May 31, 1985

1985 DRILLING OPERATIONS IN HUDSON BAY

Two wells are scheduled to be drilled in the central area of Hudson Bay during the summer of 1985 under two separate Exploration Agreements held by two separate consortiums.

Administrative Jurisdiction

Administration of offshore operations falls under the federal Canada Oil and Gas Act, administered by the Canada Oil and Gas Lands Administration (COGLA). COGLA reports to the Minister of Energy, Mines and Resources (EMR) or to the Minister of Indian and Northern Affairs (DIAND), depending on the jurisdiction of the Canada Lands involved. The Hudson Bay area falls under EMR's jurisdiction.

Drilling Operations Manager (Operator)

Canterra Energy Ltd.

Participants in Consortiums

Trillium Consortium:

- Trillium Exploration Corporation
- Exploration SOQUIP
- Onexco Oil & Gas Limited
- ICG Group
- Canterra Energy Ltd.

ICG Consortium:

- ICG Resources Ltd.
- Sogepet Limited
- Trillium Group
- Canterra Energy Ltd.

Proposed Wells

Trillium Consortium:

Well Name: Trillium Soquip Onexco et al Beluga O-23

Co-ords.: 59° 12' 54.4" N, 88° 33' 26.6"W

Approx. Loc.: 250 km East of Churchill

Water Depth: 179 m (587 feet)

Proj. Total Depth: 2 430 m (7,972 feet)

Drilling Time: 55 days (est.)

Approx. Drilling Dates: Aug. 1/85 - Sept. 25/85

Est. Cost: $25 million

ICG Consortium:

Well Name: ICG Sogepet et al Netsiq N-01

Co-ords: 59° 50' 48.0" N, 87° 30' 59.5" W

Approx. Loc: 300 km ENE of Churchill

Water Depth: 198 m (650 feet)

Proj. Total Depth: 1 370 m (4,495 feet)

Drilling Time: 35 days (est.)

Est. Cost: $16 million

Approx. Drilling Dates: Sept. 25/85 - Oct. 30/85

Drilling Contractor: Bawden Western Oceanic Offshore Ltd.

Drill Unit

- Neddrill II
- a dynamically positioned (DP) drillship
- can be operated in either a DP or anchored mode
- ice strengthened converted bulk carrier, built in Japan by Mitsubishi in 1977
- registered in the Netherlands
- previously used in Canadian waters by Petro Canada
- 540 feet length, 226 feet derrick height
- accommodation for 90 persons
- currently on contract to Chevron offshore Barcelona, Spain

Supply Vessels

- contracted from Seaforth Fednav
- 3 vessels; the Takapu, Toanui and Arctic Shiko
- each approximately 200 feet in length
- used for: ice monitoring, towing, re-supply of consumables, anchor deployment & recovery and rig standby
- the Arctic Shiko has increased ice strengthening and will be utilized as lead vessel when entering the Bay

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General Program of Operations

- drillship to arrive in St. Johns, Newfoundland in first half of July
- drillship will be safety inspected and loaded with all required drilling supplies (fuel, casing, mud, cement, etc.)
- hiring of experienced Canadians to fill possible positions on rig and supply vessels contracted to Harvey Offshore Services Ltd.
- rig specific safety training carried out
- approx. July 15 (depending on ice conditions) drillship & 3 supply vessels will proceed up coast of Labrador to Cape Chidley to await first (ice) opening of Hudson Strait
- one helicopter will accompany drillship and be used for forward ice reconnaissance, crew changes and Medivacs
- as soon as Hudson Strait passable, will leave Cape Chidley and enter the Bay
- the Arctic Shiko support vessel will proceed to location of first (Trillium - Beluga) wellsite and set up positioning beacons on sea floor
- drillship will be located on the Beluga well till about mid to late September and then move NE, approx. 60 km., to the Netsiq location
- final drilling is expected to be completed by about Nov. 1st with the drillship and vessels leaving the Bay as early as possible
- if for unforeseen circumstances the vessles had to winter in the Bay, they would do so at Port Harrison on East shore of Bay

NOTE: It costs approximately $200,000/day to contract drillship.

Support Services

- St. Johns, Newfoundland will be the mobilization base (i.e. - vessels will be manned and loaded with necessary equipment and supplies for most of the planned operations before leaving for Bay)
- Churchill will be mainly a personnel transfer base
- Churchill will also be a staging area for fuel, water and catering supplies

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- supply vessels will be utilized to transport fuel, water and other supplies between Churchill and the drillship
- 2 Bell 214 Super Transporter helicopters, contracted through Okanagan Helicopters, will be based at Churchill during drilling operations and utilized mainly for personnel transfer between Churchill and the rig. One helicopter will be on standby whenever the other is being flown.
- office and maintenance facilities at Churchill will be located in a hanger adjacent to the main airport terminal
- the helicopter operator will have 4 flight crew and 3 maintenance personnel in Churchill
- Canterra will have their on-site manager, 2 local expeditors, a secretary and other contracted local help in Churchill
- one local Churchill hotel will be used for accommodation of full time staff while transient crews will be booked at a second
- transportation between Churchill and Winnipeg will be via a Hawker Siddely 748 turbo prop aircraft chartered from Bradley Air Services. This aircraft will also be used for ice reconnaissance before rig arrival in the Bay and while the rig is drilling
- crew changes will entail approximately 25-30 people per week travelling each way between the drillship, Churchill and Winnipeg. This will require approximately 3 round trips by the HS 748 between Churchill and Winnipeg, and about 5 round trips by the helicopter between Churchill and the drillship
- Canterra will maintain an expediting office at the Winnipeg airport utilizing the support facilities of Pacific Western
- St. Albert, Alberta is location of Canterra's central communication system for all Canada lands
- if a blowout were to occur, environmental studies indicate prevailing winds and currents in the Bay would be from the wellsites to the southeast, therefore the Manitoba coastline would not be in a subjected area

- if a blowout resulted in the loss or immobilization of the drillship, a second rig would be brought in from either the east coast, North Sea or the Beaufort (estimated time from the East Coast for a drillship is approximately 10 days)
- approximately $3.55 million will be spent with local firms in the Hudson Bay area. About $3.0 of this will be for fuel, office renovations and supplies, accommodation, vehicle rental and maintenance, expediting of provisions and the operator's local employment and consultation programs in Churchill. The other $550,000 will be in other northern communities outside of Churchill.

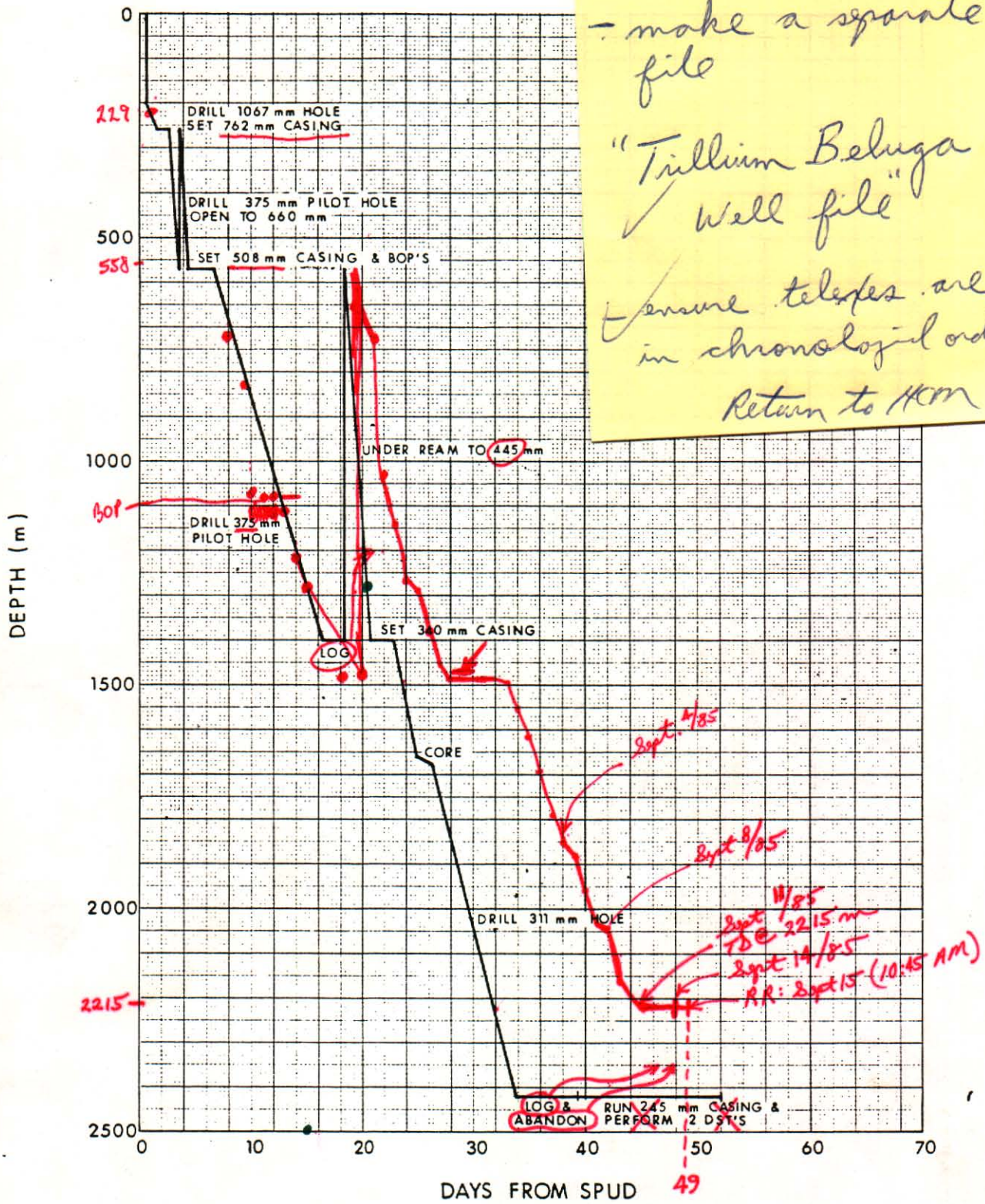
Manpower

- approximately 292 people in total
  - ≃ 80% will be Canadians
  - ≃ 30% residents of local area (i.e. - Newfoundland, Hudson Bay)

- drillship: 165 (112 Canadians), 2 crew shifts, 28 days on, 28 days off crew schedule
- supply vessels: 76 (100% Canadians)
- land bases: 51 (49 Canadians)

Note:
- Operator is committed to fill a minimum of 25 positions with local residents of communities in the Hudson Bay region.
- Nunasi Corporation has been contracted to assist in implementing this northern employment program.

- make a separate file "Trillium Beluga Well file"
ensure telexes are in chronological order.
Return to HKM



Canterra

TRILLIUM SOQUIP ONEXCO et al BELUGA 0-23

DRILLING CURVE

TRILLIUM SOQUIP ONEXCO ET AL BELUGA 0-23

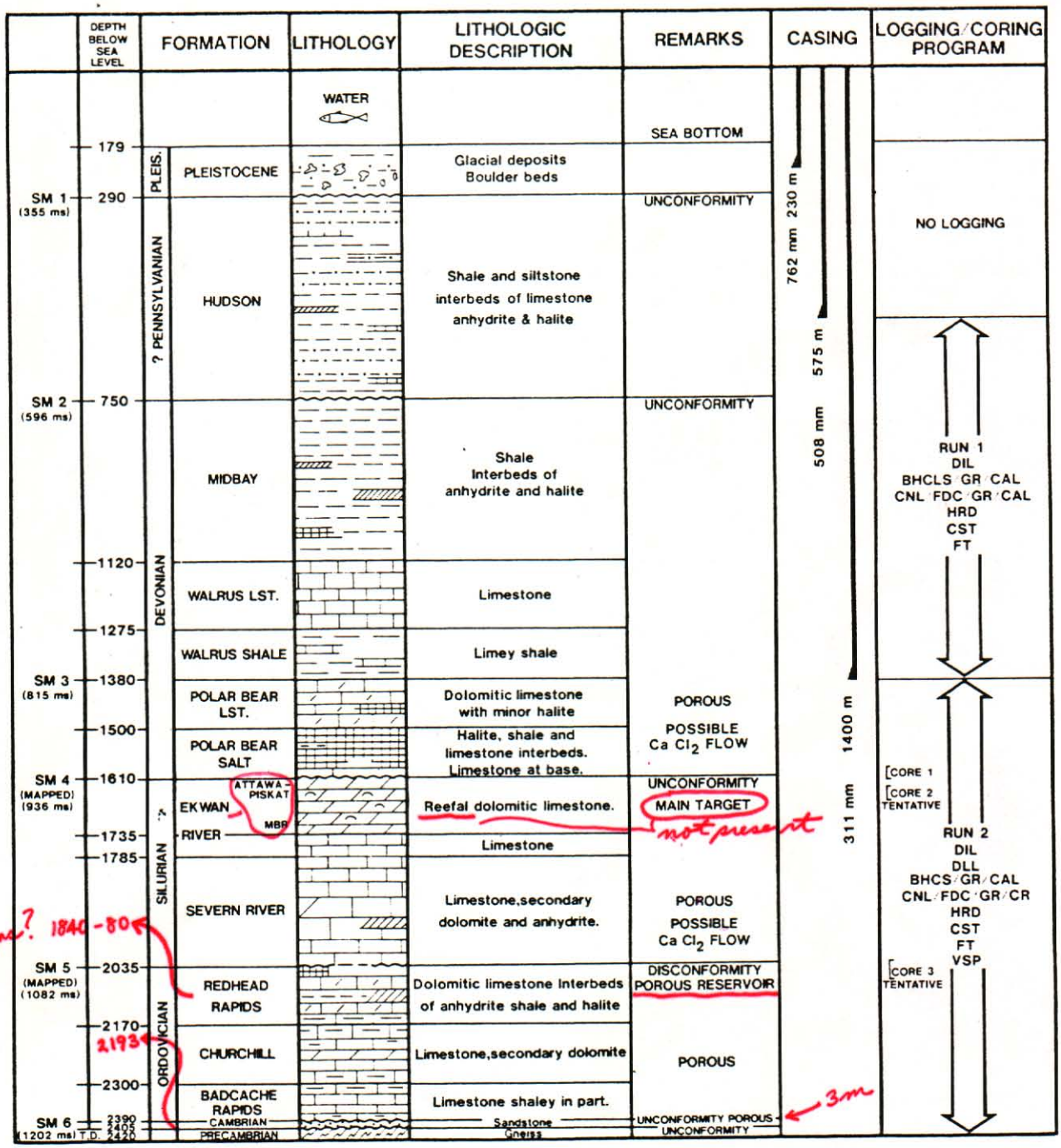
SEISMIC LINE: CO 15 S.P. 2780

LOCATION: Lat. 59°12'54.4"N
Long. 88°33'26.6"W

FEDERAL PERMIT :

DEPTH 2420 m

WATER DEPTH 179 m



Prec. 124 m high

Canterra Energy Ltd.

HUDSON BAY

TRILLIUM SOQUIP ONEXCO ET AL
BELUGA 0-23
PROGNOSIS

SCALE:	CONTOUR INTERVAL:
PREPARED BY: J.E.THORPE	DATE: APRIL, 1985
DRAWN BY: C.A.	FILE: 13-J9

Hole Size	Depth	Casing
1067 (42")	60 m BML 252 RT	762 (30")
drill out shoe 26"		
pilot 375 (14 3/4)	575 RT	
ream 660 (26")		508 (20") @ 565 m 559 m
~~pilot 3~~		

BOP stack

375 (14 3/4) 1395 m? actual 1488 Day 20 - Aug 17/8

log — Day 21

ream 445 (17 1/2) — Day 22 to

340 (13 3/8")

311 (12 1/4) 1650 m?

core

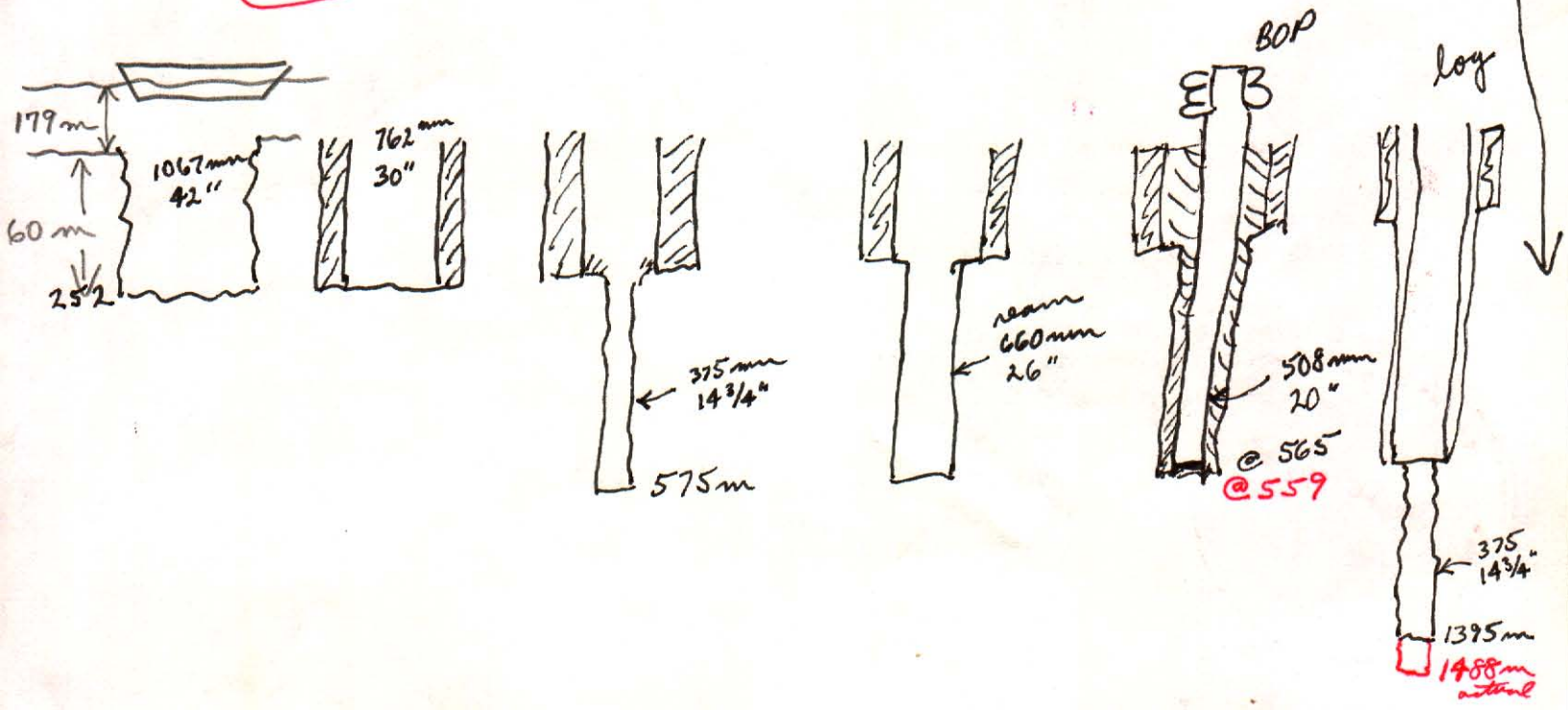
311 TD

log

245 mm (9 5/8") below test zones

~~248~~

DST tests



MANITOBA
Inter-Departmental Memo

Date AUG 16 1985

To Barbara Carroll
Federal-Provincial Relations and Research Division
Room 4 Legislative Building

From Charles S. Kang
Deputy Minister
Energy and Mines
309 Legislative Building

Telephone 945-3130

Subject NIELSEN TASK FORCE - REVIEW OF REGULATIONS

The following regulations/agencies undergoing the federal review are of concern to the Department of Energy and Mines:

EC 903 Industrial Effluent and Emission Controls

The regulation which is of particular concern to the Mines Branch is the Metal Mining Liquid Effluent Regulation under the Canada Fisheries Act (R.S.C. 1970, F-14).

This regulation designates arsenic, copper, lead, nickel, zinc, radium 2Z6 and suspended solids as deleterious substances and prescribes limits for these substances and pH as well. The levels are prescribed as concentration of substance rather than total amount of metal or solids being discharged. This creates undue hardship on the mining industry, particularly for those mines which do not have a designated tailings (mine waste) disposal area. Furthermore, there is duplication of effort here, because Manitoba has authority to issue orders through the Clean Environment Commission under the Clean Environment Act.

It is recommended that the regulation under the Fisheries Act be repealed.

LC 6 Occupational Health and Safety.

The concern to the Mines Branch is the federal presence in the "Flin Flon Mineral Area", wherein Labour Canada has jurisdiction for health and safety at the mining operation of Hudson Bay Mining and Smelting Company and they do not have any regulations respecting health and safety in mines.

It is recommended that the jurisdiction for health and safety as well as other matters (e.g. labour relations), be returned to the respective provinces.

Contact Person: W.A. Bardwich
Director of Mines
945-6505

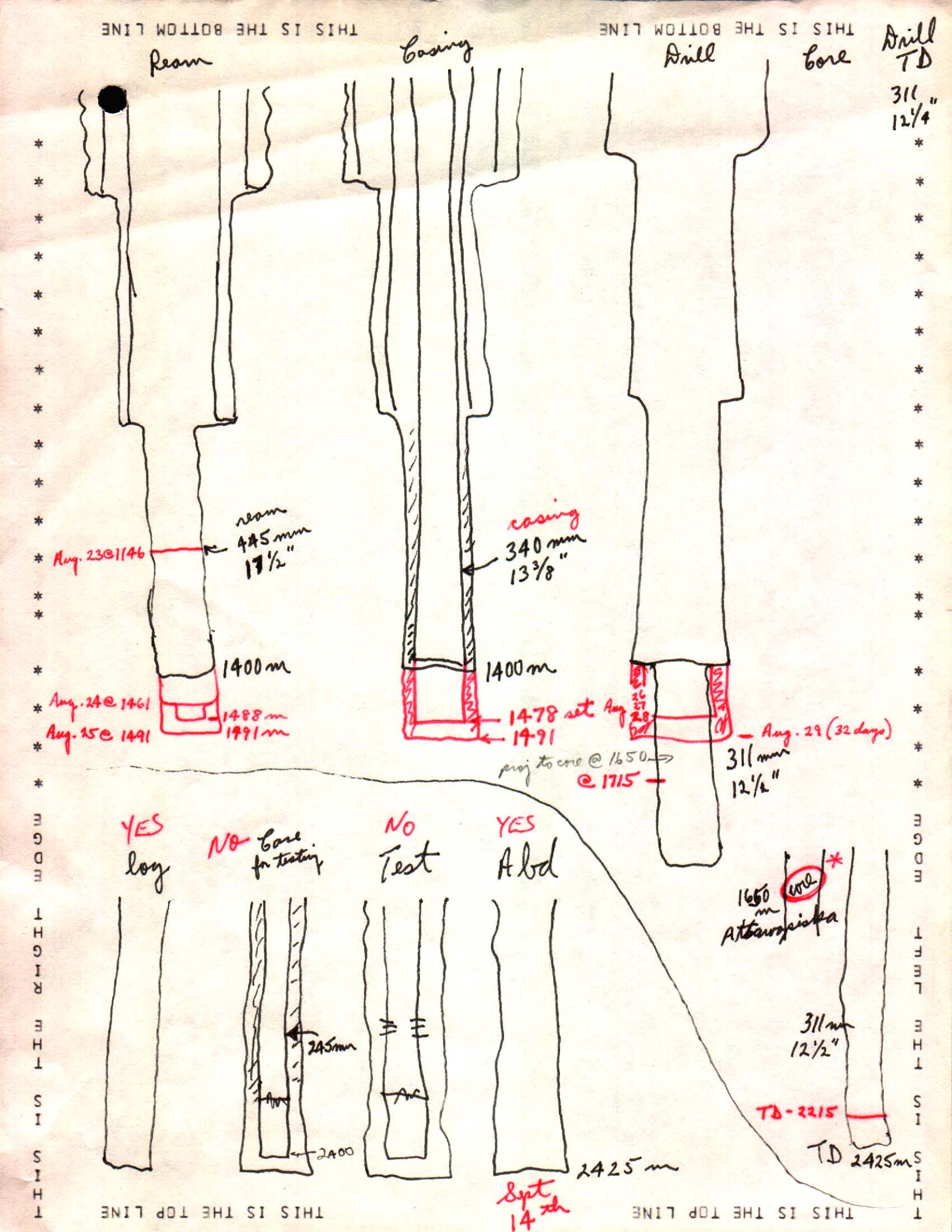
Manitoba Energy and Mines
Policy Planning and
Project Development
AUG 19 1985
MINERAL POLICY

AUG 21 1985
PETROLEUM BRANCH

PC Bardswich
Master

for info

continued . . . .


THIS IS THE BOTTOM LINE
Ream
Casing
Drill
Core
Drill TD
311 12 1/4"
ream 445 mm 17 1/2"
Aug. 23@1146
1400 m
Aug. 24@ 1461
1488 m
Aug. 25@ 1491
1491 m
casing 340 mm 13 3/8"
1400 m
1478 set
1491
Aug 26 27 28
Aug. 29 (32 days)
proj to core @ 1650
@ 1715
311 mm 12 1/2"
YES log
NO Core for testing
NO Test
YES Abd
245 mm
2400
2425 m
Sept 14th
1650 m core
Attawapiska
311 mm 12 1/2"
TD - 2215
TD 2425 m
THIS IS THE TOP LINE
THIS IS THE RIGHT EDGE
THIS IS THE LEFT EDGE

RIG RELEASED FROM BELUGA (10:45AM) SEPT. 15/85 (Day 49)

DEPARTMENT OF ENERGY AND MINES
SEP 18 1985
PETROLEUM BRANCH

TELCOM WPG

POLESTAR SALB

TO: COGLA/OTTAWA/ATTN: F. LEPINE 053-4366
GOVT OF MANITOBA /ATTN: C MOSTER 07-57346
CANTERRA/CAL/ATTN: FRONTIER DRLG. 038-21511

CANTERRA DAILY DRILLING REPORT

WELL: BELUGA O-23 RIG: NEDDRILL 2
DATE: 85/09/15 DAYS FROM SPUD 49
2400 DEPTH M 0.0 PROGRESS M 0.0
LAST CASING 0.0 MM DEPTH 0.0 M
LAST LOT 0 KG/M3 AT 0.0 M

NO OF PERSONS ON BOARD 92
STANDBY VESSELS
ARTIC SHIKO

STATUS AT 0600
N/A
OPERATIONS SUMMARY
0-100 COMPLETED PLACING ABANDONMENT CEMENT PLUG NO.3 AS PER PROGRAM 100-1030 RIGGED UP TO PULL BOPS. DISCONNECTED AT 0300 HRS. PULLED BOPS AND RIG DOWN RUNNING EQUIPMENT. RECOVERED BEACONS USING ROV AND SHIPS BEACON. RETRACTED HYDROPHONES AND THRUSTERS. NEDDRILL 2 UNDERWAY TO NETSIQ N-01 LOCATION AT 1045 HRS.
DRILLS
OPERATIONS FORECAST

BIT DIAM 0.0 MM TYPE
MUD DENSITY 1260 KG/M3 VIS 35 WL 35.0
MAX GAS READING 0 UNITS AT 0 M

ENVIRONMENT	MAX	0600		MAX	0600
WIND SPEED KNOTS	21	21	DIRECTION	170	170
WAVES HEIGHT M	1.5	1.0	DIRECTION	170	170
WAVES PERIOD	3.0	3.0			
SWELL HEIGHT M	0.0	0.0	DIRECTION		
SWELL PERIOD	0.0	0.0			

ICE STATUS: GREEN
BERGS IN RANGE 0 CLOSEST AT 0.0 KM
CLOSEST BERG AT KM BEARING DEG AT 0600 HRS
PACK ICE CONC (1/10) AT 0.0 KM
VESSEL RESPONSE 24 HOUR MAX PITCH DEG 0.3 ROLL DEG 0.0
HEAVE M 0.3

REMARKS

BEST REGARDS
STAN JOHNSTON, DRILLING SUPT.
709-753-9555 TELEX 016-4138

#
TELCOM WPG

POLESTAR SALB
TO: CCGLA/OTTAWA/ATTN: F. LEPINE 053-4366
GOVT OF MANITOBA /ATTN: C MOSTER 07-57346
CANTERRA/CAL/ATTN: FRONTIER DRLG. 038-21511

CANTERRA DAILY DRILLING REPORT

WELL: BELUGA O-23 RIG: NEDDRILL 2
DATE: 85/09/14 DAYS FROM SPUD 48
2400 DEPTH M 2214.8 PROGRESS M 0.0
LAST CASING 0.0 MM DEPTH 0.0 M
LAST LOT 0 KG/M3 AT 0.0 M

NO OF PERSONS ON BOARD 88
STANDBY VESSELS
TAKAPU, ARCTIC SHIKO AT NETSIQ SITE

STATUS AT 0600
PULLING BOP STACK
OPERATIONS SUMMARY
0-430 RUN SCLUM LOGS 7)CST(SIDEWALLS CORES:66 SHOTS,36 RECOV,2 BULLETS LOST 430-5 RIG DOWN SCLUM 5-730 R.I.H.W/O.E.D.P. 730-10 MIXED AT PUMPED ABAND CEMENT PLUG NO.1(2215-2115M)9.5M3 15.8 PPG SLURRY(12.4T CLASS G CEMENT)AS PER PROG.10-12 POH 12-1430 RETRIV WEAR BUSHINGS.FR BALL JT AT WELL HEAD.1430-1930 RIG UP SCLUM:RUN AT SET 339.8MM ABAND BRIDGE PLUG AT 1460M.PRES TEST TO 2000 PSI. 1930-21 R.I.H.W/O.E.D.P.AT TAG PLUG AT 1460M 21-2230 MIXED AT PUMPED ABAND CEMENT PLUG NO.2 (SUMMARY CONT IN REMARKS)
DRILLS
OPERATIONS FORECAST
PULL BOPS,RECOVER BEACONS,RETRACT HYDROSHONES AT THRUSTERS. SAIL TO NETSIQ N-01 LOCATION AT SPUD WELL.

