is a porous conglomerate for 14' and granite for remainder. Circulation after logging indicated calcium chloride water from 1,900' to 2,900' which may have come from intervals 2,823' - 2,852' and 2,884' - 2,930'.

..... 2

The following is a summary of major lithology changes and location of porous intervals for 12¼" hole below 13 3/8" casing, see Details of Log Evaluation for additional information.

The interval 1,756' - 2,550' is primarily a tight limestone, some salt and gypsum infilling, thin bands of poor porosity. Dipmeter indicates base of reefal material to be at 2,550'.

The interval 2,550' - 2,823' is a tight limestone with shaly material 2,550' - 2,600' and anhydrite 2,740' - 2,755'.

The interval 2,823' - 2,930' is dolomitic limestone, dolomite and limestone with anhydrite 2,856' - 2,884'. The dolomite and dolomitic limestone has approximately 40' of effective porosity, 6 - 12%, and a water saturation of 65% if Rw is .040 at BHT.

The interval 2,930' - 3,286' is primarily a limestone, dolomitic in part, some gypsum infilling, band of anhydrite, intermittent poor porosity.

The interval 3,286' - 3,362' is salt, dolomite bands in bottom 14'.

The interval 3,362' - 3,637' is tight limestone, porous dolomite with gypsum infilling and bands of anhydrite. The dolomite porosity over approximately 60' of the interval ranges from 6 to 14% with water saturation of 40 to 70% using an Rw of .035 at BHT.

The interval 3,637' - 4,262' is a tight limestone, slightly dolomitic in part with some poor porosity in the dolomitic sections. Dolomite with gypsum infilling from 3,938' - 3,976', porosity in dolomite is 3-13% from CNL/FDC but sonic generally indicates poor porosity.

The interval 4,262' - 4,276' is conglomerate from samples. Porosity of 17% from logs and Sw of 40% if Rw is .035 at BHT and if Rt from deep induction is correct.

Details of Log Evaluation

500' - 1,088'	Ran GR and CNL through casing. GR indicates increasing shaliness below 797'. The CNL is useless because of casing effect.
1,088' - 1,112'	Logs indicate shale.
1,112' - 1,165'	Salt, hole size in excess of 22", logs indicate wall face to be rough which is probably due to the presence of some argillaceous dolomite.
1,165' - 1,200'	Shaly dolomite, minor salt infilling.

..... 3

1,200' - 1,350'	Shale/Siltstone, dolomitic stringers, minor salt infilling, hole conditions are good, very slightly oversize.
1,350' - 1,370'	Sandstone, shaly in part, slightly dolomitic, some salt or gypsum infilling, porosity of 5 - 8%.
1,370' - 1,495'	Shale/Silstone, dolomitic in part, hole conditions are good.
1,544' - 1,710'	Salt with bands of dolomite and salt infilled dolomite, hole is only 1/2" to 2 1/2" oversize in salt sections indicating that drilling fluid is almost saturated at this point.
1,710 - 1,752'	Dolomite/Limestone (sonic log only).
1,756' - 1,774'	Dolomite and Anhydrite, 4' of porosity otherwise tight.
1,774' - 1,779'	Limestone, ϕ 6%, drop in resistivity indicating a permeable, water bearing horizon, Sw is 70% if Rw is .040 and if Rt from DIL is correct.
1,779' - 2,336'	Limestone, intermittent salt infilling, tight except for interval 1,988' - 1,995 which has a porosity of 6 - 8%, Sw is 40% if Rw is .040 and Rt is correct. Bands of salt? 2,206' - 09' and 2,226' - 29', CNL/FDC effected by rough hole.
2,336' - 2,390'	Limestone, dolomitic? or gypsum? intermittent porosity of 6 - 8%, drop in Rt opposite porous horizons, Sw indicated to be 50 - 60%. Hole is oversize and rough indicating some leaching from drilling fluid.
2,390' - 2,474'	Limestone, tight.
2,474' - 2,550'	In part similar to interval 2,336' - 2,390'. Dipmeter indicates a change of formation at 2,550', possibly base of reefal material.
2,550' - 2,600'	Limestone, shaly, thin band of dolomite 2,572' - 2,577', tight.
2,600' - 2,740'	Limestone, generally tight, 3 - 6% porosity 2,610' - 2,620' and 2,700' - 2,720'.
2,740' - 2,755'	Anhydrite, some dolomite.
2,755' - 2,780'	Limestone, slightly dolomitic, ϕ 9%, Sw 65% using Rw of .040. Location of calcium chloride water after logging might indicate that this interval is the source of this water.

..... 4

2,780' - 2,795' Limestone, some anhydrite? tight.

2,795' - 2,823' Limestone, tight.

2,823' - 2,852' Limestone, slightly dolomitic, ϕ 9%, Sw 65% using Rw of .040. Location of calcium chloride water after logging might indicate that this interval is the source of the water.

2,852' - 2,856' Probably limestone and gypsum.

2,856' - 2,884' Anhydrite, some dolomite.

2,884' - 2,930' Dolomite, limestone and some gypsum? then bands of porosity, 6 - 12%, drop in resistivity opposite porous intervals, also possible source of calcium chloride water.

2,930' - 3,003' Limestone tight.

3,003' - 3,037' Limestone/Dolomite, ϕ of 6%, probably a fine porosity, water bearing.

3,037' - 3,082' Limestone, gypsum at 3,055', poor porosity?

3,082' - 3,093' Dolomite and anhydrite, gypsum infilling in the dolomite.

3,093' - 3,108' Dolomite, gypsum, possibly porous with a porosity of 3 - 4%.

3,108' - 3,273' Limestone, dolomitic in part, essentially tight except for thin band of dolomite 3,199' - 3,204', ϕ 15%, Sw 45% (Rw .035).

3,286' - 3,348' Salt, oversize hole with relatively smooth bore hole face except for bottom 14', some dolomite in bottom 14'.

3,348' - 3,362' Dolomite and salt.

3,362' - 3,380' Dolomite, porosity 6%, Sw 70%.

3,380' - 3,436' Limestone, dolomitic, shaly 3,431'-36' tight.

3,436' - 3,440' Anhydrite.

3,440' - 3,448' Dolomitic limestone, tight.

3,448' - 3,480' Limestone, poor fine porosity.

3,480' - 3,510' Dolomite, argillaceous in part, band of anhydrite, possibly some gypsum porosity intermittent at 8 - 14%, drop in resistivity opposite porous intervals.

3,510' - 3,545' Limestone, tight.

..... 5

3,545' - 3,568' Anhydrite, dolomite bands.

3,568' - 3,584' Dolomite, minor porosity.

3,584' - 3,598' Limestone, tight.

3,598' - 3,608' Dolomite, shaly, ϕ 10%, Sw 40%.

3,608' - 3,617' Anhydrite.

3,617' - 3,626' Limestone, tight.

3,626' - 3,632' Anhydrite.

3,632' - 3,637' Dolomite limestone, poor porosity.

3,637' - 3,660' Limestone, tight.

3,660' - 3,670' Dolomite/limestone, poor porosity?

3,670' - 3,938' Limestone, tight, dolomitic 3,870' - 3,903' with some poor porosity.

3,938' - 3,976' Dolomite and limestone, porosity of 3 - 13%, drilling times do not indicate good porosity, sonic log does not indicate good porosity except in the lower 4' where there is a drop in resistivity in high porosity from CNL is probably due to inclusions of gypsum.

3,976' - 3,988' Limestone, tight.

3,988' - 3,993' Dolomitic limestone, ϕ 5%.

3,993' - 4,262' Limestone, tight.

4,262' - 4,276' Sandstone, ϕ17%, Sw 40% (Rw .035)
Sw 73% (Rw .10)

Formation water is probably in the order of 100,000 ppm NaCl for an Rw of .035 to .04 at BHT of 150°F. Relationship of deep and medium resistivity measurements opposite porous horizons indicate the formation water salinity to be slightly lower than the mud filtrate salinity.

4,276' - T.D. Precambrian.

AJB/dl

AQUITAINE & AL. - NARWHAL SOUTH nr.1 - N 58

(HUDSON BAY, CANADA)

- GEOLOGICAL AND GEOCHEMICAL STUDY -

Note R/GEO n°48/75

February 19, 1975

COLOURED PAPER
PAPIER DE COULEUR

SOCIETE NATIONALE DES PETROLES D'AQUITAINE
DEPARTMENT OF ENERGY AND MINES
C. R. P. - GEOLOGY

AQUITAINE & AL. - NARWHAL SOUTH nr.1 - N 58

(HUDSON BAY, CANADA)

- GEOLOGICAL AND GEOCHEMICAL STUDY -

Note R/GEO n°48/75 February 19, 1975

Authors :

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Optical study of the organic matter : A.M. CASSOU, M. CORREIA

Geochemistry : J. CONNAN, B. PORTHAULT R. MAGALHAES-GOMES

Micropaleontology : J. LE FEVRE

Distribution : A.C.C.

MAIN RESULTS

The various formations intercepted in the borehole can be stratigraphically compared with those known elsewhere in Hudson Bay, on the basis of microfauna and microflora : their attributions have been summarized in figure 2. The most surprising fact is the occurrence of Permian and/or Carboniferous palynomorphs in the upper part of the section, under glacial drift.

The source-rock potential of the whole section must be regarded as low, due to insufficient maturation, in spite of some organic matter enrichments in the Severn and Bad Cache Rapids Formations.

The present report is a tentative synthesis of all stratigraphic, petrographic, mineralogical and geochemical analyses made by the geological staff of the S.N.P.A. Research Centre on the Narwhal South well. The preliminary results exposed in the note R/GEO n° 268/74 of October 28, 1974 ("flash study nr. 7") have been thus completed and updated hereafter.

1. / BIOSTRATIGRAPHY /

1.1. PALYNOPLANKTOLOGY

Between 614' and 4,280', fifty-two palynological slides were made. The samples were almost exclusively cuttings except for the core n° 1 (1,837'-1,867') and the materials recovered on the bit at 614' and 713'. The maximum spacing between each composite sample is 100'.

The analysis of these slides has shown that this well is very irregularly fossiliferous from the palynoplanktological point of view. It is possible to distinguish three main and very different intervals on the basis of kinds and abundance of microfossils.

1/ from 614' to 1,790' : Spores and saccate Pollens are present but rather scarce.

2/ from 1,837' to 2,390' : interval devoid of palynoplanktological material.

3/ from 2,480' to 4,280' : Acritarchs, Chitinozoans and Scolecodonts are very abundant.

The observation of all these categories of microorganisms has given palynostratigraphical subdivisions derived from our Canadian scale established for these regions (Note R/GEO n° 354/70) on one hand, and the paper 67-11 of MS. BARSS (1967) "Carboniferous and Permian Spores of Canada" on the other hand. Seven of these eight subdivisions are positive ; one is negative and mainly corresponds to the Silurian (in these regions, the Silurian is generally very poor to barren from the palynoplanktological point of view).

We describe hereafter the different intervals which can be recognized, their palynoplanktological contents and their assumed age.

1.1.1. 614'

Very poor and disparate association composed of :

Disaccate Pollens
Punctate periporate Pollen
Cicatricosisporites aff. dorogensis
Granulate spore type 22 (Devonian)
Hymenozonotriletes variabilis (Devonian)

Some of them are certainly reworked (Devonian) because they are incongruous ; but it seems normal in a glacial drift to contain mixed associations of different age.

Assumed age : "Cretaceous to Oligocene ?"

1.1.2. 713'

The Spores and saccate Pollens in this assemblage are very scarce. There are :

Disaccate Pollens
Nuskoisporites sp.
Spore type 1067

It is not possible to secure the datation but we propose :

Assumed age : "Permian to Carboniferous"

for this evaporite (gypsum and anhydrite).

1.1.3. 1,135'-1,160'

This level is fairly fossiliferous. The Spores and Saccate Pollens are numerous enough and various. It is possible to recognize :

Florinites sp.
Limitisporites sp.
Lophotriletes microsaetosus
Punctatisporites staplini
Convolutispora sp.
Lycospora brevijuga
Reticulatisporites mediareticulatus
Triquitrites bransonii
Verrucatosporites sp. 16 231 (BARSS)
Densosporites sp. 16 411 (BARSS)
Laevigatosporites desmoinensis

Leiotriletes adnatus
Lycospora pseudoannulata
Endosporites globiformis

Following the paper of M.S. BARSS relative to Canada, the datation of this sample may be secured.

Assumed age : "Westphalian B-C"

Remarks -

It is the first time that we find sediments of Carboniferous age in the Hudson Bay.

The "Kenogami" name which has been assigned to this interval seems to be improper in our opinion.

1.1.4. 1,220'-1,250'

This composite sample includes only some species of Spores, but they are very characteristic :

Leiotriletes sp. (Sr 14)
Leiozonotriletes laurelensis (Sr 54)
Geminospora lemurata (Sr 129)
Stenozonotriletes simplex (Sr 137)

According to our studies of these regions, this assemblage corresponds to the units 3-4 of our scale.

Assumed age : "Eifelian to Emsian"

The name "Kenogami" seems to be appropriate for this interval.

1.1.5. 1,837'-2,390'

Interval absolutely barren : might be of Silurian age with regard to the fact that palynoplanktological microorganisms are often lacking in this stratigraphic unit in Hudson Bay. The attribution to the Ekwan Formation would therefore be consistent with previous observations.

1.1.6. 2,480'-2,510'

This interval has only provided some Acritarchs belonging to the family of Tasmanaceae ; their stratigraphic range is large.

Assumed age : "Eifelian to Ashgillian"

1.1.7. 2,570'-3,290'

This is the first interval containing an abundant and various assemblage of Acritarchs, Chitinozoans and Scolecodonts. The major species or types are :

- Among the Acritarchs :

Hy 121
Hy 178 - Baltisphaeridium aff. dilatispinosum
Hy 180
Hy 205 - Veryhachium sp.
Hy 321
Hy 326
Hy 355 - Polygonium sp.
Hy 358 - Polygonium sp.

which are restricted to this interval, and the appearance of :

Hy 10 - Combazia cf. sampetrensis
Hy 318 - Veryhachium sp.

There are also many Tasmanaceae, but as it has been mentioned above, these ones have little stratigraphic importance.

- Among the Chitinozoans :

Cz 11b - Desmochitina oblonga
Cz 93b - Desmochitina sp.
Cz 131 - Sphaerochitina sphaerocephala
Cz 151 - Desmochitina sulcata
Cz 182 - Ancyrochitina aculeata
Cz 220b - Rhabdochitina claviformis
Cz 301 - Conochitina micracantha comma
Cz 340 - Conochitina tomentosa
Cz 346 - Conochitina gordonensis

Cz 347 - Conochitina sp.

Cz 349 - Conochitina probocifera

which are restricted to the interval, and the appearance of :

Cz 39b - Conochitina brevis

Cz 126 - Sphaerochitina schwalbi

Cz 132 - Ancyrochitina fragilis

Cz 189 - Sphaerochitina pilosa

Cz 220a - Conochitina decipiens

Cz 303 - Sphaerochitina macrostoma

Cz 332 - Conochitina simplex

Cz 358 - Ancyrochitina sp.

- Among the Scolecodonts :

D 18 - Oenonites fornicatus

D 20 - Paleoenonites delae

D 42 - Eunicites mutabilis

D 55 - cf. Polychaetaspis sp.

D 136 - Polychaetaspis wyszogrodensis

D 174

which are restricted to this interval.

The combined ranges of all these microorganisms nearly fit with the units 7/8 and 7 C.UP-PA of our scale and we can assume that their age is :

"Ashgillian"

Remarks -

According to the palynoplanktological analysis, the major biostratigraphic limit in this well is situated between 2,510' and 2,570' and the base of the Ekwan Formation placed at 2,545' on the log seems to be very accurate.

The interval numbered 7 (2,570'-3,290') is already "Upper Ordovician" in age : this is not in agreement with the attribution to the Severn Formation and the Conodont results. One can assume that a particular environment or a facies variation might explain this discrepancy.

1.1.8. 3,320'-4,280'

As in the preceding interval, Acritarchs, Chitinozoans and Scolecodonts are numerous and various. But if some species are the same, some other ones appear. We can quote :

- Acritarchs :

Hy .3 - Veryhachium lairdi
Hy 36 - Veryhachium subglobosum
Hy 78 - Dasydiacrodium sp.
Hy 81 - Baltisphaeridium klabavensis
Hy 82 - Veryhachium sp.
Hy 83 - Peteinosphaeridium bergström
Hy 87 - Baltisphaeridium saharicum
Hy 101
Hy 212 - Baltisphaeridium
Hy 266 - Polygonium spinosum
Hy 320 - Baltisphaeridium sp.
Hy 359

- Chitinozoans :

Cz 20 - Conochitina cf. decipiens
Cz 35 - Cyathochitina calix
Cz 39c - Conochitina micracantha
Cz 89 - Conochitina aculeata
Cz 94 - Hoegisphera complanata
Cz 163c - Ancyrochitina ancyrea
Cz 229 - Cyathochitina campanulaeformis
Cz 302 - Cyathochitina stentor
Cz 311 - Desmochitina minor
Cz 314 - Desmochitina erinacea
Cz 317 - Conochitina cactacea
Cz 318 - Conochitina micracantha micracantha
Cz 324 - Ancyrochitina sp.
Cz 325 - Hercochitina sp.
Cz 326 - Hercochitina sp.
Cz 327 - Hercochitina sp.
Cz 328 - Hercochitina crickmayi
Cz 336 - Conochitina sp.
Cz 338 - Conochitina sp.
Cz 342 - Conochitina sp.