BIT DIAM 0.0 MM TYPE
MUD DENSITY 1260 KG/M3 VIS 34 WL 35.0
MAX GAS READING 0 UNITS AT 0 M

ENVIRONMENT	MAX	0600		MAX	0600
WIND SPEED KNOTS	21	12	DIRECTION	120	130
WAVES HEIGHT M	1.0	0.7	DIRECTION	140	130
WAVES PERIOD	4.0	3.0			
SWELL HEIGHT M	0.0	0.0	DIRECTION		
SWELL PERIOD	0.0	0.0			

ICE STATUS: GREEN
BERGS IN RANGE 0 CLOSEST AT 0.0 KM
CLOSEST BERG AT KM BEARING DEG AT 0600 HRS
PACK ICE CONC (1/10) AT 0.0 KM
VESSEL RESPONSE 24 HOUR MAX PITCH DEG 0.0 ROLL DEG 0.0
HEAVE M 0.0

REMARKS
(1457-1407M)3.7M3 15.5 PPG SLURRY(5 T CLASS G CEMENT)AS PER PROGRAM 2230-2330 POH TO 250M 2330-24 MIXED AT PUMPED ABAND CEMENT PLUG NO.3 (250-200M)3.7M3 15.8PPG SLURRY (5 T CLASS G CEMENT) AS PER PROGRAM

BEST REGARDS
STAN JOHNSTON, DRILLING SUPT.
709-753-9555 TELEX 016-4138

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POLESTAR SALB
TO: COGLA/OTTAWA/ATTN: F. LEPINE 053-4366
GOVT OF MANITOBA /ATTN: C MOSTER 07-57346
CANTERRA/CAL/ATTN: FRONTIER DRLG. 038-21511

CANTERRA DAILY DRILLING REPORT

WELL: BELUGA O-23 RIG: NEDDRILL 2
DATE: 85/09/12 DAYS FROM SPUD 46
2400 DEPTH M 2214.9 PROGRESS M 0.0
LAST CASING 339.7 MM DEPTH 1477.9 M
LAST LOT 2461 KG/M3 AT 1477.9 M

NO OF PERSONS ON BOARD 92
STANDBY VESSELS
TAKAPU, ARTIC SHIKO ETA CHURCHILL 0700 LOCAL

STATUS AT 0600
RUNNING SCHLUMBERGER ELECTRIC LOGS.
OPERATIONS SUMMARY
0-100 CIRCULATED B/U
100-630 MEASURED OUT OF HOLE (OK).LAID OUT MWD AND MONELS
630-700 RIGGED UP SCHULMBERGER. RUN ELECTRIC LOGS
700-1200 DLT,MSFL
1200-1630 CNL,LDT,GR
1630-2100 HDT (DIPMETER)
2100-2400 BHC - SONIC,GR PLUS (CBL,VDL, INSIDE CASING)
DRILLS
OPERATIONS FORECAST
LOG 5) RFT 6) VELOCITY SURVEY 7) CST

BIT 25 DIAM 311.1 MM TYPE F4
MUD DENSITY 1284 KG/M3 VIS 35 WL 31.0
MAX GAS READING 0 UNITS AT 0 M

ENVIRONMENT	MAX	0600		MAX	0600
WIND SPEED KNOTS	22	18	DIRECTION	180	250
WAVES HEIGHT M	1.9	0.7	DIRECTION	190	240
WAVES PERIOD	5.0	4.0			
SWELL HEIGHT M	0.0	0.0	DIRECTION		
SWELL PERIOD	0.0	0.0			

ICE STATUS: GREEN
BERGS IN RANGE 0 CLOSEST AT 0.0 KM
CLOSEST BERG AT KM BEARING DEG AT 0600 HRS
PACK ICE CONC (1/10) AT 0.0 KM
VESSEL RESPONSE 24 HOUR MAX PITCH DEG 0.2 ROLL DEG 0.2
HEAVE M 0.1

REMARKS

BEST REGARDS
STAN JOHNSTON, DRILLING SUPT.
709-753-9555 TELEX 016-4138

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4
TELCON WPG

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TO: COGLA/OTTAWA/ATTN: F. LEPINE 053-4366
GOVT OF MANITOBA /ATTN: C MOSTER 07-57346
CANTERRA/CAL/ATTN: FRONTIER DRLG. 038-21511

DEPARTMENT OF ENERGY AND MINES
SEP 18 1985
PETROLEUM BRANCH

CANTERRA DAILY DRILLING REPORT

WELL: BELUGA O-23 RIG: NEDDRILL 2
DATE: 85/09/13 DAYS FROM SPUD 47
2400 DEPTH M 2214.9 PROGRESS M 0.0
LAST CASING 339.7 MM DEPTH 1477.9 M
LAST LOT 2461 KG/M3 AT 1477.9 M

NO OF PERSONS ON BOARD 93
STANDBY VESSELS
TAKAPU

STATUS AT 0600
RIH OEDP TO SET ABANDONMENT CEMENT PLUG B1
OPERATIONS SUMMARY
RUN SCHLUMBERGER LOGS. -330 4)BHC-SONIC.GR PLUS (CBL,VDL INSIDE CASING) 330-600 WORK ON R.F.T (VALVES STICKING), DECIDE TO USE BACK UP TOOL. 600-11 5)R.F.T. 11-14 6)W.S.T.(WELL SEISMIC TOOL) 14-17 MALFUNCTION POH AT REPAIR (MAJOR PROBLEM V.D.U. IN SCHLUMBERGER UNIT) 17-2230 COMPLETED W.S.T. RUN 2230-24 7) C.S.T. (SIDE WALL CORES)
DRILLS
OPERATIONS FORECAST
ABANDON W/100M CMT AT BOTM.BRIDGE PLUG AT SHOE.2X50M CEMENT PLUG IN CASING-AS PER PROGRAM.PULL WEAR BUSHINGS.DISCIN AT PULL BOPOS

BIT DIAM 0.0 MM TYPE
MUD DENSITY 1272 KG/M3 VIS 35 WL 32.0
MAX GAS READING 0 UNITS AT 0 M

ENVIRONMENT	MAX	0600		MAX	0600
WIND SPEED KNOTS	18	12	DIRECTION	250	100
WAVES HEIGHT M	0.8	0.3	DIRECTION	260	110
WAVES PERIOD	4.0	3.0			
SWELL HEIGHT M	0.6	0.4	DIRECTION	240	240
SWELL PERIOD	5.0	5.0			

ICE STATUS: GREEN
BERGS IN RANGE 0 CLOSEST AT 0.0 KM
CLOSEST BERG AT KM BEARING DEG AT 0600 HRS.
PACK ICE-CONC (1/10) AT 0.0 KM
VESSEL RESPONSE 24 HOUR MAX PITCH DEG 0.0 ROLL DEG 0.0
HEAVE M 0.0

REMARKS

BEST REGARDS
STAN JOHNSTON, DRILLING SUPT.
709-753-9555 TELEX 016-4138

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DEPARTMENT OF ENERGY AND MINES
SEP 19 1985
PETROLEUM BRANCH

TO: COGLA/OTTAWA/ATTN: F. LEPINE 053-4366
GOVT OF MANITOBA /ATTN: C MOSTER 07-57346
CANTERRA/CAL/ATTN: FRONTIER DRLG. 038-21511

CANTERRA DAILY DRILLING REPORT

WELL: BELUGA O-23 RIG: NEDDRILL 2
DATE: 85/09/12 DAYS FROM SPUD 46
2400 DEPTH M 2214.9 PROGRESS M 0.0
LAST CASING 339.7 MM DEPTH 1477.9 M
LAST LOT 2461 KG/M3 AT 1477.9 M

NO OF PERSONS ON BOARD 92
STANDBY VESSELS
TAKAPU, ARTIC SHIKO ETA CHURCHILL 0700 LOCAL

STATUS AT 0600
RUNNING SCHLUMBERGER ELECTRIC LOGS.
OPERATIONS SUMMARY
0-100 CIRCULATED B/U
100-630 MEASURED OUT OF HOLE (OK),LAID OUT MWD AND MONELS
630-700 RIGGED UP SCHULMBERGER. RUN ELECTRIC LOGS
700-1200 DLT,MSFL
1200-1630 CNL,LDT,GR
1630-2100 HDT (DIPMETER)
2100-2400 BHC - SONIC,GR PLUS (CBL,VDL, INSIDE CASING)
DRILLS
OPERATIONS FORECAST
LOG 5) RFT 6) VELOCITY SURVEY 7) CST

BIT 25 DIAM 311.1 MM TYPE F4
MUD DENSITY 1284 KG/M3 VIS 35 WL 31.0
MAX GAS READING 0 UNITS AT 0 M

ENVIRONMENT	MAX	0600		MAX	0600
WIND SPEED KNOTS	22	18	DIRECTION	180	250
WAVES HEIGHT M	1.9	0.7	DIRECTION	190	240
WAVES PERIOD	5.0	4.0			
SWELL HEIGHT M	0.0	0.0	DIRECTION		
SWELL PERIOD	0.0	0.0			

ICE STATUS: GREEN
BERGS IN RANGE 0 CLOSEST AT 0.0 KM
CLOSEST BERG AT KM BEARING DEG AT 0600 HRS
PACK ICE CONC (1/10) AT 0.0 KM
VESSEL RESPONSE 24 HOUR MAX PITCH DEG 0.2 ROLL DEG 0.2
HEAVE M 0.1

REMARKS

BEST REGARDS
STAN JOHNSTON, DRILLING SUPT.
709-753-9555 TELEX 016-4138

#
TELCOM WPG

POLESTAR SALB

#
TELCOM WPG

POLESTAR SALB

DEPARTMENT OF ENERGY AND MINES
SEP 16 1985
PETROLEUM BRANCH

TO: COGLA/OTTAWA/ATTN: F. LEPINE 053-4366
GOVT OF MANITOBA /ATTN: C MOSTER 07-57346
CANTERRA/CAL/ATTN: FRONTIER DRLG. 038-21511

CANTERRA DAILY DRILLING REPORT

WELL: BELUGA O-23 RIG: NEDDRILL 2
DATE: 85/09/11 DAYS FROM SPUD 45
2400 DEPTH M 2214.9 PROGRESS M 43.9
LAST CASING 339.7 MM DEPTH 1477.9 M
LAST LOT 2461 KG/M3 AT 1477.9 M

NO OF PERSONS ON BOARD 91
STANDBY VESSELS
TAKAPU, ARTIC SHIKO NETSIG N-01

STATUS AT 0600
POH
OPERATIONS SUMMARY
0-630 FINISH TRIP. 630-1330 DRILL 2171M-2195M. 1330-1830 TRIP FOR WASHOUT IN DRILL PIPE 1 SINGLE ABOVE HWDP. 1830-2330 DRILL 2195M-2215M. 2330-2400 CIRCULATE & CONDITION HOLE TO LOG.
DRILLS
OPERATIONS FORECAST
RIG TO LOG X SCHLUMBERGER.

BIT 25 DIAM 311.1 MM TYPE F-4
MUD DENSITY 1284 KG/M3 VIS 35 WL 32.0
MAX GAS READING 0 UNITS AT 0 M
LITHOLOGY GRANITE

ENVIRONMENT	MAX	0600		MAX	0600
WIND SPEED KNOTS	17	14	DIRECTION	200	170
WAVES HEIGHT M	0.7	0.7	DIRECTION	180	180
WAVES PERIOD	4.0	4.0			
SWELL HEIGHT M	0.0	0.0	DIRECTION		
SWELL PERIOD	0.0	0.0			

ICE STATUS: GREEN
BERGS IN RANGE 0 CLOSEST AT 0.0 KM
CLOSEST BERG AT KM BEARING DEG AT 0600 HRS
PACK ICE CONC (1/10) AT 0.0 KM
VESSEL RESPONSE 24 HOUR MAX PITCH DEG 0.0 ROLL DEG 0.0
HEAVE M 0.0

REMARKS

BEST REGARDS
STAN JOHNSTON, DRILLING SUPT.
709-753-9555 TELEX 016-4138

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POLESTAR SALB

First Well
(48 days)
— on schedule because drilled 105 m less than planned, did not run 245 mm test casing nor any DSTs.

[redacted]

#
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POLESTAR SALB

DEPARTMENT OF ENERGY AND MINES
SEP 12 1985
PETROLEUM BRANCH

TO: COGLA/OTTAWA/ATTN: F. LEPINE 053-4366
GOVT OF MANITOBA /ATTN: C MOSTER 07-57346
CANTERRA/CAL/ATTN: FRONTIER DRLG. 038-21511

CANTERRA DAILY DRILLING REPORT

WELL: BELUGA O-23 RIG: NEDDRILL 2
DATE: 85/09/10 DAYS FROM SPUD 44
2400 DEPTH M 2171.0 PROGRESS M 32.9
LAST CASING 339.7 MM DEPTH 1477.9 M
LAST LOT 2461 KG/M3 AT 1477.9 M

NO OF PERSONS ON BOARD 92
STANDBY VESSELS
TAKAPU, ARCTIC SHIKO AT NETSIG N-01

STATUS AT 0600
RIH WITH BIT 025
OPERATIONS SUMMARY
0-900 DRILL 2139M-2171M. 900-930 PRESSURE LOSS IN DRILL STR
PUMP SOFTLINE. 930-1200 POH FIND CRACK IN 5 INCH DRILL PIPE
TUBE 3 JTS ABOVE HWDP. 1200-2230 POH MAGNA FLUX BHA.
LAY DOWN: 2 JTS HWDP WITH CRACKS.7 8 1/4 INCH D.C. WITH CRAC
2 8 1/4 INCH D.C. DAMAGED THREADS 1X/0 4 1/4 INCH I.F. X 6 5
REG WITH CRACK. PICK UP 6 8 1/4 INCH D.C.. 2230-2300 PICK U
STAND AND LAY DOWN 2 10 INCH D.C. AND 1 8 1/4 INCH D.C.
2300-2400 CHANGE BIT AND MAGNA FLUX BIT SUB. MWD NOT WORKIN
DRILLS
OPERATIONS FORECAST
STATUS AT 0600 RIH WITH BIT NO. 25
DRILL AHEAD

BIT 25 DIAM 311.1 MM TYPE F-4
MUD DENSITY 1284 KG/M3 VIS 35 WL 39.0
MAX GAS READING 0 UNITS AT 0 M
LITHOLOGY LIMESTONE

ENVIRONMENT	MAX	0600		MAX	0600
WIND SPEED KNOTS	15	3	DIRECTION	340	300
WAVES HEIGHT M	1.2	0.0	DIRECTION	340	
WAVES PERIOD	4.0	0.0			
SWELL HEIGHT M	0.0	0.0	DIRECTION		
SWELL PERIOD	0.0	0.0			

ICE STATUS: GREEN
BERGS IN RANGE 0 CLOSEST AT 0.0 KM
CLOSEST BERG AT KM BEARING DEG AT 0600 HRS
PACK ICE CONC (1/10) AT 0.0 KM
VESSEL RESPONSE 24 HOUR MAX PITCH DEG 0.0 ROLL DEG 0.0
HEAVE M 0.0

REMARKS

BEST REGARDS
STAN JOHNSTON, DRILLING SUPT.
709-753-9555 TELEX 016-4138

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POLESTAR SALB

TO: COGLA/OTTAWA/ATTN: F. LEPINE 053-4366
GOVT OF MANITOBA /ATTN: C MOSTER 07-57346
CANTERRA/CAL/ATTN: FRONTIER DRLG, =038-21511

DEPARTMENT OF ENERGY AND MINES
SEP 11 1985
BRANCH

CANTERRA DAILY DRILLING REPORT

WELL: BELUGA O-23 RIG: NEDDRILL 2
DATE: 85/09/09 DAYS FROM SPUD 43
2400 DEPTH M 2138.0 PROGRESS M 92.0
LAST CASING 339.7 MM DEPTH 1477.9 M
LAST LOT 2460 KG/M3 AT 1477.9 M

NO OF PERSONS ON BOARD 92
STANDBY VESSELS
TAKAPU, ARCTIC SHIKO

STATUS AT 0600
DRILLING AT 7088 FT. (2161M)
OPERATIONS SUMMARY
0-2400 D1 DRILL AHEAD FROM 2047M TO 2139M
NWD NOT WORKING.
DRILLS
OPERATIONS FORECAST

BIT 24 DIAM 311.1 MM TYPE F-4
MUD DENSITY 1234 KG/M3 VIS 35 WL 35.0
MAX GAS READING 0 UNITS AT 0 M
LITHOLOGY LIMESTONE

ENVIRONMENT	MAX	0600		MAX	0600
WIND SPEED KNOTS	17	15	DIRECTION	020	340
WAVES HEIGHT M	0.8	0.7	DIRECTION	310	340
WAVES PERIOD	4.0	4.0			
SWELL HEIGHT M	1.7	0.0	DIRECTION	290	
SWELL PERIOD	6.0	0.0			

ICE STATUS: GREEN
BERGS IN RANGE 0 CLOSEST AT 0.0 KM
CLOSEST BERG AT KM BEARING DEG AT 0600 HRS
PACK ICE CONC (1/10) AT 0.0 KM
VESSEL RESPONSE 24 HOUR MAX PITCH DEG 0.0 ROLL DEG 0.0
HEAVE M 0.0

REMARKS

BEST REGARDS
STAN JOHNSTON, DRILLING SUPT.
709-753-9555 TELEX 016-4138

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POLESTAR SALB

ENERGY AND MINES
SEP 10 1985
PETROLEUM BRANCH

TO: COGLA/OTTAWA/ATTN: F. LEPINE 053-4366
GOVT OF MANITOBA /ATTN: C MOSTER 07-57346
CANTERRA/CAL/ATTN: FRONTIER DRLG. 038-21511

CANTERRA DAILY DRILLING REPORT

WELL: BELUGA O-23 RIG: NEDDRILL 2
DATE: 85/09/08 DAYS FROM SPUD 42
2400 DEPTH M 2046.0 PROGRESS M 27.1
LAST CASING 339.7 MM DEPTH 1477.9 M
LAST LOT 2460 KG/M3 AT 1477.9 M

NO OF PERSONS ON BOARD 93
STANDBY VESSELS
TAKAPU

STATUS AT 0600
DRILLING AT 6791 FT (2070M)
OPERATIONS SUMMARY
0-830 R6 W.O.W. RIH WITH BHA CHECK FOR WASHOUT REPLACE VALVE STAND PIPE MANIFOLD. 830-1030 R8 RIH BHA, 15STANDS DRILL PI PUMP 2800 PSI PRESSURE DROP 400 PSI. 1030-1300 R8 POH CHECK DRILL STRING, FOUND WASH OUT IN HWDP BOX. LAY DOWN 2 JTS AND TEST WITH KELLY. 1300-1500 DR6 RIH. 1500-2400 D1 DRILL AHEAD 2019M TO 2047M.
MWD NOT WORKING.
DRILLS
OPERATIONS FORECAST
STATUS AT 0600 DRILLING AT 2070M.
OP-FORECAST DRILL-AHEAD.

BIT 24 DIAM 311.1 MM TYPE F-4
MUD DENSITY 1284 KG/M3 VIS 35 WL 35.0
MAX GAS READING 0 UNITS AT 0 M
LITHOLOGY INTERBEDDED LIMESTONE, SILTSTONE

ENVIRONMENT	MAX	0600		MAX	0600
WIND SPEED KNOTS	40	8	DIRECTION	310	290
WAVES HEIGHT M	6.8	0.3	DIRECTION	310	280
WAVES PERIOD	7.0	7.0			
SWELL HEIGHT M	1.7	1.7	DIRECTION	290	290
SWELL PERIOD	6.0	6.0			

ICE STATUS: GREEN
BERGS IN RANGE 0 CLOSEST AT 0.0 KM
CLOSEST BERG AT KM BEARING DEG AT 0600 HRS
PACK ICE CONC (1/10) AT 0.0 KM
VESSEL RESPONSE 24 HOUR MAX PITCH DEG 2.0 ROLL DEG 0.8
HEAVE M 2.0

REMARKS

BEST REGARDS
STAN JOHNSTON, DRILLING SUPT.
709-753-9555 TELEX 016-4136

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POLESTAR SALB

DEPARTMENT OF ENERGY AND MINES
SEP 10 1985
PETROLEUM DIVISION

TO: COGLA/OTTAWA/ATTN: F. LEPINE 053-4366
GOVT OF MANITOBA /ATTN: C MOSTER 07-57346
CANTERRA/CAL/ATTN: FRONTIER DRLG. 038-21511

CANTERRA DAILY DRILLING REPORT

WELL: BELUGA O-23 RIG: NEDDRILL 2
DATE: 85/09/07 DAYS FROM SPUD 41
2400 DEPTH M 2024.3 PROGRESS M 59.1
LAST CASING 349.2 MM DEPTH 1477.9 M
LAST LOT 2460 KG/M3 AT 1477.9 M

NO OF PERSONS ON BOARD 94
STANDBY VESSELS
TAKAPU

STATUS AT 0600
RIH BREAK AND CHECK DRILL COLLARS, W.O.W.
OPERATIONS SUMMARY
0-1630 DRILL AHEAD FROM 1960M-2019M LOST 2068.41 KPA ON DRIL PIPE PRESSURE. 1630-2230 POH WET AND CHECK FOR WASH OUT AND CHANGE BIT.
2230-2400 WAIT ON WEATHER, LOOK FOR WASHOUT, CIRCULATE SHOCK BIT, AND SERVICE M.W.D. TOOL.
DRILLS
HOLD PIT DRILL
OPERATIONS FORECAST
W.O.W., AND DRILL AHEAD

BIT #24 DIAM 311.1 MM TYPE F-4
MUD DENSITY 1272 KG/M3 VIS 36 WL 29.5
MAX GAS READING 0 UNITS AT 0 M
LITHOLOGY LIMESTONE

ENVIRONMENT	MAX	0600		MAX	0600
WIND SPEED KNOTS	40	30	DIRECTION	310	320
WAVES HEIGHT M	7.4	4.4	DIRECTION	310	310
WAVES PERIOD	7.0	7.0			
SWELL HEIGHT M	1.8	0.0	DIRECTION	090	
SWELL PERIOD	6.0	0.0			

ICE STATUS: GREEN
BERGS IN RANGE 0 CLOSEST AT 0.0 KM
CLOSEST BERG AT KM BEARING DEG AT 0600 HRS
PACK ICE CONC (1/10) AT 0.0 KM
VESSEL RESPONSE 24 HOUR MAX PITCH DEG 3.0 ROLL DEG 3.0
HEAVE M 1.6

REMARKS

BEST REGARDS
STAN JOHNSTON, DRILLING SUPT.
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TO: COGLA/OTTAWA/ATTN: F. LEPINE 053-4366
GOVT OF MANITOBA /ATTN: C MOSTER 07-57346
CANTERRA/CAL/ATTN: FRONTIER DRLG. 038-21511

CANTERRA DAILY DRILLING REPORT

WELL: BELUGA O-23 RIG: NEDDRILL 2
DATE: 85/09/06 DAYS FROM SPUD 40
2400 DEPTH M 1959.7 PROGRESS M 76.5
LAST CASING 339.7 MM DEPTH 1477.9 M
LAST LOT 2460 KG/M3 AT 1477.9 M

NO OF PERSONS ON BOARD 94
STANDBY VESSELS
TAKAPU

STATUS AT 0600
DRILLING AT 6506 FT (1983M)
OPERATIONS SUMMARY
0-300 RIH, SLIP AND CUT LINE
300-2400 DRILL AHEAD FROM 1884M - 1960M
DRILLS
HOLD TRIP DRILL
OPERATIONS FORECAST
DRILL AHEAD

BIT 23RR DIAM 311.1 MM TYPE J-33
MUD DENSITY 1272 KG/M3 VIS 37 WL 33.0
MAX GAS READING 0 UNITS AT 0 M
LITHOLOGY SILTSTONE LIMESTONE

ENVIRONMENT	MAX	0600		MAX	0600
WIND SPEED KNOTS	24	12	DIRECTION	080	320
WAVES HEIGHT M	2.3	0.1	DIRECTION	090	320
WAVES PERIOD	6.0	2.0			
SWELL HEIGHT M	1.7	1.7	DIRECTION	090	090
SWELL PERIOD	6.0	6.0			

ICE STATUS: GREEN
BERGS IN RANGE 0 CLOSEST AT 0.0 KM
CLOSEST BERG AT KM BEARING DEG AT 0600 HRS
PACK ICE CONC (1/10) AT 0.0 KM
VESSEL RESPONSE 24 HOUR MAX PITCH DEG 1.0 ROLL DEG 0.5
HEAVE M 0.5

REMARKS

BEST REGARDS,
STAN JOHNSTON, DRILLING SUPT.
709-753-9555 TELEX 016-4138

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POLESTAR SALB

DEPARTMENT OF ENERGY AND MINES
SEP 9 1985
PETROLEUM BRANCH

TO: COGLA/OTTAWA/ATTN: F. LEPINE 053-4366
GOVT OF MANITOBA /ATTN: C MOSTER 07-57346
CANTERRA/CAL/ATTN: FRONTIER DRLG. 038-21511

CANTERRA DAILY DRILLING REPORT

WELL: BELUGA O-23 RIG: NEDDRILL 2
DATE: 85/09/05 DAYS FROM SPUD 39
2400 DEPTH M 1883.2 PROGRESS M 32.0
LAST CASING 339.7 MM DEPTH 1477.9 M
LAST LOT 2460 KG/M3 AT 1477.9 M

NO OF PERSONS ON BOARD 94
STANDBY VESSELS
TOANUI

STATUS AT 0600
DRILLING AT 6203 FT (1891M)
OPERATIONS SUMMARY
0-400 DRILL FROM 1852M-1869M. 400-430 CHECK MUD SYSTEM FOR L
(LOSS IN DRILL PIPE PRESSURE) 430-800 POH WET, WASH OUT IN X
BOX OF DC/HWDP, LAY DOWN X/O AND SINGLE HWDP. 800-1230 TRIP,
PICK UP NEW X/O AND SINGLE HWDP. 1230-1600 DRILL FROM 1869M-
LOSS OF PRESSURE ON DRILL PIPE. 1600-2400 POH WET, WASH OUT
BOX END OF 8.25 D.C., LAY DOWN SAME AND JARS. CHECK BIT AND
A. CONNECTIOS AND RIH PICK UP 2 - 8.25 DRILL COLLARS.
DRILLS.
OPERATIONS FORECAST
DRILL AHEAD

BIT 22 DIAM 311.1 MM TYPE J-33
MUD DENSITY 1272 KG/M3 VIS 38 WL 35.0
MAX GAS READING 0 UNITS AT 0 M
LITHOLOGY DOLOMITE SILTSTONE

ENVIRONMENT	MAX	0600		MAX	0600
WIND SPEED KNOTS	20	17	DIRECTION	070	070
WAVES HEIGHT M	1.4	1.4	DIRECTION	070	070
WAVES PERIOD	5.0	5.0			
SWELL HEIGHT M	0.0	0.0	DIRECTION		
SWELL PERIOD	0.0	0.0			

ICE STATUS: GREEN
BERGS IN RANGE 0 CLOSEST AT 0.0 KM
CLOSEST BERG AT KM BEARING DEG AT 0600 HRS
PACK ICE CONC (1/10) AT 0.0 KM
VESSEL RESPONSE 24 HOUR MAX PITCH DEG 0.3 ROLL DEG 0.2
HEAVE M 0.3

REMARKS

BEST REGARDS
STAN JOHNSTON, DRILLING SUPT.
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POLESTAR SALB

DEPARTMENT OF ENERGY AND MINES
SEP 6 1985
PETROLEUM DIVISION

TO: COGLA/OTTAWA/ATTN: F. LEPINE 053-4366
GOVT OF MANITOBA /ATTN: C MOSTER 07-57346
CANTERRA/CAL/ATTN: FRONTIER DRLG. 038-21511

CANTERRA DAILY DRILLING REPORT

WELL: BELUGA O-23 RIG: NEDDRILL 2
DATE: 85/09/04 DAYS FROM SPUD 38
2400 DEPTH M 1851.2 PROGRESS M 61.2
LAST CASING 339.7 MM DEPTH 1477.9 M
LAST LOT 2460 KG/M3 AT 1477.9 M

NO OF PERSONS ON BOARD 93
STANDBY VESSELS
TORNUI

STATUS AT 0600
TRIP CHECK FOR WASHOUT AT 1868 M.
OPERATIONS SUMMARY.
0-830 TRIP FOR BIT NUMBER 20, INSTALL SHOCK SUB,
LAY DOWN TOP STABILIZER.
830-24 DRILL FROM 1790M-1852M
DRILLS
TRIP DRILL
OPERATIONS FORECAST
TRIP AND DRILL AHEAD

BIT 21 DIAM 311.1 MM TYPE F3
MUD DENSITY 1272 KG/M3 VIS 38 WL 31.0
MAX GAS READING 0 UNITS AT 0 M
LITHOLOGY LIMESTONE INTERBEDDED W/SILTSTONE

ENVIRONMENT	MAX	0600		MAX	0600
WIND SPEED KNOTS	16	5	DIRECTION	340	340
WAVES HEIGHT M	0.8	0.1	DIRECTION	320	340
WAVES PERIOD	4.0	2.0			
SWELL HEIGHT M	0.0	0.0	DIRECTION		
SWELL PERIOD	0.0	0.0			

ICE STATUS: GREEN
BERGS IN RANGE 0 CLOSEST AT 0.0 KM
CLOSEST BERG AT KM BEARING DEG AT 0600 HRS
PACK ICE CONC (1/10) AT 0.0 KM
VESSEL RESPONSE 24 HOUR MAX PITCH DEG 0.0 ROLL DEG 0.0
HEAVE M 0.0

REMARKS

BEST REGARDS
STAN JOHNSTON, DRILLING SUPT.
709-753-9555 TELEX 016-4138

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POLESTAR SAL3

DEPARTMENT OF ENERGY AND MINES
SEP 6 1985
PETROLEUM BRANCH

TO: COGLA/OTTAWA/ATTN: F. LEPINE 053-4366
GOVT. OF MANITOBA /ATTN: C. MOSTER 07-57346
CANTERRA/CAL/ATTN: FRONTIER DRLG. 038-21511

CANTERRA DAILY DRILLING REPORT

WELL: BELUGA O-23 RIG: NEDDRILL 2
DATE: 85/09/03 DAYS FROM SPUD 37
2400 DEPTH M 1790.0 PROGRESS M 93.5
LAST CASING 339.7 MM DEPTH 1477.9 M
LAST LOT 2460 KG/M3 AT 1477.9 M

NO OF PERSONS ON BOARD 90
STANDBY VESSELS
TORNUI, SHIKO AT NETSIQ N-01 W/CURRENT METERS

STATUS AT 0600
RIH WITH BIT NO. 21
OPERATIONS SUMMARY
0-2400 DRILL FROM 1697M-1790M.
DRILLS
OPERATIONS FORECAST
DRILL AHEAD

BIT 20 DIAM 311.1 MM TYPE F-3
MUD DENSITY 1272 KG/M3 VIS 36 WL 29.0
MAX GAS READING 0 UNITS AT 0 M
LITHOLOGY DOLOMITIC LIMESTONE

ENVIRONMENT	MAX	0600		MAX	0600
WIND SPEED KNOTS	23.	16	DIRECTION	140	340
WAVES HEIGHT M	1.2	0.2	DIRECTION	160	020
WAVES PERIOD	4.0	2.0			
SWELL HEIGHT M	0.5	0.5	DIRECTION	180	180
SWELL PERIOD	5.0	5.0			

ICE STATUS: GREEN
BERGS IN RANGE 0 CLOSEST AT 0.0 KM
CLOSEST BERG AT KM BEARING DEG AT 0600 HRS
PACK ICE CONC (1/10) AT 0.0 KM
VESSEL RESPONSE 24 HOUR MAX PITCH DEG 0.0 ROLL DEG 0.0
HEAVE M 0.0

REMARKS

BEST REGARDS
STAN JOHNSTON, DRILLING SUPT.
709-753-9555 TELEX 016-4138

SEP 4 1985
PETROLEUM BRANCH

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POLESTAR SALB

59 DOGLA/OTTAWA/ATTN: R. LEPINE 053-4366
GOVT OF MANITOBA /ATTN: C MOSTER 07-57346
CANTERRA/CAL/ATTN: FRONTIER DRLG. 038-21511

CANTERRA DAILY DRILLING REPORT

WELL: BELUGA O-23 RIG: NEDDRILL 2
DATE: 85/09/02 DAYS FROM SPUD 36
2400 DEPTH M 1696.4 PROGRESS M 77.0
LAST CASING 339.7 MM DEPTH 1477.9 M
LAST LOT 2460 KG/M3 AT 1477.9 M

NO. OF PERSONS ON BOARD 90
STANDBY VESSELS
TOANUI, ARCTIC SHIKO TAKING CURRENT METERS TO NEXT LOCATION

STATUS AT 0600
DRILLING AT 5626 FT (1715M)
OPERATIONS SUMMARY
0-2400 DRILL FROM 1620 - 1697 M
DRILLS
OPERATIONS FORECAST
DRILL AHEAD, TRIP FOR NEW BIT

BIT 20 DIAM 311.1 MM TYPE F-3
MUD DENSITY 1272 KG/M3 VIS 35 WL 26.0
MAX GAS READING 0 UNITS AT 0 M
LITHOLOGY DOLOMITIC LIMESTONE

ENVIRONMENT	MAX	0600		MAX	0600
WIND SPEED KNOTS	18	14	DIRECTION	210	190
WAVES HEIGHT M	1.7	0.7	DIRECTION	180	190
WAVES PERIOD	5.0	3.0			
SWELL HEIGHT M	1.2	0.0	DIRECTION	200	
SWELL PERIOD	5.0	0.0			

ICE STATUS: GREEN
BERGS IN RANGE 0 CLOSEST AT 0.0 KM
CLOSEST BERG AT KM BEARING DEG AT 0600 HRS
PACK ICE CONC (1/10) AT 0.0 KM
VESSEL RESPONSE 24 HOUR MAX PITCH DEG 0.2 ROLL DEG 0.0
HEAVE M 0.1

REMARKS

BEST REGARDS
STAN JOHNSTON, DRILLING SUPT.
709-753-9555 TELEX 016-4138

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POLESTAR SALB

DEPARTMENT OF ENERGY AND MINES
SEP 4 1985
PETROLEUM BRANCH

TO: DOGLA/OTTAWA/ATTN: F. LEPINE 053-4366
GOVT OF MANITOBA /ATTN: C MOSTER 07-57346
CANTERRA/CAL/ATTN: FRONTIER DRLG. 038-21511

CANTERRA DAILY DRILLING REPORT

WELL: BELUGA O-23 RIG: NEDDRILL 2
DATE: 85/09/01 DAYS FROM SPUD 35
2400 DEPTH M 1619.6 PROGRESS M 66.4
LAST CASING 339.7 MM DEPTH 1477.9 M
LAST LOT 2461 KG/M3 AT 1477.9 M

NO OF PERSONS ON BOARD 92
STANDBY VESSELS
ARCTIC SHIKO

STATUS AT 0600 8
DRILLING AT 5371 FT.
OPERATIONS SUMMARY
0-130 RIH TO 1521 M.
130-500 REAM FROM 1521 TO 1620 M.
500-2400 DRILL FROM 1553 TO 1620 M.
DRILLS
PIT DRILLS ON BOTH CREWS
OPERATIONS FORECAST
DRILL AHEAD

BIT 20 DIAM 311.1 MM TYPE F-3
MUD DENSITY 1272 KG/M3 VIS 35 WL 22.0
MAX GAS READING 0 UNITS AT 0 M
LITHOLOGY LIMESTONE DOLOMITE

ENVIRONMENT	MAX	0600		MAX	0600
WIND SPEED KNOTS	17	9	DIRECTION	210	250
WAVES HEIGHT M	1.0	0.5	DIRECTION	240	250
WAVES PERIOD	5.0	2.0			
SWELL HEIGHT M	1.0	0.8	DIRECTION	330	280
SWELL PERIOD	8.0	5.0			

ICE STATUS: GREEN
BERGS IN RANGE, 0 CLOSEST AT 0.0 KM
CLOSEST BERG AT KM BEARING DEG AT 0600 HRS
PACK ICE CONC (1/10) AT 0.0 KM
VESSEL RESPONSE 24 HOUR MAX PITCH DEG 0.2 ROLL DEG 0.1
HEAVE M 0.1

REMARKS

BEST REGARDS
STAN JOHNSTON, DRILLING SUPT.
709-753-9555 TELEX 016-4138

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POLESTAR SALB

TO: COGLA/OTTAWA/ATTN: F. LEPINE 053-4366
GOVT OF MANITOBA /ATTN: C MOSTER 07-57346
CANTERRA/CAL/ATTN: FRONTIER DRLG. 038-21511

CANTERRA DAILY DRILLING REPORT

WELL: BELUGA O-23 RIG: NEDDRILL 2
DATE: 85/08/31 DAYS FROM SPUD 34
2400 DEPTH M 1553.1 PROGRESS M 55.1
LAST CASING 339.7 MM DEPTH 1477.9 M
LAST LOT 2460 KG/M3 AT 1477.9 M

NO OF PERSONS ON BOARD 97
STANDBY VESSELS
TAKAPU, ARCTIC SHIKO

STATUS AT 0600
DRILLING AT 5106 FT.
OPERATIONS SUMMARY
0-930 DRILL FROM 1498 M TO 1522 M.
930-1030 CIRCULATE SAMPLE
1030-1730 DRILL FROM 1522 M TO 1553 M
1730-2030 POOH - RECOVERED 6 KG. JUNK.
2030-2100 SERVICE MWD
2100-2400 MAKE UP NEW BHA - RIH.
DRILLS
OPERATIONS FORECAST
DRILL AHEAD

BIT 20 DIAM 318.7 MM TYPE F-3
MUD DENSITY 1260 KG/M3 VIS 35 WL 38.0
MAX GAS READING 0 UNITS AT 0 M
LITHOLOGY SALT AND DOLOMITE

ENVIRONMENT	MAX	0600		MAX	0600
WIND SPEED KNOTS	23	15	DIRECTION	030	240
WAVES HEIGHT M	1.6	1.3	DIRECTION	030	240
WAVES PERIOD	3.0	5.0			
SWELL HEIGHT M	1.0	0.0	DIRECTION	330	
SWELL PERIOD	7.0	0.0			

ICE STATUS: GREEN
BERGS IN RANGE 0 CLOSEST AT 0.0 KM
CLOSEST BERG AT KM BEARING DEG AT 0600 HRS
PACK ICE CONC (1/10) AT 0.0 KM
VESSEL RESPONSE 24 HOUR MAX PITCH DEG 0.3 ROLL DEG 0.2
HEAVE M 0.2

REMARKS

BEST REGARDS
STAN JOHNSTON, DRILLING SUPT.
709-753-9555 TELEX 016-4138

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POLESTAR SALB

TO: COGLA/OTTAWA/ATTN: F. LEPINE 053-4366
GOVT OF MANITOBA /ATTN: C. MOSTER 07-57346
CANTERRA/CAL/ATTN: FRONTIER DRLG. 038-21511

CANTERRA DAILY DRILLING REPORT

WELL: BELUGA O-23 RIG: NEDDRILL 2
DATE: 85/08/30 DAYS FROM SPUD 33
2400 DEPTH M 1498.0 PROGRESS M 7.0
LAST CASING 339.7 MM DEPTH 1477.9 M
LAST LOT 2460 KG/M3 AT 1477.9 M

NO OF PERSONS ON BOARD 99
STANDBY VESSELS
TAKAPU, ARCTIC SHIKO

STATUS AT 0600
DRILLING AT 4969
OPERATIONS SUMMARY
0-30 LAY OUT WEAR BUSHING RUNNING TOOL
30-100 STAND 254.0MM COLLARS OUT OF THE WAY
100-730 PICK UP BIT MWD D.C.S. AND RIH
730-11 TAG CEMENT AT 1477.9 WASH THROUGH RAT HOLE TO 1490.4
11-12 CIRCULATE 12-13 RUN FLOT EMW EQUALS 2460M3
13-1530 WASH DOWN TO 1891.0M AND DRILL TO 1493.8M - LOW ROP
1530-18 POOH 18-2130 CHANGE BHA - RIH 2130-22 WORK JUNK SUBS
22-24 DRILL FROM 1493.8 TO 1495.0M
DRILLS
AQUA STAR ETA LOCATION 21:30M HRS LOCAL
OPERATIONS FORECAST
DRILL AHEAD

BIT 19" DIAM 311.1 MM TYPE XDU
MUD DENSITY 1261 KG/M3 VIS 35 WL 41.0
MAX GAS READING 0 UNITS AT 0 M
LITHOLOGY DOLOMITE - ANHYDRITE

ENVIRONMENT	MAX	0600		MAX	0600
WIND SPEED KNOTS	22	15	DIRECTION	220	040
WAVES HEIGHT M	1.8	0.5	DIRECTION	280	040
WAVES PERIOD	4.0	3.0			
SWELL HEIGHT M	1.2	1.0	DIRECTION	330	330
SWELL PERIOD	6.0	7.0			

ICE STATUS: GREEN
BERGS IN RANGE 0 CLOSEST AT 0.0 KM
CLOSEST BERG AT KM BEARING DEG AT 0600 HRS
PACK ICE CONC (1/10) AT 0.0 KM
VESSEL RESPONSE 24 HOUR MAX PITCH DEG 0.4 ROLL DEG 0.4
HEAVE M 0.4

REMARKS

BEST REGARDS
STAN JOHNSTON, DRILLING SUPT.
709-753-9555 TELEX 016-4138

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POLESTAR SALB

DEPARTMENT OF ENERGY AND MINES
SEP 9 1985
PETROLEUM MANAGEMENT

TO: COGLA/OTTAWA/ATTN: F. LEPINE 053-4366
GOVT OF MANITOBA /ATTN: C MOSTER 07-57346
CANTERRA/CAL/ATTN: FRONTIER DREG. 038-21511

CANTERRA DAILY DRILLING REPORT

WELL: BELUGA 023 RIG: NEDDRILL 2
DATE: 85/08/29 DAYS FROM SPUD 32
2400 DEPTH M 1477.9 PROGRESS M 0.0
LAST CASING 339.7 MM DEPTH 1477.9 M
LAST LOT 0 KG/M3 AT 0.0 M

NO OF PERSONS ON BOARD 95
STANDBY VESSELS
TAKAPU, ARCTIC SHIKO

STATUS AT 0600
RIH WITH DRILL OUT ASSEMBLY
OPERATIONS SUMMARY
0-12 RUN BOPS,TEST CHOKE AND KILL LINES TO 3348.3/334.8 KPA.
SLIP JOINT 12-13 POSITION RIG OVER WELLHEAD AND LAND BOPS 13
PULL INTERNAL T.V. RIG UP AND RUN DIVERTER 15-16 RIH WITH TE
TOOL 16-1930 TEST ALL RAMS,FAIL SAFES AND KILL AND CHOKE LIN
TO 3348.3/334.8 KPA AND ANNULAR TO 3348.3/17236.7 KPA ALL TE
O.K. TEST ON YELLOW POD.1930-20 POOH-L/D TEST TOOL 20-2230 P
PUN N ELLHEAD EAR USHING/NSTALL ANE UNCTION EST
ON LUE OD-KOOH 2230-24IH NSTALL ALL TEAR USHING
DRILLS
OPERATIONS FORECAST
DRILL OUT,RUN FLOT,RILL HEAD

BIT DIAM 0.0 MM TYPE
MUD DENSITY OGIS L 0.0
MAX AS EADING ONITS T

ENVIRONMENT	MAX	0600		MAX	0600
WIND PEED,NOTS	8	7	IRECTION	250	200
AVES EIGHT	2.2	1.4	IRECTION	250	230
AVES ERIOD	4.0	.0			
SWELL EIGHT	2.4	.2	IRECTION	310	10
SWELL ERIOD	7.0	.0			

ICE STATUSREEN
BERGS IN RANGE OLOSEST T 0.0M
CLOSEST ERG T M EARING EG T 0600RS
ACK CE ONC (1/10) T .0 M
VESSEL ESPONSE 240UR AX ITCH EG 1.30LL EG 1.3
HEAVE 1.6

REMARKS

BEST REGARDS
STAN JOHNSTON, DRILLING SUPT.
709-753-9555 TELEX 016-4138

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DEPARTMENT OF ENERGY AND MINES
AUG 30 1985
PETROLEUM BRANCH

TO: COGLA/OTTAWA/ATTN: F. LEPINE 613-4366
GOVT OF MANITOBA /ATTN: C. MOSTER 07-57346
CANTERRA/CAL/ATTN: FRONTIER DRLG 403-21511

CANTERRA DAILY DRILLING REPORT

WELL: BELUGA O-23 RIG: NEDDRILL 2
DATE: 85/08/28 DAYS FROM SPUD 31
2400 DEPTH M 1477.9 / PROGRESS M 0.0
LAST CASING 0.0 MM DEPTH 0.0 M
LAST LOT 0 KG/M3 AT 0.0 M

NO. OF PERSONS ON BOARD 95
STANDBY VESSELS
ARCTIC SHIKO, TAKAPU

STATUS AT 0600
PICK UP SLIP JOINT
OPERATIONS SUMMARY
0-2200 WAIT ON WEATHER
2200-2400 RUN BOPS
RECOVER TAUT WIRE CLUMP AND TRANSPONDER WHILE W.O.W.
DRILLS
OPERATIONS FORECAST
LATCH BOPS
WEATHER PERMITTING

BIT DIAM 0.0 MM TYPE
MUD DENSITY 0 KG/M3 VIS 0 WL 0.0
MAX GAS READING 0 UNITS AT 0 M

ENVIRONMENT	MAX	0600		MAX	0600
WIND SPEED KNOTS	30	27	DIRECTION	300	270
WAVES HEIGHT M	3.5	2.2	DIRECTION	290	280
WAVES PERIOD	7.0	5.0			
SWELL HEIGHT M	3.0	0.0	DIRECTION	360	
SWELL PERIOD	7.0	0.0			

ICE STATUS: GREEN
BERGS IN RANGE 0 CLOSEST AT 0.0 KM
CLOSEST BERG AT KM BEARING DEG AT 0600 HRS
PACK ICE CONC (1/10) AT 0.0 KM
VESSEL RESPONSE 24 HOUR MAX PITCH DEG 2.0 ROLL DEG 1.2
HEAVE M 4.3

REMARKS

BEST REGARDS
STAN JOHNSTON, DRILLING SUPT.
709-753-9555 TELEX 016-4138
POLESTAR SALB

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DEPARTMENT OF ENERGY AND MINES
AUG 29 1985
PETROLEUM BRANCH

TO: COGLA/OTTAWA/ATTN: F. LEPINE 053-4366
GOVT OF MANITOBA /ATTN: C. MOSTER 07-57346
CANTERRA/CAL/ATTN: FRONTIER DRLG. 038-21511

CANTERRA DAILY DRILLING REPORT

WELL: BELUGA O-23 RIG: NEDDRILL 2
DATE: 85/08/27 DAYS FROM SPUD 30
2400 DEPTH M 1477.9 PROGRESS M 0.0
LAST CASING 339.7 MM DEPTH 1477.9 M
LAST LOT 0 KG/M3 AT 0.0 M

NO OF PERSONS ON BOARD 90
STANDBY VESSELS
TAKAPU

STATUS AT 0600
W.O.W.
OPERATIONS SUMMARY
0-430 PULL BOPS. 430-530 RIG DOWN RISER HANDLING EQPT. 530-2200
REPAIR BOP STACK 2200-2400 W.O.W.
WHILE REPAIRING BOPS MADE UP CROWS FOOT RIH AND RECOVERED D.P.
TRANSPONDER. ATTEMPTED TO RECOVER TAUTWIRE WEIGHT AND
TRANSPONDER UNSUCCESSFULL
TESTED CHOKE MANIFOLD TO 34473.5 KPA
TESTED STAND PIPE MANIFOLD TO 20684.1 KPA
DRILLS
OPERATIONS FORECAST
RUN STACK WHEN WEATHER PERMITS

BIT DIAM 0.0 MM TYPE
MUD DENSITY 0 KG/M3 V.IS 0 WL 0.0
MAX GAS READING 0 UNITS AT 0 M

ENVIRONMENT	MAX	0600		MAX	0600
WIND SPEED KNOTS	43	30	DIRECTION	290	290
WAVES HEIGHT M	4.4	3.6	DIRECTION	290	290
WAVES PERIOD	8.0	7.0			
SWELL HEIGHT M	0.7	0.0	DIRECTION	150	
SWELL PERIOD	6.0	0.0			

ICE STATUS: GREEN
BERGS IN RANGE 0 CLOSEST AT 0.0 KM
CLOSEST BERG AT KM BEARING DEG AT 0600 HRS
PACK ICE CONC (1/10) AT 0.0 KM
VESSEL RESPONSE 24 HOUR MAX PITCH DEG 2.0 ROLL DEG 1.2
HEAVE M 1.8

REMARKS

BEST REGARDS.
STAN JOHNSTON, DRILLING SUPT.
709-753-9555 TELEX 016-4138

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DEPARTMENT OF ENERGY AND MINES
AUG 28 1985
PETROLEUM

TO: COGLA/OTTAWA/ATTN: F. LEPINE 053-4366
GOVT OF MANITOBA /ATTN: C. MOSTER 07-57346
CANTERRA/CAL/ATTN: FRONTIER DRLG. 038-21511

CANTERRA DAILY DRILLING REPORT

WELL: BELUGA O-29 RIG: NEDDRILL 2
DATE: 85/08/26 DAYS FROM SPUD 29
2400 DEPTH M 1491.0 PROGRESS M 0.0
LAST CASING 339.7 MM DEPTH 1477.9 M
LAST LOT 3037 KG/M3 AT 579.1 M

NO OF PERSONS ON BOARD 90
STANDBY VESSELS
TAKAPU

STATUS AT 0600
REPAIR BOPS
OPERATIONS SUMMARY
0-730 RUN 339.8MM CSG AND LAND IN WH: 730-900 R/U AND CIRC 95.4 M3 MUD. 900-1000 R/U TST LINES 27578.8 KPA AND PREFLUSH: 1000-1330 MIX AND PUMP CMT. 1330-1430 DROP DART AND DISPL CMT - TEST CSG 20684.1 KPA. 1430-1630 TORQUE PACK-OFF. TST TO 20684.1 KPA. 1630-1730 DSPLC RSR TO WATER. POOH 1730-2400 R/U AND PULL DIVRTR LAY OUT SLIP JNT, UNLATCH BOX AT 1930: PULL BOPS.
DRILLS
OPERATIONS FORECAST

BIT DIAM 0.0 MM TYPE
MUD DENSITY 1273 KG/M3 VIS 40 WL 38.0
MAX GAS READING 0 UNITS AT 0 M

ENVIRONMENT	MAX	0600		MAX	0600
WIND SPEED KNOTS	28	16	DIRECTION	110	230
WAVES HEIGHT M	2.7	0.2	DIRECTION	160	230
WAVES PERIOD	6.0	1.0			
SWELL HEIGHT M	2.0	1.4	DIRECTION	150	150
SWELL PERIOD	6.0	6.0			

ICE STATUS: GREEN
BERGS IN RANGE 0 CLOSEST AT 0.0 KM
CLOSEST BERG AT KM BEARING DEG AT 0600 HRS
PACK ICE CONC (1/10) AT 0.0 KM
VESSEL RESPONSE 24 HOUR MAX PITCH DEG 0.8 ROLL DEG 0.0
HEAVE M 0.6

REMARKS

BEST REGARDS
STAN JOHNSTON, DRILLING SUPT.
709-753-9555 TELEX 016-4138

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DEPARTMENT OF PETROLEUM BRANCH AUG 27 1985

TOGC COGLA/OTTAWA/ATTN: F. LEPINE 063-666
GOVT OF MANITOBA /ATTN: C MOSTER 07-57346
CANTERRA/CAL/ATTN: FRONTIER DRLG. 038-21511

CANTERRA DAILY DRILLING REPORT

WELL: BELUGA O-23 RIG: NEDDRILL 2
DATE: 85/08/25 DAYS FROM SPUD 28
2400 DEPTH M 1491.0 PROGRESS M 29.5
LAST CASING 508.0 MM DEPTH 558.6 M
LAST LOT 3037 KG/M3 AT 579.0 M

NO OF PERSONS ON BOARD 95
STANDBY VESSELS
TOANUI

STATUS AT 0600
RIG UP TO RUN CASING ON 5 IN. D.P.
OPERATIONS SUMMARY
0-230 D6 RIH WITH UR NO.12. 230-800 D3 UNDERREAM FROM 1461.4M TO 1491.0M. 0800-0930 D4 CIRCULATE. 930-1200 D6 POOH. 1200-1230 G2 RIG UP LOGGERS. 1230-1600 G2 RUN 4 ARM CALIPER. 1600-1630 G2 RIG DOWN LOGGERS. 1630-1730 D8 RIH RETRIVE SEAT PROTECTOR, POOH. 1730-1830 D8 RIG UP TO RUN CASING. 1830-2400 D8 RUN 4.07M CASING 57JTS IN HOLE.
DRILLS
FIRE, BOAT, SAFETY MEETING
OPERATIONS FORECAST
LAND CASING, CEMENT, PULL BOPS FOR REPAIRS.

BIT UR012 DIAM 444.5 MM TYPE UM13
MUD DENSITY 1272 KG/M3 VIS 40 WL 38.0
MAX GAS READING 0 UNITS AT 0 M

ENVIRONMENT	MAX	0600		MAX	0600
WIND SPEED KNOTS	28	28	DIRECTION	110	110
WAVES HEIGHT M	1.8	1.8	DIRECTION	110	110
WAVES PERIOD	5.0	5.0			
SWELL HEIGHT M	0.7	0.0	DIRECTION	350	
SWELL PERIOD	4.0	0.0			

ICE STATUS: GREEN
BERGS IN RANGE 0 CLOSEST AT 0.0 KM
CLOSEST BERG AT KM BEARING DEG. AT 0600 HRS
PACK ICE CONC (1/10) AT 0.0 KM
VESSEL RESPONSE 24 HOUR MAX PITCH DEG 0.0 ROLL DEG 0.0
HEAVE M 0.0

REMARKS

BEST REGARDS
STAN JOHNSTON
DRILLING SUPT.
709-753-9555 TELEX 016-4138

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TO: COGLA/OTTAWA/ATTN: F. LEPINE 053-4366
GOVT OF MANITOBA /ATTN: C HOSTER 07-57346
CANTERRA/CAL/ATTN: FRONTIER DRLG. 038-21511

CANTERRA DAILY DRILLING REPORT

WELL: BELUGA O-23 RIG: NEDDRILL 2
DATE: 85/08/24 DAYS FROM SPUD 27
2400 DEPTH M 1461.4 PROGRESS M 73.8
LAST CASING 508.0 MM DEPTH 558.7 M
LAST LOT 3037 KG/M3 AT 579.1 M

NO OF PERSONS ON BOARD 95
STANDBY VESSELS
TOANUI

STATUS AT 0600
UNDERREAMING AT 4823 FT/1470 M.
OPERATIONS SUMMARY
0-500 500 D3 REAM FROM 1387.6M - 1432.1M. 500-730 230 D930-1100 130 D
9 SLIP AND CUT LINE. 1100 -1230 130 D6
RIH. 1230-1830 600 D3 UNDERREAM FROM 1417.5M TO 1461.4M.
1830-2100 230 D6 POOH.
2100-2330 230 D6 LAY DOWN UR011 REDRESS TEST SAME
2330-2400 30 D6 RIH WITH UR012
DRILLS
OPERATIONS FORECAST
FINISH UNDERREAMING, RUN CALIPER LOG.

BIT UR11 DIAM 444.5 MM TYPE UM13
MUD DENSITY 1272 KG/M3 VIS 39 WL 39.0
MAX GAS READING 0 UNITS AT 0 M

ENVIRONMENT	MAX	0600		MAX	0600
WIND SPEED KNOTS	16	9	DIRECTION	190	350
WAVES HEIGHT M	1.0	0.2	DIRECTION	360	350
WAVES PERIOD	3.0	1.0			
SWELL HEIGHT M	1.0	0.0	DIRECTION	160	
SWELL PERIOD	4.0	0.0			

ICE STATUS: GREEN
BERGS IN RANGE 0 CLOSEST AT 0.0 KM
CLOSEST BERG AT KM BEARING DEG AT 0600 HRS
PACK ICE CONC (1/10) AT 0.0 KM
VESSEL RESPONSE 24 HOUR MAX PITCH DEG 0.0 ROLL DEG 0.0
HEAVE .0

REMARKS

BEST REGARDS
STAN JOHNSTON, DRILLING SUPT.
709-753-9555 TELEX 016-4138

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POLESTAR SALB

ATTN: . MONSTER

AUG 26 1985
PETROLEUM BRANCH

MSG NO.: 03

DATE/TIME: 85.08.24 1040 GMT/DB

TO: CANTERRA BASE

FROM: NEDDRILL 2
KEN EICHER

SUBJECT: CANTERRA DAILY DRILLING REPORT - ENGLISH UNITS
REPORT NO. 26 (DAYS FROM SPUD) 0000-2400 85/08/23

WELL: BELUGA O-23 RIG: NEDDRILL 2 SUPERVISOR: R. CARSTAIRS
HOLE DIAM.: 17.5 DEPTH: 4553' PROGRESS: 302' ROTATING HOURS: 16
LAST CASING: 20.0 SET AT: 1833 LAST LOT: 25.3 TAKEN AT: 1900'
MUD WEIGHT: 10.5 PROG SECTION TD: 4894
LAST BOP TEST: 85/08/04 RAMS TO: 2500 PSI ANNULARS TO: 2500 PSI
PEOPLE ON BOARD: 95 ICE ALERT STATUS: GREEN BERGS ON RADAR: NIL
STAND BY BOATS: TOANUI

STATUS AT 0600: POOH WITH UR NO. 10
OPERATIONS FORECAST: CONTINUE UNDERREAMING

OPERATIONS TIME ANALYSIS
0000-0230 0230 D6 RIH WITH UR NO. 9
0230-0800 0530 D3 UNDERREAM FROM 4251 - 4297 FT.
0800-1030 0230 D6 POOH
1030-1130 0100 D6 LAY OUT UR NO. 9, PICK UP UR NO. 10
1130-1330 0200 D6 RIH
1330-2400 1030 D3 UNDERREAM FROM 4213 FT. TO 4553 FT.