- Scolecodonts :

D 5 - Eunicites denticulatus
D 18 - Oenonites fornicatus
D 26 - Paulinites paranaensis
D 39 - Paleoenonites angiportus
D 53 - Oenonites kopfi
D 61 - Eunicites alveolaris
D 68 - Arabellites sp.
D 97 - Oenonites orthodontus
D 104 - Oenonites sp.
D 120 - Paleoenonites armigerus
D 122 - Oenonites crepitus
D 125 - Diopatraites sulcatus
D 134 - Staurocephalites aequilateralis
D 148 - Pollagenys sp.
D 162 - Anisocerasites acanthophorus
D 164 - Oenonites grandidentatus
D 165
D 167 - Oenonites canaliculatus
D 175
D 176 - Lumbriconercites hibbardi
D 201
D 218

The combined vertical distributions of all these microfossils correspond to the units 5-7, 3,320'-3,440'/3,470' and 5-6, 3,440'/3,470'-4,280' of our canadian scale.

Assumed age : "Ashgillian to Upper Caradocian"

This stratigraphic attribution is in agreement with the Churchill River and Bad Cache Rapid Formations but we cannot separate them from each other on the basis of palynoplanktology.

1.2. MICROFAUNA (CONODONTS AND OTHER MICROFOSSILS)

By means of the acid treatment carried out on 47 samples grouped every 50' between 1,125' and 4,280', we have been able to satisfactorily identify most of the Ordovician and Silurian biozones previously worked out in the Hudson Bay wells (cuttings apparently in situ). A complementary analysis allowed to observe a mixture of Recent and Devonian forms between 614' and 713'.

Below, we shall readopt for each biozone the denomination and colour code used in Note R/GEO n° 130/74. Plate II presents the biozones and the correlations between Narwhal and the other wells. Plate I shows the specific distributions observed in the Narwhal section.

1.2.1. Principal results

1.2.1.1. Interval 614'-713'

A mixture of Recent species (Ostracodes, Foraminifera) and of Devonian Crinoids and Tentaculitids (equivalent with those observed in 2,200'-3,050' interval of Walrus A-71 : Middle to Upper Devonian) has been observed.

1.2.1.2. Silurian

- Interval 1,130'-1,550' : the 5 samples taken in this interval have proved to be completely barren.
- Undetermined biozone : between 1,550' and 1,730', Conodonts and Ostracodes are present, apparently of Silurian age, but which we could not definitely ascribe to biozone SC 7 or SC 6.
- Note on core sample 1 (1,837'-1,867') : "Attawapiskat Formation" : The 7 samples taken in the various facies of this core did not show any Conodonts (too restricted environment ?).
- Biozone SC 6 (orange code) : this biozone is determined between 2,120' and 2,300' and, as the previous wells, appears to correspond to the "sole" of the Attawapiskat and to the lower part of this formation.
- Biozone SC 5 (red code) : the presence of this biozone has been recognized between 2,550' and 2,660'.

- Biozone SC 4 (green code) : the microfauna characteristic of this biozone has been identified between 2,690' and 3,050' (and occasionally down to 3,110'). One should note the presence of a monospecific association of Ostracodes (lagoonal tendency) between 2,870' and 2,930', formerly recognized in core sample 93 (2,185'-2,200') of the Pen Island 1 well.

1.2.1.3. Ordovician (+ Ordovician/Silurian limit)

- Undetermined biozone : we have attributed an Ordovician age to the interval comprised between 3,260' and 3,300', due to identification of the Drepanodus type and a possible fragment of Amorphognathus type. This association, as yet unknown in the Hudson Bay above biozone OC 2b, could be caused by the reoccurrence of the environment corresponding to this biozone.

- The Ordovician/Silurian limit can therefore be placed between 3,050' (or 3,110') and 3,260'. We are unable to be more precise, as biozones SC 1 (yellow code) and SOC 2/3 (blue/black codes) are unidentifiable.

- Biozone OC 3 (mauve code) : we can identify this biozone between 3,500' and 3,570', and probably down to 3,680'.

- Biozone OC 2b (brown code) : this biozone can be clearly recognized between 3,800' and 3,980'.

- Biozone OC 2a (mauve striped code) : same environment as in biozone OC 3 ; the range of this biozone is limited to the interval 3,980'-4,040'.

- Biozone OC 1 : the presence of this biozone, which has been recognized between 4,130' and 4,220', seems probable down to 4,280'.

1.2.2. Remarks

We can tentatively compare the thickness of the Ordovician and Silurian series in Narwhal with that of the previous wells.

- The thickness of the interval comprising biozones OC 1 + OC 2a is almost similar to that of the other wells.

- That of the interval comprising biozones OC 2b + OC 3 is slightly more important than that of the other onshore wells (+ 200').

- A greater thickness can be observed at the top of the Ordovician of Narwhal 1 through the existence of an unknown series in the other onshore wells (+ 200').

- The interval including biozones SC 4 and SC 5 is comparable in thickness to that of the other onshore and offshore wells (Walrus A-71).

- The thickness of biozone SC 6 is equally comparable to that of these wells.

- That of the Silurian interval found between 1,550' and 2,120' is superior by at least 400' to the corresponding interval in the other wells (onshore and offshore).

- The total thickness of the Ordovician and Silurian series at Narwhal seems to be superior to that observed in the other onshore wells by about 400'-650' (interval between top of biozone SC 6 and base of biozone OC 1) or 1,000' (interval between first probable Silurian Conodonts and base of Ordovician, and interpretative logs). This thickness increase appears to be located mainly at the top of both the Ordovician and the Silurian.

2. / LITHOLOGICAL AND MINERALOGICAL DATA / (Pl. IV)

2.1. KENOGAMI FORMATION (1,135'?-1,775')

This formation is chiefly composed of reddish to greyish silty mudstones and fine-grained sandstones alternating with dolomites and anhydrite ; minor calcareous and salt layers also occur.

The clay fraction is basically composed of illite and chlorite with sporadic sepiolite in the evaporitic layers : the presence of the latter mineral implies a very restricted environment.

2.2. EKWAN FORMATION (1,775'-2,545')

Biosparitic or reefal limestones are predominant, with a minor proportion of microcrystalline limestone and dolomite.

In the clay fraction, which represents quite a small part of the rock, illite is the major component, associated with a small percentage of chlorite. Cryptocristalline silica has been also detected by X-Ray diffraction, especially in the lower part of the interval.

2.3. SEVERN FORMATION (2,545'-3,290')

Microcrystalline limestones prevail ; they are associated with dolomite, which is in increasing proportion downward ; in addition, anhydrite is frequently interbedded in the lower part.

Clay minerals are very badly crystallized ; they are mostly composed of illitic minerals, including mixed-layered structures.

2.4. CHURCHILL RIVER FORMATION (3,290'-3,975')

This interval is constituted of dolomite and limestone; the proportion of dolomite is the highest in the upper part, where it is associated with anhydrite. A small proportion of secondary silica is also noticeable.

Badly crystallized illitic minerals are the major components of the clay fraction, as in the above interval.

2.5. BAD CACHE RAPIDS FORMATION (3,975'-4,285')

Microcrystalline limestones are dominant, associated with minor dolosparite or microdolosparite. Secondary silica is still frequent.

Chlorite reappears in the clay fraction, which is still dominated by poorly crystallized illitic minerals.

3. / MICROFACIES OBSERVATIONS /

The observed materials are generally devoid of significant elements ; they chiefly involve dolosparites, dolomicrosparites and dolomicrites frequently associated with anhydrite. Some calcareous horizons also occur, occasionally including rounded intraclasts, but they do not support valuable comparisons between Narwhal and the previously studied wells of Hudson Bay (Pen 1, Kaskattama 1, Walrus A-71), on the basis of their microfacies.

4. / MINERAL GEOCHEMISTRY /

4.1. BORON AND PALEOSALINITY (Pl. IV)

Boron concentrations indicate :

- normal marine salinity in the Kenogami Formation,
- a hypersaline environment throughout the underlying deposits, with a maximum in the Bad Cache Rapids Formation.

However, it can be suspected that the low boron concentrations recorded in the Kenogami Formation would be related to the occurrence of particular clay minerals (i.e. sepiolite) which are unable to fix boron in a large amount. This assumption is supported by the instability of sepiolite in normal marine conditions.

4.2. STATISTICAL STUDY OF MAJOR AND TRACE ELEMENTS

The records of trace and major element concentrations have been processed by factor analysis, in order to find out the significant geochemical associations. With regard to the relatively low number of samples and to the similar behaviour of these elements in the Narwhal and Polar Bear wells, the sets of values from the two wells have been treated together, because this attenuates the influence of analytical fluctuations and favours the comparisons between the two well sections. Four major factors have been displayed by this statistical analysis, as shown in Figure 3.

Factor 1, which represents over 30 % of the total variance, is a dilution one, opposing silica and organic carbon to lithophile and

"siderophile" elements. The latter ones are particularly enriched in the lower part of the Ekwan Formation (maybe due to sulphide concentrations), whereas the first ones are chiefly represented by magnesium which is highly concentrated in the Kenogami Formation : factor 1 expresses the fact that these two intervals have relatively lower concentrations in silica and organic carbon than the remainder of the section.

Factor 2 clearly reflects an organophile association principally including organic carbon, loss at ignition, molybdenum and copper. It means that the organic matter was deposited in a reducing environment enabling the formation of organo-metallic complexes. This factor is evidenced by Figure 4 and its variations are represented in Plate IV showing that organophile concentrations are particularly developed in the Bad Cache Rapids Formation, the lower Severn Formation and some horizons of the Ekwan Formation. These concentrations generally correspond with a relatively high Mo/Cu ratio (0.3 - 0.7), reflecting the reducing environmental conditions.

Factor 3 is a lithophile association chiefly influenced by the aluminum - bearing minerals, as opposed to the magnesium-bearing ones (see Figure 4).

Factor 4 is principally induced by Ba and Sr which are particularly abundant in the Ekwan Formation, presumably due to diagenetical processes in reefal and bioclastic carbonates.

The statistical analysis also shows that increases in insoluble residue are related with increases in magnesium, zinc and manganese ; these elemehts are generally linked with chlorite which would have a detrital origin in the present case, as opposed to illitic minerals which would be rather authigenic. In addition, it is clearly demonstrated that the ratio of organic carbon of fine-grained fraction versus that of total residue has no relationship with organic matter nature or concentration (such a correlation has been sometimes observed in other basins). In the section under study, this ratio would rather be influenced by variations in the insoluble residue, i.e. the proportion of detrital materials, irrespectively of the quality of organic matter.

5. / STUDY OF THE ORGANIC MATTER /

5.1. QUANTITY OF ORGANIC MATTER (Fig. 5, Pl. V)

The organic matter contents are relatively high in certain horizons of the Severn and Bad Cache Rapids Formations only, but they are rather poor or, at most, average, in the remainder of the section.

5.2. QUALITY OF ORGANIC MATTER

Several data contribute in the definition of the quality of organic matter :

- Optical observation of organic components in transmitted and reflected light (see Plate V) : an idea of the representativity of this observation is given by the ratio of recovered organic matter in the preparations versus total organic carbon.

- Scores of the "organophile factor" from factor analysis.

- Yields and composition of chloroform extractable organic matter (particularly the chromatographical patterns, Fig. 6 and Pl. V).

- Carbon-ratio.

It appears that the quality of organic matter is generally fair in most of the section, especially in the Severn and Bad Cache Rapids Formations ; however it seems to be rather mediocre in the Ekwan Formation, with regard to chloroform extract and carbon-ratio values : this is a possible explanation for the abnormal records of the states of preservation as previously suggested in the note R/GEO n° 268/74.

5.3. MATURATION

This parameter has been determined by means of :

- optical study of the organic matter in transmitted and reflected light (states of preservation, vitrinite reflectance, intensity of fluorescence).
- study of the chloroform extractable organic matter (including chromatography of total alkanes, Fig. 6)
- amount and composition of sorbed gases (Fig. 7)
- carbon-ratio.

All these data confirm the immaturity of the sediments under study, as previously assumed in the note R/GEO n° 268/74. The relatively rich organic matter bearing horizons of the Severn and Bad Cache Rapids Formations cannot be valorized accordingly.

6. / CONCLUSIONS /

6.1. BIOSTRATIGRAPHY

The biostratigraphic attributions have been summarized in Fig.2. It appears that Permian and/or Carboniferous microfloras have been found in sediments attributed to the Kenogami Formation (713' and 1,135'-1,160'). These elements are not ascertained to be autochtonous but, even so, their occurrence is a puzzler as far as neither Carboniferous nor Permian deposits were known, up to now, in the Hudson Bay area.

Another problem is the discrepancy between the data from microfauna and microflora in the Severn Formation (2,545'-3,290'). According to the reliability of the Conodont and Ostracod scales in the studied province, as shown in Plate II, we can assume that the interval in question is more probably Silurian than Ordovician.

6.2. ENVIRONMENTAL REMARKS

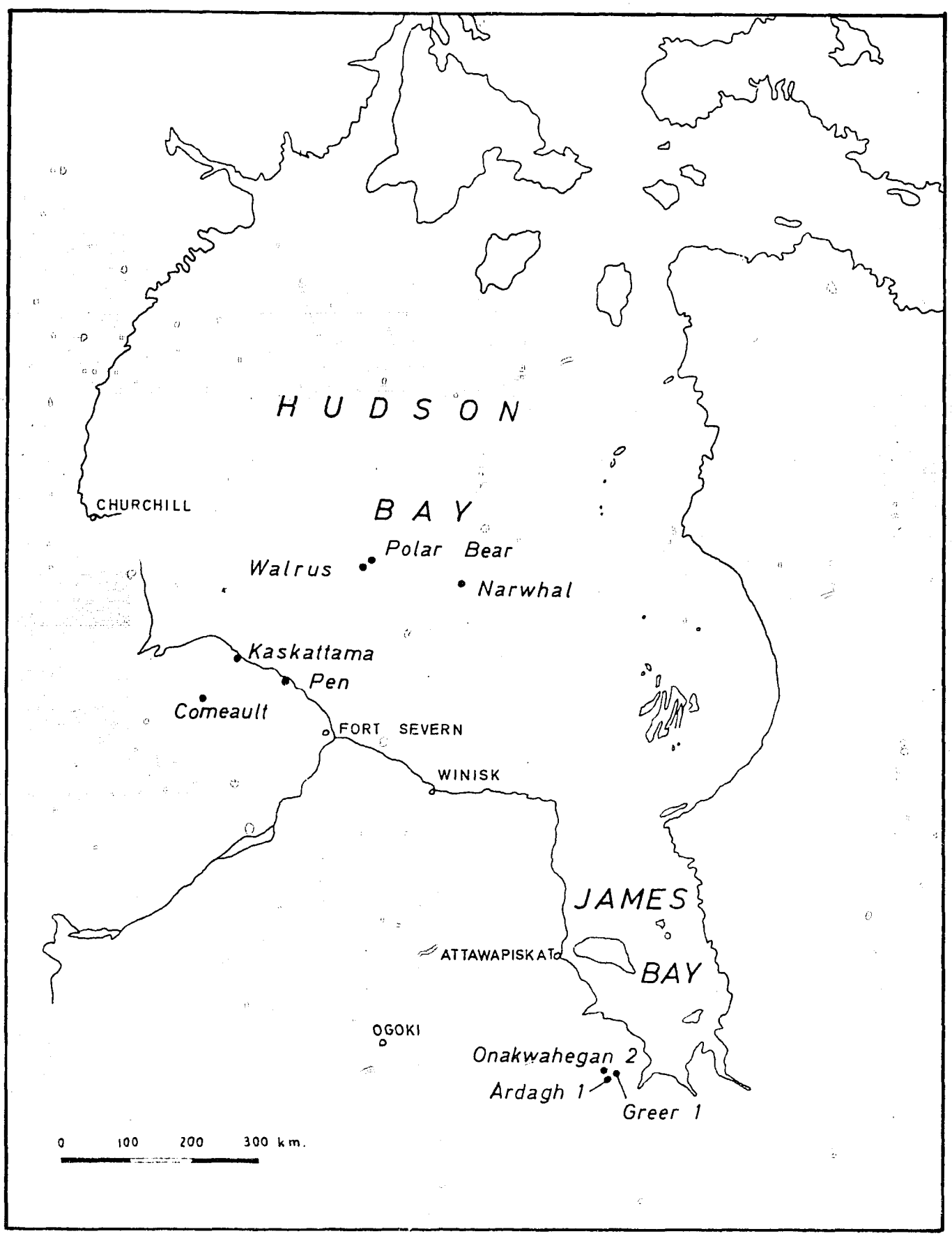
A hypersaline and reducing environment has been found throughout the Ordovician-Silurian interval. The paleosalinity is lower in the Kenogami Formation, probably due to an increase in the continental supply, but restricted conditions seem to persist, as shown by the occurrence of sepiolite in certain horizons.