WATER DEPTH: 590 RT TO SEA LEVEL 45
RIG HEADING: 220 RISER TENSION 370 KIPS

PEOPLE ON BOARD: TOTAL: 95 OPERATOR: 2 REPS: KEN EICHER
CONTRACTORS: DRILLING: 45 MARINE: 11 CATERING: 10 SERVICES: 27

DAILY COST: 306,000 CUMULATIVE COST: 17,670,000

BIT NO.	OPRN	DIA IN	TYPE	SERIAL	DEPTHIN	RUN FT	HRS	ROP	WOB	RPM
16R	R	14.75	R3	9055	4251	46	5.5	8.4	10	70
UR9	R	17.5	10KWA	1303						
17R	R	14.75	R3	9055						
UR10	R	17.5	10KWA	8299	4213	240	10.5	22.8	12	100

BIT NO.	NOZZELS	32NDS		FLOW	PRES PSI	T	B	G	REMARKS
16R	15	15	15			1	1	I	
UR9	14	14	14	860	2800	6	7	I	BROKEN TEETH
17R	15	15	15			R	U	N	
UR10	16	16	16	860	2800	R	U	N	

BHA: UR9 - BIT, UR NO. 9, X-O, 2 - 10'' D.C., X-O, 7 - 8 1/4''
D.C., JARS, 2 - 8 1/4'' D.C., X-O, 6 - HWDP LENGTH: 573

BHA: UR NO. 10 - SAME AS UR NO. 9 LENGTH: 571

MUD TYPE: SATURATED SALT DENSITY IN/OUT 10.5/--- TIME CHECKED 2300
VICOSITY IN/OUT: 38/-- YP: 8 PV: 10 GEL0: 3 GEL10: 6
WRT LOSS: 34 PH: 11.0
CHLOR 175,000 CA++ 3400 SOLIDS: 4.0 SAND: .1 MBT: 7.5
VOLUMES BBL: HOLE: 1500 SURFACE: 1050 DUMPED: 123 FLOW LINE TEMP: 21
MUD COST: DAY: 5694 ECUM: 127,065
ADDED PRODUCTS: CAUSTIC - 31, DF - VIS - 10, TECHNIFLO - 31,
SODA ASH 9XS

B(34 ':433,': 1) 110/--- 2) 175/--- 3) 110/---
SOLIDS CONTROL: D - SILTER - DF 10.5 DF - 11.9 16 HRS

ENVIRONMENT	0600	MAX		0600	MAX
WIND	14	19	DIRECTION	190	160
WAVE HEIGHT	0.8	0.8	DIRECTION	160	160
PERIOD	3/0	3.0			
CURRENT SPD	.28	.28	DIRECTION	321	124
	0600	MIN			
TEMPERATURE	9.5	7.4			
PRESSURE	1014.6	1014.6			
VISIBILTY	30	16			
CEILING	3000	3000			
PRECIPITATION	TRACE				
TYPE	RAIN				

BULK AND LIQUID STATUS

VESSEL	BARITE	GEL	CEMENT	POTWTR	DRLWTR	FUEL	HELI	GYLCL
RIG	0/749	0/110	0/267	96/428	76/1007	39/2483	0/599	4/47
TOANUI			0/197	0/230	0/163	6/94		

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TO: COGLA/OTTAWA/ATTN: F. LEPINE 053-4366
GOVT OF MANITOBA /ATTN: C MOSTER 07-57346
CANTERRA/CAL/ATTN: FRONTIER DRLG. 038-21511

CANTERRA DAILY DRILLING REPORT

WELL: BELUGA RIG: NEDDRILL 2
DATE: 85/08/23 DAYS FROM SPUD 26
2400 DEPTH M 1387.6 PROGRESS M 92.0
LAST CASING 508.0 MM DEPTH 558.6 M
LAST LOT 3037 KG/M3 AT 579.0 M

NO OF PERSONS ON BOARD 95
STANDBY VESSELS
TOANUI

STATUS AT 0600
POOH WITH UR NO. 10
OPERATIONS SUMMARY
0000 -0230 0230 D6 RIH WITH UR NO. 9
0230 -0800 0530 D3 UNDERREAM FROM 4251 - 4297 FT.
0800 - 1030 0230 D6 POOH
1030 - 1130 0100 D6 LAY OUT UR NO. 9, PICK UP UR NO. 10
1130 - 1330 0200 D3 RIH
1330 - 2400 1030 D3 UNDERREAM FROM 4213 FT. TO 4553 FT.
DRILLS
OPERATIONS FORECAST
CONTINUE UNDERREAMING

BIT UR10 DIAM 444.5 MM TYPE 10 KWA
MUD DENSITY 1260 KG/M3 VIS 38 WL 34.0
MAX GAS READING 0 UNITS AT 0 M

ENVIRONMENT MAX 0600 MAX 0600
WIND SPEED KNOTS 19 14 DIRECTION 160 190
WAVES EIGHT 0.8 .8 IRECTION 160 160
AVES ERIOD 3.0 .0
SWELL HEIGHT 0.0 0.0 IRECTION
SWELL PERIOD 0.0 .0
ICE STATUSREEN
BERGS IN RANGE 0LOSEST T .0M
CLOSEST ERG T M EARING EG T 600RS
PACK CE ONC (1/10) T .0 M
VESSEL ESPONSE 24 OUR AX ITCH EG 0.0OLL EG .0
EAVE .0

REMARKS

BEST REGARDS
STAN HNSTON, DRILLING SUPT.
709-753-9555 TELEX 016-4138

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POLESTAR SALB

TO: COGLA/OTTAWA/ATTN: F. LEPINE 063666
GOVT. OF MANITOBA/ATTN: C. MOSTER 07-57346
CANTERRA/CAL/ATTN: FRONTIER DRLG. 038-21511

CANTERRA DAILY DRILLING REPORT

WELL: BELUGA O-23 RIG: NEDDRILL 2
DATE: 85/08/22 DAYS FROM SPUD 25
2400 DEPTH M 1295.6 PROGRESS M 58.8
LAST CASING 508.0 MM DEPTH 558.6 M
LAST LOT 3037 KG/M3 AT 579.0 M

NO OF PERSONS ON BOARD 93
STANDBY VESSELS
TOANUI

STATUS AT 0600
UNDERREAMING AT 4275
OPERATIONS SUMMARY
0-330 POOH. 330-430 LAY OUT UR NO 6; P/U UR NO 7. 430-700
RIH TO 1237.12 M. 700-900 WORK UNDERREAMER WOULD NOT OPEN PROPERLY.
900-1200 POOH. 1200-1300 LAY OUT UR NO 7; PICK UP UR NO 8.
1300-1500 RIH. 1500-2100 UNDERREAM FROM 1236.82 TO 1295.64.
2100-2300 POOH. 2300-2400 LAY OUT UR NO 8; PICK UP UR NO 9.

DRILLS
OPERATIONS FORCAST
CONTINUE TO UNERREAM

BIT UR 8 DIAM 444.5 MM TYPE UM13
MUD DENSITY 1260 KG/M3 VIS 39 WL 0.0
MAX GAS READING 0 UNITS AT 0 M

ENVIRONMENT	MAX	0600		MAX	0600
WIND SPEED KNOTS	10	9	DIRECTION	150	150
WAVES HEIGHT M	0.0	0.0	DIRECTION		
WAVES PERIOD	0.0	0.0			
SWELL HEIGHT M	0.2	0.0	DIRECTION	070	
SWELL PERIOD	0.4	0.0			

ICE STATUS: GREEN
BERGS IN RANGE 0 CLOSEST AT 0.0 KM
CLOSEST BERG AT KM BEARING DEG AT 0600 HRS
PACK ICE CONC (1/10) AT 0.0 KM
VESSEL RESPONSE 24 HOUR MAX PITCH DEG 0.0 ROLL DEG 0.0
HEAVE M 0.0

REMARKS

BEST REGARDS
STAN JOHNSTON, DRILLING SUPT.
709-753-9555 TELEX 016-4138

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DEPARTMENT OF ENERGY
AUG 26 1985
PETROLEUM BRANCH

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POLESTAR SALB
59: COGLA/OTTAWA/ATTN: F. LEPINE
GOV'T OF MANITOBA/ATTN: C. MOSTER 075-7346
CANTERRA/CAL/ATTN: FRONTIER DRILLING 038-21511

CANTERRA DAILY DRILLING REPORT

WELL: BELUGA O-23 RIG: NEDDRILL 2
DATE:85/08/21 DAYS FROM SPUD 24
2400 DEPTH M 1261.8 PROGRESS M 165.4
LAST CASING 508.0MM DEPTH 558.6 M
LAST LOT 3037 KG/M3 AT 579.0 M

NO OF PERSONS ON BOARD 93
STANDBY VESSELS
TOANUI

STATUS AT 0600
RIH UR NO. 7
OPERATIONS SUMMARY
0000-0030 RIH TO 1096M , 0030-1030 UNDERREAM FROM 1096M TO 1197M
1030-1300 POOH, 1300-1430 LAY DOWN UR 5 P/U UR 6 - TEST SAME
1430-1600 RIH, 1600-2400 UNDERREAM FROM 1197M TO 1262M.
DRILLS
OPERATIONS FORECAST
CONTINUE UNDERREAMING

BIT UR6 DIAM 444.5 MM TYPE UM13
MUD DENSITY 1260 KG/M3 VIS 38 WL 30.0
MAX GAS READING 0 UNITS AT 0 M

ENVIRONMENT	MAX	0600		MAX	0600
WIND SPEED KNOTS	12	0	DIRECTION	050	0.0
WAVES HEIGHT M	0.0	0.0	DIRECTION		
WAVES PERIOD	0.0	0.0			
SWELL HEIGHT M	0.6	0.3	DIRECTION	070	070
SWELL PERIOD	5.0	5.0			

ICE STATUS: GREEN
BERGS IN RANGE 0 CLOSETS AT 0.0 KM
CLOSEST BERG AT KM BEARING DEG AT 0600 HRS
PACK ICE CONC (1/10) AT 0.0 KM
VESSEL RESPONSE 24 HOUR MAX PITCH DEG 0.00 ROLL DEG 0.0
HEAVE M 0.0

REMARKS

BEST REGARDS
STAN JOHNSTON, DRILLING SUPT.
709-753-9555 TELEX 016-4133
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DEPARTMENT OF ENERGY AND MINES
AUG 22 1985
PETROLEUM BRANCH

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POLESTAR SALB
COGLA/OTTAWA/ATTN: F. LEPINE 053-4366
GOVT OF MANITOBA /ATTN C MOSTER 07-57346
CANTERRACALATTN FRONTIER DRLG 038-21511

CANTERRA DAILY DRILLING REPORT

WELL BELUGA 023 RIG NEDDRILL 2
DATE 85/08/20 DAYS FROM SPUD 23
2400 DEPTH M 1096.3 PROGRESS M 67.6
LAST CASING 508.0 MM DEPTH 558.6 M
LAST LOT 3037 KGM AT 579.0 M

NO OF PERSONS ON BOARD 94
STANDBY VESSELS
ARCTIC SHIKO

STATUS AT 0600
UNDERREAMING AT 1146M (3760)
OPERATIONS SUMMARY
0000-0400 UNDERREAM 1029M TO 1070M 0400-0630 POOH
0630-0730 CHANGE UNDERREAMERS TEST UR NO 4
0730-0830 PIH TO 175M 0830-0900 TEST KILL LINE
0900-1030 RIH TO 1048M 1030-1830 UNDERREAM FROM
1070M TO 1096M 1830-2100 POOH 2100-2230 CHANGE UNDERREAMERS
TEST UR NO 5, 2230-2400 RIH WITH UR NO 5
DRILLS
OPERATIONS FORECAST
CONTINUE UNDERREAMING

BIT UR DIAM 444.5 MM TYPE 10LWV
MUD DENSITY 1272 KGM VIS 37 WL 36.0
MAX GAS READING 0 UNITS AT 0 M
LITHOLOGY UNDERREAMING

ENVIRONMENT	MAX	0600		MAX	0600
WIND SPEED KNOTS	13	12	DIRECTION	330	050
WAVES HEIGHT M	0.3	0.0	DIRECTION	340	000
WAVES PERIOD	0.1	0.0			
SWELL HEIGHT M	0.5	0.5	DIRECTION	060	060
SWELL PERIOD	5.0	5.0			

ICE STATUS GREEN
BERGS IN RANGE 0 CLOSEST AT 0.0 KM
CLOSEST BERG AT KM BEARING DEG AT 0600 HRS
PACK ICE CONC (1/10) NIL AT 0.0 KM
VESSEL RESPONSE 24 HOUR MAX PITCH DEG 0.0 ROLL DEG 0.0
HEAVE M 0.0

REMARKS

BEST REGARDS
STAN JOHNSTON DRILLING SUPT
709-753-9555 TELEX 016-4138

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POLESTAR SALB
TO COGLA/OTTAWA/ATTN: F LEPINE 053-4366
GOVT OF MANITOBA /ATTN C MOSTER 07-57346
CANTERRA/CAL/ATTN: FRONTIER DRLG. 038-21511

DEPARTMENT OF ENERGY AND MINES
AUG 21 1985
PETROLEUM BRANCH

CANTERRA DAILY DRILLING REPORT

WELL BELUGA 023 RIG NEDDRILL 2
DATE 85/08/19 DAYS FROM SPUD (22)
2400 DEPTH M 1028.6 PROGRESS M 303.9
LAST CASING 508.0 MM DEPTH 558.7 M
LAST LOT 3037 KGM AT 579.1 M

NO OF PERSONS ON BOARD 94
STANDBY VESSELS
ARCTIC SHIKO

STATUS AT 0600
UNDERREAMED TO 3520. POH 0400 HRS
OPERATIONS SUMMARY
0-930 UNDERREAMED HOLE TO 444.5MM FROM 724.78M TO 906.74M (LOST 6894.7 KPA PUMP PRESSURE 930-1230 POOH LOOKING FOR WASHOUT LEAK AT UNDERREAMER BODY LOOS SNAP RING PARTED (CONES READY FOR POH 1230-1530 MU NEW UNDERREAMER 3 AND RIH 1530-1600 REAMED FROM 865.89M TO 878.09M (TOURQUING PROBABLY UNDERGUAGE 1600-1630 PULL BACK 4 SINGLES 1630-2400 UNDERREAMED HOLE TO 444.5MM FROM 830.54 TO 1028.65.
DRILLS
OPERATIONS FORECAST
CHANGE OUT UNDERREAMER AND RIH CONTINUE UNDERREAMING

BIT UR DIAM 444.5 MM TYPE
MUD DENSITY 1261 KGM VIS 38 WL 36.0
MAX GAS READING 0 UNITS AT 0 M
LITHOLOGY UNDERREAMING

ENVIRONMENT	MAX	0600		MAX	0600
WIND SPEED KNOTS	15	12	DIRECTION	010	350
WAVES HEIGHT M	0.5	0.3	DIRECTION	340	350
WAVES PERIOD	1.0	1.0			
SWELL HEIGHT M	0.7	0.0	DIRECTION	070	
SWELL PERIOD	5.0	0.0			

ICE STATUS GREEN
BERGS IN RANGE 0 CLOSEST AT 0.0 KM
CLOSEST BERG AT KM BEARING DEG AT 0600 HRS
PACK ICE CONC (1/10) 0 AT 0.0 KM
VESSEL RESPONSE 24 HOUR MAX PITCH DEG 0.0 ROLL DEG 0.0
HEAVE M 0.0

REMARKS
STATUS AT 0600- UNDERREAMED TO 1072.84M POH 0400 HRS

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DEPARTMENT OF ENERGY AND MINES
AUG 20 1985
PETROLEUM BRANCH

TO: COGLA/OTTAWA/ATTN: F. LEPINE
GOVT OF MANITOBA /ATTN C MOSTER 07-57346
CANTERRA/CAL/ATTN: FRONTIER DRLG 038-21511

CANTERRA DAILY DRILLING REPORT

WELL BELUGA 023 RIG NEDDRILL 2
DATE 85/08/18 DAYS FROM SPUD 21
2400 DEPTH M 724.8 PROGRESS M 169.8
LAST CASING 508.0 MM DEPTH 558.7 M
LAST LOT 3037 KGM AT 579.1 M

NO OF PERSONS ON BOARD 94
STANDBY VESSELS
ARCTIC SHIKO

STATUS AT 0600
UNDERREAMING AT 2668.
OPERATIONS SUMMARY
0-200 POHURM 57MM GUAGE200-300:MU CSG HGR ON RNG TOOL AND STD BACK300-330: RU SCHLUM330-700: RUN CALIPER LOG FM 1490M559M CALIPER LOG IND HOLE OPEN TO 445MM FM 559M630M AND EXCL WASHOUT HOLE OPEN TO 394MM FM 630-1492M CMT IN SHOE OPEN TO 394MMUNDER REAMER UNDERGUAGE SINCE 630M700-730:RD SCHLUM730-830:MU TRISTATE 10LWV UNDERREAMER AND TEST830-1230:RIH TO 1468M1230-1430 PUMP SLUG AND POH TO 550MSOFT BREAK SINGLE AND LAY IN PIPE RACKER.1430-2400:TAG CMT AT 555MURM HOLE TO 445MM FM 555M725M
DRILLS
SAFETY MEETING
OPERATIONS FORECAST
UNDERREAM UNDERGUAGE HOLE TO 445 MM

BIT UR DIAM 444.5 MM TYPE LWV F
MUD DENSITY 0 KGM VIS 0 WL 0.0
MAX GAS READING 0 UNITS AT 0 M
LITHOLOGY UNDERREAMING

ENVIRONMENT	MAX	0600		MAX	0600
WIND SPEED KNOTS	14	9	DIRECTION	060	030
WAVES HEIGHT M	0.0	0.0	DIRECTION		
WAVES PERIOD	0.0	0.0			
SWELL HEIGHT M	0.8	0.8	DIRECTION	070	070
SWELL PERIOD	5.0	5.0			

ICE STATUS GREEN
BERGS IN RANGE 0 CLOSEST AT 0.0 KM
CLOSEST BERG AT KM BEARING DEG AT 0600 HRS
PACK ICE CONC (1/10) 0 AT 0.0 KM
VESSEL RESPONSE 24 HOUR MAX PITCH DEG 0.0 ROLL DEG 0.0
HEAVE M 0.0

REMARKS

BEST REGARDS
STAN JOHNSTON DRILLING SUPT
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TO COGLA/OTTAWA/ATTN: F LEPINE 053-4366
GOVT OF MANITOBA /ATTN C MOSTER 07-57346
CANTERRA/CAL/ATTN: FRONTIER DRLG. 038-21511

CANTERRA DAILY DRILLING REPORT

WELL BELUGA 023 RIG NEDDRILL 2
DATE 85/08/17 DAYS FROM SPUD 20
2400 DEPTH M 1488.0 PROGRESS M 836.9
LAST CASING 508.0 MM DEPTH 558.7 M
LAST LOT 3037 KGM AT 579.1 M

NO OF PERSONS ON BOARD 95
STANDBY VESSELS
ARCTIC SHIKO

STATUS AT 0600
RUNNING SCHLUNDERGER CALIPER LOG
OPERATIONS SUMMARY
0-1900 UNDERREAM FROM 651 M - 1448 M 1900-2030: CIRC BU PUMP SLUG 2030-2200: POH TO 550 M (INSIDE CASING SHOE) 2200-2230: UNDERREAM CEMT AND CSG SHOE F558 M TO 559 M 2230-2400: POH
1) UNDERREAMER 5.7 CM UNDERGAUGE
DRILLS
OPERATIONS FORECAST
UNDERREAM AS REQUIRED OR PULL WEAR BUSHING AND RUN CASING

BIT UR DIAM 444.5 MM TYPE DIA BRT
MUD DENSITY 1261 KGM VIS 40 WL 28.0
MAX GAS READING 0 UNITS AT 0 M

ENVIRONMENT	MAX	0600		MAX	0600
WIND SPEED KNOTS	10	6	DIRECTION	080	080
WAVES HEIGHT M	0.1	0.1	DIRECTION	080	080
WAVES PERIOD	1.0	1.0			
SWELL HEIGHT M	0.0	0.0	DIRECTION		
SWELL PERIOD	0.0	0.0			

ICE STATUS GREEN
BERGS IN RANGE 0 CLOSEST AT 0.0 KM
CLOSEST BERG AT KM BEARING DEG AT 0600 HRS
PACK ICE CONC (1/10) 0 AT 0.0 KM
VESSEL RESPONSE 24 HOUR MAX PITCH DEG 0.0 ROLL DEG 0.0
HEAVE M 0.0

REMARKS

BEST REGARDS
STAN JOHNSTON DRILLING SUPT
709-753-9555 TELEX 016-4138

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DEPARTMENT OF MINES AUG 20 1985 PETROLEUM BRANCH

TO: COGLA/OTTAWA/ATTN: F. LEPINE 053-4366
GOVT OF MANITOBA /ATTN C MOSTER 07-57346
CANTERRA/CAL/ATTN: FRONTIER DRLG 038-21511

CANTERRA DAILY DRILLING REPORT

WELL BELUGA 023 RIG NEDDRILL 2
DATE 85/08/16 DAYS FROM SPUD (19)
2400 DEPTH M 651.0 PROGRESS M 86.9
LAST CASING 508.0 MM DEPTH 558.7 M
LAST LOT 3037 KGM AT 579.1 M

NO OF PERSONS ON BOARD 94
STANDBY VESSELS
ARCTIC SHIKO

STATUS AT 0600
UNDERREAMING 14 3/4 PILOT HOLE TO 17 1/2 HOLE AT 3236.
OPERATIONS SUMMARY
0-630:RUN SCHLUM LOGS 5)RFT 630-700:RD SCHLUM 700-800:
SLIP AND CUT 800-1000:MU BHA 1000-1300:LAY OUT BHA PU CSG
SHOE AND FLOAT AND BAKERLOCK WHILE WAIT FOR GUNS TO BE LOADED
1300-1330:RIG UP SCHLUM 1330-1730:RUN SCHLUM 6) CST44 GUNS
42 GOOD 1730-1800:RIG DOWN SCHLUM 1800-2000:MU UNDERREAMING
BHA AND RIH 2000-2030:FUNC BOP YELLOW POD - 100 PERCENT BLU
POD LEAK (BLUE ANNULAR REG. 2030-2400: 375 CM HOLE TO 445 CM
FROM 564 M TO 651 M
DRILLS
OPERATIONS FORECAST
CONTINUE UNDERREAMING TO 1491.7 M

BIT UR 1 DIAM 444.5 MM TYPE DIABRT
MUD DENSITY 1273 KGM VIS 40 WL 29.0
MAX GAS READING 0 UNITS AT 0 M
LITHOLOGY UNDERREAMING 14 3/4 HOLE TO 17 1/2.

ENVIRONMENT	MAX	0600		MAX	0600
WIND SPEED KNOTS	10	8	DIRECTION	340	350
WAVES HEIGHT M	0.3	0.3	DIRECTION	340	350
WAVES PERIOD	1.0	1.0			
SWELL HEIGHT M	0.4	0.0	DIRECTION	360	000
SWELL PERIOD	5.0	0.0			

ICE STATUS GREEN
BERGS IN RANGE 0 CLOSEST AT 0.0 KM
CLOSEST BERG AT KM BEARING DEG AT 0600 HRS
PACK ICE CONC (1/10) 0 AT 0.0 KM
VESSEL RESPONSE 24 HOUR MAX PITCH DEG 0.0 ROLL DEG 0.0
HEAVE M 0.0

REMARKS

BEST REGARDS
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TO COGLA OTTAWA ATTN F LEPINE
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CANTERRA CALGARY ATTN FRONTIER DRLG 038-21511

CANTERRA DAILY DRILLING REPORT

WELL BELUGA 023 RIG NEDDRILL 2
DATE 85/08/15 DAYS FROM SPUD 18
2400 DEPTH M 1491.6 PROGRESS M 0.0
LAST CASING 508.0 MM DEPTH 558.7 M
LAST LOT 3037 KGM AT 579.1 M

NO OF PERSONS ON BOARD 95
STANDBY VESSELS 0 00
ARCTIC SHIKO

STATUS AT 0600
POHRFT RIG DOWN SCHLUM
OPERATIONS SUMMARY
0-2400 24 G RUN SCHLUMBERGER ELECTRIC LOGS
1) DLLMSFL IN 2330-OUT 0430 HRS REPAIR TENSION GUAGE 0430-0600
2) LSBHCDISFL IN 0630-OUT 1000 HRS
3) CNLLDTNET IN 1230-OUT 1730 HRS
4) HDT IN 1830-OUT 2200 HRS
5) RFT IN 0030-OUT
DRILLS
OPERATIONS FORECAST
RIH 444.50 MM DIAMONT BOART UNDERREAMER

BIT DIAM 0.0 MM TYPE

MUD DENSITY 1273 KM VIS 38 WL 26.0
MAX GAS READING 0 UNITS AT 0 M
LITHOLOGY LOGGING

---3--3---

ENVIRONMENT	MAX	0600		MAX	0600
WIND SPEED KNOTS	16	4	DIRECTION	360	040
WAVES HEIGHT M	0.5	0.0	DIRECTION	180	000
WAVES PERIOD	0.2	0.0			
SWELL HEIGHT M	0.0	0.0	DIRECTION		
SWELL PERIOD	0.0	0.0			

ICE STATUS GREEN
BERGS IN RANGE 0 CLOSEST AT 0.0 KM
CLOSEST BERG AT KM BEARING DEG AT 0600 HRS
PACK ICE CONC (1/10) AT 0.0 KM
VESSEL RESPONSE 24 HOUR MAX PITCH DEG 0.0 ROLL DEG 0.0
HEAVE M 0.0

REMARKS

BEST REGARDS
STAN JOHNSTON DRILLING SUPT
709-753-9555 TELE 16-4108

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DEPARTMENT OF MINES AUG 19 1985 PETROLEUM BRANCH

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DEPARTMENT OF ENERGY AND MINES
AUG 14 1985
PETROLEUM BRANCH

TO COGLAOTTAWAATTN F LEPINE ON
220
GOVT OF MANITOBA /ATTN C MOSTER 07-57346
CANTERRACALATTN FRONTIER DRLG 088-21511

CANTERRA DAILY DRILLING REPORT

WELL BELUGA 023 RIG NEDDRILL 2
DATE 85/08/12 DAYS FROM SPUD 15
2400 DEPTH M 1286.8 PROGRESS M 67.7
LAST CASING 508.0 MM DEPTH 558.7 M
LAST LOT 3037 KGM AT 579.1 M

NO OF PERSONS ON BOARD 09
STANDBY VESSELS
TAKAPU

STATUS AT 0600
DRILLING AT 1312M
OPERATIONS SUMMARY
0-900 DRILLED 374.6MM PILOT HOLE FROM 1219M TO 1283M
900-1300 POH
1300-1330 MU BHA (CHANGED OUT JARS
1330-1500 REPAIRED SWIVEL LOCK PIN
1500-1800 RIH W NEW BIT NUMBER 9 (3.6 FILL ON BOTTOM
1800-2400 DRILLED 374.6MM PILOT HOLE FROM 1267M TO 1286.8M
DRILLS
FIREDRILL
OPERATIONS FORECAST
DRILL AHEAD
SURVEY NO 20 DEPTH 1267.6 INCLINATION 0.31 AZIMUTH 124

BIT 9 DIAM 374.6 MM TYPE F
MUD DENSITY 1240 KGM VIS 35 WL 39.6
MAX GAS READING 0 UNITS AT 0 M
LITHOLOGY SALTANHDRITELST TRIP GAS 45 U

ENVIRONMENT	MAX	0600		MAX	0600
WIND SPEED KNOTS	13	4	DIRECTION	220	360
WAVES HEIGHT M	0.3	0.0	DIRECTION	220	0
WAVES PERIOD	3.6	0.0			
SWELL HEIGHT M	0.0	0.0	DIRECTION		
SWELL PERIOD	0.0	0.0			

ICE STATLS GREEN
BERGS IN RANGE 0 CLOSEST AT 0.0 KM
CLOSEST BERG AT KM BEARING DEG AT 0600 HRS
PACK ICE CONC (1/10) AT 0.0 KM
VESSEL RESPONSE,24 HOUR MAX PITCH DEG 0.0 ROLL DEG 0.0
HEAVE M 0.0

REMARKS

BEST REGARDS
STAN JOHNSTON DRILLING SUPT
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Aug 12/85

TO COGLA/OTTWA/ATTN E. LEPINE OM
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GOV. OF MANITOBA /ATTN C MOSTER 07-57346
CANTERRA/CAL/ATTN: FRONTIER DRLG 038-21511

CANTERRA DAILY DRILLING REPORT

WELL BELUGA 023 RIG NEDDRILL 2
DATE 85/08/11 DAYS FROM SPUD 14
2400 DEPTH M 1219.1 PROGRESS M 113.4
LAST CASING 508.0 MM DEPTH 558.7 M
LAST LOT 3037 KGM AT 579.1 M

DEPARTMENT OF ENERGY AND MINES
AUG 13 1985
PETROLEUM BRANCH

NO OF PERSONS ON BOARD 88
STANDBY VESSELS
TORNUI TAKAPU

STATUS AT 0600
DEPTH 1260M
OPERATIONS SUMMARY
0-30 CIRCULATE AND WORK JUNK SUB
30-330 SLUG PIPE AND POH
330-430 MU NEW BIT NUMBER AND RIH
430-730 INSTALL AND TEST MWD AND GAMMA RAY TOOLS (GALLED MONELS LAYED OUT)
730-1030 RIH TO 1098.8M
1030-11 REAM FR 1098.M TO 1105.M (7.0 FILL-STICKY/TORQUING)
WORK JUNK SUB11-24 DRILLED 374.6MM PILOT HOLE FR 1106M TO 1219M
DRILLS
FIRE AND LIFEBOAT DRILL
OPERATIONS FORECAST
DRILL AHEAD TILL NEW BIT
SURVEY NO 19 DEPTH 1219.4 INCLINATION .28 AZIMUTH 152.13

BIT 8 DIAM 374.6 MM TYPE R3
MUD DENSITY 1236 KGM VIS 35 WL 34.0
MAX GAS READING 0 UNITS AT 0 M
LITHOLOGY DOL LST ANHYDRITE SALT MUDSTONE

ENVIRONMENT	MAX	0600		MAX	0600
WIND SPEED KNOTS	14	10	DIRECTION	310	300
WAVES HEIGHT M	0.4	0.0	DIRECTION	350	
WAVES PERIOD	4.0	0.0			
SWELL HEIGHT M	0.7	0.0	DIRECTION	350	
SWELL PERIOD	6.0	0.0			

ICE STATUS GREEN
BERGS IN RANGE 0 CLOSEST AT 0.0 KM
CLOSEST BERG AT KM BEARING DEG AT 0600 HRS
PACK ICE CONC (1/10) AT 0.0 KM
VESSEL RESPONSE 24 HOUR MAX PITCH DEG 0.0 ROLL DEG 0.0
HEAVE M 0.0

REMARKS

BEST REGARDS
STAN JOHNSTON DRILLING SUPT
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CANTERRACRLATTN FRONTIER DRLG 038-21511

CANTERRA DAILY DRILLING REPORT

WELL BELUGA 023 RIG NEDDRILL 2
DATE 85/08/10 DAYS FROM SPUD 13
468 DEPTH M 1105.0 PROGRESS M 22.2
LAST CASING 508.0 MM DEPTH 558.7 M
LAST LOT 3037 KGM AT 579.1 M

NO OF PERSONS ON BOARD 88
STANDBY VESSELS
TORNUT TAKAPU

STATUS AT 0600
BIT 07 - ERRATIC TORQUE POH RIH BIT 08 - R
OPERATIONS SUMMARY
-02;RIG POD HOSES 02-03:RU SLP JT LND STRCK 03-0400: INSTL
DVRTR 400-06: RIH FNCTN TST STCK RETRV WR BSHG 06-08: PU
NMD TLTSTPLTYLD 08-1200:RIH BOP TST TL TST LNRP CNCTR OK
RERNWR BSHG 1200-1500:RIH WBIT. 1500-16:RND TGHT SPT .616.9-
9+0M21'-1600:RIH 1600-1700:RM 1061-BTM 1083.6M WRK JNK SUB
700-19;CIRC SURV 19-24: DRLD
DRILLS
SAFETY MEETING
OPERATIONS FORECAST
DRILLING AHEAD
SURVEY NO 15 DEPTH 1063.5 INCLINATION 1/4 DEG AZIMUTH TOTCO

BIT 7 DIAM 374.6 MM TYPE J2
MUD DENSITY 1236 KGM VIS 35 WL 25.0
MAX GAS READING 0 UNITS AT 0 M
LITHOLOGY ANHYDRITE LST DOL

ENVIRONMENT	MAX	0600		MAX	0600
WIND SPEED KNOTS	14	14	DIRECTION	310	310
WAVES HEIGHT M	6.7	0.2	DIRECTION	360	310
WAVES PERIOD	6.0	3.0			
SWELL HEIGHT M	0.8	0.8	DIRECTION	340	340
SWELL PERIOD	6.0	6.0			

ICE STATUS GREEN
BERGS IN RANGE 0 CLOSEST AT 0.0 KM
CLOSEST BERG AT KM BEARING DEG AT 0600 HRS
PACK ICE CONC (1/10) AT 0.0 KM
VESSEL RESPONSE 24 HOUR MAX PITCH DEG 0.0 ROLL DEG 0.0
HEAVE M 0.0

REMARKS

BEST REGARDS
STAN JOHNSTON DRILLING SUPT
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CANTERRACALATTN FRONTIER DRLG 038-21311

AUG 13 1985
PETROLEUM BRANCH

CANTERRA DAILY DRILLING REPORT

WELL BELUGA G23 RIG NEDDRILL 2
DATE 85/08/09 DAYS FROM SPUD 12
2400 DEPTH M 1033.5 PROGRESS M 0.0
LAST CASING 508.0 MM DEPTH 558.6 M
LAST LOT 3037 KGM AT 579.0 M

NO OF PERSONS ON BOARD 88
STANDBY VESSELS
TORNDITAKARI

STATUS AT 0600
LANDED BOP STACK CHECK FOR WELL PRESS CIRC MUD TO RISER
OPERATIONS SUMMARY
0001-1600: WORKED ON LOWER MARINE RISER PACKAGE
1600-2400: RUN LRRP TEST C AND K LINES 1378.94-4136.89 KPA
RUN INTERNAL CAMERA CONNECT K AND C GOOSENECKS
PRESS TEST SAME 1378.94-4136.89 KPA - OK
DRILLS
OPERATIONS FORECAST
RIH WB RRT FOR TEST BOPS RETRIEVE WB CHECK WWD TOOL RUN
TEST PLUG TEST LRRP CONN RERUN WB RIH AND DRILL AHEAD

BIT DIAM 0.0 MM TYPE
MUD DENSITY 1224 KGM VIS 32 WL 22.0
MAX GAS READING 0 UNITS AT 0 M

ENVIRONMENT	MAX	0600		MAX	0600
WIND SPEED KNOTS	22	10	DIRECTION	280	290
WAVES HEIGHT M	1.5	0.2	DIRECTION	270	290
WAVES PERIOD	5.0	3.0			
SWELL HEIGHT M	2.0	0.7	DIRECTION	280	280
SWELL PERIOD	8.0	7.0			

ICE STATUS GREEN
BERGS IN RANGE 0 CLOSEST AT 0.0 KM
CLOSEST BERG AT KM BEARING DEG AT 0600 HRS
PACK ICE CONC (1/10) AT 0.0 KM
VESSEL RESPONSE 24 HOUR MAX-PITCH DEG 1.0 ROLL DEG 1.0
HEAVE M 1.0

REMARKS

BEST REGARDS
STAN JOHNSTON DRILLING SUPT
709-753-9555 TELEX 016-3148XXXX TELEX 016-4138

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AUG 12 1985
PETROLEUM BRANCH

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TO: COGLA/OTTAWA/ATTN: F. LEPINE
GOVT OF MANITOBA /ATTN: C KOSTER 07-57346
CANTERRA/CAL/ATTN: FRONTIER DRLG. 038-21511

CANTERRA DAILY DRILLING REPORT

WELL: BELUGA O-23 RIG: NEDDRILL 2
DATE: 85/08/08 DAYS FROM SPUD: 11
2400 DEPTH M 1083.5 PROGRESS M 11.5
LAST CASING 508.0 MM DEPTH 556.6 M
LAST LOT 3037 KG/M3 AT 579.0 M

NO OF PERSONS ON BOARD 86
STANDBY VESSELS
TOANUI, ARCTIC SHIKO, TAKAPU

STATUS AT 0600
WORKING ON LMRP
OPERATIONS SUMMARY
0-330 DRILL 1072M TO 1083.5M, 330-600 WOW POS OF KEC, 600-830 SURVEY PUMP SLUG POH, 830-900 SURVEY MISRUN, 900-1000 CONTD POH, 1000-1130 SERVICE 1400 FUNC TEST LMRP ON BLU LEAK PULL LMRP 1400 -1630 RIG TO PULL LMRP. 1630-2300 UNLATC LMRP PULL LMRP. 2300-2400 REP LMRP AND FUNC TEST.
DRILLS
~~OPERATIONS FORECAST~~
RUN LMRP.