This leads to the conclusion that sebkha-like conditions were almost constant in the Hudson Bay basin during the Lower Paleozoic.

6.3. SOURCE-ROCK POTENTIAL

In spite of some organic matter enrichments in the Severn and Bad Cache Rapids Formations and of a relatively fair quality of this organic matter, the degree of maturation remains quite inconsistent with the generation of liquid hydrocarbons and the source-rock potential must be therefore regarded as low in the whole investigated section.

LOCATION MAP



NARWHAL - TENTATIVE SYNTHESIS OF STRATIGRAPHICAL DATA

▨ non-investigated intervals

Depths	Well data	Conodonts - Ostracods	Palynoplanktology	Assumed attributions
	Glacial drift		Cretaceous to Oligocene ? some scarce Devonian microfloras	Glacial drift with various reworked materials
614		} Mixing of Recent and Devonian microfossils		
713			Permian and Carbon. microfloras	Questionably Permian or Carboniferous
	Kenogami ?	▨	▨	?
1135			1135 Westphalian B-C	1135 Westphalian B-C ?
			1160	1160
			1220 Eifelian - Emsian	1220 Eifelian to Emsian
			1250	1250
	Kenogami	No data	1310	Questionably Devonian
		1550	Barren, except for probably reworked or caved materials	1550
		Silurian ?		Questionably
		1730		
1775			1790	
		Barren	1837	Silurian
	Ekwan		Barren	
		2120		2120
				Lower Silurian
			2390	
			2480 Eifelian to Ashgillian	
2545		Lower Silurian	2510	2545
			2570	
	Severn		Ashgillian	Silurian to Ordovician (more probably Silurian)
		3110		
		Non diagnostic microfossils		
3290		3260 / 3300	3290 / 3320	3290
	Churchill river	Middle to upper Ordovician	Ashgillian to Upper Caradocian	Middle to upper Ordovician
3975				
	Bad Cache Rapids			
4285			4280	4285
TD 4341	Precambrian			Precambrian

FACTORS	1	2	3	4	
% Variance	30.67	20.95	12.98	14.63	

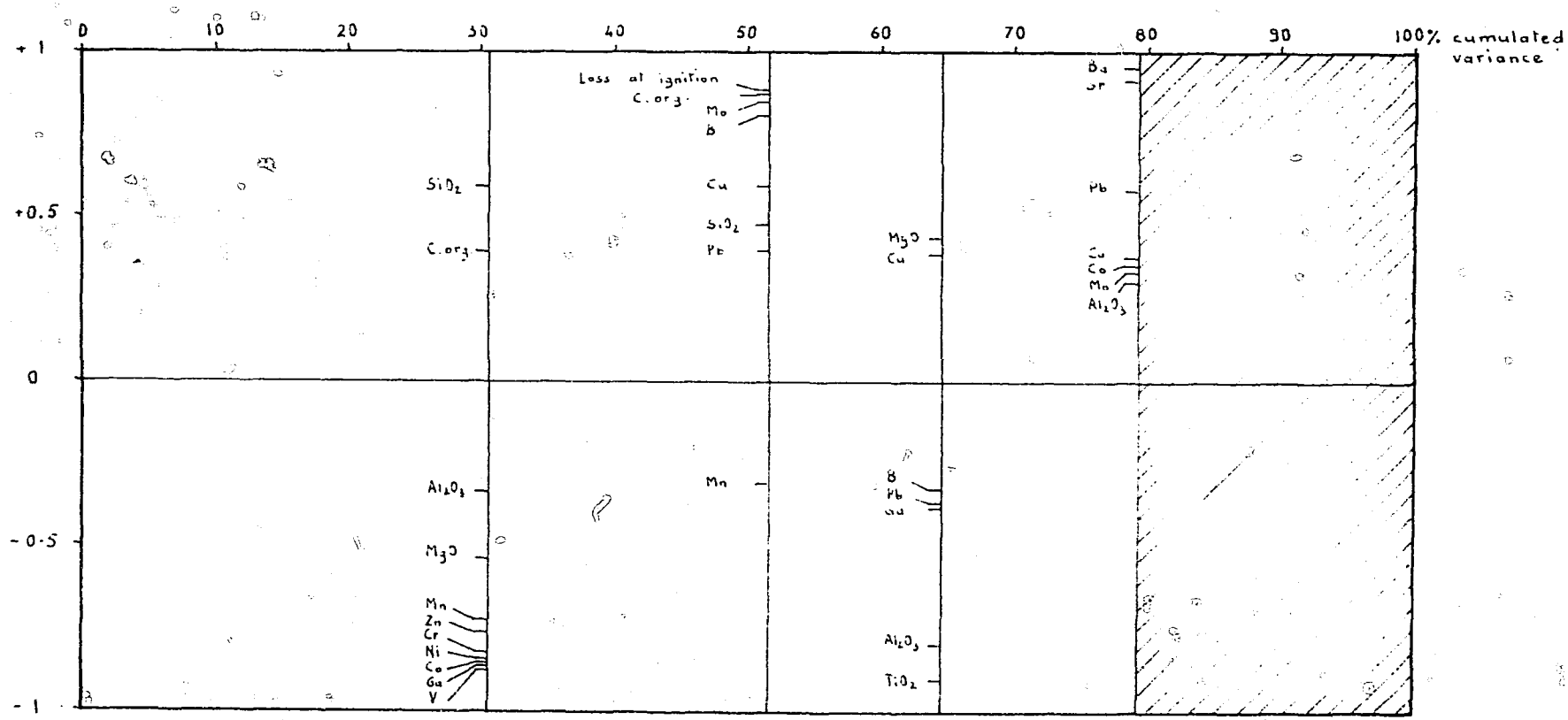


Fig. 3 FACTOR ANALYSIS (VARIMAX MATRIX)

Major factors and weights of variables in the combined set of samples of NARWHAL and POLAR BEAR

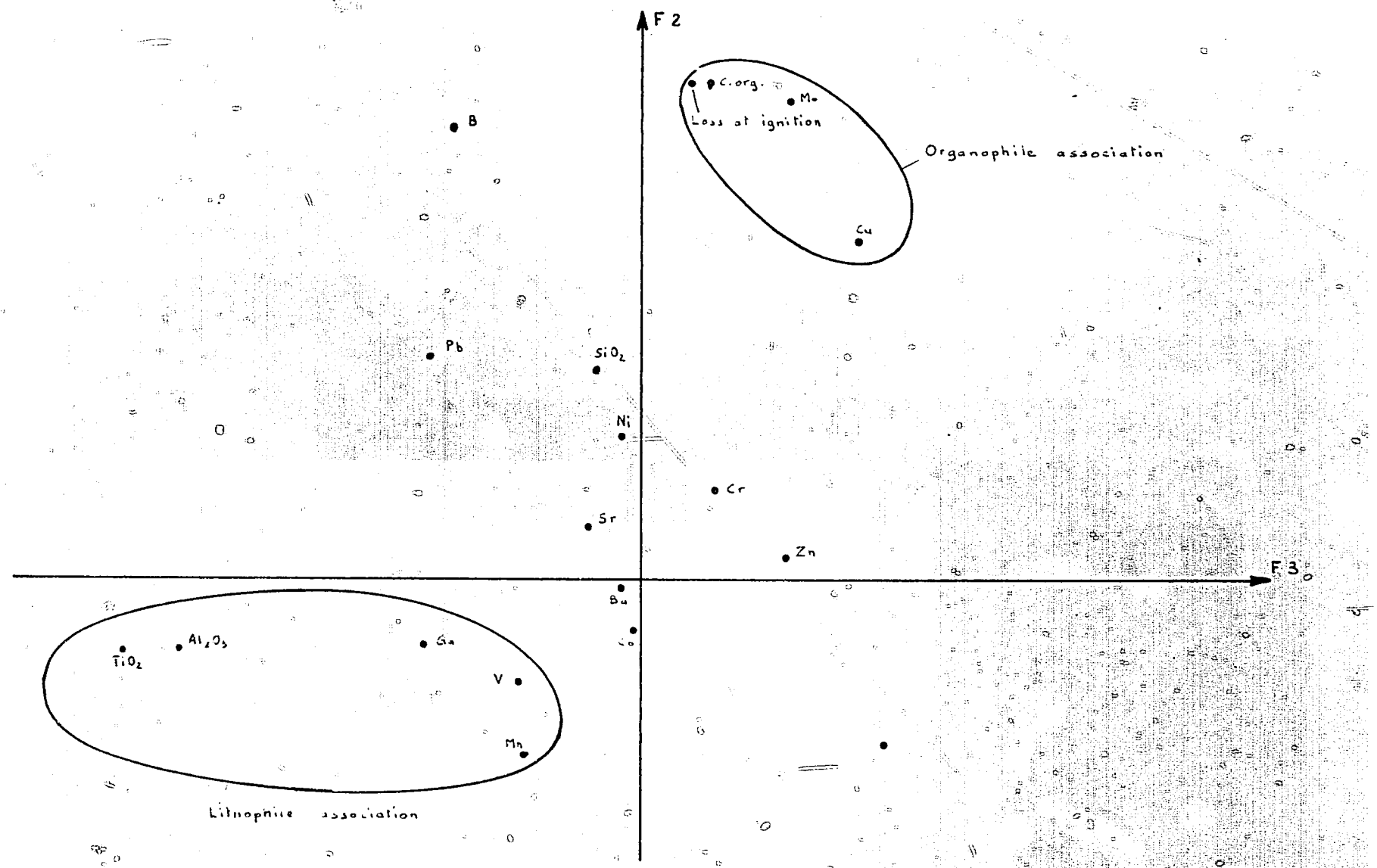
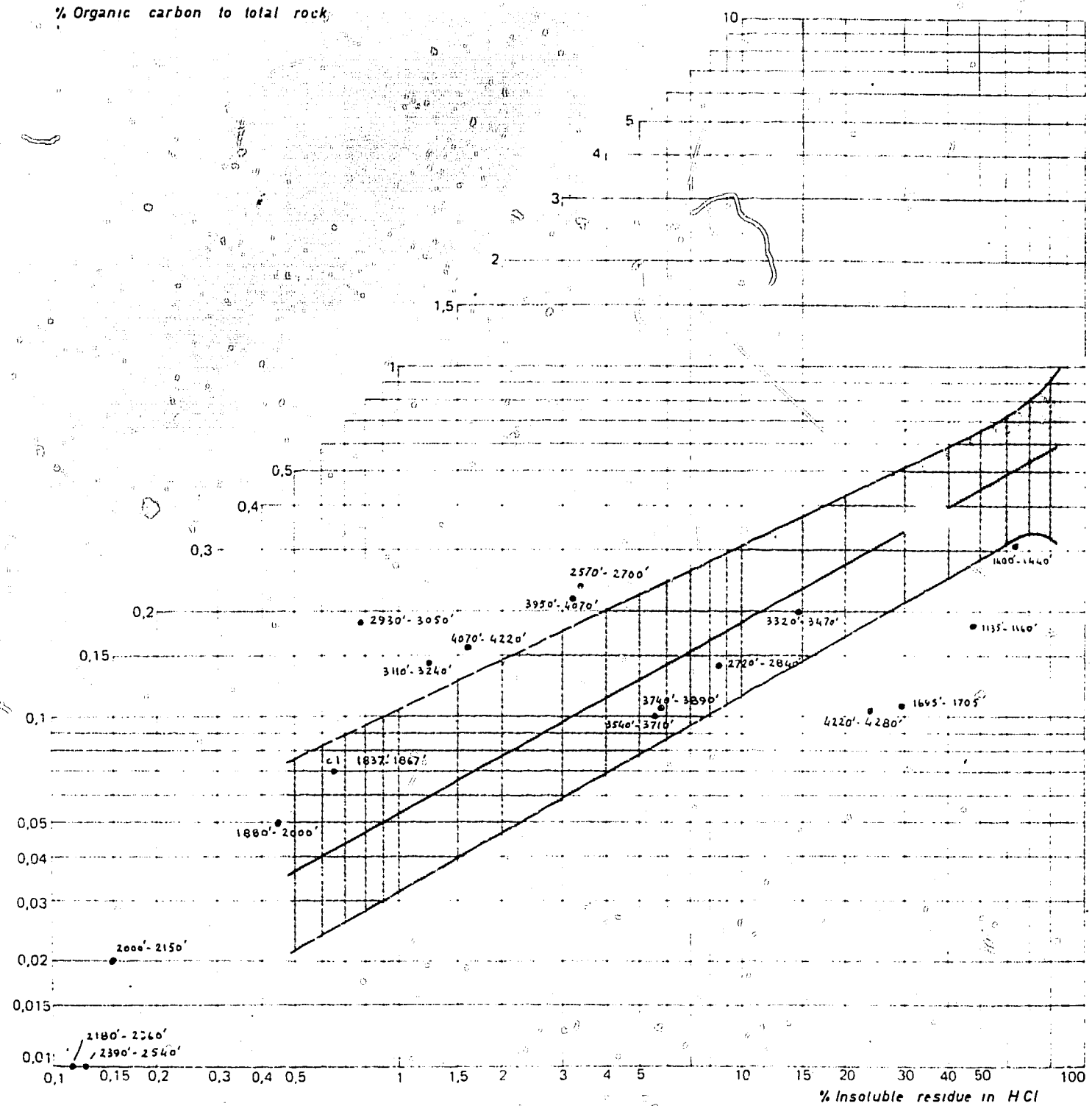


Fig: 4 FACTOR ANALYSIS - Distribution of variables in the plane of factors 2 and 3 : combined set of samples of NARWHAL and POLAR BEAR



ORGANIC CARBON CONTENTS

The shaded area represents the carbon concentration of 50 % of the samples in a statistical set of random sedimentary rocks

2,930' - 3,050'

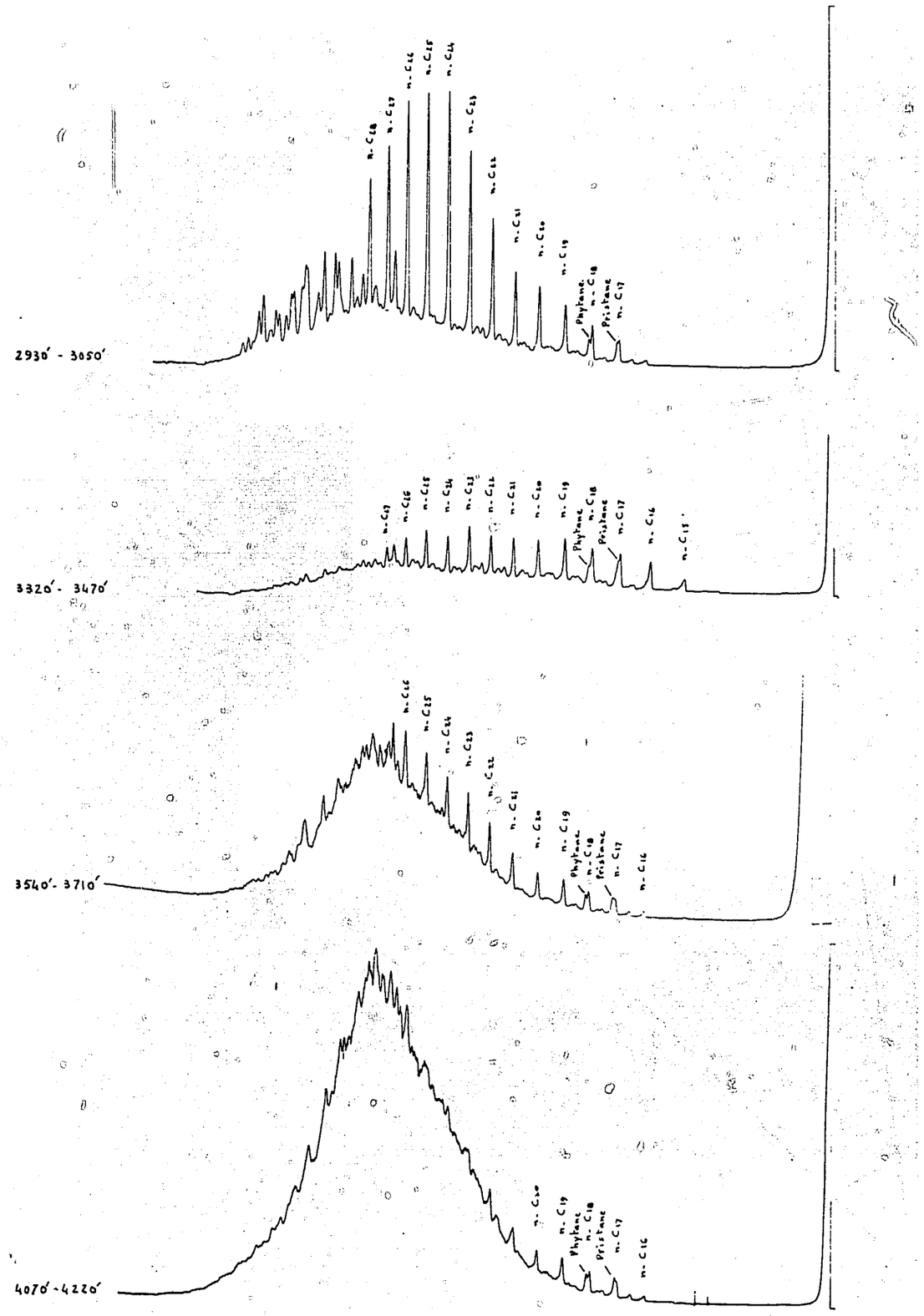
The gas chromatogram of total alkanes contains high proportion of n-alkanes, especially in the range n-C_{22} - n-C_{28}. Steranes and triterpanes, occurring in the branched and cyclic alkanes, mean that the organic matter is obviously immature. On the basis of the n-alkane pattern, one can assume that land-derived material may be predominant. This conclusion, in good agreement with the gross composition of the organic extract, is not consistent with the low carbon ratio of the kerogen. Consequently, at this stage, it seems preferable not to come to a decision upon the nature of the organic matter present in this sample.

3,320' - 3,470'

The gas chromatogram of total alkanes and the all sets of organic geochemical data are very close to those of the previous sample. The apparent discrepancy between the carbon-ratio of kerogen and the n-alkane pattern may only be explained by considering that the organic matter is mostly composed of microscopic algae (Botryococcus type). This hypothesis seems to be confirmed by microscopic observations of the organic matter (III_A type).

3,540' - 3,710'
4,070' - 4,220'

The two gas chromatograms of total alkanes are mostly composed of branched and cyclic molecules, especially in the high molecular range. The bump pattern of the branched and cyclic fraction is quite frequent in pollutants such as drill pipe grease, wonder seal, lubricating oils... Consequently, the two corresponding samples seem to be contaminated by such a type of product. The deeper sample appears to be the most affected.

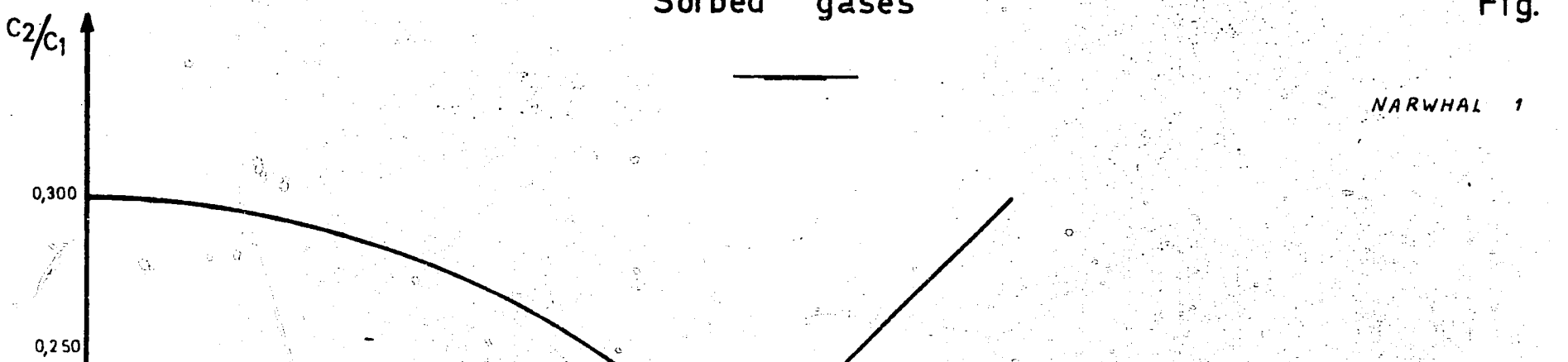


NARWHAL Chromatograms of total alkanes

Sorbed gases

Fig. 7

NARWHAL 1



NARWHAL SOUTH nr 1

Major mineralogical and mineral chemical data

R/GEO n° 48/75

STRATIGRAPHY	COLUMNAR SECTION	SAMPLING FOR GEOCHEMES	GROSS LITHOLOGY
	0'		Rounded pebbles and gravels, (lms., dol., granite) in clayey matrix
			Dol. + gypsum + anhydrite
1135' PEARCE CARBONIF. 1160'	1000'	1135 - 1160'	Dolosparite, dolomicrosparite, anhydrite, siltstone and fine grained sandstone; ferruginous nodules
KENOGAMI		1400 - 1440'	Silty and micaceous microsparite, dolomicrosparite and anhydrite; iron oxide
		1695 - 1705'	Abundant anhydrite, dolomicrite, dolomicrosparite and calcimicrite
1775'		1837 - 1867' (c)	Reefal limestones and dolomites
	2000'	1880 - 2000'	Biosparite with abundant bioclasts (corals, algae?); small proportion of dolomite
EKWAN		2000 - 2150'	Biosparite as above with small proportion of microsparite
		2180 - 2360'	Biosparite as above with small proportion of dolomite
		2390 - 2540'	Biosparite with minor micrite and microsparite; small proportion of dolomite
2515'		2570 - 2700'	Dominant micrite with minor sparite and microsparite (from cavings?), small proportion of dolomite
SEVERN		2720 - 2840'	Micrite as above with minor sparite and anhydrite
	3000'	2930 - 3050'	Micrite, microsparite and sparite with bioclasts; certain parts are dolomitized
		3110 - 3240'	Same as above but more abundant dolomicrite (30%)
3290'		3320 - 3470'	Pelmicrite, dolosparite, dolomicrosparite and anhydrite. Some secundary silica
CHURCHILL RIVER		3540 - 3710'	Biomicrite, dolomitic dismicrite, dolomicrosparite and small proportion of anhydrite. Some secundary silica
		3740 - 3890'	Micrite, microsparite, dolomicrosparite, dolomicrite and small proportion of anhydrite
3975'		3950 - 4070'	Dolomicrosparite, dolosparite with laminite-like structures; micrite being dolomitized
BAC CACHE RAPIDS	4000'	4070 - 4220'	Micrites, biomicrites, biosparites with numerous bioclasts; some dolosparites
		4220 - 4280'	Microsparites with numerous bioclasts, dolosparites; fgts of the granitic basement
4285' PRECAMBRIAN	TD 4341'	4280 - 4310'	Granite with some carbonates from cavings

MAJOR MINERALOGICAL COMPONENTS

quartz
dolomite
calcite
insoluble residue in HCl
50%

CLAY MINERALS

chlorite
illite
m.l. illite-montmor.
sepiolite
50%

bad X-ray pattern

PALEOSALINITY FROM BORON CONCENTRATION

hyposaline | normal marine | hypersaline

200 320 400 600 ppm

955
986
1070
918

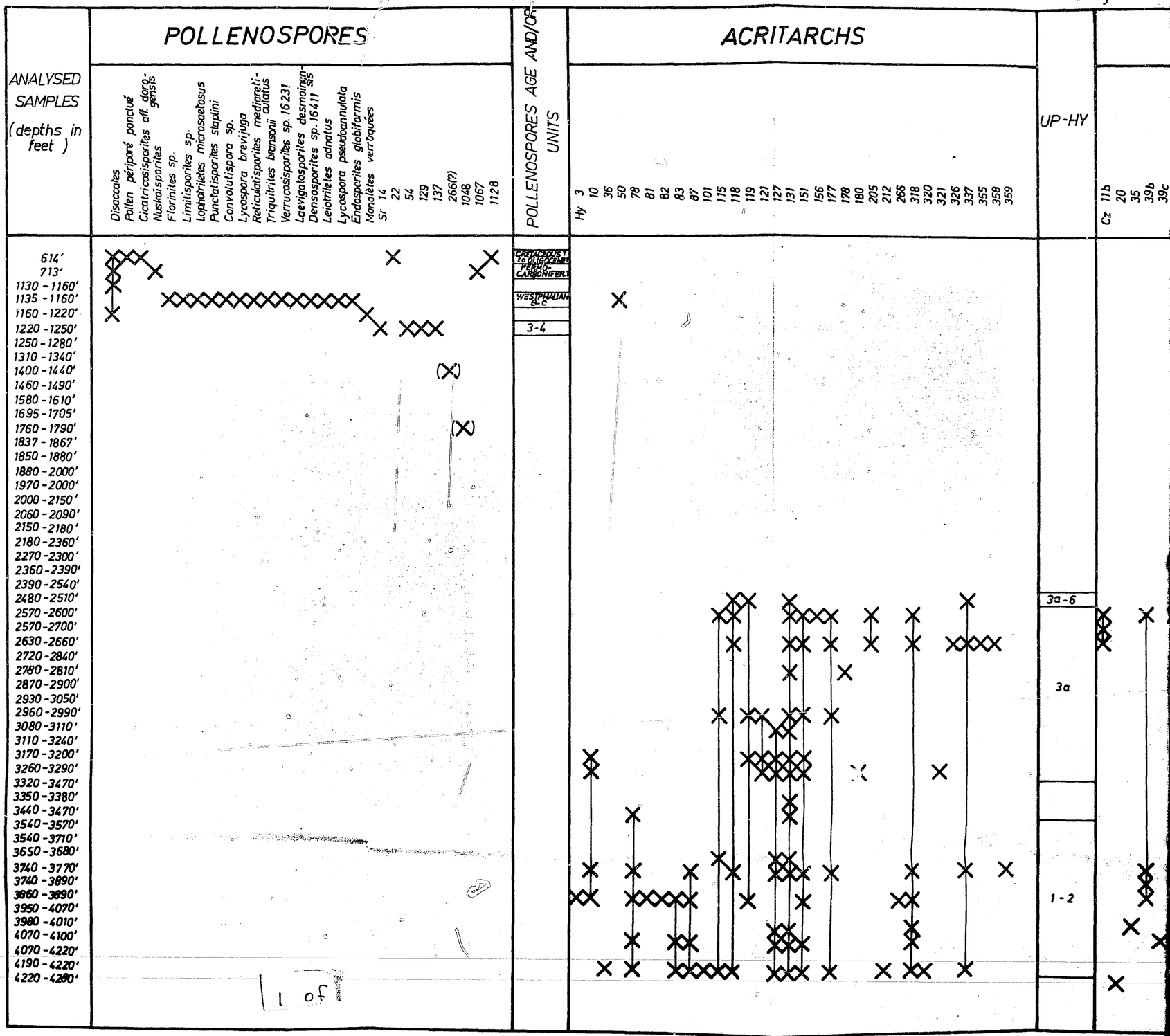
Pl. III

NARWHAL 1 - N58

HUDSON BAY - CANADA

VERTICAL DISTRIBUTION OF POLLENOSPORES, ACRITARCHS, CHITINOZOANS AND SCOLECODONTS.

R/GEO n° 48/75



ACRITARCHS

115
118
119
121
127
131
151
156
177
178
180
205
212
266
318
320
321
326
337
355
358
359

UP-HY

3a-6

3a

1-2

CHITINOZOANS

Cz 11b
20
35
39b
39c
54(?)
89
93b
94
106(?)
126
131
132
151
163c
182
189
220a
220b
229
301
302
303
311
314
317
318
319(?)
324
325
326
327
328
332
336
338
340
342
346
347
349
358

UP-Cz

2

SCOLECODONTS

D 1
5
15
18
20
26
39
42
53
55
61
68
90
97
104
114
120
122
125
134
136
148
162
164
165
167
174
175
176
185
193
201
218

UP-D

4

3-4

3

2-3

C
UP-PA

16-19

8-17
7/8

7

5-7

5-6

ASSUMED PALYNOPLANKTOLOGICAL AGE

PRE-ARENIG to OLIGOCENE

PERMIAN to CARBONIFEROUS

WESTPHALIAN B-E

"LLANDEILIAN"

"LLANVIRN to LLANDEILIAN"

"ASHGILLIAN"

"ASHGILLIAN to UPPER CARADOCIAN"

2 of 2

AQUITAINE AND AL NARWHAL SOUTH

ORDOVICIAN and SILURIAN MICROFAUNAS

Note R / Geo n° 48 / 75

BIOZONES

DEPTH (feet)

CUTTING SAMPLING

CORE

PROCESSING

Washing
Acid attack

C O N O D O N T S

- Ozarkodina sp.
- Undet. platform
- Undet. fragment
- Undet. fragment
- Undet. fragment
- Trichonodella sp.
- Lonchodina ? sp.
- Ozarkodina sp.
- Undet. fragment
- Neoprioniodus ? sp.
- Lonchodina sp.
- Plectospathodus ? sp.
- Neoprioniodus planus
- Panderodus sp. sc.
- Pygodus lyra
- Roundya sp.
- Simple cone undet. Neopr. trians. tenuis. ?
- Synprioniodina silurica ?
- Ozarkodina adiutrix ?
- Neoprioniodus triangularis tenuipectinatus (?)
- Ozarkodina cf. adiutricis + Spatho. cf. celloni
- Hindeodella sp. (n. sp ?)
- Ozarkodinid ? sp.
- Ozarkodina ? sp.
- Trichonodella sp.
- Roundya sp.
- Lonchodina sp.
- «Drepanodus subarcuatus» sensu «REXROAD
- Undet. fragment Na 2550 [= K1/1612]
- Roundya sp.
- Roundya sp.
- Neoprioniodus ? sp.
- Neoprioniodus sp. (Kentuckyensis ?)
- Neospathognathodus ceratoides ?
- Icriodella ? sp. fragment
- «Oneotodus» (sensu JENTZSCH) aff. K 453)
- «Oneotodus» sp. (sensu JENTZSCH)
- Undet. simple cone
- simple cone K1/1349
- Ozarkodina n. sp. A Pol. REX. Ni.
- Ozarkodina hanoverensis ?
- Spathognathodus sp. cf. K1/1783-1795
- Hindeodella Pen C 80
- Trichonodella cf.
- Undet. Pen C 89
- Ozarkodina adiutrix ?
- Ozarkodina ? CN 468
- Synprioniodina ? sp.
- Hindeodella sp. CM 11;14
- Simple cone sp.
- Ozarkodina aff. hanoverensis
- Trichonodella sp.
- Lonchodina sp.
- Undet. element
- Undet. fragment
- Undet. fragment
- Ozarkodina n. sp. B. Pol. REX. Ni.
- Lonchodina sp.
- Hindeodella n. sp.
- Neospathognathodus K1/2010
- Neoprioniodus costatus paucidentatus ?
- Drepanodus sp. sp.
- Undet. branch
- Cordylodus sp.
- Amorphognathus sp.
- Simple cone undet ? (Acontiodus ? sp.)
- Plectodina undulata
- Zygognathus pyramidalis
- Undet branch
- Rhipidognathus sp.
- Rhipidognathus pauciidentatus ? (fragment)
- Ozarkodina sp.
- Undet. fragment
- Ambalodus sp.
- Belodina sp.
- Belodina sp.
- Oulodus sp.
- Roundya sp.
- cf. Eoligonodina delicata (Tetraprioniodus delicatus)
- Undet. branch
- Cyrtoniodus sp.
- Ozarkodina conelina ?
- simple cone N 3880/K 2602
- Simple cone N 3920
- Undet. branch
- Undet. branch
- Plegagnathus nehoni/dartoni
- Eoligonodina ? sp.
- Zygognathus cf. plebia } Plectodina undulata gp.
- Trichonodella undulata } Plectodina undulata gp.
- Zygognathus like = Plectodina undulata
- Belodina sp.
- Cordylodus sp.
- Roundya sp.
- Oulodus sp.
- Cordylodus (subcordylodus sp.)
- Belodina sp.
- Neospathognathodus bullatus ? (Pen C 86 ?)

OSTRACODES

- Ostracode sp. Na 1
- Ostracode sp. K 42 Var. 1
- Ostracode sp. Na 2
- Ostracode sp. Na 3
- Ostracode sp. Na 4
- Ostracode sp. Na 6
- Aechmina ? sp. Na 1
- Ostracode sp. Na 5
- Ostracode sp. Na 7
- Ostracode sp. Na 8

O

- Fossm. ?
- Bryozoa ?