BIT 6 DIAM 374.6 MM TYPE SDT
MUD DENSITY 1224 KG/M3 VIS 32 WL 20.0
MAX GAS READING 14 UNITS AT 1083 M
LITHOLOGY LIMSTONE

ENVIRONMENT	MAX	0600		MAX	0600
WIND SPEED KNOTS	35	22	DIRECTION	260	280
WAVES HEIGHT M	3.0	1.5	DIRECTION	260	280
WAVES PERIOD	6.0	1.9			
SWELL HEIGHT M	2.5	2.0	DIRECTION	270	270
SWELL PERIOD	8.0	8.0			

ICE STATUS: GREEN
BERGS IN RANGE 0 CLOSEST AT 0.0 KM
CLOSEST BERG AT KM BEARING DEG AT 0600 HRS
PACK ICE CONC (1/10) AT 0.0 KM
VESSEL RESPONSE 24 HOUR MAX PITCH DEG 0.0 ROLL DEG 0.0
HEAVE M 2.0

REMARKS

BEST REGARDS
STAN JOHNSTON, DRILLING SUPT.
709-753-9555 TELEX 016-4138

6
TELCOM WPG

POLESTAR SALB

TELCOM MPG

POLESTAR SALS

TO: COGLA/OTTAWA/ATTN: F. LEPINE

225

GOVT OF MANITOBA /ATTN: C MOSTER 07-37346
CANTERRA/CAL/ATTN: FRONTIER DRLG., 038-21511

CANTERRA DAILY DRILLING REPORT

WELL: BELUGA O-29 RIG: NEDDRILL 2
DATE: 85/08/07 DAYS FROM SPUD 10
2400 DEPTH M 1071.9 PROGRESS M 242.9
LAST CASING 508.0 MM DEPTH 558.6 M
LAST LOT 3087 KG/M3 AT 573.0 M

NO OF PERSONS ON BOARD 90
STANDBY VESSELS
TORNUIT, ARCTIC SHIKO

STATUS AT 0600
DRILL TO 1083 M.
OPERATIONS SUMMARY
0001-2400: DRILLED 37.47CM PILOT HOLE FROM 829M TO 1071.9M
DRILLS
OPERATIONS FORECAST
TEST X AND C LINES, DROP SURVEY. POH FOR BIT CHANGE.

BIT 6 DIAM 374.6 MM TYPE SDT
MUD DENSITY 1224 KG/M3 VIS 33 WL 19.0
MAX GAS READING 0 UNITS AT 0 M
LITHOLOGY SADT, DOLOMITE, LST

ENVIRONMENT	MAX	0600		MAX	0600
WIND SPEED KNOTS	31	21	DIRECTION	280	240
WAVES HEIGHT M	3.0	1.0	DIRECTION	270	230
WAVES PERIOD	6.0	4.0			
SWELL HEIGHT M	1.5	1.5	DIRECTION	260	260
SWELL PERIOD	6.0	6.0			

ICE STATUS: GREEN
BERGS IN RANGE 0 CLOSEST AT 0.0 KM
CLOSEST BERG AT KM BEARING DEG AT 0600 HRS
PACK ICE CONC (1/10) AT 0.0 KM
VESSEL RESPONSE 24 HOUR MAX PITCH DEG 0.5 ROLL DEG 0.5
HEAVE M. 0.4

REMARKS

BEST REGARDS
STAN JOHNSTON, DRILLING SUPT.
709-753-9555 TELEX 016-4138

DEPARTMENT OF ENERGY AND MINES
AUG 9 1985
PETROLEUM BRANCH

① Telex rcd.
Aug. 7/85

9
TELCOM WPG

POLESTAR SAUB

DEPARTMENT OF ENERGY AND MINES
AUG 8 1985
PETROLEUM BRANCH

TOGO COGLA/OTTAWA/ATTN: F. LEPINE
GOVT OF MANITOBA /ATTN: C MOSTER 07-57346
CANTERRA/CAL/ATTN: FRONTIER DRLG. 038-21511

CANTERRA DAILY DRILLING REPORT

WELL: BELUGA O-23 RIG: NEDDRILL 2
DATE: 85/08/06 DAYS FROM SPUD 9
2400 DEPTH M 829.0 PROGRESS M 105.2
LAST CASING 508.0 MM DEPTH 553.7 M
LAST LOT 3037 KG/M3 AT 579.1 M

NO OF PERSONS ON BOARD 91
STANDBY VESSELS
TOANUI, ARTIC SHIKO

STATUS AT 0600
DRILLING AT 2918 (890M)
OPERATIONS SUMMARY
0000-0630 DRILLED 374.6MM HOLE FORM 724M TO 766M, 0630-0930 NOW DIFFICULT TO HOLD POSITION DUE TO WIND PLUS UNPREDICTABLE CURRENT FORCE. INTERCHANGED K AND C COFLEXIP HOSES TO PERMIT RIG TO CONTINUE ROTATING HDG TO STARBOARD. RETESTED TO 41370 KPA OK. 0930-1000 DRILLED 374.6MM PILOT HOLE FROM 766M TO 767M 1000-1030 REPAIRED MUD PUMP BLOWER NO 2, 1030-1400 POH, 1400-1500 WORK ON BHA ABD CHECK MWD TOOLS, 1700-1730 REAMED FROM 751M TO 767M, 1730-2400 DRILL 364.6MM FROM 767M TO 829M
DRILLS
OPERATIONS FORECAST
DRILL AHEAD
SURVEY: NO 14 DEPTH 721.7 INCLINATION 0.17 AZIMUTH 219

BIT 6 DIAM 374.6 MM TYPE SDT
MUD DENSITY 1200 KG/M3 VIS 33 WL 16.0
MAX GAS READING 0 UNITS AT 0 M
LITHOLOGY LST,DOL,SALT

ENVIRONMENT	MAX	0600		MAX	0600
WIND SPEED KNOTS	29	16	DIRECTION	120	270
WAVES HEIGHT M	2.0	0.8	DIRECTION	110	270
WAVES PERIOD	5.0	5.0			
SWELL HEIGHT M	0.0	0.0	DIRECTION		
SWELL PERIOD	0.0	0.0			

ICE STATUS: GREEN
BERGS IN RANGE 0 CLOSEST AT 0.0 KM
CLOSEST BERG AT KM BEARING DEG AT 0600 HRS
PACK ICE CONC (1/10) AT 0.0 KM
VESSEL RESPONSE 24 HOUR MAX PITCH DEG 0.3 ROLL DEG 0.0
HEAVE M 0.5

REMARKS
TOTCO SURVEY IN BOP - ZERO DEG (NEDDRILL CO POLICY)
CONVERTEDD MUD TO SALT SATURATED MUD

BEST REGARDS
STAN JOHNSTON, DRILLING SUPT.
709-753-9555 TELEX 016-4138

8
TELCOM WPG

E+M
5th - 330 Graham
6573

DEPARTMENT OF ENERGY AND MINES
AUG 7 1985
PETROLEUM BRANCH

① Telex. red.
Aug 6/85

9
TELCOM WPG

POLESTAR SALB

TO: CLARE MOSTER ,GOVT OF MANITOBA

TO: COGLA/OTTAWA/ATTN: F. LEPINE 053-4366
CANTERRA/CAL/ATTN: FRONTIER DRLG. 038-21511

CANTERRA DAILY DRILLING REPORT

WELL: DELUGA C-23 RIG: NEDDRILL 2
DATE: 85/08/05 DAYS FROM SPUD 8
2400 DEPTH M 723.9 PROGRESS M 152.4
LAST CASING 508.0 MM DEPTH 558.7 M
LAST LOT 3037 KG/M3 AT 579.1 M

NO OF PERSONS ON BOARD 92
STANDBY VESSELS
TOANUI, ARTIC SHIKO

STATUS AT 0600
DRILLING PILOT HOLE AT 2509 FT
OPERATIONS SUMMARY
0-400 INSTAL GAMMA RAY MWD TOOL AND FUNC.TEST RIH. TAG T.O.C. AT 553M. 400-430 SLO PUMP RATE KILL LINE FRICT LOSS. 430-630 DRILL OUT 508MM SHOE CEMENT 553-559M WASH 559-571M. 630-730 DRILL FM 571-575 M WHILE DISP HOLE TO MUD. 730-900 REPD SANDTRAP. 900-1000 DRILL 575-579M. 1000-1130 PLOT TO 11032 KPA NO LEAK OFF.MUD IN HOLE 1030 KG/M3 PLOT 3031 KG/M3 (IN MUDST) 1130-2400 DRILL 579-724M.
DRILLS
OPERATIONS FORECAST
DRILL AHEAD
SURVEY: NO. 13 DEPTH 683.6 INCLINATION .20 AZIMUTH 176

BIT 5 DIAM 374.6 MM TYPE OSCSAJ
MUD DENSITY 1104 KG/M3 VIS 35 WL 16.0
MAX GAS READING 0 UNITS AT 0 M
LITHOLOGY MUDST,SHALE,ANHYD,SALT STRINGERS

ENVIRONMENT	MAX	0600		MAX	0600
WIND SPEED KNOTS	27	27	DIRECTION	120	120
WAVES HEIGHT M	1.5	1.5	DIRECTION	120	120
WAVES PERIOD	4.0	4.0			
SWELL HEIGHT M	0.0	0.0	DIRECTION		
SWELL PERIOD	0.0	0.0			

ICE STATUS: GREEN
BERGS IN RANGE 0 CLOSEST AT 0.0 KM
CLOSEST BERG AT KM BEARING DEG AT 0600 HRS
PACK ICE CONC (1/10) AT 0.0 KM
VESSEL RESPONSE 24 HOUR MAX PITCH DEG 0.0 ROLL DEG 0.0
HEAVE M 0.0

REMARKS
FROM 675M CHLORIDES INCREAS 18000 TO 65000RPM. SALT STRINGERS

BEST REGARDS
STAN JOHNSTON, DRILLING SUPT.
709-753-9555 TELEX 016-4138

POLESTAR SALB
9
TELCOM WPG

Trillium Soquip Onexco et al Beluga O-23

I SEQUENCE OF EVENTS

1. Move into Hudson's Bay as soon as ice conditions permit. Test the BOP stack to 10 ksi (69.9 mPa) enroute with both 5" and 3-1/2" D.P.

2. Position the rig at 59 degrees 12 minutes 54.4 seconds North and 88 degrees 33 minutes 26.6 seconds West. The sonardyne deck unit will be used to reference the transponders set by the positioning vessels. Set D.P. transponders at the location.

3. Spud the well and simultaneously drill and open 1067 mm (42") hole to 60 m BML. Take MWD surveys. Circulate seawater and clean the hole with spud mud slugs. Prior to running casing, fill the hole with a heavy pill.

4. Run 762 mm (30") casing with the GRA (Sling the GLS below if the bottom is soft as anticipated).

5. Cement the casing to surface and hold it with the housing 1-2 m above the mud line until the cement has set.

6. Drill out the shoe with a 26" bit.

7. Drill a 375 mm (14-3/4") pilot hole to 575 m RT. Take MWD surveys. Circulate seawater and use slugs of spud mud as required.

8. Open the hole to 660 mm (26").

9. Run 508 mm (20") casing to 565 m and cement in place.

10. Run BOP stack and riser and set it with the mid point of the ship's swing at ±315 degrees. Then pressure test BOP equipment.

11. Drill out the shoe with a 375 mm (14-3/4") bit and perform a FLOT. Drill a 375 mm pilot hole to the top of the Polar Bear limestone at approximately 1395 m. Minor lost circulation is possible in this hole section. A seawater/polymer/PHG mud will be used.

12. Log the well.

13. Underream the pilot hole to 445 mm (17-1/2").

14. Run 340 mm (13-3/8") casing and cement it in place. Pressure test the casing and BOP equipment.

15. Drill out cement with a 311 mm (12-1/4") bit and perform a FLOT. Drill ahead to core point in the Attawapiskat at ±1650 m. A high pressure CaCl2 flow is possible in the Polar Bear limestone. Pore pressure would be up to 1800 kg/m3 (15 ppg). A massive salt is prognosed in the lower portion of the Polar Bear formation.

16. Core.

17. Drill 311 mm hole to T.D. if possible. A high pressure CaCL2 flow is anticipated in the Severn River at 1800 m. Equivalent mud weight could be as high as 1800 kg/m^3 (15 ppg).

18. Log the well.

19. Run 245 mm (9-5/8") casing to below any test zones and cement in place.

20. Perform drill stem tests as determined by logs.

21. Abandon the well with cement plugs and retainers. Then pull the BOP stack and riser.

22. Recover the D.P. transponders.

WELL SUMMARY

WELL NAME:	Trillium Soquip Onexco et al Beluga O-23
CLASSIFICATION:	New Field Wildcat
LOCATION:	59°12'54.4"N. Lat., 88°33'26.6"W Long. Seismic Line CO-15, Shot Point 2780
ELEVATION (K.B.):	12 metres
WATER DEPTH:	179 metres
PROPOSED TOTAL DEPTH:	2420 metres
OPERATOR:	Canterra Energy Ltd.
DRILLING VESSEL:	Drillship Neddrill 2
OBJECTIVES:	Primary - Silurian Attawapiskat Member of Ekwan River Carbonate Secondary - Ordovician Red Head Rapids Carbonates, Devonian Polar Bear Limestone

GEOLOGICAL PROGNOSIS

Formation	Drill Depth (m)	Subsea (m)
Seafloor	191	-179
Pennsylvanian	302	-290
Devonian	762	-750
Silurian	1622	-1610
Ordovician	2047	-2035
Cambrian(?)	2402	-2390
Precambrian	2417	-2405
T.D.	2420	-2408

Canada Oil and Gas Lands Administration | Administration du pétrole et du gaz des terres du Canada

Nova Scotia	☐	West Coast	☐	Exploratory	☒
Newfoundland	☐	Northern	☐	Development	☐
Gulf of St. Lawrence	☐	Hudson Bay	☒	Delineation	☐
				Service	☐

AUTHORITY TO DRILL A WELL

APPLICATION

This application is submitted with Section 82 of the Canada Oil and Gas Drilling Regulations. When approved under Section 83 of the Regulations, it is the requisite authority for the commencement of drilling operations.

Well Name in Full: Trillium Soquip Onexco et al Beluga O-23

Operator: Canterra Energy Ltd. Drilling Program No.:

Contractor: Bawden Western Oceanic Offshore Permit or Lease No.: 282-010

Drilling Rig or Unit: Neddrill II Estimated Well Cost: $ 25 MM

Location-Unit: O Section: 23 Grid Area: 59° 20' N 88° 30' W

Coordinates: Lat.: 59° 12' 54.4" N Long.: 88° 33' 26.6" W

Area: Hudson Bay Field/Pool:

Elevation-RT/KB: 13 m (ASL) Seafloor: 192 m (BRT)

Approx. Spud Date: July 15, 1985 Estimated Days on Location: 55

Anticipated Total Depth: 2430 m Target Horizon(s) Silurian, Ordovician

EVALUATION PROGRAM

Ten-metre sample intervals

Five-metre sample intervals 575 m to Total Depth

Canned sample intervals Jars every 10 m, 575 m to TD

Conventional cores at 1-9 m at top of Silurian; 2 others possible in Silurian & Ordovician

Logs and Tests Log run #1, 1400m: DIL,LSA, GR, Cal, HRD, CST, RFT
Run #2, 2430m: DIL, DLL, GR, Cal, Sonic, CNL-FDC, HRD, CST, RFT, Velocity
Tests through casing if required

CASING AND CEMENTING PROGRAM

O.D. mm	Weight: kg/m	Grade:	Setting Depth Below Seafloor: m	Cementing Program (Volumes): m^3
762	680/461	API5LB	50	48
508	198	X56	380	83
340	107	S0095	1200	77
245	70	S0095	2200	42

B.O.P. Equipment: 16 3/4" 10KSI CIW BOP stack composed of (top to bottom)
1 - 5 ksi Hydril annular preventer, 2 - CIW double "U" ram preventers c/w
1 - blind/shear, 1-3 1/2" pipe, 1 - 2 7/8 - 5" variable bore, 1 - 5" pipe

Other Information: Possible abnormal pressures in Polar Bear at +/-1400 m and Severn River at +/- 1800 m. Flows would probably be saturated $CaCl_2$ water. Equivalent mud weight could be up to 1800 kg/m^3

Signed: [signature] Title: Frontier Drilling Manager

Date: 15 May 85 Company: Canterra Energy Ltd.

APPROVAL

An approved copy of this notice is to be posted at each wellsite.

Signed:
Engineering Branch

Date:

File:

Department of Energy Mines and Resources | Department of Indian Affairs and Northern Development

Ministère de l'Énergie, des Mines et des Ressources | Ministère des Affaires indiennes et du Nord Canadien

Canada

PROVINCE OF MANITOBA

FILE BACK COVER No. .....

FROM

TO

SUBJECT :--

TRILLIUM BELUGA WELL FILE

PS-f-38

Misc Rpts

(4)

Trillion Beluga Well File

1985

59° 20' N and 88° 30' W

TRILLIUM SOQUIP

ET AL

BELUGA 0-23

8710-C55-1-1

Sept.
1985

Canada Oil and Gas Lands Administration | Administration du pétrole et du gaz des terres du Canada

				Well Status	
Nova Scotia	☐	West Coast	☐	Suspended	☐
Newfoundland	☐	Northern	☐	Completed	☐
Gulf of St. Lawrence	☐	Hudson Bay	☒	Abandoned	☒

WELL TERMINATION RECORD

This record is submitted in triplicate in compliance with Section 184 of the Canada Oil and Gas Drilling Regulations.

WELL DATA

Well Name: Trillium Soquip Onexco et al Beluga O-23 Area: Hudson Bay

Grid Area: 59° 20' N, 88° 30' W Field/Pool: Wildcat

Permit or Lease No.: 282-010 Final Coordinates: Lat.: 59° 12'54.033"N Long: 88° 33'27.184"W

Drilling Unit: Neddrill 2 Elevations-RT/KB: 13.72m /SF/GL: 193.5 mRT

Spud Date: 20:30 July 28/85 Rig Released: 10:45 Sept. 15/85 Total Depth: 2214.8 mRT

CASING AND CEMENTING

O.D.:	Weight:	Grade:	Depth Set:	Cement and Additives:
762	461	API 5LB	228.5	45t ClG + 2% $CaCl_2$
508	198	X-56	558.7	Lead 41 t ClG + 2.5% Gel + 0.5% D-65
				Tail 37 t ClG + 2% $CaCl_2$
340	107.1	K&C-95	1477.9	Lead 55t ClG + 8% PHG + 0.75% D-65
				Tail 18.5 t ClG neat

PLUGGING PROGRAM

Approval of the following program was obtained by (person) R. Waymouth from (person) P. Simard of the Canada Oil and Gas Lands Administration by means of telex on September 13 19 85

Type of Plug:	Interval:	Felt:	Cement and Additives:
cement	2214.8 - 2115	no	12.4t ClG + 8% NaCl (BWOW) + 0.2% D-13
bridge plug	1460	yes-ptest to 2000 psi	
cement	1457 - 1407	no	5.0t ClG + 8% NaCl (BWOW) + 1% CaCl2
cement	250 - 200	no	5.0t ClG + 8% NaCl (BWOW) + 1% CaCl2

Lost Circulation/Overpressure Zones: None

Equipment left on Seafloor (Describe): PGB, 16 3/4" wellhead (see attached diagram)

Provision for Re-entry (Describe and attach sketch): PGB in place (see attached diagram)

Cores: Type: sidewall cores Intervals: see attached

Other Downhole Completion/Suspension Equipment: None

CERTIFICATION

I certify on the basis of personal knowledge of operations undertaken at the above named well that the above information is accurate.

Signed: R. Waymouth P. Eng. Title: Frontier Drilling Manager

Name: R Waymouth Date:

Acknowledged by: P. Simard
Engineering Branch

Date: 85/10/25

File: 8310-C55-1-1

Department of Energy, Mines and Resources | Ministère de l'Énergie, des Mines et des Ressources

Department of Indian Affairs and Northern Development | Ministère des Affaires indiennes et du Nord canadien

Canada

BELUGA O-23 RUN NO. 1 August 15, 1985

SHOT SUMMARY LISTING PERFORMED 00- -00 04:24

HOT	STATUS	DEPTH	TENSION
1	FIRED	1481.0	204.3
2	FIRED	1481.0	99.06
3	FIRED	1478.9	112.1
4	FIRED	1479.0	117.4
5	FIRED	1473.4	123.5
6	FIRED	1473.5	188.0
7	FIRED	1464.9	80.93
8	FIRED	1465.0	151.5
9	FIRED	1457.0	133.5
10	FIRED	1457.0	169.5
11	FIRED	1439.0	83.06
12	FIRED	1439.0	163.5
13	FIRED	1259.9	128.1
14	FIRED	1260.0	99.25
15	FIRED	1201.4	100.8
16	FIRED	1201.5	68.12
17	FIRED	1095.8	113.8
18	FIRED	1096.0	90.25
19	FIRED	1077.9	110.1
20	FIRED	1078.0	105.3
21	FIRED	1074.5	99.31
22	FIRED	1074.5	164.8
23	FIRED	1073.0	158.2
24	EMPTY	1073.0	166.8
25	FIRED	1070.0	126.7
26	EMPTY	1070.0	143.5
27	FIRED	1069.0	162.2
28	FIRED	1068.0	125.0
29	FIRED	1068.0	121.3
30	FIRED	1065.4	75.31
31	FIRED	1065.4	136.1
32	FIRED	1063.5	159.0
33	FIRED	1063.5	121.7
34	FIRED	1061.4	154.2
35	FIRED	1061.4	168.0
36	FIRED	773.9	193.5
37	FIRED	774.0	107.2
38	FIRED	750.9	86.37
39	FIRED	751.0	127.0
40	FIRED	742.9	120.6
41	FIRED	742.9	120.6
42	FIRED	635.9	118.7
43	FIRED	635.8	133.3
44	FIRED	631.5	120.5
45	FIRED	631.5	121.2

DEPTH UNITS : METE BIT SIZE : 14.750 IN

RING TYPE : LARG BULLET TYPE : DHOL

POWDER LOAD : 8.00 G POWDER TYPE : AHT

Remarks: 45 cores fired, 46% recovery

SHOT SUMMARY LISTING PERFORMED 00- -00 01:44

SHOT	STATUS	DEPTH	TENSION
1	EMPTY	2209.9	198.8
2	FIRED	2200.0	168.7
3	FIRED	2192.0	1207.
4	FIRED	2192.0	969.0
5	FIRED	2191.0	1296.
6	FIRED	2191.0	1050.
7	LOST	2190.5	1078.
8	FIRED	2189.5	1543.
9	MISFIRED	2180.0	173.1
10	EMPTY	2160.0	114.5
11	LOST	2160.0	301.2
12	MISFIRED	2139.9	110.1
13	FIRED	2120.0	160.5
14	FIRED	2100.0	137.2
15	MISFIRED	2100.0	106.0
16	FIRED	2080.0	156.2
17	FIRED	2060.0	103.6
18	MISFIRED	2040.0	123.9
19	EMPTY	2020.0	85.50
20	FIRED	2020.0	105.5
21	MISFIRED	2000.0	118.8
22	EMPTY	1992.5	123.5
23	FIRED	1992.5	195.3
24	MISFIRED	1980.0	165.3
25	EMPTY	1959.0	162.2
26	EMPTY	1959.0	143.2
27	FIRED	1949.0	105.1
28	FIRED	1920.0	100.5
29	EMPTY	1905.0	77.06
30	EMPTY	1905.0	135.6
31	EMPTY	1893.9	99.50
32	EMPTY	1893.8	219.8
33	FIRED	1880.0	127.5
34	FIRED	1875.9	113.4
35	MISFIRED	1876.0	125.0
36	EMPTY	1852.0	129.2
37	EMPTY	1852.0	98.75
38	EMPTY	1840.0	166.3
39	FIRED	1820.5	228.8
40	EMPTY	1820.5	194.1
41	MISFIRED	1800.0	165.7
42	EMPTY	1780.0	124.0
43	FIRED	1765.0	85.62
44	MISFIRED	1765.0	67.87
45	FIRED	1745.0	84.43
46	FIRED	1745.0	112.0
47	FIRED	1720.0	131.6
48	FIRED	1710.0	123.9
49	FIRED	1694.0	123.5
50	FIRED	1694.0	85.62
51	EMPTY	1680.0	126.0
52	FIRED	1680.0	125.8
53	FIRED	1660.0	88.81
54	MISFIRED	1659.9	149.8
55	FIRED	1620.0	99.87
56	FIRED	1620.0	131.0
57	FIRED	1600.0	128.2
58	FIRED	1577.9	130.5
59	FIRED	1578.0	119.8
60	FIRED	1565.0	86.00
61	FIRED	1565.0	127.1
62	FIRED	1550.0	91.25
63	MISFIRED	1510.9	93.87
64	FIRED	1507.0	92.50
65	EMPTY	1507.0	89.18
66	FIRED	1486.0	97.75

Remarks:

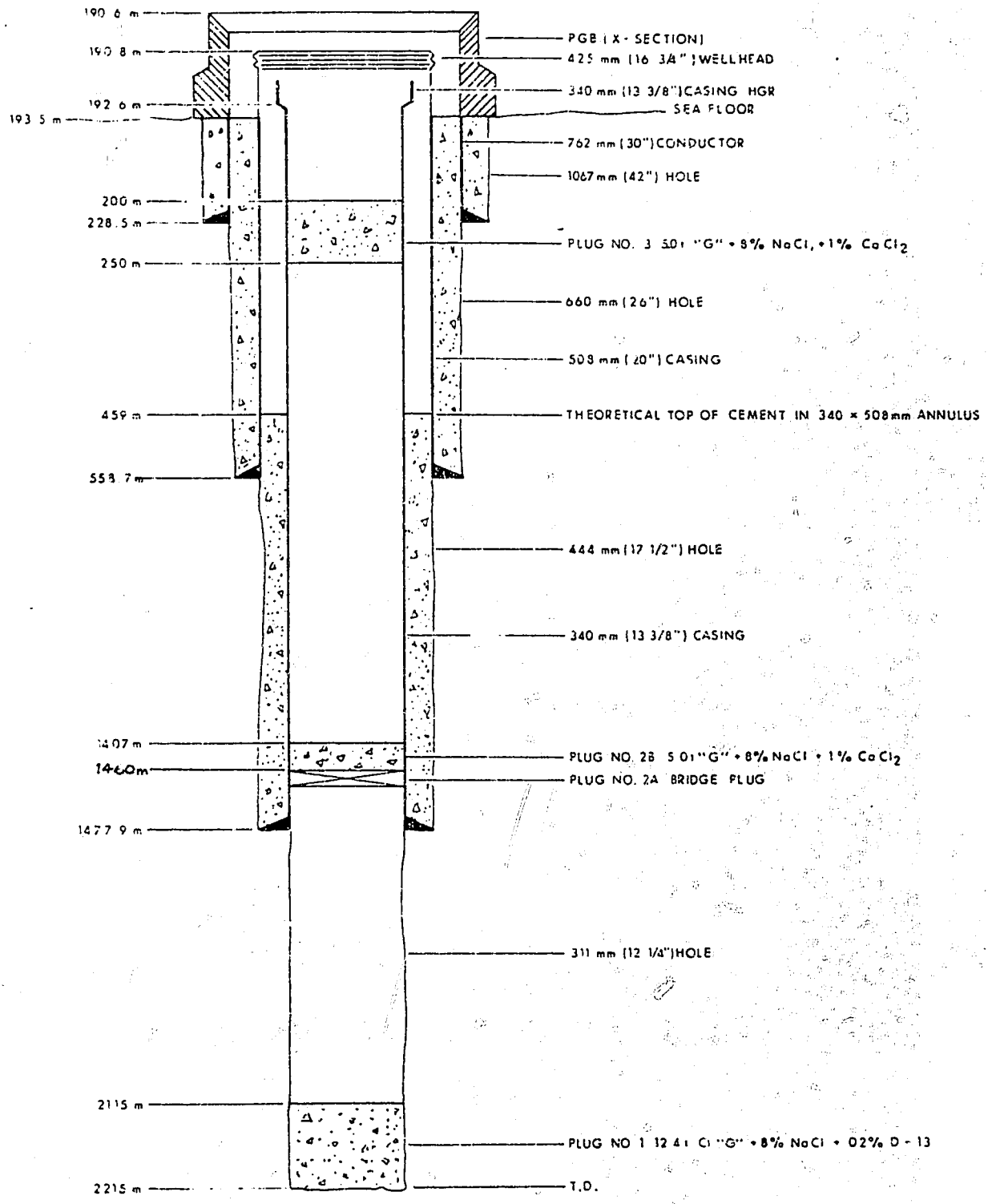
36 cores recovered
11 cores misfired
17 cores empty
2 cores lost
66 bullets total

DEPTH UNITS : METE BIT SIZE : 311.150 MM

RING TYPE : NONE BULLET TYPE : DHOL

POWDER LOAD : 8.00 G POWDER TYPE : AHT

GR (GAPI)		TENS(N)
0.0	100.00	25000.