1100
1200
1300
1400
1500
1550
1600
?
1700
1730
1800

10

Pl: 1

AQUITAINE AND AL NARWHAL SOUTH

ORDOVICIAN and SILURIAN MICROFAUNAS

C O N O D O N T S

- Lonchodina sp.
- «Drepanodus subrectus» sensu REXROAD
- Undet. fragment Na 2550 (= K1/1617)
- Roundya sp.
- Roundya sp.
- Neoprioniodus ? sp.
- Neoprioniodus sp. (Kentuckyensis ?)
- Neospathognathodus ceratoides ?
- Acriodella ? sp. fragment
- «Oneotodus» (sensu JENTZSCH) aff. K 453)
- «Oneotodus» sp. (sensu JENTZSCH)
- Undet. simple cone
- Simple cone K1/1349
- Ozarkodina n. sp. A PoL.REX.Ni.
- Ozarkodina hanoverensis ?
- Spathognathodus sp. cf. K1/1783-1795
- Hindeodella Pen C 80
- Trichonodella cf.
- Undet. Pen C 89
- Ozarkodina adiutricis ?
- Ozarkodina ? CN 468
- Synprioniodina ? sp.
- Hindeodella sp. CM 11-14
- Simple cone sp.
- Ozarkodina aff. hanoverensis
- Trichonodella sp.
- Lonchodina sp.
- Undet element
- Undet. fragment
- Undet. fragment
- Ozarkodina n. sp. B. PoL.REX.Ni.
- Lonchodina sp.
- Hindeodella n. sp.
- Neospathognathodus K1/2010
- Neoprioniodus costatus paucidentatus ?
- Drepanodus sp.
- Undet. branch
- Cordylodus sp.
- Amorphognathus sp.
- Simple cone undet ? (Acontiodus ? sp.)
- Plectodina undulata
- Zygognathus pyramidalis
- Undet branch
- Rhipidognathus sp.
- Rhipidognathus paucidentatus ? (fragment)
- Ozarkodina sp.
- Undet. fragment
- Ambalodus sp.
- Belodina sp.
- Belodina sp.
- Oistodus sp.
- Roundya sp.
- cf. Eoligonodina delicata (Tetraprioniodus delicatus)
- Undet. branch
- Cyrtoniodus sp.
- Ozarkodina concinna ?
- Simple cone N 3880/K 2602
- Simple cone N 3920
- Undet. branch
- Undet. branch
- Plegagnathus nelsoni/dartoni
- Eoligonodina ? sp.
- Zygognathus cf. plebia } Plectodina undulata gp.
- Trichonodella undulata }
- Zygognathus like = Plectodina undulata gp.
- Belodina sp.
- Cordylodus sp.
- Roundya sp.
- Oulodus sp.
- Cordylodus (subcordylodus sp.)
- Belodina sp.
- Neospathognathodus bullatus ? (Pen C 86 ?)

OSTRACODES

- Ostracode sp. Na 1
- Ostracode sp. K 42 Var. 1
- Ostracode sp. Na 2
- Ostracode sp. Na 3
- Ostracode sp. Na 4
- Ostracode sp. Na 6
- Aechmina ? sp. Na 1
- Ostracode sp. Na 5
- Ostracode sp. Na 7
- Ostracode sp. Na 8

VARIOUS ORGANISMS

- Foram. ?
- Bryozoa ?
- Tentaculites P 32 ?
- Echinid spine
- spicule (pyrite)
- spicule (silice)
- Bryozoa ?
- crinoid (yellow)
- crinoid (white)
- Holothurian

PHOSPHATE ORGANISMS

- Massive phosphate element
- Phosphate element Na 1
- Phosphate element
- thin phosphate element
- «aff. egg case ? »
- Phosphate element Na 2
- «aff. egg case»
- Conularia
- Conularia
- Phosphate element Na 3
- Phosphate plate
- «Oneotodus» like element
- Phosphannulus universalis ?
- Phosphate ? element Na 4
- Miaculum ethinclarki
- Phosphatic Brachiopod

STAGES

?

1550

2 of

1550
1600
?
1700
1730
1800
1900
2000
2100
2120
SC 6
2200
2300
2300
2400
2500
2550
SC 5
2600
2660
2690
2700
2800
SC 4
2900
3000
3050
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Ordovi-
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3400

1500

1

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SILURIAN

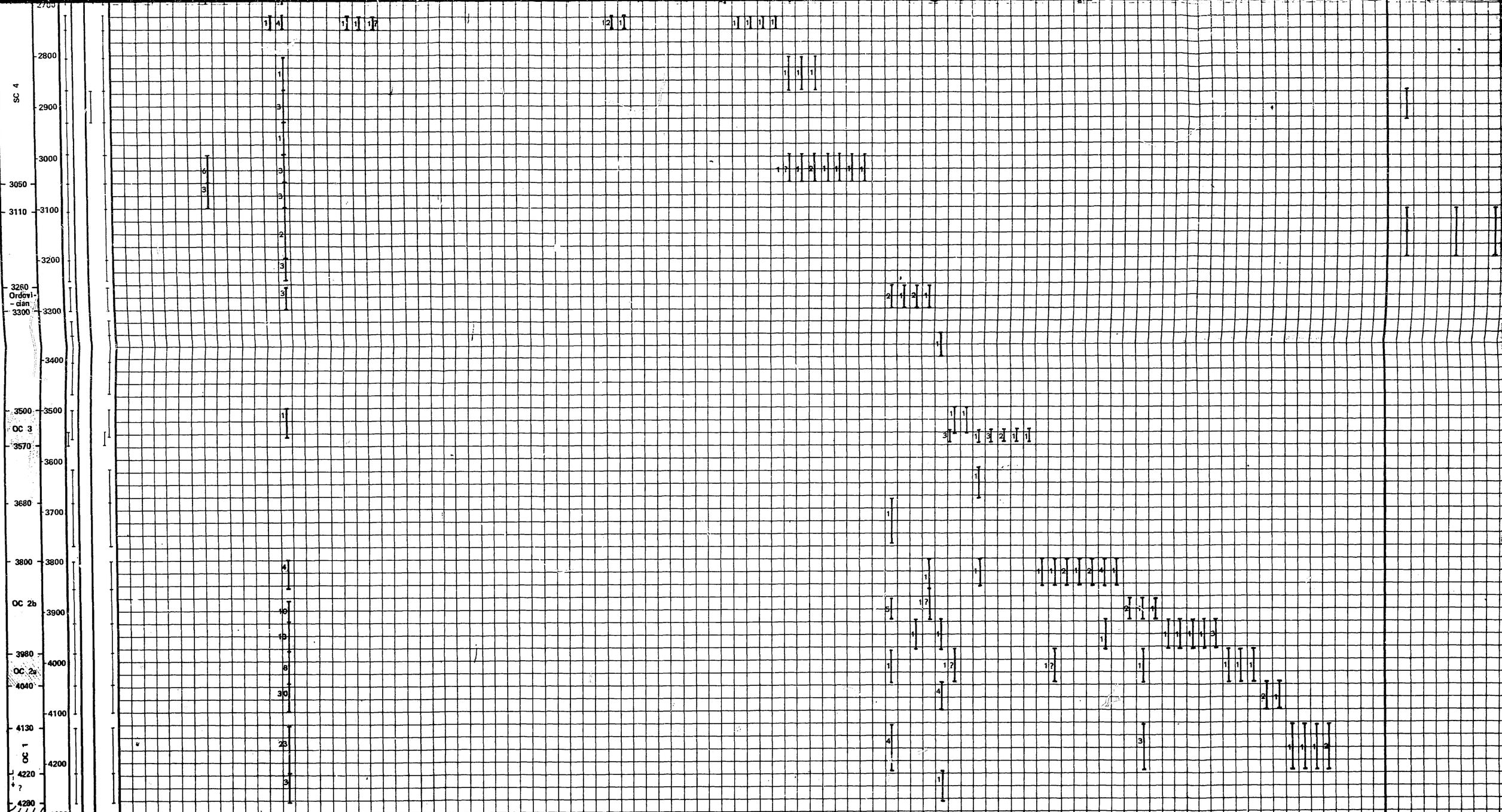
2050

3050

3110

3260

420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4000
OC 2a
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SC 4

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SILU

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3110

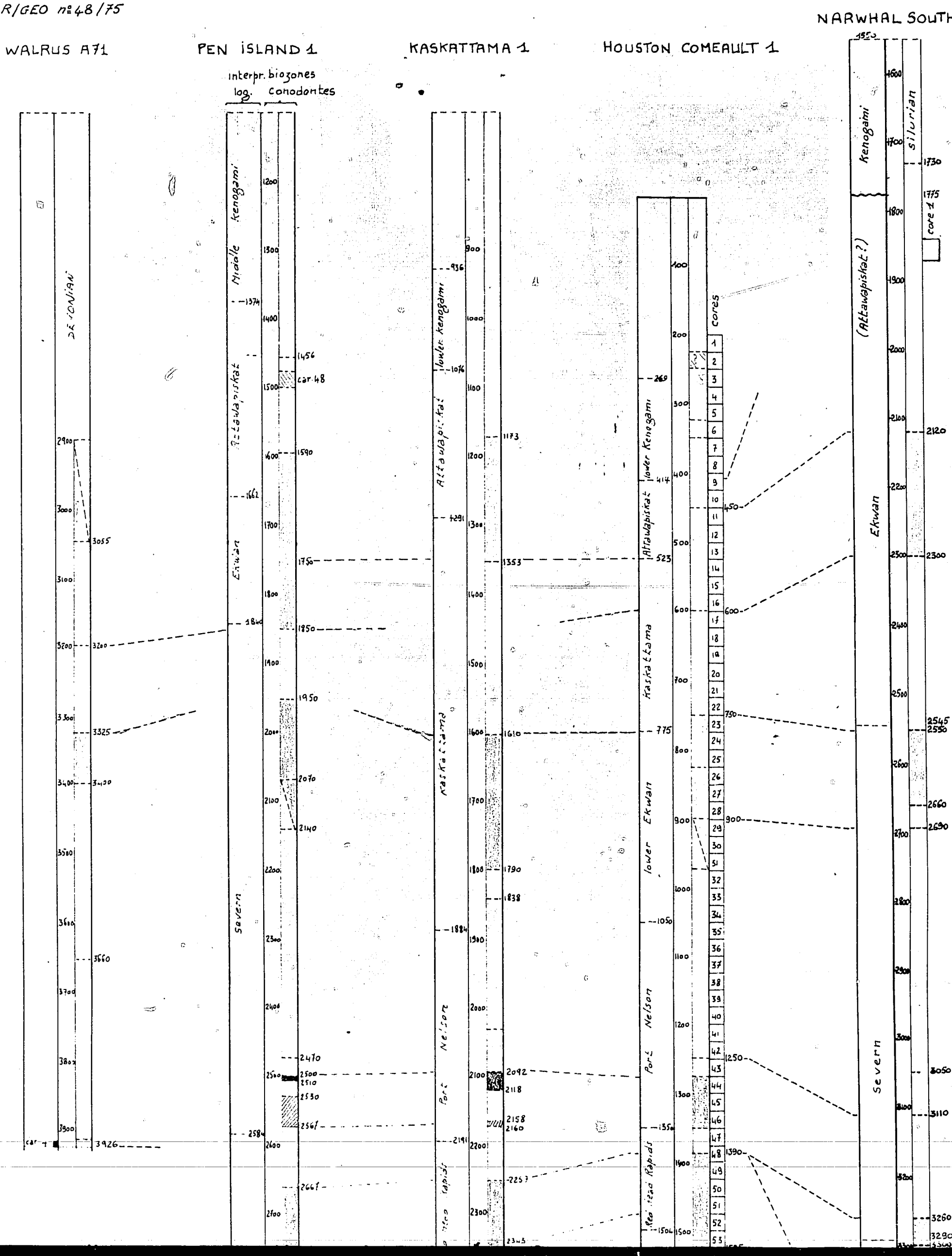
3260

ORDOVICIAN

4280

69

Note R/GEO n°48/75



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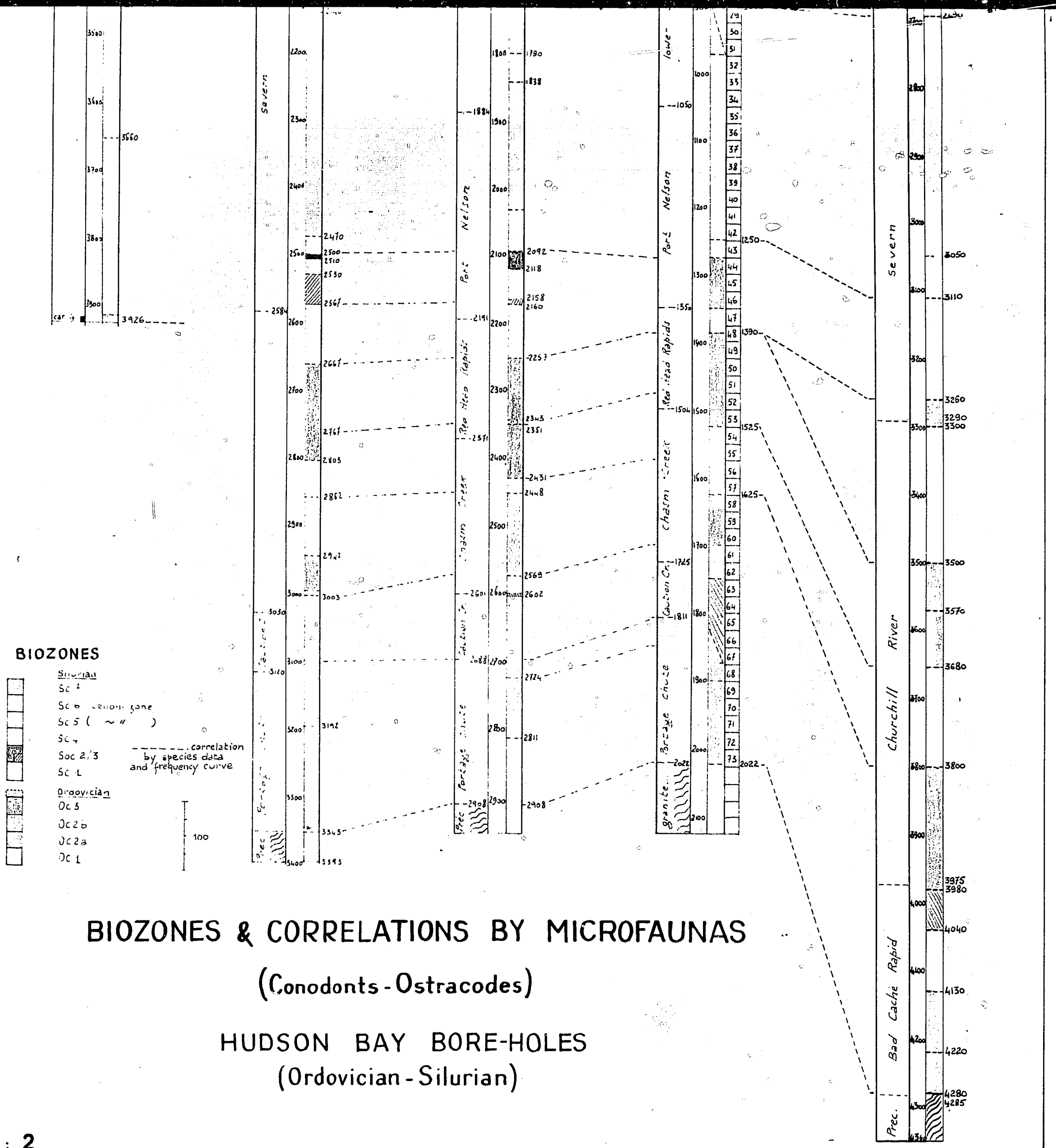


BIOZONES & CORRELATIONS BY MICROFAUNAS

(Conodonts - Ostracodes)

HUDSON BAY BORE-HOLES

(Ordovician - Silurian)

PI: 2

2 of

ORGANIC ANALYTICAL DATA

aquitaine

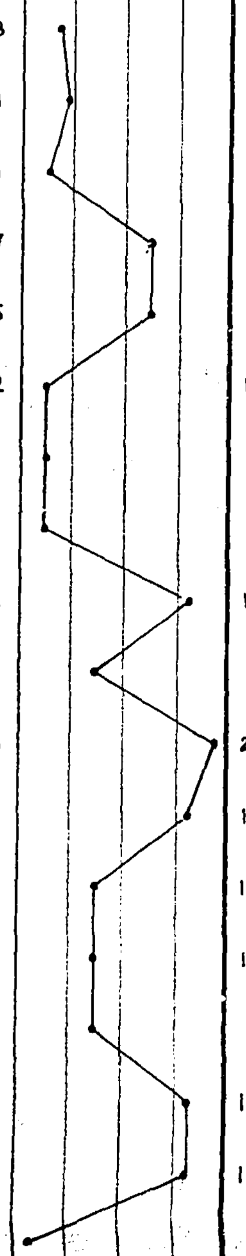
COUNTRY or AREA HUDSON BAY

SECTION NARWHAL

R: Rare
S: Some
C: Common
F: Frequent
A: Abundant

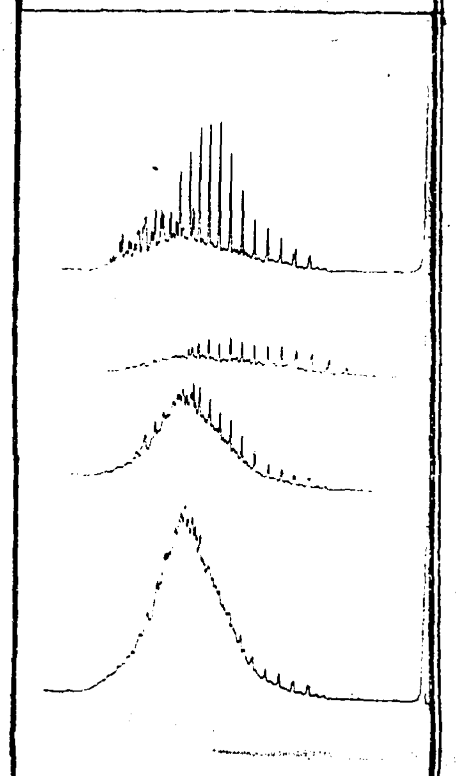
STRATIGRAPHY	SAMPLE IDENTIFICATION	GROSS LITHOLOGY	INSOLUBLE RESIDUE in HCl	ORGANIC CARBON DATA – TOTAL ROCK % weight	Fine grained fraction (< 5μ)	C (fine grained) / C (total residue)	CARBON RATIO total residue	CARBON RATIO fine grained fraction
Questionably Permian or Carbon. — 1135 — Wesphalien B-C? — 1160	1135-1160	Dolosparite, dolomicrosparite, anhydrite, siltstone and fine grained sdst; ferruginous nodules	47,6	0,18	0,35	0,95		
— 1220 — Eifel. to Emsian — 1250 — Questionably Dévonian — 1550 —	1400-1440	Silty and micaceous microsparite, dolomicrosparite and anhydrite; iron oxide	62,7	0,31	0,40	0,82		
Questionably	1695-1705	Abundant anhydrite, dolomicrite, dolomicrosparite and calcimicrite	29,8	0,11	1,28	3,37		0,56
SILURIAN	c1 1837-1867	Reefal limestones and dolomites	00,66	0,07				
	1880-2000	Biosparite with abundant bioclasts (corals, algae!); small proportion of dolomite	0,46	0,05			0,60	
— 2120 —	2000-2150	Biosparite as above with a small proportion of microsparite	0,15	0,02	18,27	1,24	0,77	
Lower SILURIAN	2180-2360	Biosparite as above with a small proportion of dolomite	0,12	0,01				
— 2545 —	2390-2540	Biosparite with minor micrite and microsparite; small proportion of dolomite	0,13	0,01				
SILURIAN	2570-2700	Dominant micrite with minor sparite and microsparite (from cavings?), small proportion of dolom.	3,42	0,24	10,18	1,45	0,46	0,42
to ORDOVICIAN	2720-2840	Micrite as above with minor sparite and anhydrite	8,78	0,14			0,15- 0,14	-
(more probably	2930-3050	Micrite, microsparite and sparite with bioclasts; certain parts are dolomitized	0,79	0,18	25,50	1,09	0,31	0,47
Silurian) — 3290 —	3110-3240	Same as above but more abundant dolomicrite (30%)	1,23	0,14	13,15	1,17	0,49	0,45
Middle	3328-3470	Pelmicrite, dolosparite, dolomicrosparite and anhydrite. Some secundary silica	14,92	0,20	15,65	11,20	0,37	0,49
to	3540-3710	Biomicrite, dolomitic dismicrite, dolomicrosparite and small proportion of anhydrite. Some secundary silica	5,55	0,10	10,60	6,30	0,39	0,45
Upper	3740-3890	Micrite, microsparite, dolomicrosparite, dolomicrite and small proportion of anhydrite	5,81	0,11	3,05	1,54	0,65	0,56
ORDOVICIAN ~~SILURIAN~~	3950-4070	Dolomicrosparite, dolosparite with laminite like structures; micrites being dolomitized	3,12	0,22	12,75	1,77	0,51	0,42
	4070-4220	Micrites, biomicrites, biosparites with numerous bioclasts; some dolosparites	1,56	0,16	14,30	1,39	0,47	0,41
~~ 4285 ~~	4220-4280	Microsparites with numerous bioclasts dolosparites; fragments of the granitic basement	20,58	0,11	4,06	7,39		0,54
PRECAMBRIAN	4280-4310	Granite with some carbonates from cavings						

TOTAL ROCK relative value (percentiles) 25 50 75



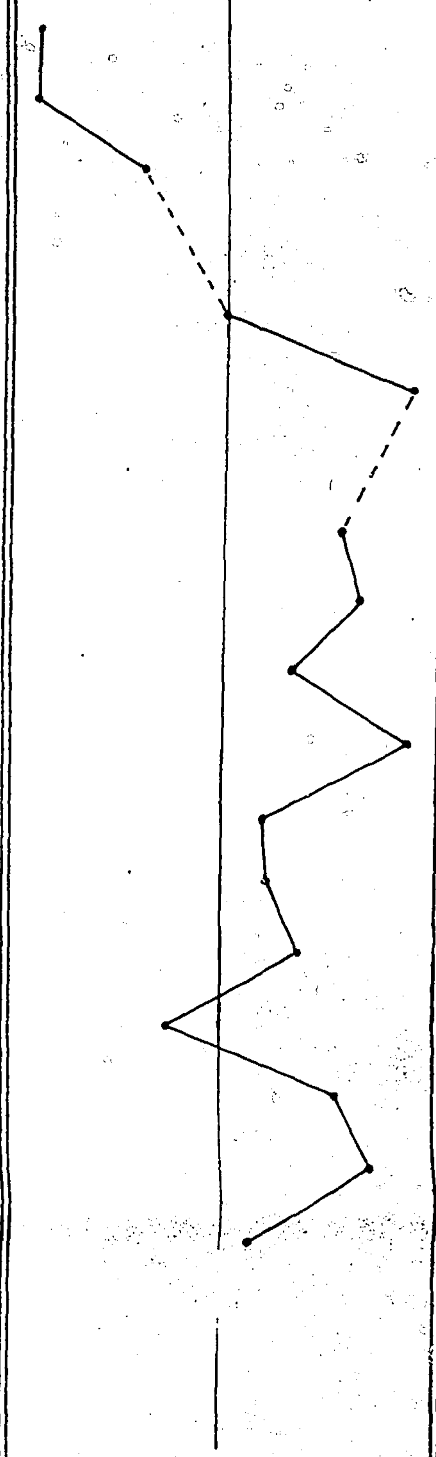
SAMPLE IDENTIFICATION	CHLOROFORM EXTRACT ppm	% ext. / org. C	Sat.	Arom.	NSO'S	Asph.	Arom. / Sat.	HC / Arom. + Sat.	HC / Org. C
1135-1160	85	4,7							
1400-1440	26	0,8							
1695-1705	93	**							
c1 1837-1867	34	**							
1880-2000	31	**							
2000-2150	38	**							
2180-2360	13	**							
2390-2540	36	**							
2570-2700	147	6,1							
2720-2840	166	11,9							
2930-3050	224	12,4	1,2	11,0	70,8	17,0	8,99	12,2	1,5
3110-3240	143	10,2							
3328-3470	268	13,4	3,7	15,4	65,9	15,0	4,12	19,1	2,5
3540-3710	167	**	11,2	8,2	65,0	15,6	0,73	19,4	**
3740-3890	53	**							
3950-4070	107	4,9							
4070-4220	228	14,3	32,0	14,4	40,9	12,7	0,45	46,4	6,5
4220-4280	51	**							
4280-4310									

CHROMATOGRAPHY OF TOTAL ALKANES



SAMPLE IDENTIFICATION	SORBED GASES ml/kg of total rock	ΣHC g / %.org.C	% CH_4	Recovered OM %	Recovered OM / total organic C	MOL	MOT	MOV	MOC	others	Resulting type	Fluor.	Liptinite Exinite	Huminite
1135-1160	3,19	1,77	73,48	0.04	0.22	S	R	R	R		Indet.			
1400-1440	1,88	0,61	79,02	0.04	0.13	R	-	-	R		Indet.			
1695-1705	10,00	9,09	79,56	0.03	0.27	R	-	C	S		III B			
c1 1837-1867	1,89	2,70	71,88	0.01	0.14	R	-	S	-		Indet.			
1880-2000	0,98	**	81,42	0.01	0.20	S	-	C	C		III A			
2000-2150	0,68	3.40	81,90	0.01	0.50	C	-	S	S		II			
2180-2360	0,12	**	87,10	0.01	1.00	C	-	C	R		II			
2390-2540	1,07	**	84,50	0.01	1.00	R	-	S	R		Indet.			
2570-2700	4,49	1,87	75,56	0.01	0.04	S	-	R	F		II A	70	10	2
2720-2840	1,73	1.24	76,52	0.01	0.07	R	-	S	C		III B		?	
2930-3050	3,88	2,16	70,22	0.01	0.06	-	-	S	R		Indet.			
3110-3240	1,48	1,06	66,06	0.01	0.07	C	-	-	C		II			
3328-3470	5,46	2,74	73,39	0.01	0.05	S	-	-	F		III A			
3540-3710	4,13	4,13	73,95	0.01	0.10	C	-	C	S		II B - III A		?	
3740-3890	2,41	2,19	79,05	0.06	0.55	C	-	F	S		II B - III A	25	25	
3950-4070	5,90	2,68	78,34	0.12	0.55	S	-	-	F		III A	60	10	
4070-4220	7,08	4,42	73,03	0.01	0.06	C	-	C	C		II B - II A	25	15	
4220-4280	5,74	5.21	73,06	0.01	0.09	S	-	F	S		III A	40	10	
4280-4310														

TRACE ELEMENTS – ORGANOPHILE ASSOCIATION FROM FACTOR ANALYSIS (scores of factor 2)



** unsignificant results

RGANIC ANALYTICAL DATA

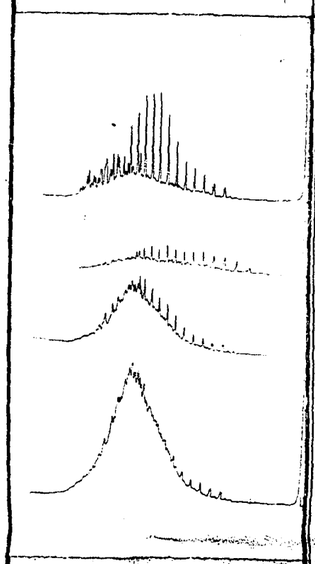
SECTION NARWHAL

R/GEO n° 48/75

R: Rare
S: Some
C: Common
F: Frequent
A: Abundant

MOL (ligneous organic matter)
MOT (tracheids)
MOV (cellular vegetal organic matter)
MOC (colloidal organic matter)

CHLOROFORM EXTRACT									SORBED GASES			TRACE ELEMENTS	OPTICAL STUDY OF ORGANIC MATTER																SAMPLE IDENTIFICATION
% ext. / org. C	GROSS COMPOSITION				Arom. / Sat.	HC Arom. + Sat.	HC / Org. C	CHROMATOGRAPHY OF TOTAL ALKANES	ml/kg of total rock	≠HC g / %org.C	% CH_4	ORGANOPHILE ASSOCIATION FROM FACTOR ANALYSIS (scores of factor 2)	Recovered OM %	Recovered O.M / total organic C	TYPE OF ORGANIC MATTER								DIAGENETIC EVOLUTION					
	Sat.	Arom.	NSO'S	Asph.											Transmitted light						Reflected light					States of preservation	Light absorption	Fluorescence	Vitrinite reflectance	
															MOL	MOT	MOV	MOC	others	Resulting type	Fluor.	Liptinite Exinite	Huminite Vitrinite	Inertinite						
4,7									3,19	1,77	73,48		0.04	0.22	S	R	R	R		Indet.					Indet.				1135-1160
0,8									1,88	0,61	79,02		0.04	0.13	R	-	-	R		Indet.					Indet.				1400-1440
* *									10,00	9,09	79,56		0.03	0.27	R	-	C	S		III_B					150/200				1695-1705
* *									1,89	2,70	71,88		0.01	0.14	R	-	S	-		Indet.					300/275				cl 1837-1867
* *									0,98	* *	81,42		0.01	0.20	S	-	C	C		III_A					300/325				1880-2000
* *									0,68	3.40	81,90		0.01	0.50	C	-	S	S		II					300/325?				2000-2150
* *									0,12	* *	87,10		0.01	1.00	C	-	C	R		II					300				2180-2360
* *									1,07	* *	84,50		0.01	1.00	R	-	S	R		Indet.					325/300?				2390-2540
6,1									4,49	1,87	75,56		0.01	0.04	S	-	R	F		III_A	70	10	20		300		3.50	0.48	2570-2700
11,9									1,73	1,24	76,52		0.01	0.07	R	-	S	C		III_B		?			300		4.00	0.30	2720-2840
12,4	1,2	11,0	70,8	17,0	8,99	12,2	1,5		3,88	2,16	70,22		0.01	0.06	-	-	S	R		Indet.					300				2930-3050
10,2									1,48	1,06	66,06		0.01	0.07	C	-	-	C		II					300				3110-3240
13,4	3,7	15,4	65,9	15,0	4,12	19,1	2,5		5,46	2,74	73,39		0.01	0.05	S	-	-	F		III_A					225				3320-3470
* *	11,2	8,2	65,0	15,6	0,73	19,4	* *		4,13	4,13	73,95		0.01	0.10	C	-	C	S		II_B-III_A		?			225		.00	0.42	3540-3710
* *									2,41	2,19	79,05		0.06	0.55	C	-	F	S		II_B-III_A	25	25	50		200/225		4.00	0.46	3740-3890
4,9									5,90	2,68	78,34		0.12	0.55	S	-	-	F		III_A	60	10	25	5	200		3.50	0.53	3950-4070
43,3	32,0	14,4	40,9	12,7	0,45	46,4	6,5		7,08	4,42	73,03		0.01	0.06	C	-	C	C		II_B-III_A	25	15	60		225/200		3.00	0.48	4070-4220
* *									5,74	5.21	73,06		0.01	0.09	S	-	F	S		III_A	40	10	50		225/200		3.00	0.45	4220-4280
																													4280-4310



** unsignificant results

Schlumberger

Synergetic Log Systems

Computer Processed Interpretation

USING THE FOLLOWING LOGS:	FDC-CNL-GR, SLC-GR, DIL
COMPANY	AQUITAINE COMPANY OF CANADA LTD.
WELL	AQUITAINE ET AL NARWHAL SOUTH #1 N-58
FIELD	WILDCAT
PROVINCE	FEDERAL WATERS
DATE	29 AUG 74 RUN NO. TWO
LOCATION	58° 07' 56.28" N LAT
	84° 08' 16.78" W LONG
ELEV. KB	77 DF GL 0

FOLD HERE

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

All interpretations are opinions based on inferences from electrical or other measurements and we cannot, and do not, guarantee the accuracy or correctness of any interpretations, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees. These interpretations are also subject to Clause 7 of our General Terms and Conditions as set out in our current Price Schedule.