Canterra

TRILLIUM SOQUIP ONEXCO ET AL BELUGA 0-23

ABANDONMENT SCHEMATIC

ACTION SLIP

WELL HISTORY REPORT

Project No: 8710-C55-1-1

O ET AL BELUGA 0-23

the following action has been taken:

Receipt acknowledged .....

REPORT REVIEW .....

Reports and maps and logs date-stamped .....

Reports labelled .....

Confidential Sections removed: .....

(micro) paleontological .....

palynological .....

OR Source Rock Analyses
Geochemical Analyses .....

Other

Land Management memo sent .....

REVIEW and APPROVAL made by:

Engineering Branch

Resource Evaluation DRB

Environmental PROTECTION

PENDING RECEIPT OF OCEANOGRAPHIC TAPES
13/5/86 AM.

Canada Oil and Gas Lands Administration
Administration du pétrole et du gaz des terres du Canada

355 River Road
Ottawa, Ontario
K1A 0E4

355, chemin River
Ottawa (Ontario)
K1A 0E4

File: 8710-C55-1-1

April 18, 1986

Canterra Energy Ltd.
P.O. Box 1051
Calgary, Alberta
T2P 2K7

Attn: G. Prusakowski

Dear Sirs:

Re: Trillium Soquip Onexco et al
Beluga O-23

Earlier this year we received a shipment of tapes pertaining to various logs run in connection with the above-mentioned well. Unfortunately, we are unable to use this information in the format provided as, (b) we do not have the facilities and (b), hard copies are required for "in house" review and evaluation, and for eventual release to the general public, together with the Well History Report, once the relevant period of confidentiality has expired (i.e. 2 years from rig release date).

In this regard, we are returning the tapes to you and would ask that you provide us with three (3) copies of the final prints for each log run as replacements.

Your assistance would be most appreciated. Thank you.

Yours sincerely,

P.S. Simard
Information Coordination Section
Engineering Branch

RECEIPT ACKNOWLEDED _____

CANADA OIL AND GAS LANDS
ADMINISTRATION
ADMINISTRATION DU PÉTROLE ET DU
GAZ DES TERRES DU CANADA
DEC 19 1985
ENGINEERING AND CONTROL
BRANCH
TECHNIQUE ET DU CONTROLE

TRILLIUM SOQUIP ONEXCO ET AL BELUGA O-23

FINAL WELL SUMMARY

November 1985

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WELL HISTORY REPORT
TRILLIUM SOQUIP ONEXCO ET AL BELUGA O-23

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F. Core Laboratories Petrographic Report (lower hole)
G. Final Survey Plan (filed July 29, 1985)

TRILLIUM SOQUIP ONEXCO ET AL BELUGA O-23

1. Introduction

1.1 Summary:

Trillium Soquip Onexco et al Beluga O-23 was drilled in the Hudson Bay at 59° 12' 54.033" N Latitude and 88° 33' 27.184" W Longitude. Water depth at this location is 179.8 m.

Canterra Energy Ltd. operated the well for the Trillium group, which consists of the following:

Participants:

Trillium Exploration Corporation
Exploration Soquip
Onexco Oil and Gas Limited
Sogepet Limited
I.C.G. Resources Ltd.
Omega Hydrocarbons Limited
The Consumer's Gas Company Limited

Non-Participants

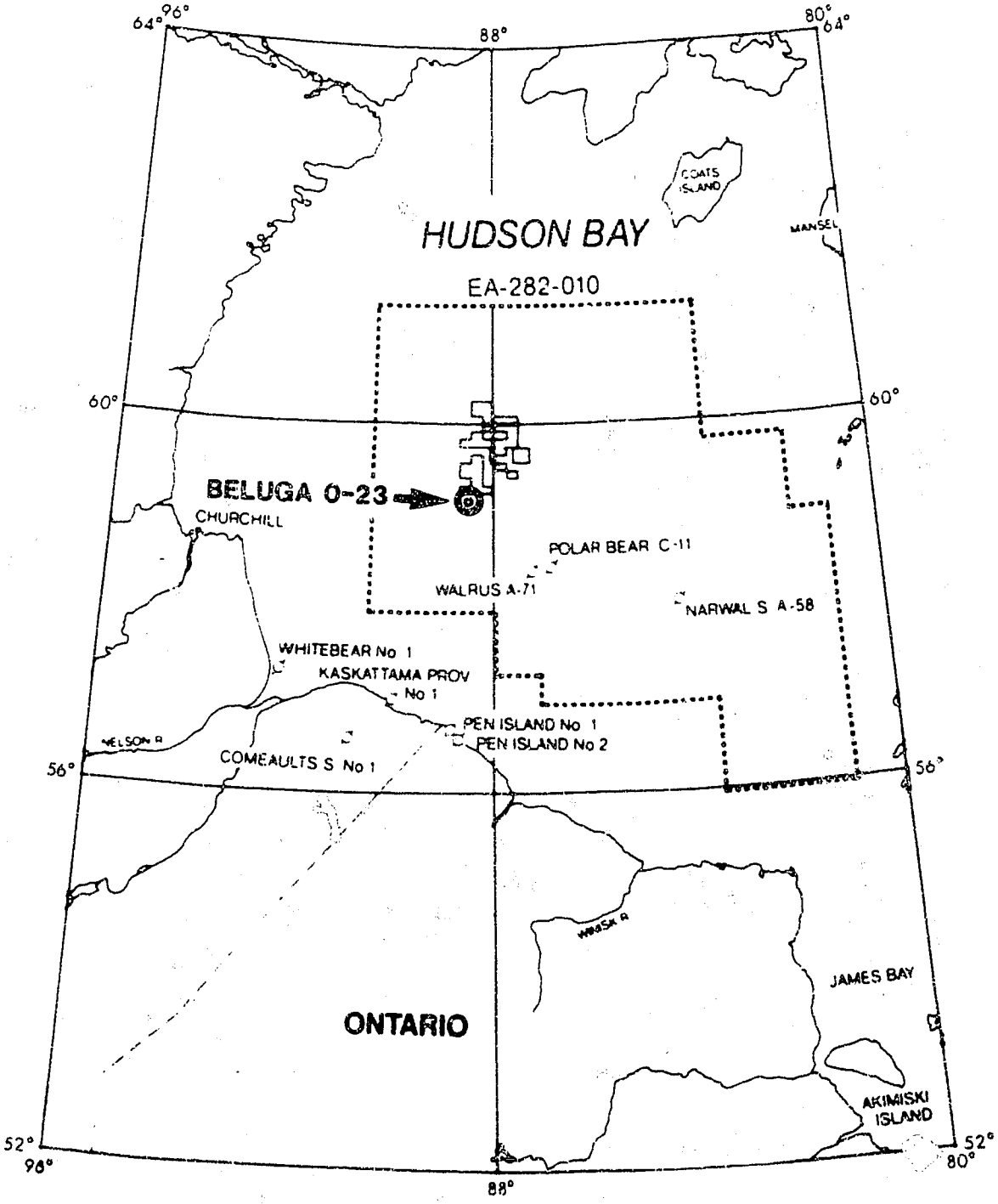
Canadian Occidental Petroleum Ltd.
Canterra Energy Ltd.
Petro-Canada Inc.
Northcor Energy Ltd.
Parks Resources Ltd.

The Contractor was Bayden Western Oceanic Offshore Ltd., a Canadian Company which chartered the Neddrill II drillship from Neddrill of the Netherlands.

The Beluga O-23 well was drilled to evaluate the Silurian Ekwan River carbonates. Secondary objectives included the Ordovician Red Head Rapids carbonates and the Devonian Polar Bear carbonates.

The Neddrill II departed St. John's on July 16, 1985 at 10:30 hours local time for the Beluga O-23 location. The well was spudded July 28, 1985 at 20:30 hours and reached total depth of 2215m on September 11, 1985 at 23:30 hours.

There were no significant hydrocarbon indications and no testing was conducted. The well was plugged and abandoned and the rig released on September 15, 1985 at 10:45 hours.



Canterra Energy Ltd.

HUDSON BAY

TRILLIUM SOQUIP ONEXCO ET AL BELUGA 0-23

LOCATION MAP

SCALE:	CONTOUR INTERVAL:
PREPARED BY:	DATE: APRIL, 1985
DRAWN BY: A. J.	FILE: 13-19

2.0 GENERAL DATA

2.1	WELL NAME AND NUMBER:	TRILLIUM SOQUIP ONEXCO ET AL BELUGA O-23
	GRID AREA:	59° 20' N 88° 30' W
2.2	WELL LOCATION:	59°12' 54.033" N 88°33' 27.184" W
2.3	UNIQUE WELL IDENTIFIER:	MID BAY EA 300 023 5 920 088300 FEDERAL PERMIT 282-010
2.4	OPERATOR:	Canterra Energy Ltd. 555 Fourth Avenue S.W. Calgary, Alberta.
	CONTRACTOR:	Bawden Western Oceanic Offshore Ltd. 600, 300 5th Avenue S.W. Calgary, Alberta.
2.5	DRILLING UNIT:	Neddrill II
	Type:	dynamically positioned and/or moored Drillship
	Class:	Bureau Veritas Class 1 3/3 E-Glace/ Super
	Registry:	The Netherlands, Rotterdam
	Year Built:	1977
	Shipyard:	Mitsubishi Heavy Industries, Japan (converted bulk carrier)
2.6	POSITION KEEPING:	Dynamic Positioning System consisting of 8 thrusters and Delco Electronics station keeping. 8 pt mooring system with 8 - 30,000 lb Flipper Delta anchors and 3" wire rope.

2.7 SUPPORT CRAFT:

Supply Boats:

1. Toanui
Type: Anchor Handling/Supply Vessel
Owner: Seaforth Fednav, Inc.

2. Takapu
Type: Anchor Handling/Supply Vessel
Owner: Seaforth Fednav, Inc,

3. Arctic Shiko
Type: Anchor Handling/Supply Vessel
Owner: Seaforth Fednav, Inc.

Helicopters:

Type: 1 - Super Puma (Tigar)
1 - Super Puma (332C)
1 - Bell 214 Super Transporter IFR equipped
Owner: Okanagan Helicopters Ltd.

Fixed Wing:

Type: Hawker Siddely HS748 Turbo Prop
Owner: Bradley Air Services

2.9 Drilling Unit Performance:

See Dobrocky Seatech Limited Report, Appendix 8 of this summary.

2.9 Difficulties and Delays:

Lost time was incurred due to the following problems:

1. Underreaming

The underreaming to 445 mm (17 1/2") hole required more time than planned. The first run with the underreamer resulted in +/- 860 m of underguage (394 mm; 15 1/2") hole which had to be redrilled. Subsequent runs were slowed due to a combination of hard formations and a 375 mm (14 3/4") pilot hole, which caused uneven tooth and bearing wear on the underreamer cutters, thus limiting their effective life.

2. Washouts in Drill String

Five instances of washouts occurred in the drillstring. These occurred in the 8 1/4" Drill collars, Hevi-wate Drillpipe and the 5" drillpipe. Delays as a result of these washouts included extra trips to detect the washouts, and time to inspect and remove the joints.

3. LMRP - Blue Pod

Problems with the blue pod on the LMRP necessitated that it be pulled two times for repairs, resulting in 36 hours of lost time.

4. MWD Tool

Problems with the MWD tool caused minor delays in changing out and/or servicing the faulty tool(s). Additionally, seven potential surveys were missed due to the tool not being operational on the final two bit runs.

5. Mobilization to Location

The sail to location was slowed at times due to icebergs, growlers and pack ice. Assistance was received from the coast guard ice breaker Sir John Franklin while in the Hudson Strait.

III SUMMARY OF DRILLING OPERATIONS

3.1	ELEVATIONS:	R.T. to S.F.: 193.5 metres R.T. to S.L.: 13.7 metres Water Depth: 179.8 metres
3.2	TOTAL DEPTH: Drilled: Logged:	2215.0 metres 2215.0 metres 2215.0 metres
3.3	DATE AND HOUR SPUDDED:	85-07-28 at 20:30 hrs..
3.4	DATE DRILLING COMPLETED:	85-09-11 at 23:30 hrs.
3.5	RIG RELEASE DATE:	85-09-15 at 10:45 hrs..
3.6	WELL STATUS:	Plugged and abandoned
3.7	HOLE SIZES AND DEPTHS:	1067mm to 230 metres 660mm to 572 metres 444mm to 1491 metres 311mm to 2215 metres
3.8	CASING AND CEMENTING RECORD:	Reports included in this section. See section 3.21.
3.9	SIDE TRACKED HOLE:	None

3.10 DRILLING FLUID: Following is a listing of the drilling fluid types in each hole section. A table of mud properties and daily additions is included in this section (see 3.20)

Hole Phase (mm)	Fluid Type
1067	Seawater/Viscous pills
660	Seawater/Viscous pills
311	Salt-saturated Gel polymer
216	Salt-saturated Gel polymer

3.11 FISHING OPERATIONS: No fishing operations were required.

3.12 WELL KICKS: None

3.13 LOST CIRCULATION: None

3.14 FORMATION LEAK OFF TESTS:

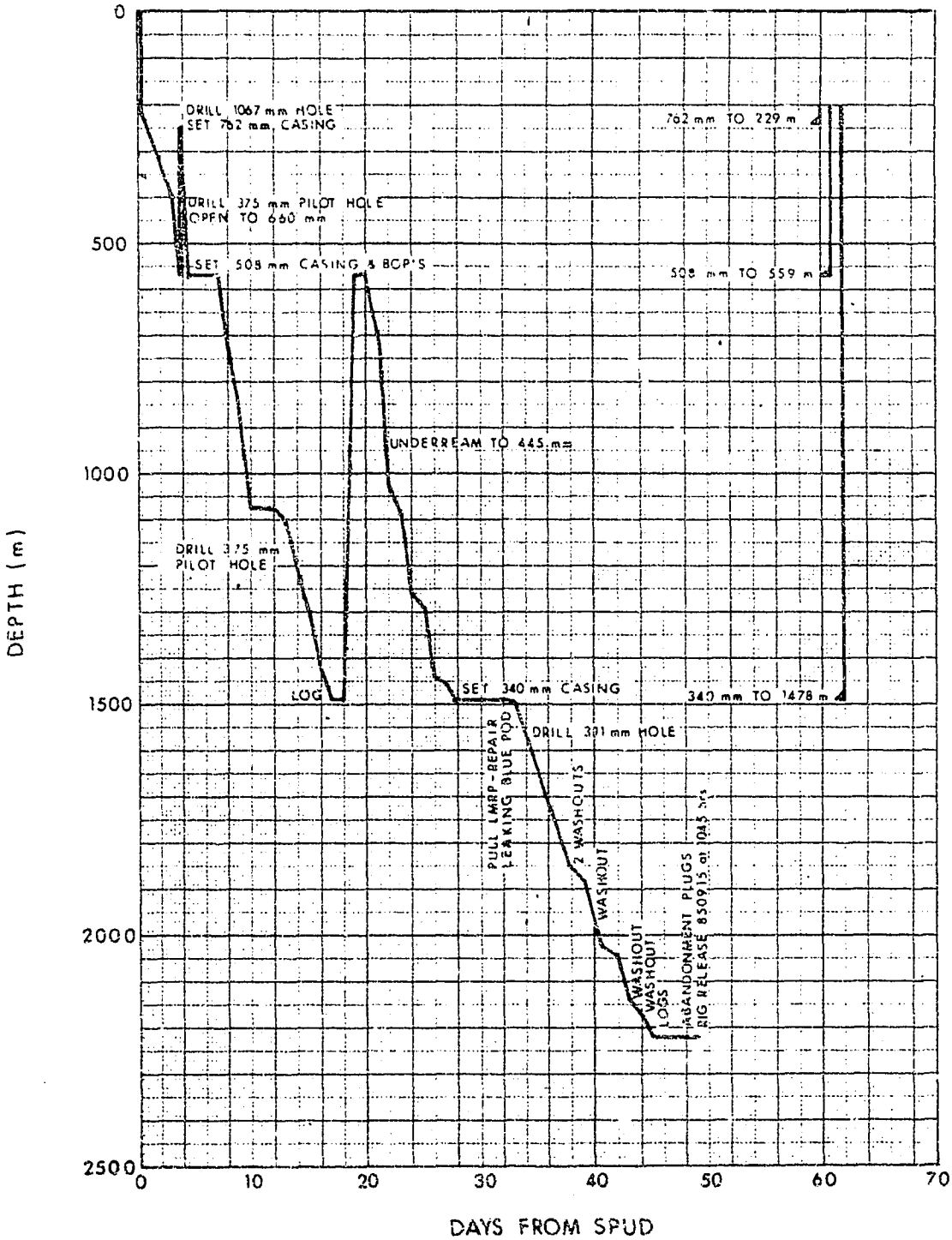
Hole Size (mm)	Casing Size (mm)	Shoe Depth (m)	Equivalent Mud Weight (kg/m^3)
444	508	558.7	3037
311	340	1477.9	2460

3.15 TIME DISTRIBUTION: see section 3.24

3.16 DEVIATION SURVEY: see section 3.22 of this section

3.17 ABANDONMENT PLUGS:

Plug No.	Interval	Felt	Plug Type
1	2215 - 2115m	No	12.4t Class "G" + 8% NaCl + 0.2% D-13
2A	1460m	Yes	Bridge Plug
2B	1457 - 1407m	No	5.0t Class "G" + 8% NaCl + 1% $CaCl_2$
3	250 - 200m	No	5.0t Clas "G" + 8% NaCl + 1% $CaCl_2$



Canterra

TRILLIUM SOQUIP ONEXCO ET AL BELUGA 0-23

DRILLING CURVE – ACTUAL

3.19 Mud Properties

CANTERRA ENERGY ET AL BELUGA O-23

TOTAL MATERIAL USAGE

PRODUCT SUMMARY REPORT FOR 08/07/85 TO 15/09/85

PRODUCT	UNIT WEIGHT	UNIT COST	DELIV'D	RETUR'D	USED	DAMAGED	ON HAND	T. COST
AMMBISUL	55GAL	696.11	12	0	0	0	12	0.00
BARITEBULK	MT	165.00	908.7	0	140.58	0	798.7	23195.70
BENTBULK	MT	256.00	149.34	0	51.34	0	110.5	13143.04
BICARB	100LB	37.50	40	0	16	0	24	600.00
BIOTROL	5GAL	130.04	20	0	4	0	16	520.16
B-FREE	60L	295.00	25	0	0	0	25	0.00
CAUSTIC	25KG	17.50	770	0	412	0	358	7210.00
CORE-VIS	50LB	100.00	210	0	180	0	1	18000.00
DFOAMER	55GAL	819.28	4	0	0	0	4	0.00
DEFOAMER	200L	784.00	4	0	2	0	2	1568.00
DRILLDETER	55GAL	1054.21	14	0	1	0	13	1054.21
DF-VIS	25KG	320.00	300	0	101	0	199	32320.00
FLR-100	25KG	128.00	420	0	37	0	383	4736.00
SUPERLO	25KG	132.00	150	0	0	0	150	0.00
FOAM KONTR	205L	1700.30	4	0	4	0	0	6801.20
KWIK SEAL	40LB	29.90	100	0	0	0	100	0.00
LIME	50LB	8.95	180	0	42	0	138	375.90
MICA-F	25KG	15.20	136	0	0	0	36	0.00
MICA-M	25KG	15.20	0	0	0	0	0	0.00
MICA-C	25KG	15.20	0	0	0	0	0	0.00
PELTEX	25KG	21.30	160	0	15	0	145	319.50
SALT	40KG	7.00	2940	0	2410	0	530	16870.00
SAWDUST	SK	4.95	100	0	0	0	100	0.00
SAPP	40KG	119.90	21	0	0	0	21	0.00
SODA ASH	40KG	24.00	164	0	126	0	38	3024.00
SPUD MUD R	25KG	208.00	264	0	94	0	170	19552.00
TECHNIFLOW	25KG	56.00	200	0	200	0	0	11200.00
TECHNIFLO	50LB	50.82	400	0	26	0	374	1321.32
TGUARD6000	200L	990.00	16	0	1	0	15	990.00
WALNUT-F	50LB	26.60	120	0	0	0	30	0.00
WALNUT-M	50LB	26.60	0	0	0	0	0	0.00
WALNUT-C	50LB	26.60	0	0	0	0	0	0.00

Material Cost = $162801.03

Engineering Cost: (52 Days @ $400.00 per Day) = 20800.00

Total Well Cost = $183,601.03

Canterra Energy et al Beluga O-23

SUGGESTIONS & RECOMMENDATIONS

42" Hole / 30" Casing

No problems were reported in this hole section. Gravel and rocks were encountered shortly after spudding; therefore, we would suggest that a viscous mud be used with an adequate viscosity to keep the hole clean.

14 3/4" Hole Opened to 26" / 20" Casing

This hole section was drilled / opened with viscous slugs as required.

No major problems were reported. Therefore, we recommend drilling any further wells in this area in the same manner.

14 3/4" Hole Opened to 17 1/2" / 13 3/8" Casing

In this hole section, the 20" shoe was drilled out with seawater; and the well was displaced to a seawater / polymer system.

Shortly after drilling out, large anhydrite and salt stringers were encountered causing minor problems with the seawater polymer system.

The system was then changed out to a saturated sodium chloride system. With the massive salt just under the shoe, we would suggest that a saturated system be used from under the shoe through to casing depth.

Another major problem reported throughout this section was slow underreaming of the 14 3/4" hole to 17 1/2" hole. Although not a problem on this well, Technifluids would suggest the density be controlled as low as possible with solids control equipment and whole mud dilution.

Finally, we feel that special consideration should be given to the large amount of anhydrite found throughtout this section. An adequate supply of products should be kept on hand such as Caustic, Soda Ash, and fluid loss control agents.

Canterra Energy et al Beluga O-23

SUGGESTIONS & RECOMMENDATIONS

12 1/4" Hole / Logging and Plug & Abandon

The 13 3/8" shoe was drilled out with the saturated salt system from the 17 1/2" hole section. High calcium content was reported throughout this section causing minor problems with controlling the fluid loss.

The only other major problem reported was a number of pipe failures in the form of wash out. Technifluids would recommend the use of a filming corrosion inhibitor throughout this section. This would help to lower the excessive pipe failure.

As in all sections of the well, we would again recommend the optimum use of solids control equipment in an effort to maintain the solids percentage as low as possible.

Technifluids

SUITE 612, 45 ALDERNEY DRIVE
DARTMOUTH, NOVA SCOTIA
B2Y 2N6

WELL NAME AND LOCATION BELUGA - O-23 HUNTON BAY

OPERATOR CANTERRA INTERVAL 0 - 3555'

CONTRACTOR NEODRILL #2 SPUD DATE 28 July 91

MUD ENGINEERS DEL KELLSEY/D COX MUD SYSTEM SPUDMUD

DRILLING MUD SUMMARY

DAY NUMBER	1	2	3	4	5	6	7	8	9	10	11	12	13
DATE	08/28	08/29	08/30	08/31	09/01	09/02	09/03	09/04	09/05	09/06	09/07	09/08	09/09
DEPTH (M (FT))	0	650	750	1200	1225	1734	1832	1833	1907	2492	3517	3555	3555
FLOWLINE SUCTION TEMP. (C F)	V			V	U			46°	52	55	67	64	52
FUNNEL VISCOSITY (S/L S/Q)	T			T		W		32	32	33	33	32	32
MUD DENSITY (KG/M LB/GAL)	C			C		D		8.6	8.8	9.5	10.2	10.2	10.2
PRESSURE GRADIENT (KPA/M PSI/FT)		C			C	E		.447	.457	.480	.530	.530	.530
PH (STRIP METER)		O			C		O	10.0	10.0	9.5	11.0	11.0	11.0
RHEOLOGY TEST TEMP. (C F)	S	S		S	S	D		-	-	-	-	-	
PLASTIC VISCOSITY (MPAS CPS)	L			L				4	4	5	6	6	6
YIELD POINT (PA LB/100FT²)	U				U		A	10	12	12	9	8	8
GEL STRENGTHS (PA LB/100FT²)	1	1	1	1	4	1	1	113	114	112	214	113	212
0/R (RPM--/--MPA lb/100FT²)	1	1	1	1	15	1	1	1	+	+	+	+	+
API FILTRATE (ML)							6	18	14	18	19	20	22
FILTER CAKE (32NDS ML)							26	THN	THN	THN	THN	THN	THN
HTHP TEST TEMP/TEST PRESS									+	+	+	+	+
HTHP FILTRATE (ML)									-	-	-	-	-
FILTER CAKE (32NDS ML)									-	-	-	-	-
VOLUME FRACTION SAND (Ø SAND)									TR	1/4	Ø	TR	TR
VOLUME FRACTION OIL (Ø OIL)									Ø	Ø	Ø	Ø	Ø
VOLUME FRACTION SOLIDS (Ø TS)									2	2.5	2.5	2.5	2.5
MBT (KG/M³ LB/BBL)								7	9	6	6	7.5	5
HIGH GRAVITY SOLIDS (KG/M³ LB/BBL)								Ø	Ø	Ø	Ø	Ø	Ø
BENTONITE AS GEL (KG/M³ LB/BBL)								7	7	6	6	7.5	5
DRILLED SOLIDS (KG/M³ LB/BBL)								Ø	11	19	24	22	25
ALKALINITY (PF/MF)	1	1	1	1	1	1	1	3/3	3/4	1.1/2	3/5	3/4	3/4
HYDROXYL (MG/L PPM)								182	40	Ø	24	68	68
BICARBONATE (MG/L PPM)								Ø	Ø	Ø	Ø	Ø	Ø
CARBONATE (MG/L PPM)								Ø	120	1200	240	120	120
CALCIUM (MG/L PPM)								380	370	900	900	1950	1850
MAGNESIUM (PPM MG/L)								20	20	140	135	240	160
CHLORIDES (PPM MG/L)								13,000	14,000	105,000	174,000	174,000	24,000
POTASSIUM (PPM MG/L)													
SS-800 POLYMER (KG/M³ LB/BBL)													
SULPHITE (PPM MG/L)													
LIGNOSULPHONATE (KG/M³ LB/BBL)													

SUMMARY OF ACTIVITY COMMENTS, OBSERVATIONS, PILOT

VISCOUS SLUGS WERE USED FOR THE 36", 14 3/4" AND 26" DRILLING.
DRILL 14 3/4" HOLE TO 4391
REAM TO 17 1/2" HOLE

ON DAYS # 9-10-11 SLUGS WERE SAL WITH NaCl, PRIOR TO DRILLING SA

Technifluids

SUITE 612, 45 ALDERNEY DRIVE
DARTMOUTH, NOVA SCOTIA
B2Y 2N6

WELL NAME AND LOCATION Beluga O-23 Hudson Bay
OPERATOR Can Terra INTERVAL 3555 — 4891
CONTRACTOR Neddrill #2 SPUD DATE 28 July 85
MUD ENGINEERS Del Kellsey / Donnell Cox MUD SYSTEM Saturated Salt

DRILLING MUD SUMMARY

DAY NUMBER	14	15	16	17	18	19	20	21	22 u/R	23	24 u/R	25	26	27	SUMMARY OF ACTIVITY COMMENTS, OBSERVATIONS, PILOT TESTS
DATE	8	9	10	11	12	13	14	15	16	17	18	19	20	21	
DEPTH (M FT ✓)	3555	3555	3628	4000	4210	4704	4891	4891	2136	4891	2360	3225	3609	4128	@ Drill 14 3/4 @ 4891
FLOWLINE SUCTION TEMP. (C F ✓)	64	52	65	71	68	77	80	70	72	78	77	80	82	77	
FUNNEL VISCOSITY (S/L S/Q ✓)	32	32	35	35	35	35	39	38	40	40	39	38	37	38	(2) Logg 4891
MUD DENSITY (KG/M LB/GAL ✓)	10.2	10.2	10.3	10.3	10.4	10.5	10.5	10.6	10.6	10.5	10.5	10.5	10.6	10.5	
PRESSURE GRADIENT (KPA/M PSI/FT ✓)	530	530	535	535	.540	.546	.546	.551	.551	.547	.547	.547	.551	.547	(3) Ream 17½ @ 4891
PH (STRIP MEYER)	11	11	10	11	11	11	9.5	10.5	9.5	9.0	9.5	10.0	11.0	10.5	Ream w/G
RHEOLOGY TEST TEMP. (C F ✓)	75	75	75	75	70	70	70	75	75	75	75	75	75	75	
PLASTIC VISCOSITY (MPAS CPS ✓)	6	6	6	6	8	8	12	12	13	14	12	12	10	11	(4) Ream 17½ @ 4128
YIELD POINT (PA LB/100FT ✓)	8	8	8	9	9	9	12	8	10	10	10	8	8	9	
GEL STRENGTHS (PA LB/100FT ✓)	1/2	2/2	2/4	3/6	4/7	2/5	4/8	1/4	3/7	3/6	2/6	2/6	2/5	2/6	
n/k (RPM--/--MPA lb/100FT²)	/	/	/	/	/	/	/	/	/	/	/	/	/	/	
API FILTRATE (ML)	20	22	35	34	39	47	20	26	29	28	31	36	36	30	
FILTER CAKE (32NDS IN.)	THIN	THIN	THIN	Med	Med	med	THIN	2	2	2	2	2	2	2	
HTHP TEST TEMP/TEST PRESS	/	/	/	/	/	/	/	/	/	/	/	/	/	/	
HTHP FILTRATE (ML)															Cox 21-27
FILTER CAKE (32NDS IN.)															Kellsey 14-21
VOLUME FRACTION SAND (% SAND)	TR	TR	TR	TR	TR	TR	1/8	1/8	1/4	TR	TR	TR	TR	TR	
VOLUME FRACTION OIL (% OIL)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
VOLUME FRACTION SOLIDS (% TS)	2½	2½	3	4	4½	4	5½	5	4½	3½	3½	3½	4¼	3½	
MBT (KG/M³ LB/BBL ✓)	7.5	5	5	5	5	5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	
HIGH GRAVITY SOLIDS (KG/M³ LB/BBL ✓)	0	0	0	0	5	5	5	5	4	0	0	5	0	0	
BENTONITE AS GEL (KG/M³ LB/BBL ✓)	7.5	5	5	5	5	5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	
DRILLED SOLIDS (KG/M³ LB/BBL ✓)	23	25	30	34	32	36	35	32	21	21	32	27	38	29	
ALKALINITY (PF/MF)	.2/.4	.3/.4	.2/.35	.3/.4	.3/.4	.3/.5	.15/.2	.15/.2	.15/.25	.1/.15	.1/.15	.3/.4	.4/.45	.3/.35	
HYDROXYL (MG/L PPM ✓)	68	68	34	68	68	34	34	34	17	17	17	68	119	119	
BICARBONATE (MG/L PPM ✓)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
CARBONATE (MG/L PPM ✓)	120	120	60	120	120	240	60	60	120	60	60	120	60	60	
CALCIUM (MG/L PPM ✓)	1950	1850	2400	2800	2900	[illegible]	2600	2600	2750	2400	3200	2800	2800	3000	
MAGNESIUM (PPM MG/L)	240	160	200	40	0	0	100	80	100	100	TR	TR	100	100	
CHLORIDES (PPM MG/L)	174,000	172,000	177,000	178,000	174,000	177,000	175,000	175,000	173,000	177,000	175,000	175,000	173,000	174,000	
POTASSIUM (PPM MG/L)															
SS-100 POLYMER (KG/M³ LB/BBL)															
SULPHITE (PPM MG/L)															
LIGNOSULPHONATE (KG/M³ LB/BBL)															

Technifluids

SUITE 612, 45 ALDERNEY DRIVE
DARTMOUTH, NOVA SCOTIA
B2Y 2N6

WELL NAME AND LOCATION Beluga D-23

OPERATOR Canterra — INTERVAL 4201 – 6074

CONTRACTOR Waddell #2 — SPUD DATE 28 Aug 85

MUD ENGINEERS Del Kellsey / D. Cox — MUD SYSTEM Saturated Salt

DRILLING MUD SUMMARY

DAY NUMBER	28	29	30	31	32	33	34	35	36	37	38	39	40	41
DATE Aug	22	23	24	25	26	27	28	29	30	31	1-Sept	2	3	4
DEPTH (M FT)	4201	4253	4689	4831	4849	4849	4849	4849	4914	5090	5313	5560	5876	6074
FLOWLINE SUCTION TEMP. (C F)	72	76	75	76	65	64	63	61	61	61	71	72	73	73
FUNNEL VISCOSITY (S/L S/Q)	29	28	39	40	40	38	38	38	35	35	35	35	36	38
MUD DENSITY (KG/M LB/GAL)	10.5	10.5	10.6	10.6	10.6	10.6	10.6	10.6	10.5	10.5	10.6	10.6	10.6	10.5
PRESSURE GRADIENT (KPA/M PSI/FT)	.547	.546	.551	.551	.551	.551	.551	.551	.546	.546	.551	.551	.551	.546
PH (STRIP METER)	10.5	11.0	11.0	11	10.0	10.0	10.0	10.0	11	11.5	11.5	11.5	11.5	11.5
RHEOLOGY TEST TEMP. (C F)	70	76	75	82	75	75	74	74	75	75	75	75	75	75
PLASTIC VISCOSITY (MPAS CPS)	12	10	11	12	11	10	10	10	10	8	8	7	7	8
YIELD POINT (PA LB/100FT²)	9	8	9	10	9	9	8	8	8	8	8	8	9	9
GEL STRENGTHS (PA LB/100FT²)	3/6	3/6	3/6	3/13	2/7	2/6	2/5	2/5	2/5	2/5	3/5	3/5	4/6	5/7
n/k (RPM=--/--MPA lb/100FT²)	1	3/1	1	1	1	1	1	1	1	1	1	1	1	1
API FILTRATE (ML)	31	34	39	38	38	39	40	39	41	38	22	26	29	31
FILTER CAKE (32NDS ML)	2	2	2	2	2	2	2	2	Thin	Thin	med	med	med	med
HTHP TEST TEMP/TEST PRESS	/	/	/	/	/	/	/	/	/	/	/	/	/	/
HTHP FILTRATE (ML)														
FILTER CAKE (32NDS ML)														
VOLUME FRACTION SAND (% SAND)	TR	TR	TR	TR	TR	TR	TR	TR	TR	TR	TR	TR	TR	0
VOLUME FRACTION OIL (% OIL)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VOLUME FRACTION SOLIDS (% TS)	3½	4	4½	5	5	5	5¼	5¼	5	5	5½	5½	5½	5
MBT (KG/M³ LB/BBL)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	5	5	5	5	5
HIGH GRAVITY SOLIDS (KG/M³ LB/BBL)	0	4	10	10	8	5	5	5	5	5	6	5	0	0
BENTONITE AS GEL (KG/M³ LB/BBL)	7.5	7	7	7	7.0	7	7	7	7.5	5	5	5	5	5
DRILLED SOLIDS (KG/M³ LB/BBL)	34	27	35	27	39	39	41	41	39	41.5	47	47	52	47
ALKALINITY (PF/MF)	.07/.45	.4/.45	.4/.5	.4/.5	.07/.2	.15/.25	.2/.3	.2/.3	.5/.7	.6/.7	.4/.6	.3/.5	.4/.5	.4/.5
HYDROXYL (MG/L PPM)	85	119	102	132	34	17	34	34	102	170	68	34	102	102
BICARBONATE (MG/L PPM)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CARBONATE (MG/L PPM)	120	60	120	120	160	120	120	120	240	120	240	240	120	120
CALCIUM (MG/L PPM)	3400	3400	3200	2700	3600	3200	3800	3800	4300	3600	2400	2650	2900	3000
MAGNESIUM (PPM MG/L)	80	80	80	80	100	100	80	80	110	100	80	100	40	60
CHLORIDES (PPM MG/L)	172000	170000	180000	172000	170000	172000	174000	174,000	175000	174,000	175000	175000	172000	175000
POTASSIUM (PPM MG/L)														
SS-100 POLYMER (KG/M³ LB/BBL)														
SULPHITE (PPM MG/L)														
LIGNOSULPHONATE (KG/M³ LB/BBL)														

SUMMARY OF ACTIVITY COMMENTS, OBSERVATIONS, PILOT TESTS

Reamed – 4201 to 4831

to Run 13 3/8 Casing

Set & Cemented @ 4849

Pulled Stack and

Washed on Wellhead

Drilled out 13 3/8

W.O. 12 1/4

Drilled 12 1/4

Leak-off Test @ 13 3/8

Formation Leak-off

20.8 MPa

Day No.
D. Cox 28-34
D. Kellsey 34-41

Technifluids

SUITE 612, 45 ALDERNEY DRIVE
DARTMOUTH, NOVA SCOTIA
B2Y 2N6

WELL NAME AND LOCATION Beluga O-23 Hudson Bay
OPERATOR CanTerra INTERVAL 6074 - TD
CONTRACTOR Neddeg. II #2 SPUD DATE 28 Aug 85
MUD ENGINEERS Del Kellsey MUD SYSTEM Saturated Sal

DRILLING MUD SUMMARY

DAY NUMBER	42	43	44	45	46	47	48	49	50	51	52			
DATE Sept 85	5	6	7	8	9	10	11	12	13	14	15			
DEPTH (M FT ✓)	6180	6430	6624	6720	7015	7122	7264	7267	7267	7267	7267			
FLOWLINE SUCTION TEMP. (C F ✓)	74	72	69	60	68	69	66	68	70	70	70			
FUNNEL VISCOSITY (S/L S/Q ✓)	38	37	36	35	35	35	35	35	35	35	35			
MUD DENSITY (KG/M LB/GAL ✓)	10.6	10.5	10.7	10.7	10.7	10.75	10.7	10.7	10.6	10.5	10.5			
PRESSURE GRADIENT (KPA/M PSI/FT ✓)	.651	.546	.556	.556	.556	.556	.556	.556	.551	.546	.546			
PH (STRIP METER)	11.5	11	11	11	10.5	10.5	11	11	11	10.5	10.5			
RHEOLOGY TEST TEMP. (C F ✓)	75	75	75	75	75	75	75	75	75	75	75			
PLASTIC VISCOSITY (MPAS CPS ✓)	9	9	10	9	7	8	8	8	8	8	8			
YIELD POINT (PA LB/100FT ✓)	10	9	8	7	8	8	7	7	7	6	6			
GEL STRENGTHS (PA LB/100FT ✓)	5/9	4/8	4/9	4/7	4/6	3/5	3/5	3/5	3/5	3/5	3/5	/	/	/
n/k (RPM--/--MPA LB/100FT ✓)	/	/	/	/	/	/	/	/	/	/	/	/	/	/
API FILTRATE (ML)	35	33	29.5	35	35	39	32	31	32	35	35			
FILTER CAKE (32NDS IN)	med	med	med	med	med	med	med	med	med	med	THIN			
HTHP TEST TEMP/TEST PRESS	/	/	/	/	/	/	/	/	/	/	/	/	/	/
HTHP FILTRATE (ML)														
FILTER CAKE (32NDS IN)														
VOLUME FRACTION SAND (% SAND)	0	0	0	0	0	0	0	0	0	0	0			
VOLUME FRACTION OIL (% OIL)	0	0	0	0	0	0	0	0	0	0	0			
VOLUME FRACTION SOLIDS (% TS)	5½	5	6½	6½	6½	6½	6½	6½	6	5	5			
MBT (KG/M³ LB/BBL ✓)	5	5	5	5	5	5	5	5	5	5	5			
HIGH GRAVITY SOLIDS (KG/M³ LB/BBL ✓)	0	0	0	0	0	0	0	0	0	0	0			
BENTONITE AS GEL (KG/M³ LB/BBL ✓)	5	5	5	5	5	5	5	5	5	5	5			
DRILLED SOLIDS (KG/M³ LB/BBL ✓)	52	50	55	55	55	55	55	55	51	42	41			
ALKALINITY (PF/MF)	.35/.5	.21/.25	.21.3	.15/.2	.15/.2	.15/.2	.3/.5	.31/.45	.31/.45	.31/.4	.31/.4	/	/	/
HYDROXYL (MG/L PPM ✓)	68	51	34	34	34	34	34	51	51	68	68			
BICARBONATE (MG/L PPM ✓)	0	0	0	0	0	0	0	0	0	0	0			
CARBONATE (MG/L PPM ✓)	180	60	120	60	60	60	240	180	180	120	1200			
CALCIUM (MG/L PPM ✓)	3900	4100	5000	7200	6700	7100	7600	8000	8100	8000	8000			
MAGNESIUM (PPM MG/L ✓)	90	150	40	110	80	80	90	150	90	70	70			
CHLORIDES (PPM MG/L ✓)	178,000	175,000	178,000	178,000	177,000	176,000	171,000	168,000	168,000	166,000	165,000			
POTASSIUM (PPM MG/L ✓)														
SS-100 POLYMER (KG/M³ LB/BBL ✓)														
SULPHITE (PPM MG/L ✓)														
LIGNOSULPHONATE (KG/M³ LB/BBL ✓)														

SUMMARY OF ACTIVITY CONTENTS, OBSERVATIONS, PILOT TE

(1) Drilled - Limestone - Anyhdrite Formations

(2) 5 x Trips for Wash outs

(3) Hole good on all Trips No fill

(4) Possible CaCl2 intrusion from 1875 m (6151 ft

Hole TD 7267

WELL: BELUGA 0-23

MUD REPORT - SECTION 1

DEPTH	TYPE----------	DENSITY IN	DENSITY OUT	VISC IN	VISC OUT	AV	PV	YP	GEL 0	GEL 10	WL	HTHP	PF	MF	PH
	SPUD MUD														
	SPUD MUD														
	CORE VIS	1020		175				80.0	1.0	3.0					
229.5	CORE VIS	1020													9.0
263.9	CORE VIS	1020		125			12.0	68.0		1.0					
~~394.7~~	~~COREVIS~~	~~1020~~		~~165~~			~~14.0~~	~~72.0~~		~~3.0~~					~~9.0~~
371.8	COREVIS	1020		130			14.0	65.0		3.0					9.0
571.4	CORVES	1044		125			11.0	66.0	2.0	4.0					9.5
571.4		1020		37			5.0	10.0	1.0	2.0	23.0		.70	.90	9.5
571.5		1032		32			4.0	10.0	1.0	3.0	18.0		.30	.30	10.0
723.9	SEAWATER/POLYMER	1104		35			5.0	12.0	2.0	5.0	16.0		.10	.20	10.0
~~829.0~~	~~SALT SATURATED~~	~~1200~~		~~33~~			~~5.0~~	~~10.0~~	~~1.0~~	~~3.0~~	~~16.0~~		~~.10~~	~~1.50~~	~~10.0~~
1071.9	SALT SATURATED	1224		33			6.0	9.0	2.0	4.0	19.0		.30	.50	11.0
1083.5	SALT SATURATED	1224		32			6.0	8.0	.3	.4	20.0		.30	.40	11.0
1083.5	SALT SATURATED	1224		32			6.0	8.0	2.0	2.0	22.0		.30	.40	11.0
1105.8	SALT SATURATED	1236		35			6.0	8.0	2.0	4.0	25.0		.20	2.50	10.0
1219.1	SALT SATURATED	1236		35			6.0	9.0	3.0	6.0	34.0		.30	.40	11.0
~~1286.8~~	~~SALT,SATURATED~~	~~1248~~		~~35~~			~~8.0~~	~~9.0~~	~~4.0~~	~~7.0~~	~~39.0~~		~~.30~~	~~.40~~	~~11.0~~
1434.9	SALT SATURATED	1260		35			8.0	9.0	2.0	5.0	27.0		.30	.50	11.0
1491.6	SALT, SATURATED	1260		39			12.0	12.0	4.0	8.0	20.0		.15	.20	12.0
1491.6	SALT SATURATED	1273		38			12.0	8.0	1.0	4.0	26.0		.20	.20	10.5
651.0	SALT SATURATED	1273		40			13.0	10.0	3.0	7.0	27.0		.15	.25	9.5
1488.0	SALT SATURATED	1261		40			14.0	10.0	2.0	6.0	28.0		.10	.15	9.0
~~724.6~~															
1028.6	SALT SATURATED	1261		38			12.0	8.0	2.0	6.0	36.0		.30	.40	10.0
1096.3	SALT SATURATED	1272		37			10.0	8.0	2.0	5.0	36.0				11.0
1261.8	SATURATED SALT	1260		38			11.0	9.0	2.0	6.0	30.0				10.5
1295.6	SATURATED SALT	1261		39			12.0	9.0	3.0	6.0					
1387.6	SATURATED SALT	1260		38			10.0	8.0	3.0	6.0	34.0				11.0
~~1461.4~~	~~SATURATED SALT~~	~~1272~~		~~39~~			~~11.0~~	~~9.0~~	~~3.0~~	~~6.0~~	~~39.0~~				~~11.0~~
1491.0	SATURATED SALT	1272		40			12.0	10.0	3.0	8.0	38.0				11.0
1491.0	SATURALTED SALT	1272		40			11.0	9.0	2.0	7.0	38.0				
1477.9															
1477.9															
1477.9															
~~1479.0~~	~~SATURATED SALT~~	~~1261~~	~~1261~~	~~35~~	~~36~~		~~10.0~~	~~8.0~~	~~2.0~~	~~5.0~~	~~41.0~~				~~11.0~~
1553.1	SATURATED SALT	1260		35			8.0	8.0	2.0	5.0	38.0				11.5
1619.6	SATURATED SALT	1272		35			8.0	8.0	3.0	5.0	22.0				11.5
1696.4	SATURATED SALT	1272		35			7.0	8.0	3.0	5.0	26.0		.40	.50	11.5
1790.0	SATURATED SALT	1272	1272	36			7.0	8.0	4.0	6.0	29.0		.40	.50	11.5

WELL: BELUGA 0-23

MUD REPORT - SECTION 1

DEPTH	TYPE----------	DENSITY IN	DENSITY OUT	VISC IN	VISC OUT	AV	PV	YP	GEL 0	GEL 10	WL	HTHP	PF	MF	PH
1851.2	SATURATED SALT	1272	1284	38			8.0	9.0	5.0	7.0	31.0		.40	.50	11.5
1883.2	SATURATED SALT	1272	1272	38			9.0	10.0	5.0	9.0	35.0		.40	.50	11.5
1959.8	SATURATED SALT	1272	1272	37			9.0	9.0	4.0	8.0	33.0		.20	2.50	11.0
2024.3	SATURATED SALT	1272	1272	36			10.0	8.0	4.0	9.0	29.5		.20	.30	11.0
2046.0	SATURATED SALT	1284		35			9.0	7.0	4.0	7.0	35.0		.10	.20	11.0
2138.0	SATURATED SALT	1284	1284	35			7.0	8.0	4.0	6.0	35.0		.10	.20	10.5
2171.0	SATURATED SALT	1284		35			9.0	8.0	3.0	5.0	39.0		.10	.20	10.5
2214.9	SATURATED SALT	1284		35			8.0	7.0	3.0	5.0	32.0		.20	.30	10.5
2214.9	SALT SATURATED	1284		35			8.0	7.0	3.0	5.0	31.0		.30	.45	11.0
2214.9	SALT SATURATED	1272		35			8.0	7.0	3.0	5.0	32.0		.30	.40	11.0
2214.9	SALT SATURATED	1260		34			8.0	6.0	3.0	5.0	35.0		.30	.40	10.5
	SALT SATURATED	1260		35			8.0	6.0	3.0	5.0	35.0		.30	.40	10.5

WELL: BELUGA U-23 MUD REPORT - SECTION 2

DEPTH	MBT	OIL %	SOLID %	SAND %	CHLOR	K+	CA+	VOLUME HOLE	SURF	DUMP	STANDBY VOL	KILL DEN
											74	1234
											74	1212
229.5											74	1284
263.9									207.0		151	
394.7									158.0	143	71	
371.8									158.0	79	79	1248
571.4									15.0		76	1248
571.4					19200		200				63	1020
571.5	7.0				17000		380		158.0		63	1260
723.9	7.0		2.5	.1	65000		800	101	158.0	27	65	1260
829.0	6.0		2.5	.1	150000		900	115	158.0	4	63	
1071.9	6.0		2.5		174000		900	134	158.0	47	63	1476
1083.5	7.5		2.5	.1	174000		1950	106		7	63	1476
1083.5	5.0		2.5	.1	172000		1850	107	158.0		63	1476
1105.8	5.0		3.0	.1	177000		2400	135	158.0	6	63	1465
1219.1	5.0		4.0	.1	178000		2800	148	158.0	7	63	1465
1286.8	5.0		4.5	.1	174000		2900	156	231.0	23	63	1465
1434.9	5.0		4.0	.1	177000		2500	168	158.0	21	63	1464
1491.6	7.5		4.0	.1	175000		2600	161	158.0	15	63	1500
1491.6	7.5		5.0	.1	175000		26000	200	159.0		64	1513
651.0	7.5		4.5	.2	173000		2750	193	159.0	3	64	1501
1488.0	7.5		3.5	.2	177000		2800	237	144.0	12	64	1501
724.6												
1028.6	7.5		3.5	.2	175000		2800	219	159.0	1	53	1501
1096.3	7.5		4.0	.1	173000		2800	233	149.0	8	55	1500
1261.8	7.5		3.5	.1	171000		3500	226	158.0	4	54	1500
1295.6	7.5		3.5		172000		3400	236	16.0			
1387.6	7.5		4.0	.1	175000		3400	238	158.0	19		
1461.4	7.5		4.5	.1	180000		3200	240	152.0	9	47	1500
1491.0	7.5		5.0	.1	179000		3700	236	158.0	5	35	1500
1491.0	7.5		5.0	.1	178000		3600	99	158.0	2	63	1500
1477.9												
1477.9												
1477.9												
1498.0	7.5		5.0	.1	175000		4300	127	16.0	10	63	1501
1553.1	5.0		5.0	.1	174500		3600	128	158.0	6	63	1500
1619.6	5.0		5.5	.1	175000		2400	139	158.0	15	63	1500
1696.4	5.0		5.5	.1	175000		2650	139	124.0	3	63	1512
1790.0	5.0		5.5		177000		2900	124	158.0	11	63	1512

WELL: BELUGA O-23 MUD REPORT - SECTION 2

DEPTH	MBT	OIL %	SOLID %	SAND %	CHLOR	K+	CA+	VOLUME HOLE	VOLUME SURF	DUMP	STANDBY VOL	KILL DEN
1851.2	5.0		5.0		175000		3000	145	158.0	8	63	1512
1883.2	5.0		5.0		178000		3900	145	143.0	26	63	1512
1959.8	5.0		5.0		175000		4100	153	158.0	9	63	1512
2024.3	5.0		6.0		178000		5000	155	144.0	19	63	1512
2046.0	5.0		6.5		178000		5900	158	158.0	23	63	1536
2138.0	5.0		6.5		174000		6700	165	158.0	15	63	1548
2171.0	5.0		6.5		176000		7100	168	143.0	9	63	1284
2214.9	5.0		6.5		171000		7500	143	123.0	17	55	1536
2214.9	5.0		6.5		168000		8000	184	157.0	7	63	1524
2214.9	5.0		6.0		168000		8100	184	157.0		63	1524
2214.8	5.0		5.0		166000		8000		158.0	158	63	1500
					165000		8000		158.0	7	63	

WELL: BELUGA O-23 MUD REPORT - SECTION 3

DATE	DEPTH	ADDED PRODUCTS
85/07/26		CORE VIS 405X,FORM CONTROL - 1 DRUM,CAUSTIC - 145X
85/07/27		CORE VIS - 295X,BARITE
85/07/28		BARITE- 10 TONS, GEL - 2 TONS
85/07/29	229.5	BARITE 5 TONS, GEL 4 TONS, CAUSTIC 5 SX, CORE VIS 20 SX, D-FOAM 1
85/07/30	263.9	GEL 3T, CAUSTIC 25X, CORE VIS-5, SMR-35
85/07/31	394.7	GEL, -2, CAUSTIC -5, COREVIS - 24 , SMR - 9 (VOLUMESBBL SURFACE IS 1435)
85/08/01	371.8	CAUSTIC - 2, COREVIS 78, SMR-220 (VOLUMEBBL SURFACE IS 1400)
85/08/02	571.4	CAUSTIC 3, COREVIS (DUMPED VOL - 1820 BBL)
85/08/03	571.4	GEL 7,CAUSTIC - 7 FLR100 - 7
85/08/04	571.5	BARITE-25,GEL 4,CAUSTIC 11,FLR-100-5,DFVIS-8(VOLUMES SURFACE 1700)
85/08/05	723.9	BAR-10,GEL-3,CAUSTIC 24,FLR-100-18,DFVS-16,SODA ASH-5 (VOLUME SURFACE 1460)
85/08/06	829.0	BAR-2, GEL-3, CAUSTIC 13, DFVIS-2, LIME=8,SALT 560 VOLUMES SURFACE 1638 BBLS.
85/08/07	1071.9	BAR-12, GEL-3, CAUSTIC-37, FLR 100-5, DF VIS-2, LIME-10,SALT570 VOLUMES(BBL) SURFACE 1506
85/08/08	1083.5	CAUSTIC 2, FLR 100 2, DF VIS 1 (SURFACE VOLUME - 1619 BBLS)
85/08/09	1083.5	NIL (VOLUMES BBL SURFACE 3504)
85/08/10	1105.8	CAUSTIC 11, LIME 7, TECHNIFLO-14, SODA ASH= 9 (VOLUMES BBL SURFACE 1407)
85/08/11	1219.1	BAR-9, GEL-3, CAUSTIC-17, DFVIS-13, SALT-50, LIME-6, TECHNIFLI-54. (VOLUMES BBL SURFACE 1409)
85/08/12	1286.8	GEL-3,CAUSTIC-20,DF VIS-4,LIME-9,TECHNIFLO-13,SODA ASH-6
85/08/13	1434.9	BAR-2, CAUSTIC-4, DF VIS-15, LIME-1, TECHNIFLO-12, SODA ASH-29 (VOLUMES BBL - SURFACE 2357)
85/08/14	1491.6	BAR-2,GEL-3, CAUSTIC-14, DF VIS-2, SALT-50, SODA ASH-1 VOLUMES BBL: SURFACE 1436
85/08/15	1491.6	FOAM KONTROL - 1
85/08/16	651.0	CAUSTIC - 1
85/08/17	1488.0	CAUSTIC 10, SALT 100
85/08/19	1028.6	CAUSTIC - 29, DFVIS - 1, TECHNIFLO - 3, SODA ASH - 9. (SURFACE VOLUME 1057)
85/08/20	1096.3	BARITE - 3T, CAUSTIC - 12, DF-VIS - 11 SX, TECHNIFLO - 30
85/08/21	1261.8	BARITE - 4T CAUSTIC - 24 DF - VIS - 7
85/08/22	1295.6	GEL - 3T CAUSTIC - 19
85/08/23	1387.6	CAUSTIC-31, DF-VIS-10, TECHNIFLO-31, SODA ASH 9SX VOLUMESbbl SURFACE SHOULD BE 1050)
85/08/24	1461.4	CAUSTIC - 10, DF-VIS-2, SALT-150
85/08/25	1491.0	CAUSTIC - 2 (VOLUMESbbl SURFACE SHOULD BE = 1050)
85/08/26	1491.0	GEL-1T, SALT-42, BICARB-14, (VOLUMESbbl- SURFACE = 1700)
85/08/31	1553.1	CAUSTIC - 7, SALT - 183, SODA ASH - 10 VOLUMESbbl SURFACE SHOULD BE = 1050
85/09/01	1619.6	CAUSTIC-8, SALT - 50, TECHNIFLO - 35, SODA ASH - 8 VOLUMES BBL SURFACE SHOULD BE = 1000
85/09/02	1696.4	CAUSTIC - 2 , FOAM KONT 1
85/09/04	1851.2	8 M TONNE BARITE, 3 GEL, 1 CAUSTIC SODA. VOLUMES bbl SURFACE SHOULD BE 1040

WELL: BELUGA O-23 MUD REPORT - SECTION 3

DATE	DEPTH	ADDED PRODUCTS
85/09/05	1883.2	5 MT BARITE, 2 MT GEL, 2 CAUSTIC, 30 SALT.
85/09/06	1959.8	4 CAUSTIC, 120 SALT, 20 SODA ASH, 6 PELTEX VOLUMES BBl SURFACE SHOULD BE 1000
85/09/07	2024.3	2 MT GEL, 7 CAUSTIC, 2 DF - VIS, 1 BIOTROL, 3 PELTEX
85/09/08	2046.0	14 CAUSTIC SODA, 60 SALT, 10 TECHNIFLO, 6 DELTEX, 1 TECHNIGARD
~~85/09/09~~	~~2138.0~~	~~6 CAUSTIC, 1 DF-VIS, 11 TECHNIFLO, 6 SODA ASH~~
85/09/10	2171.0	6 CAUSTIC
85/09/11	2214.9	BARITE 2T CAUSTIC 10 SALT 20 FOAM CONTROL 1 LINE 1
85/09/12	2214.9	NIL
85/09/13	2214.9	BIOTROL - 1
85/09/14	2214.8	SALT 20. (VOLUMES BBL: SURFACE 1150)
~~85/09/15~~		~~BAR 14, GEL 2. (VOLUMES BBL: SURFACE 1100)~~

AUTOREPORT

FFLINE TOC
EOSERVICES

WELL: BELUGA U-23

BIT RECORD
SHEET NO. 1.00

NO.	SQ	TYPE	SIZE	NOZZLES /32''	IN m	OUT m	MTG m	TIME hr:mn	DEV deg	WOB klbs	RPM	FLOW gpm	SPP psi	REV x1000	T	B	G	COST $	$/M STD	MW ppg	REMARKS
1	1	HTC OSC3AJ	26"	3x24	193.5	229.5	36.00	20:25		7.2	75	1150	1965		2	4	In		3713.	8.5	PILOT HOLE + 42" HOLE OPENER.
2	2	HTC OSC3AJ	26"	OPEN	229.5	231.5	2.00	1:00							1	1	In		-	8.5	DRILL CEMENT + SHOE ONLY.
3	3	SMT SDT	14.75"	3x18	231.5	571.5	340.0	24:00		27	95	1050	2500		3	3	In	4000	414.5	8.5	PILOT HOLE.
4	4	SMT DSJ	26"	3x22	231.6	571.5	339.9	24:30		27	105	1135	1960		3	6	In	17870	421.5	8.7	HOLE OPENING.
5	5	HTC OSC3AJ	14.75"	3x22	571.5	767	195.5	16:52		34	110	1100	2050		3	5	In	4000	602.9	9.2	
6	6	SMT SDT	14.75"	3x22	767	1082	315.0	25:00		35	115	1080	2620		6	4	In	4000	505.3	10.2	
7	7	HTC J22	14.75"	3x24	1082	1106	24.00	3:47		39	90	1100	2770		1	1	In	32000	2262.	10.3	PULLED ON HIGH TORQUE + LOW ROP.
8	8	HTC R3	14.75"	3x24	1106	1267	161.0	18:00		32	110	1080	2820		3	6	In	4000	683.5	10.3	PULLED ON LOW ROP.
9	9	SMT F3	14.75"	3x24	1267	1491.9	224.9	39:33		45	71	1000	2870		2	3	In	17000	932.3	10.4	TO CASING/LOGGING POINT.
UR 1	10	D. BOART	17.5	20-20-22	558.6	1491.9	933.3	11:10		1.4	93	914	2640		-	-	84	14000	124.8	10.6	ABORTIVE HOLE OPENING. BADLY UNDERG
UR 2	11	TRI-STATE	17.5"	25-25-26	555	910	355.0	13:21		4.5	80	1010	2815		4	8	In		278.9	10.6	POOH FOR WASHOUT.
UR 3	12	TRI-STATE	17.5"	25-25-26	910	1073	163.0	6:57		10.5	60	950	2950		-	-	-		380.5	10.6	HIGH TORQUE. POOH TO CHECK.
UR 4	13	TRI-STATE	17.5"	25-25-26	1073	1099.3	26.30	7:07		11.3	64	918	2786		-	-	-		1565	10.6	SLOW ROP. MODERATE TORQUE.
UR 5	14	TRI-STATE	17.5"	25-25-26	1099.3	1201	101.7	7:36		6.7	75	900	2720		-	-	-		585.4	10.6	
UR 6	15	BULLNOSE	17.5"	1x32	1201	1262.5	61.50	5:42		8.6	103	940	2430		-	-	-		803.5	10.6	
UR 7	16	D. BOART	17.5"	3x20	1262.5	1262.5	0.00	-		-	-	-	-		-	-	-		-	-	WOULD NOT START REAMING. NO WOB/TORQ
UR 8	17	BULLNOSE	17.5"	1x32	1262.5	1296.2	33.70	4:43		11	100	975	2620		4	8	In		1398.	10.5	
UR 9	18	TRI-STATE	17.5"	20-20-22	1296.2	1310.4	14.20	4:33		8.3	70	855	2800		6	7	In		3191	10.5	
UR10	19	TRI-STATE	17.5"	3x22	1310.4	1433.2	122.8	11:15		10.5	100	880	2955		5	7	In		606.2	10.5	
UR11	20	BULLNOSE	17.5"	1x32	1433.2	1461.7	28.50	5:17		12.2	90	873	2367		6	8	0		1410.	10.5	POOH for TORQUE.UNDERGAUG
UR12	21	BULLNOSE	17.5"	1x32	1461.7	1491.2	29.50	4:15		6.6	77	870	2450		6	6	In		1331.	10.6	POOH for CASING.
10	22	HUGHES XDV	12.25	3x13	1491.2	1494	2.80	2:30		18	100	565	2710		6	8	In	6000	2142	10.6	DRILL CEMENT+SHOE+RAT HOLE
11	23	SMITH SD6	12.25	3x15	1494	1553	59.00	15:30		38.7	101	678	2774		5	2	In	6000	1763	10.6	WORK JUNK SUB.DRILL AHEAD
12	24	SMITH F3	12.25	3x14	1553	1790.3	237.3	59:36		57.5	69	615	2828		4	3	In	15000	1242	10.7	CHANGE OUT BIT.
13	25	SMITH F3	12.25	3x14	1790.3	1868.8	78.50	15:24		58.7	81	611	2881		2	2	In	15000	1368	10.6	WASHOUT IN HWDP CROSSOVER
14	26	HTC J33	12.25	3x14	1868.8	2018.8	150.0	37:12		51.5	71	571	2561		3	3	In	15000	1579	10.7	WASHOUT IN DRILL COLLAR.