This SYNERGETIC LOG presentation was computed using

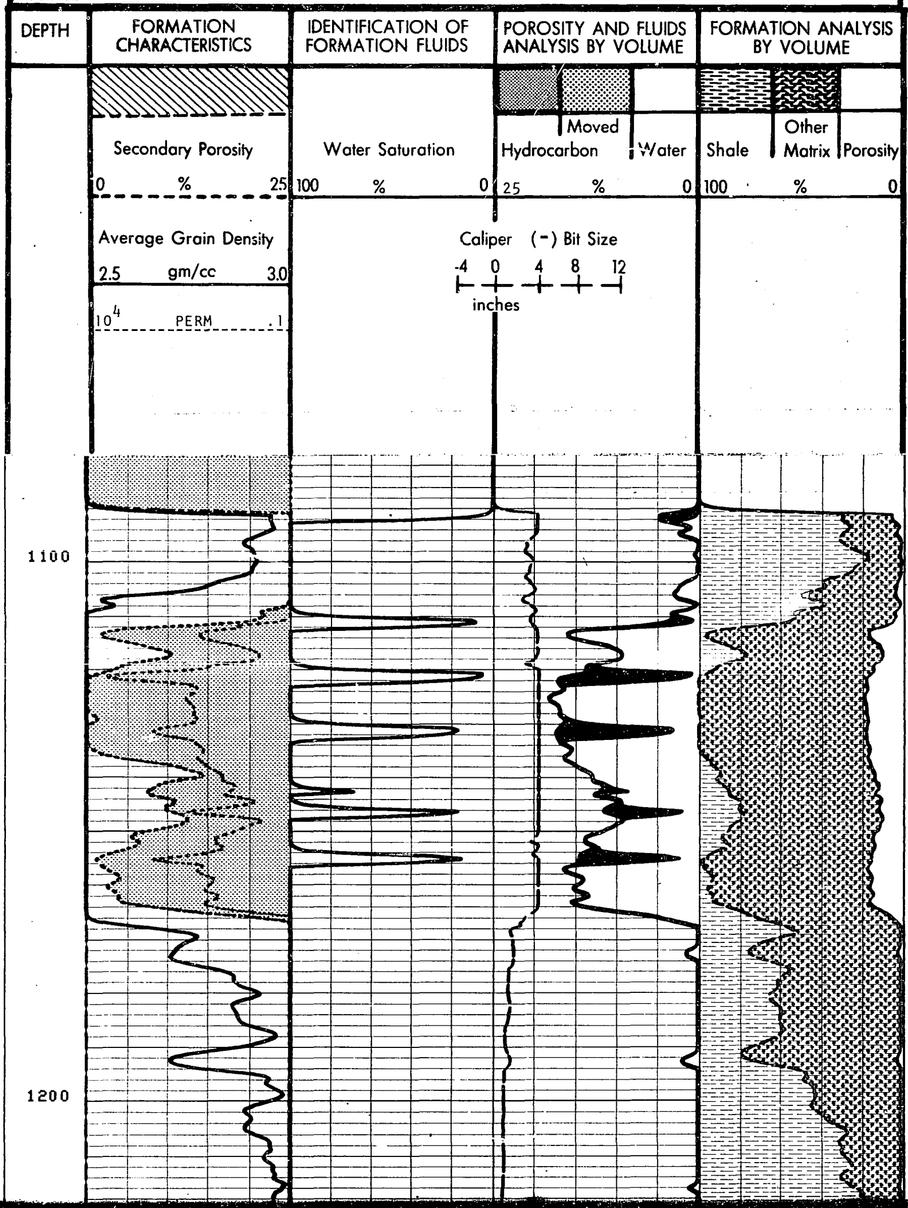
CORIBAND — Analysis of Complex Reservoirs

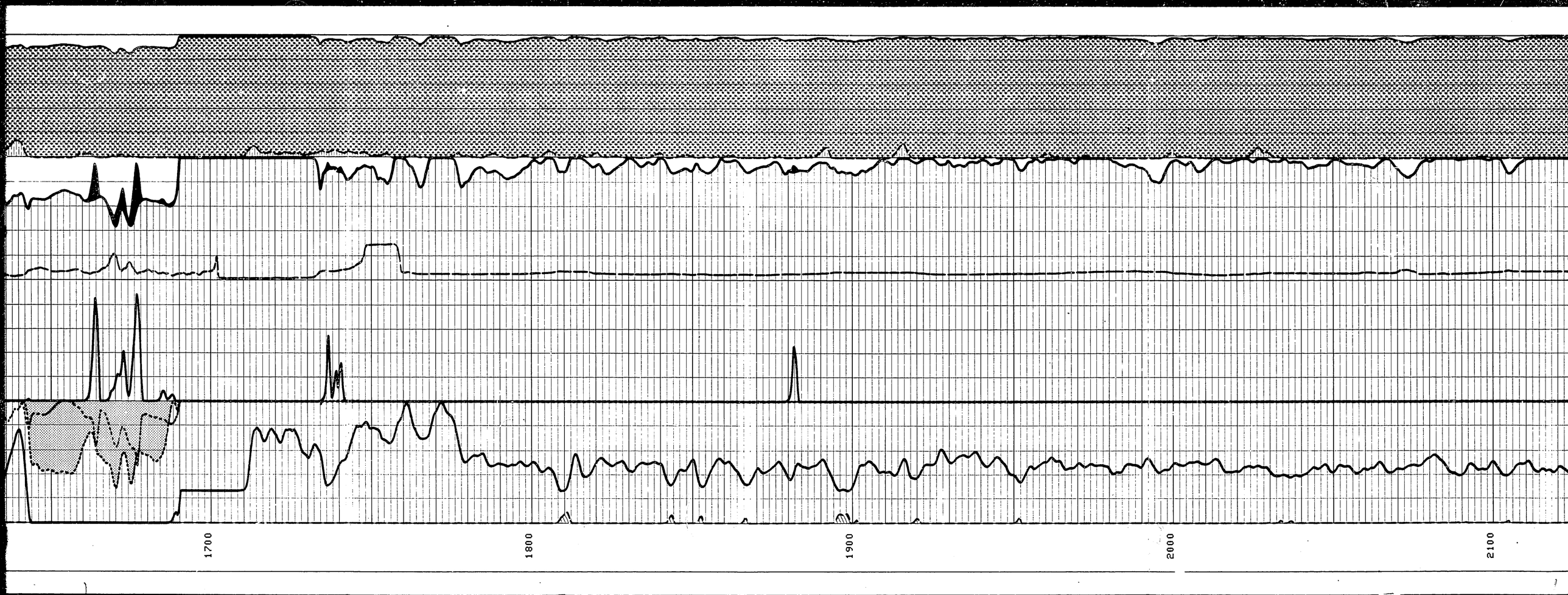
Field Recording	Engineer: NICKERSON	Truck No: OSU-C1327	Location: FRONTIER	TTR No: E- 904
Office Recording	Comp. Center: HLIC	Program No: 11	Analyst: HENDERSON	Job No: L-3335
Mud Measurements	Rm = 0.833 @ 62 °F	Rmf = 0.695 @ 64 °F	BHT = 88 °F	

COMPUTATION PARAMETERS

Depth Interval From	To	Rw
1090	1170	1.50
1170	1690	0.09
1690	1734	100.00
1734	4310	0.08

Remarks





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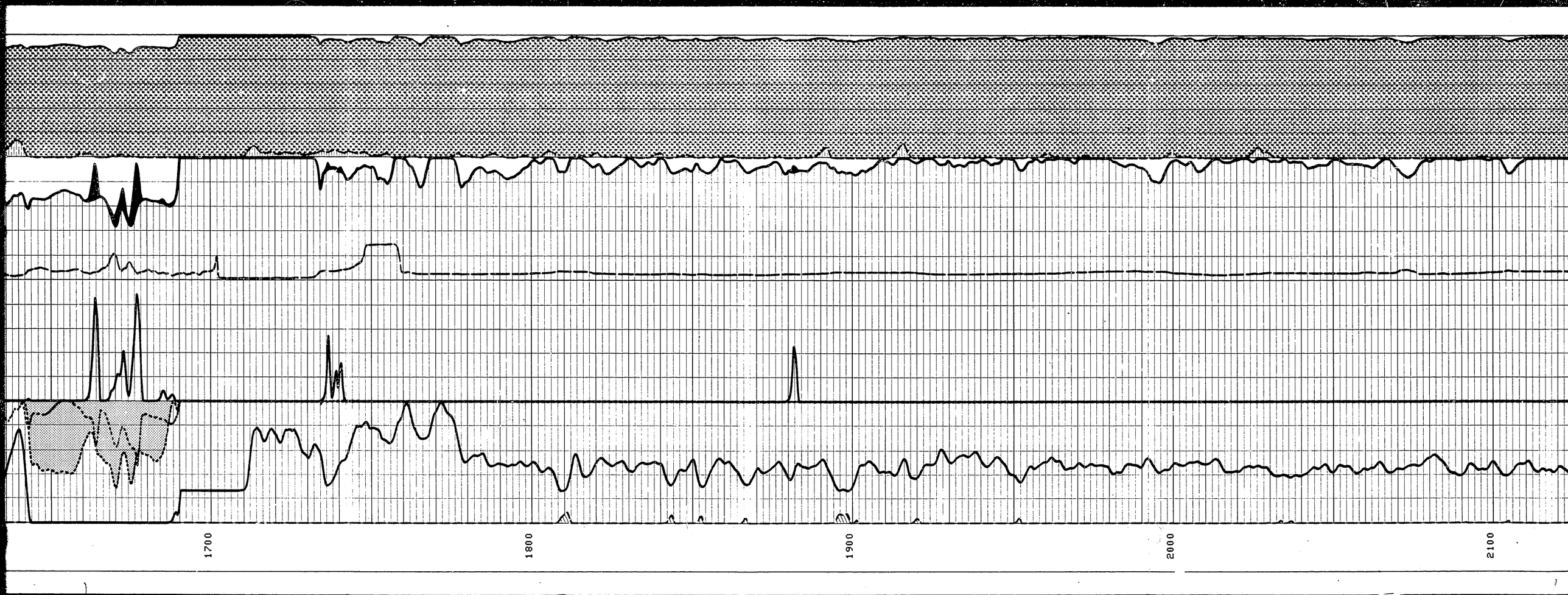

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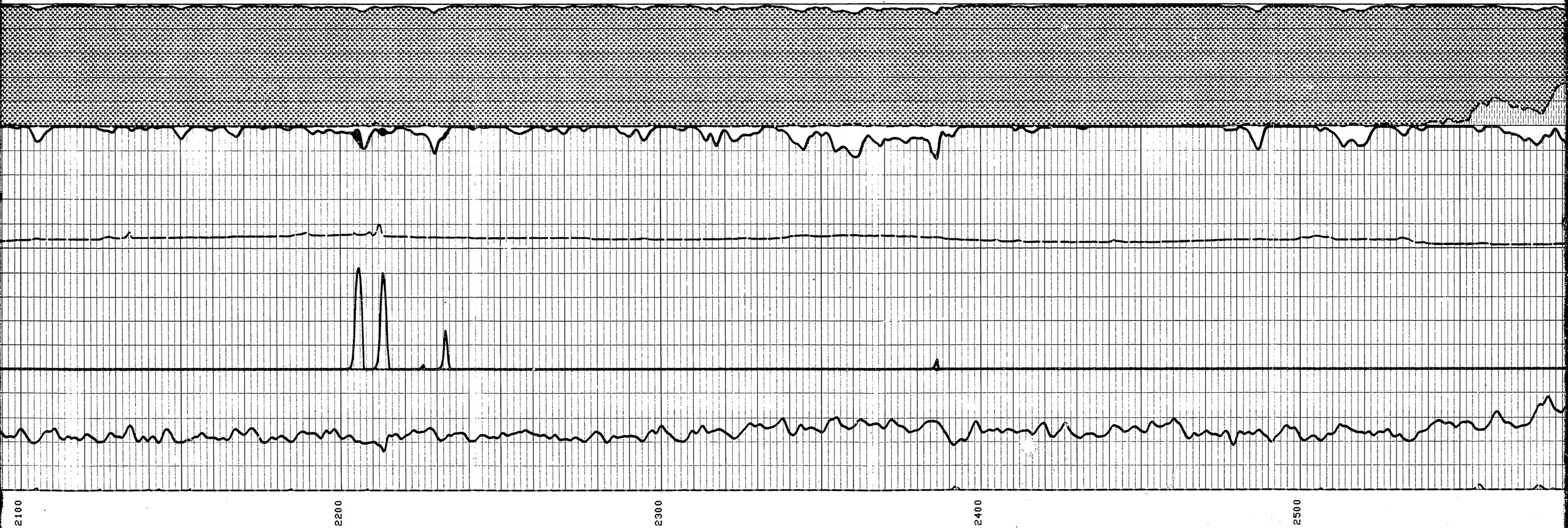
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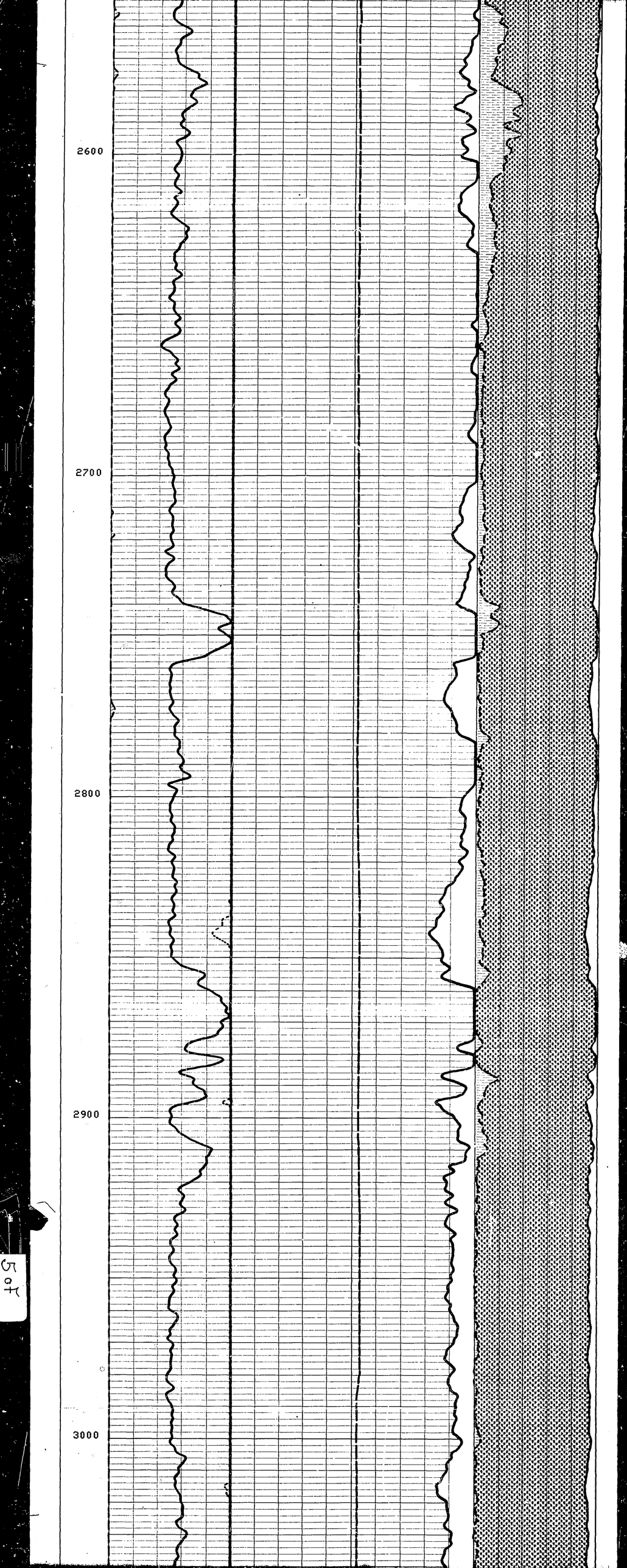
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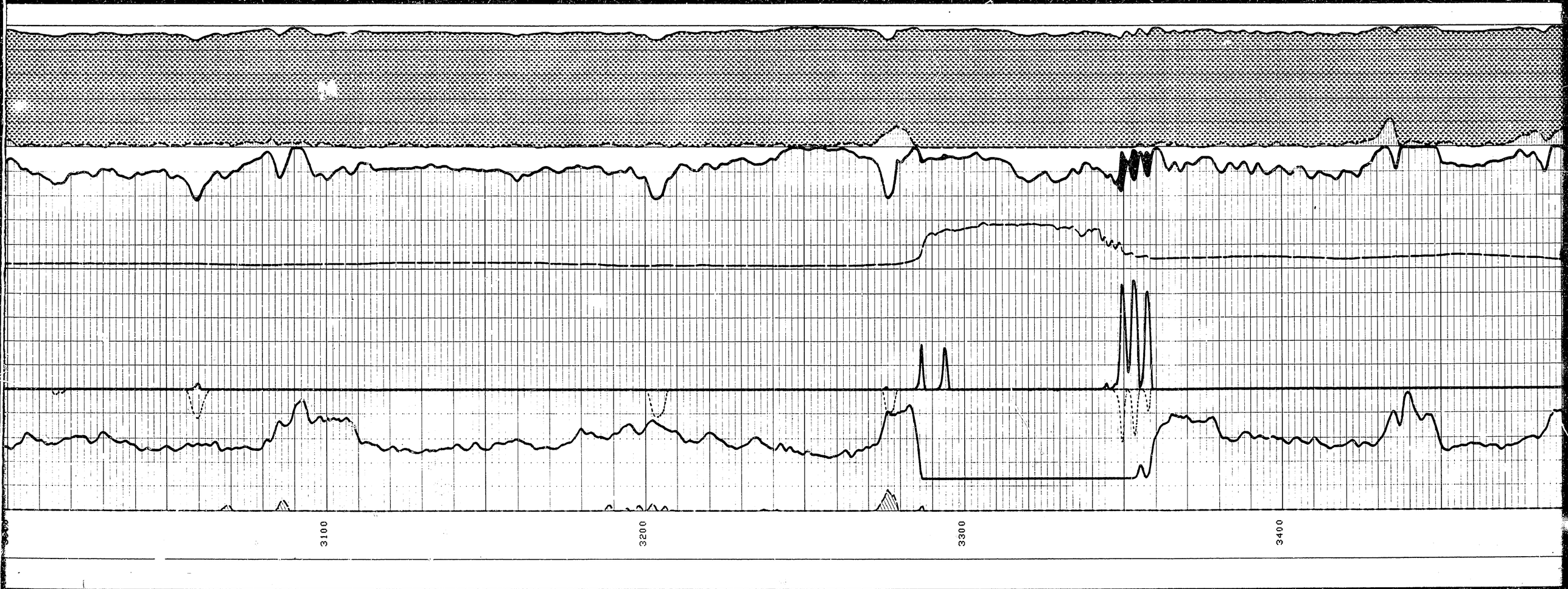
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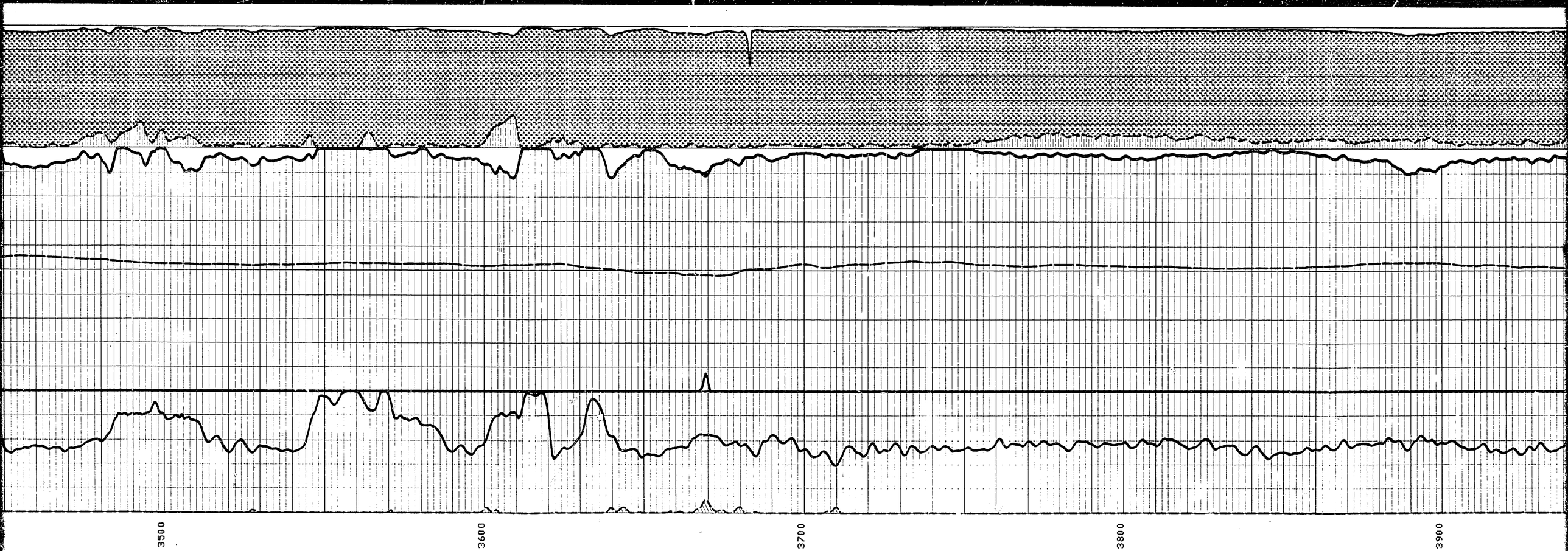
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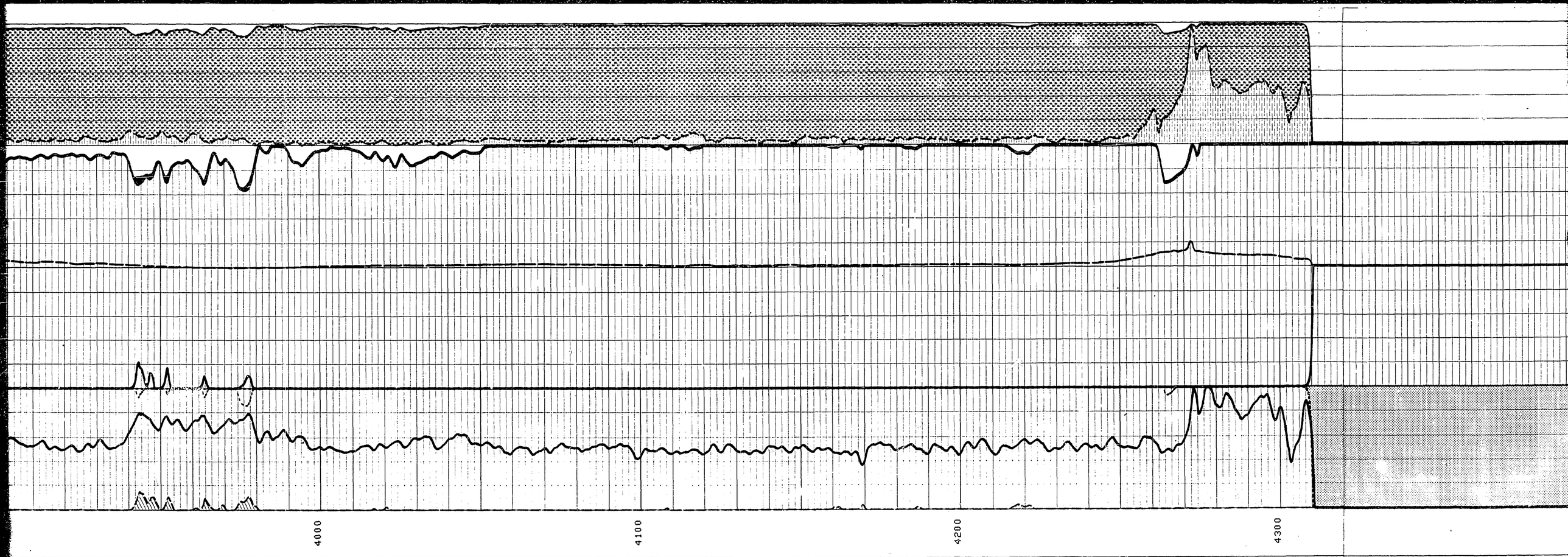
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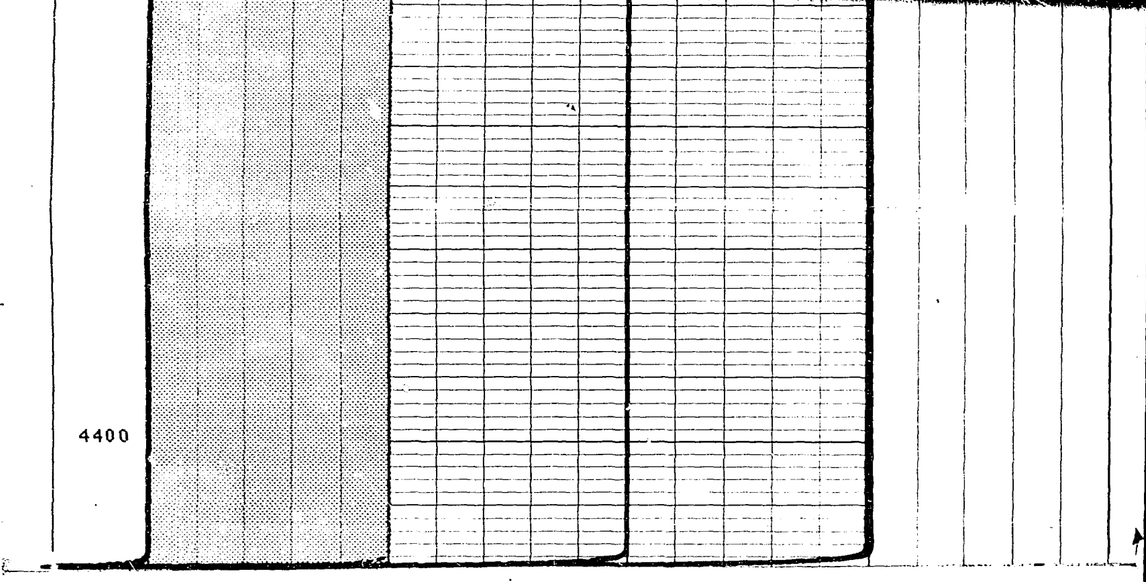


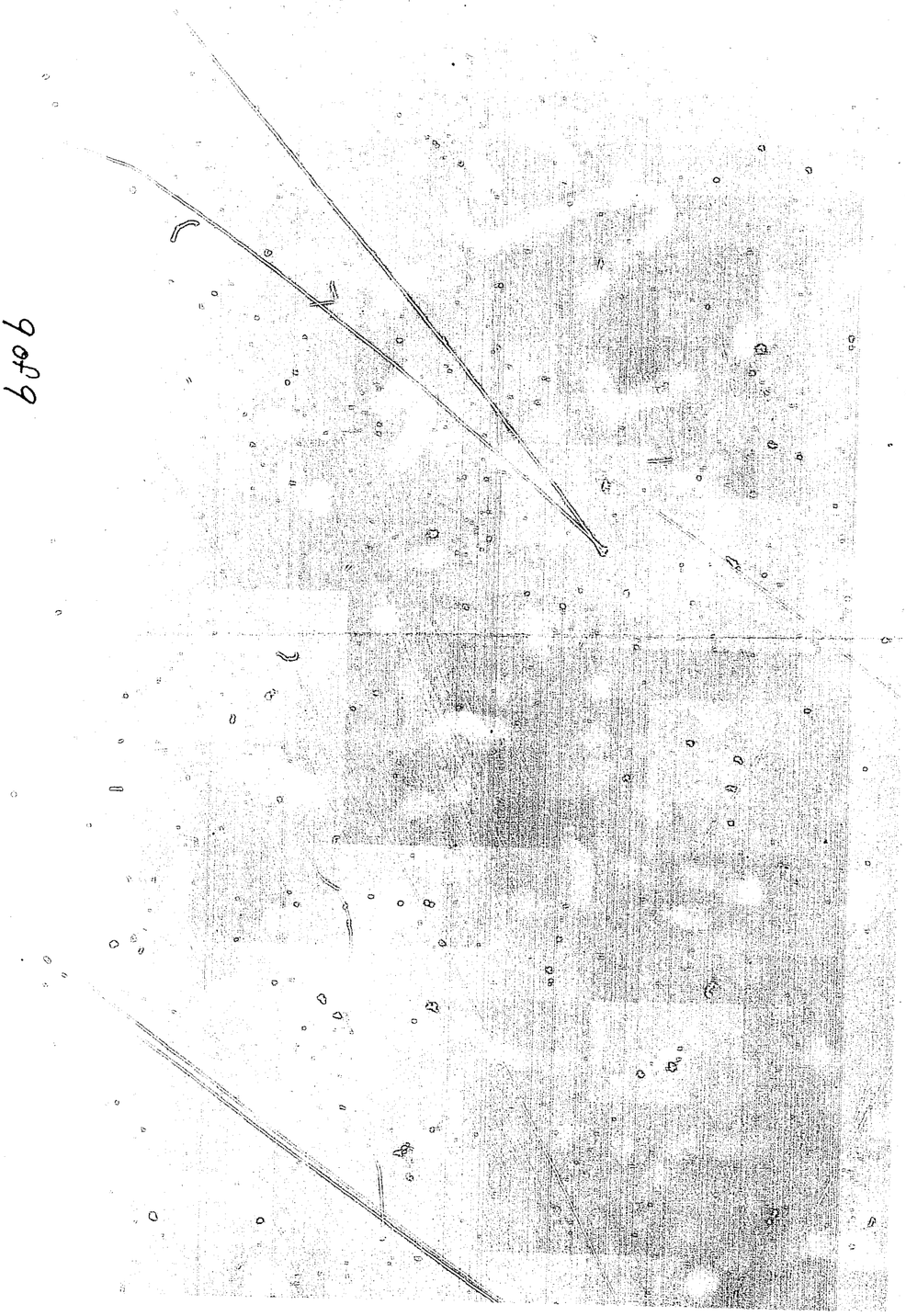
COMPANY AQUITAINE COMPANY OF CANADA LTD.

WELL AQUITAINE ET AL NARWHAL SOUTH #1 N-58

FIELD WILDCAT PROVINCE FEDERAL WATERS

Schlumberger

6706



Schlumberger

FOUR-ARM HIGH-RESOLUTION

CONTINUOUS DIPMETER

COMPUTED

PROVINCE FEDERAL WATERS
FIELD
WELL AQUITAINE ET AL NARWHAL S NO.1 N58
COMPANY AQUITAINE COMPANY OF CANADA LTD.

Date	28 AUG 74
Run No.	ONE
Depth Driller	4341
Depth Logger	4340
Btm. Log Interval	4340
Top Log Interval	1731
Casing Driller	1734
Casing Logger	1731
Bit Size	12 1/4"
Type Fluid in Hole	SALT SAT GEL CHEM
Dens. / Visc.	10.6 / 36
pH / Fluid Loss	/
Source of Sample	MUD PIT
Rm @ Meas. Temp.	0.078 @ 58 °F
Rmf @ Meas. Temp.	0.066 @ 62 °F
Rmc @ Meas. Temp.	@ °F
Source: Rmf / Rmc	— / —
Rm @ BHT	@ °F
Time Since Circ.	
Max. Rec. Temp.	°F
Equipment	SSD-D
Truck No.	DSU-C 1327
Location	FRONTIER
Recorded By	NICKERSON
Witnessed By	TILLEMENT

Permanent Datum SC Elev. 0
Log Measured From KB 77 Ft. Above Perm. Datum
Drilling Measured From

ELEV.: KB 77 GL 0 CBF

Other Services: SIC-GR DIL,FDC-CNL

LOCATION 58°97'56" NORTH LAT 84° 8'16" WEST LONG

FOLD HERE

THIS HEADING AND LOG CONFORMS TO API RP 31

Run No.	Tool Type	HDM No.	HDE No.	HDP No.	HDS No.	DPI No.	DDR No.	Computed By	Correlation Interval	Step	Search
ONE	MDT-C			C782		X2	C784	EMR 6050			

REMARKS

1st Run Service Order # 24943

Magnetic Declination 18°W

"Any directional computations made from the dipmeter must be regarded as approximate only. This is because the dipmeter log indicates the orientation of the instrument itself, rather than the direction and amount of the well drift. Therefore, we do not and cannot guarantee the accuracy of such directional computations, and we shall not be liable nor responsible for any loss, costs, damages or expenses incurred or sustained that may result from any such computations."

TABLE OF VERTICAL DISPLACEMENT IN FEET CORRESPONDING TO VARIOUS HORIZONTAL DISTANCES AND ANGLES OF DIP

DIP ANGLES (degrees)	VERTICAL DISPLACEMENT FOR HORIZONTAL DISTANCES OF 100'	1000'	1 mile (5280')
1	1.75	17.5	92.2
2	3.5	35.	184.
3	5.2	52.	277.
4	7.0	70.	369.
5	8.8	88.	462.
6	10.5	105.	555.
7	12.3	123.	648.
8	14.1	141.	742.
9	15.8	158.	836.
10	17.6	176.	931.
11	19.4	194.	1026.
12	21.3	213.	1122.
13	23.1	231.	1219.
14	24.9	249.	1316.
15	26.8	268.	1415.
16	28.7	287.	1514.
17	30.6	306.	1614.
18	32.5	325.	1716.

DIP ANGLES (degrees)	VERTICAL DISPLACEMENT FOR HORIZONTAL DISTANCES OF 100'	1000'	1 mile (5280')
19	34.4	344.	1818.
20	36.4	364.	1922.
21	38.4	384.	2027.
22	40.4	404.	2133.
23	42.5	425.	2241.
24	44.5	445.	2351.
25	46.6	466.	2462.
30	57.7	577.	3048.
35	70.0	700.	3697.
40	83.9	839.	4430.
45	100.0	1000.	5280.
50	119.2	1192.	6293.
55	142.8	1428.	7540.
60	173.2	1732.	9145.
65	214.4	2144.	11323.
70	274.8	2748.	14507.
75	373.2	3732.	19705.
80	567.1	5671.	29945.

To obtain vertical displacements corresponding to multiples of hundreds of feet, thousands of feet or miles, multiply the number found in the table by the number of hundreds, thousands or miles.

Example: The formation dip is 16 degrees. The vertical displacement occurring at a spot 660 feet away from the well is desired. The table shows 28.7 feet per 100 feet for 16° dip. Therefore 28.7 x 6.60 = 189.42, or 189. feet.

GRAPHIC PRESENTATION

N

CORRELATION RATING:
GOOD
FAIR
POOR

DEPTHS

TRUE DIP ANGLE 0° 10° 20° 30° 40° 50° 60° 70° 80° 90°

DRIFT & TRUE DRIFT DIRECTION OF SONDE 0° 10°