OFFLINE TDC
GEOSERVICES

WELL: BELUGA O-23

BIT RECORD
SHEET NO. 2.0

NO.	SQ	TYPE	SIZE	NOZZLES /32''	IN m	OUT m	MTG m	TIME hr:mn	DEV deg	WOB klbs	RPM	FLOW gpm	SPP psi	REV x1000	T	B	G	COST $	$/M STD	MW ppg	REMARKS
15	27	SMITH F4	12.25	3x14	2018.8	2171.7	152.9	37:30		63	79	636	2946		2	2	In	15000	1261	10.7	WASHOUT IN HWDP & DP
16	28	SMITH F4	12.25	14-14-15	2171.7	2215	43.3	9:13		67.5	78	648	2900		3	2	In	15000	2322	10.7	TD of WELL @ 2215m

CASING & CEMENTING REPORT

Canterra Energy Ltd.

SUMMARY

Well: Beluga O-23 Rig: Neddrill II Date: 85-07-30
Hole Size: 42" Depth: 753 Units: API
Casing Size: 30" Shoe Depth: 750 Top Hgnr or WH: 628.6'
K.B. to Sea Floor: 635' Water Depth: 590'

WELL CONDITION

Hole Problems: Formations very hard right from sea floor. Drilling very slow therefore only 3 joints of casing were run

Deviation: 1/2° ; 3/4° maximum

Losses Gains:

Mud Type: HI VUS Pills Mud Weight: 10.7 Viscosity: 200

Comments: Bullseye on guidebase 0°. Hole circulated to weighted mud after flushing with viscous pills

CASING

ITEM/TYPE	CONNECTION	AVG. TORQUE	GRADE	WEIGHT	NO. JOINTS	LENGTH	CUMULATIVE
UNITS				(lb/ft)		(ft)	(ft)
SHOE Joint	ALT 2	-	5LB	310	1	40.23	40.23
Int. Joint	ALT 2	-	5LB	310	1	38.52	78.75
30" WH Extension	ALT 2	-	5LB	500	1	40.50	119.25
					(ext)	2.17	121.43

Wellhead Type: 16 3/4" Vetco SG5, 10K Hangoff Point: 629' for 16 3/4" Housing

Hanger Type: - Lock Ring: -

Other Equipment: GRA

Running String: 5" 19.5# S-135 Drillpipe

Running Problems: Encountered fill at 718 ft. Had to circulate to bottom

CEMENTING

SLURRY	COMPOSITION	DENSITY	VOLUME	THEORETICAL TOP
UNITS		ppg	bbl	
SPACER	Mix water	8.5	20	sea floor
LEAD				
TAIL	45t Class "G" + 2% $CaCl_2$	16.5	180	sea floor

TIMES. Start Mixing: 07:45 Start Displacing: 08:31 Finish Displacing: 08:51

Displacement Fluid: sea water Rate: 3 Volume: 30.3

Plugs Used: none; cement stinger

Plug Bump: - Pressure: -

Problems: T.O.C. on drill out at 742'

CASING & CEMENTING REPORT

Canterra Energy Ltd.

SUMMARY

Well: Beluga O-23 Rig: Neddrill II Date: 85-08-03
Hole Size: 26" Depth: 1875' Units:
Casing Size: 20" Shoe Depth: 1832' Top Hgnr or WH: Top: 625'
K.B. to Sea Floor: 635' Water Depth: 590'

WELL CONDITION

Hole Problems: none

Deviation: 0.75°

Losses Gains:
Mud Type: spud mud Mud Weight: 8.4 Viscosity: 125
Comments: Circulated to viscous mud prior to cementing

CASING

ITEM/TYPE	CONNECTION	AVG. TORQUE	GRADE	WEIGHT	NO. JOINTS	LENGTH	CUMULATIVE
UNITS				lb/ft			
SHOE Joint	LS		X56	133	1	44.54	44.54
20" Casing	LS		X56	133	27	1099.38	1143.92
Crossover Joint	LS/ALT2		X56	133	1	41.01	1184.96
Wellhead Joint	ALT2				1	21.79	1206.75
Total					30	1206.76	1206.76

Wellhead Type: Vetco 16 3/4" SG-5 Hangoff Point: 629' in 30" housing
Hanger Type: Lock Ring:
Other Equipment: none

Running String: 5" 19.5 #/ft S-135 Drillpipe
Running Problems: none

CEMENTING

SLURRY	COMPOSITION	DENSITY	VOLUME	THEORETICAL TOP
UNITS		ppg	bbl	ft
SPACER	seawater	8.7	100	
LEAD	Class "G" + 2.5% PHG + 0.5% D-65	13.	350	sea floor
TAIL	Class "G" + 2% $CaCl_2$	16.5	175	1180

TIMES: Start Mixing: 11:30 Start Displacing: 13:15 Finish Displacing: 13:25
Displacement Fluid: sea water Rate: 5 bpm Volume: 48.5 bbl
Plugs Used: none - cement stinger
Plug Bump: Pressure:
Problems: none

CASING & CEMENTING REPORT

** english units

Canterra Energy Ltd.

SUMMARY

Well: Beluga 0-23 Rig: Neddrill II Date: 85-08-26

Hole Size: 17.5" Depth: 4892 Units:

Casing Size: 13 3/8" Shoe Depth: 4849' Top Hgnr or WH: 630.6'

K.B. to Sea Floor: 635 Water Depth: 590

WELL CONDITION

Hole Problems: none

Deviation: 0.75°

Losses Gains: n/a

Mud Type: sat. saltwater Mud Weight: 10.6 Viscosity: 40

Comments:

CASING

ITEM/TYPE	CONNECTION	AVG. TORQUE	GRADE	WEIGHT	NO. JOINTS	LENGTH	CUMULATIVE
UNITS							
SHOE	Butt	14,000					
2 joints	"	14,000	C-95	72#	2	80.51	80.51
Float	"	14,000	&				
108 joints	"	11,000	K-95		108	4128.62	4209.13
HGR & Pup	"	11,000			1	10.70	4219.83

Wellhead Type: Vetco Hangoff Point: 630.6 ft RKB

Hanger Type: SG5 Type "T" Lock Ring: Not run

Other Equipment:

Running String: 5" "S" 135 19.5# Drill pipe

Running Problems: Casing packoff hard to torque up. Will use 5" HWDP

CEMENTING

SLURRY	COMPOSITION	DENSITY	VOLUME	THEORETICAL TOP
UNITS		ppg	bbls	ft
SPACER	saturated salt water	8.5	50	
LEAD	"G" + 3.5% Gel + 10% NaCl	12.6	480	1640
TAIL	"G" + 34% NaCl	15.8	92	4360

TIMES. Start Mixing: 10:05 Start Displacing: 13:16 Finish Displacing: 14:15

Displacement Fluid: Mud Rate: 10 BPM Volume: 622 bbls

Plugs Used: Top

Plug Bump: Yes Pressure: 3000 psi

Problems: None

3.22 Deviation and Surveys
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WELL REPORT

FIELD: BELUGA

WELL NO.: O-23

SURVEY NUMBER	RUN NUMBER	MEASURED DEPTH(F)	INCLINATION DEGREES	AZIMUTH DEG TRUE	TOTAL MAG FLUX	TOOL TEMP DEG C	DATE	TIME
							TIE-IN	4: 3
0	0	635.00	0.00	0.00			7-27-85	12: 0
1	0	689.00	.50	0.00			7-27-85	12: 0
2	0	753.00	.75	0.00			7-30-85	22: 1
3	1	762.00	.43	326.48	1.277	11.8	7-31-85	0:46
4	1	826.00	.22	108.92	1.194	10.3	7-31-85	4:42
5	1	984.00	.10	244.97	1.195	10.8	7-31-85	7:13
6	1	1077.00	.22	281.08	1.192	11.3	7-31-85	15:22
7	1	1360.00	.40	331.92	1.187	10.3	7-31-85	23:15
8	1	1643.00	.22	38.40	1.192	10.3	8- 1-85	3:41
9	1	1857.00	.05	88.92	1.191	10.8	8- 1-85	15:42
10	1	828.00	.45	327.37	1.199	9.3	8- 5-85	13:42
11	2	1900.19	.13	247.85	1.192	17.5	8- 5-85	14: 4
12	2	1931.00	.25	264.83	1.189	17.5	8- 5-85	16:15
13	2	2028.50	.17	193.40	1.188	18.0	8- 5-85	17: 4
[illegible]	2	2058.00	.28	186.08	1.189	18.5	8- 5-85	17:36
[illegible]	2	2089.42	.23	171.90	1.188	18.5	8- 5-85	18:10
16	2	2121.00	.57	165.62	1.187	18.5	8- 5-85	18:42
17	2	2152.30	.32	268.83	1.189	18.5	8- 5-85	19:16
18	2	2180.90	.03	49.07	1.185	18.5	8- 5-85	21: 5
19	2	2243.22	.20	176.57	1.188	19.0	8- 6-85	0:55
20	2	2306.45	.12	123.85	1.188	22.0	8- 6-85	9:37
21	2	2368.89	.17	219.05	1.182	22.5	8-11-85	13:21
22	5	3595.72	.05	111.23	1.191	25.5	8-11-85	14:18
23	5	3628.20	.25	54.05	1.192	26.5	8-11-85	16:47
24	5	3721.20	.20	129.62	1.190	28.5	8-11-85	17:58
25	5	3752.90	.30	73.85	1.192	28.5	8-11-85	20:45
26	5	3847.60	.43	160.62	1.184	30.0	8-11-85	22:49
27	5	3879.19	.58	104.78	1.191	28.5	8-12-85	1:17
28	5	3941.00	.35	122.32	1.192	31.6	8-12-85	1:49
29	5	3972.84	.27	161.45	1.194	31.6	8-12-85	2:45
30	5	4001.14	.28	152.13	1.194	31.6	8-12-85	4:46
31	5	4032.67	.37	90.35	1.191	32.1	8-12-85	7:33
32	5	4064.26	.30	165.32	1.192	32.6	8-12-85	20:32
33	5	4096.40	.38	182.15	1.181	30.0	8-12-85	23:32
34	5	4127.43	.43	301.00	1.198	32.1	8-13-85	1:16
35	5	4159.28	.30	124.87	1.196	33.6	8-13-85	5:46
36	5	4221.38	.55	198.08	1.199	34.1	8-13-85	7:26
37	5	4252.84	.48	155.65	1.193	35.6	8-13-85	8:31
38	5	4284.37	.48	171.87	1.193	36.1	8-13-85	9:46
39	5	4315.98	.60	185.87	1.191	36.1	8-13-85	12:22
[illegible]	5	4378.44	.70	225.15	1.191	36.6	8-13-85	16:15
[illegible]	5	4472.73	.50	167.20	1.190	35.6	8-13-85	17:24
42	5	4503.74	.72	151.90	1.192	36.1	8-13-85	18:50
43	5	4535.20	.38	193.97	1.194	36.1	8-13-85	21:46
44	5	4596.55	.35	157.35	1.193	34.6		

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WELL REPORT

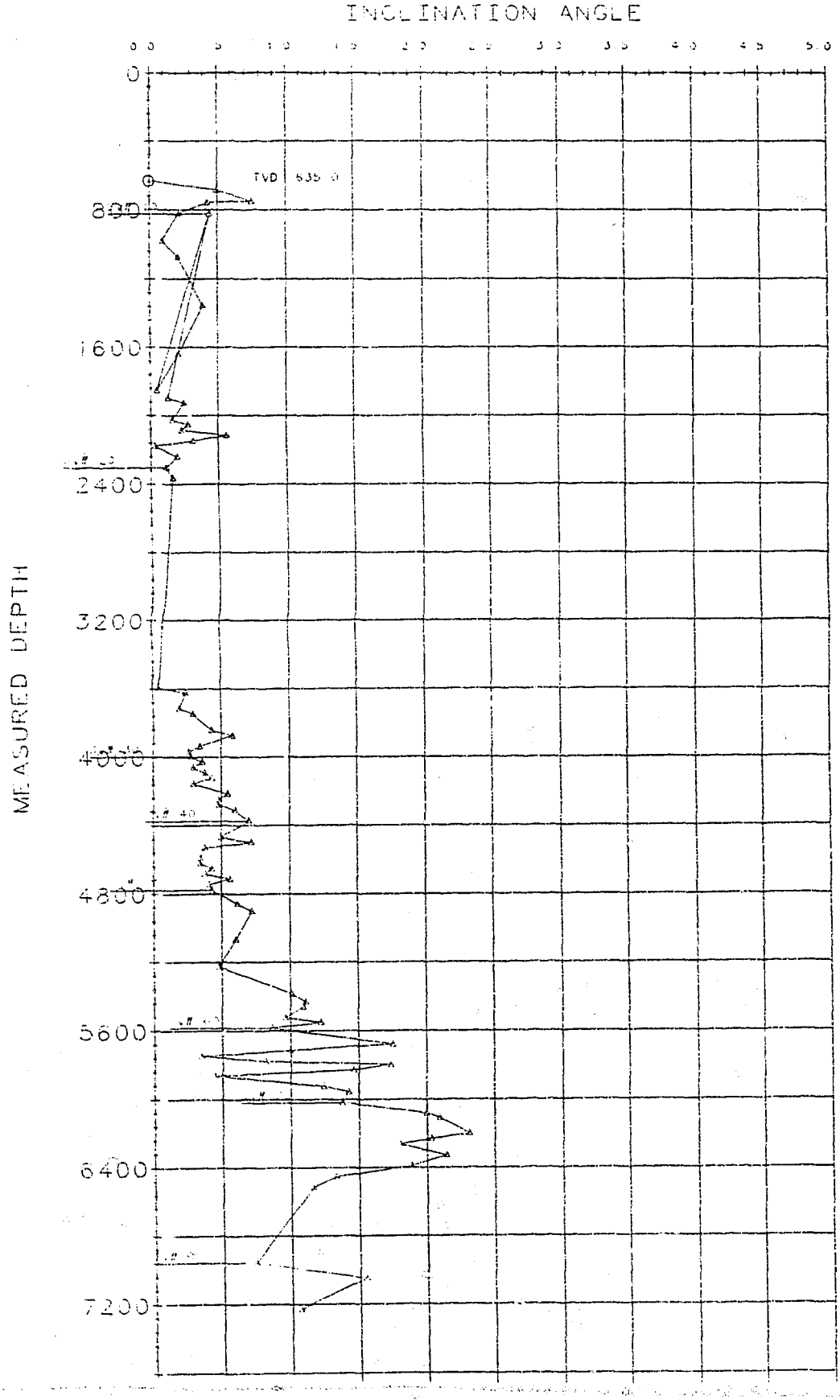
FIELD: BELUGA

WELL NO.: 0-23

SURVEY NUMBER	RUN NUMBER	MEASURED DEPTH(F)	INCLINATION DEGREES	AZIMUTH DEG TRUE	TOTAL MAG FLUX	TOOL TEMP DEG C	DATE	TIME
45	5	4628.08	.35	124.98	1.196	33.6	8-14-85	0:22
46	5	4658.26	.43	137.35	1.193	34.1	8-14-85	2:41
47	5	4689.07	.38	152.77	1.194	35.1	8-14-85	4:55
48	5	4718.85	.57	136.27	1.192	36.1	8-14-85	9:16
49	5	4750.10	.42	164.17	1.191	37.1	8-14-85	11:44
50	5	4781.63	.43	136.62	1.193	37.1	8-14-85	13:56
51	5	4861.05	.62	162.53	1.194	36.6	8-14-85	17:31
52	6	4908.00	.72	115.10	1.200	22.6	8-31-85	2:56
53	6	5071.30	.60	164.62	1.218	28.7	8-31-85	17:32
54	7	5232.00	.48	125.02	.890	29.0	9- 1-85	18:15
55	7	5389.29	1.02	220.60	.890	32.1	9- 2-85	10:24
56	7	5434.00	1.12	153.78	.891	32.6	9- 2-85	20:23
57	7	5466.00	1.10	146.65	.890	33.1	9- 2-85	22:11
58	7	5528.00	.97	159.95	.891	32.6	9- 3-85	3:10
[illegible]	7	5556.82	1.23	200.45	.890	33.1	9- 3-85	6:16
[illegible]	7	5588.52	.87	191.22	.891	33.6	9- 3-85	8:49
61	7	5683.07	1.75	164.53	.889	34.1	9- 3-85	16: 3
62	7	5718.00	1.00	243.73	.888	34.1	9- 3-85	18:28
63	7	5751.00	.35	314.17	.894	34.6	9- 3-85	20:22
64	7	5782.00	.82	167.30	.891	34.1	9- 4-85	0: 6
65	7	5802.00	1.73	135.62	.896	30.0	9- 4-85	10:21
66	7	5833.90	1.47	64.70	.890	29.5	9- 4-85	13:16
67	7	5866.00	.45	252.12	.897	32.6	9- 4-85	16: 6
68	7	5928.88	1.25	144.70	.897	34.6	9- 4-85	20: 3
69	7	5960.32	1.43	163.85	.902	35.1	9- 4-85	22:10
70	7	6023.60	1.38	179.70	.900	34.6	9- 5-85	1:47
71	7	6085.93	2.00	171.87	.899	29.0	9- 5-85	15:27
72	7	6112.59	2.10	231.87	.899	27.0	9- 6-85	5:11
73	7	6205.00	2.32	173.65	.901	32.6	9- 6-85	13:20
74	7	6236.00	2.03	318.28	.898	33.1	9- 6-85	16: 9
75	7	6268.00	1.80	259.77	.897	33.6	9- 6-85	18:55
76	7	6330.90	2.15	240.12	.899	34.6	9- 6-85	22:57
77	7	6393.71	1.88	120.43	.901	34.6	9- 7-85	3:48
78	7	6456.90	1.33	144.97	.900	34.1	9- 7-85	10: 8
79	7	6519.50	1.17	212.45	.896	34.1	9- 7-85	15: 7
80	9	6961.00	.73	323.23	1.214	29.3	9-11-85	11: 1
81	9	7054.00	1.55	214.13	1.219	30.3	9-11-85	11: 2
82	9	7232.00	1.07	238.17	1.271	30.8	9-12-85	1:36

3.23 Well Drift Plot

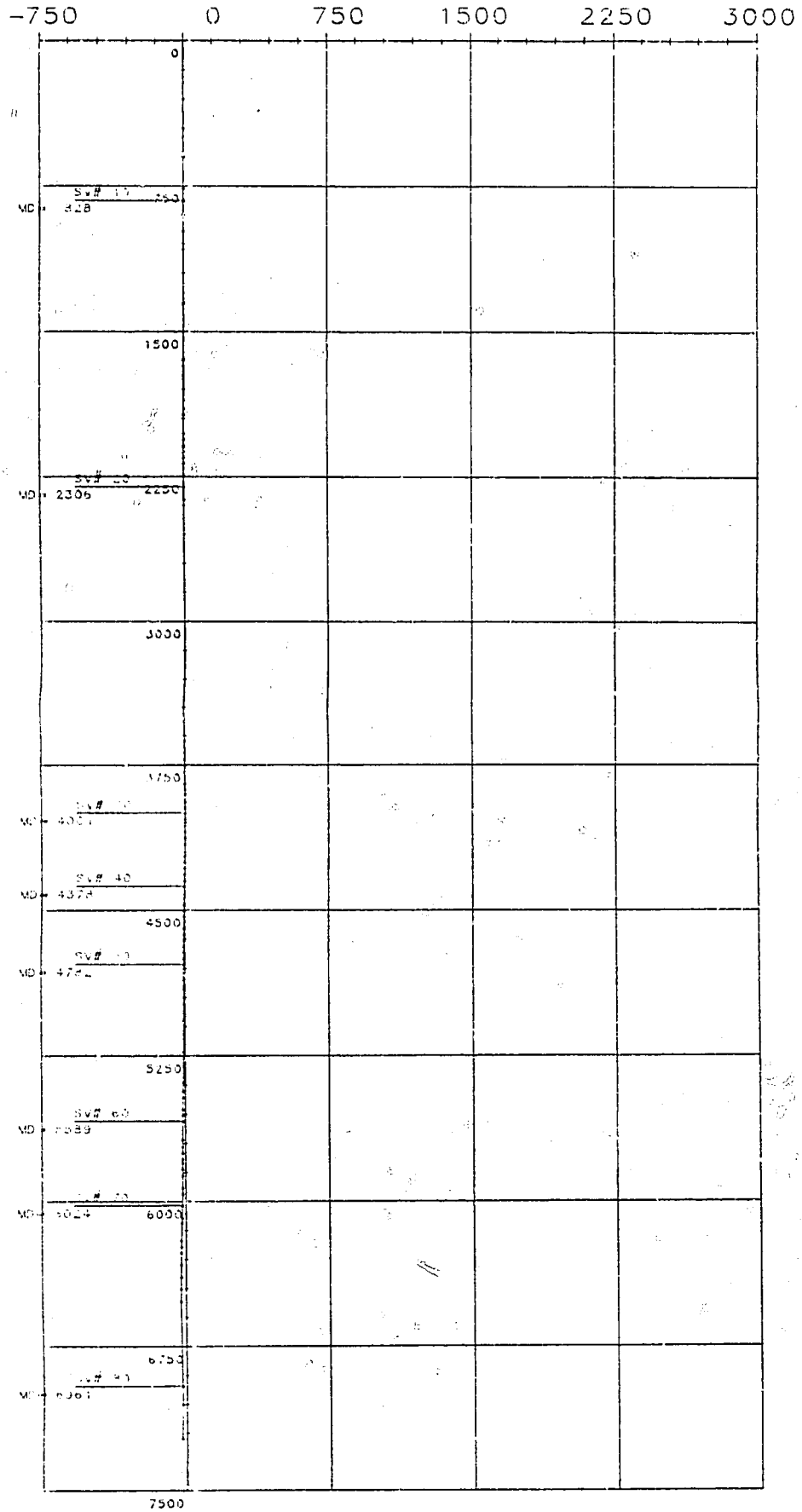
CANTERRA ENERGY LTD.
BELUGA O-23
INCLINATION VS MEASURED DEPTH PLOT



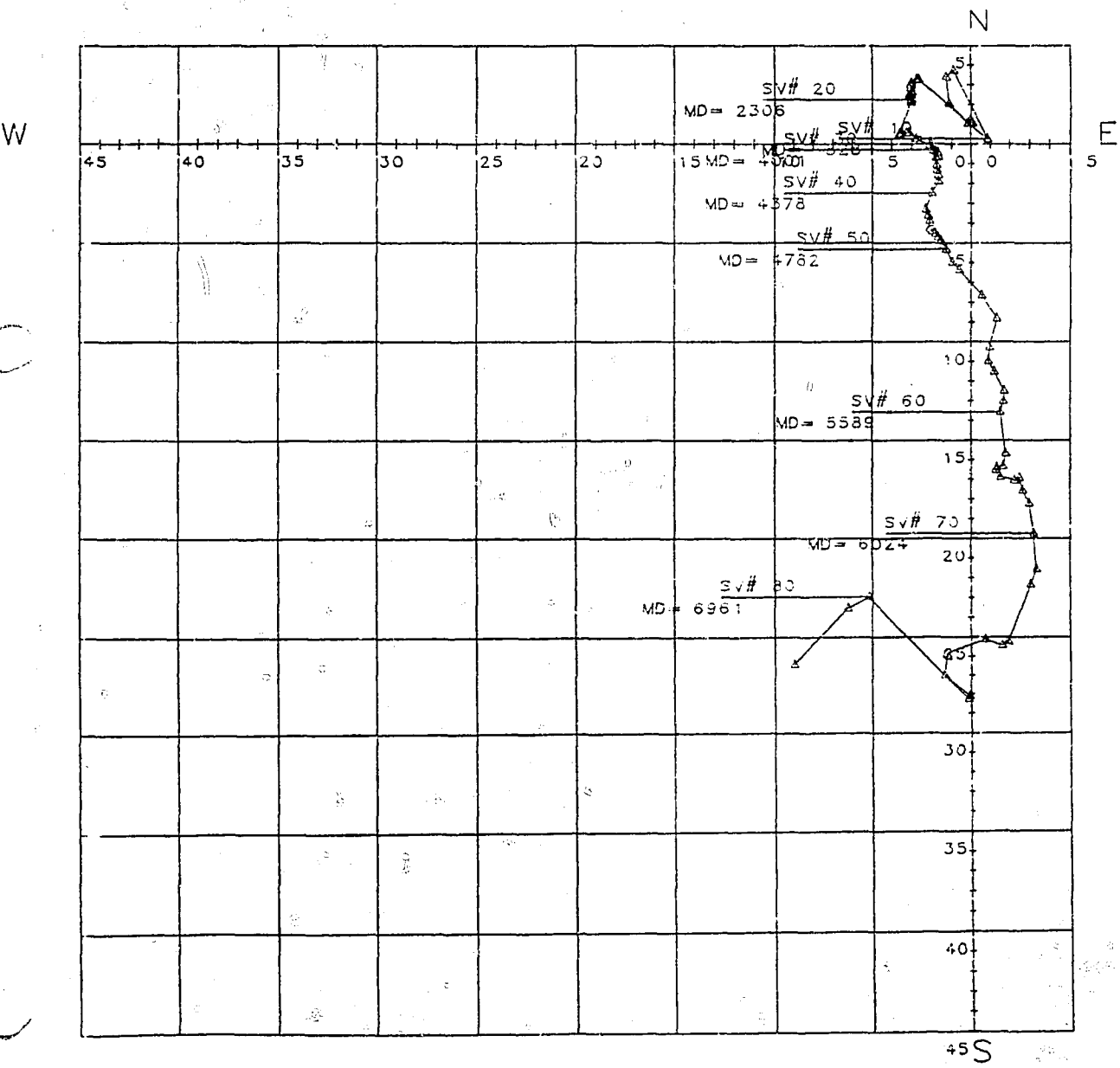
CANTERRA ENERGY LTD.

BELUGA O-23

SECTION VIEW - SECTION VS DEPTH



CANTERRA ENERGY LTD.
BELUGA O-23
PLAN VIEW - E& W VS NO&SO



TIME DISTRIBUTION - BGL 0-23

MONTH	OPERATION	CODE	DURING MONTH TIME	DURING MONTH %	SINCE START DATE TIME	SINCE START DATE %
7	LOADING UNLOADING	M1				
	MOVING	M2	188.40	52.27	188.40	52.27
	POSITIONING	M3				
	ANCHOR HANDLING	M4				
	DRILLING	D1	50.50	14.01	50.50	14.01
	HOLE OPEN	D2				
	UNDER REAMING	D3				
	NORMAL CIRCULATION	D4	1.00	.27	1.00	.27
	SURVEY	D5	1.00	.27	1.00	.27
	TRIP	D6	10.50	2.91	10.50	2.91
	REAMING AND RE-DRILLING	D7				
	CASING CEMENT W.O.C.	D8	13.00	3.60	13.00	3.60
	RIG SERVICE	D9				
	PLUG/ABANDON REMOVAL	D0				
	CIRC. SAMPLES	G1				
	LOGGING	G2				
	CORING	G3				
	PRODUCT TESTING	G4				
	W/L FORM TEST	G5				
	OTHER	G6				
	REPAIRS -OTHER THAN SUB SEA EQUIP	R1				
	SUB SEA EQUIP REPAIRS	R2				
	STICKING FISHING	R3				
	LOST CIRCULATION	R4				
	WELL CONTROL	R5				
	W.O.W.	R6	6.00	1.66	6.00	1.66
	W.O.I.	R7				
	OTHER WAITING	R8	88.50	24.55	88.50	24.55
	UNFORSEEN EVENTS	R9	1.50	.41	1.50	.41
	TOTALS		360.40		360.40	

3.24 Time Distribution Chart

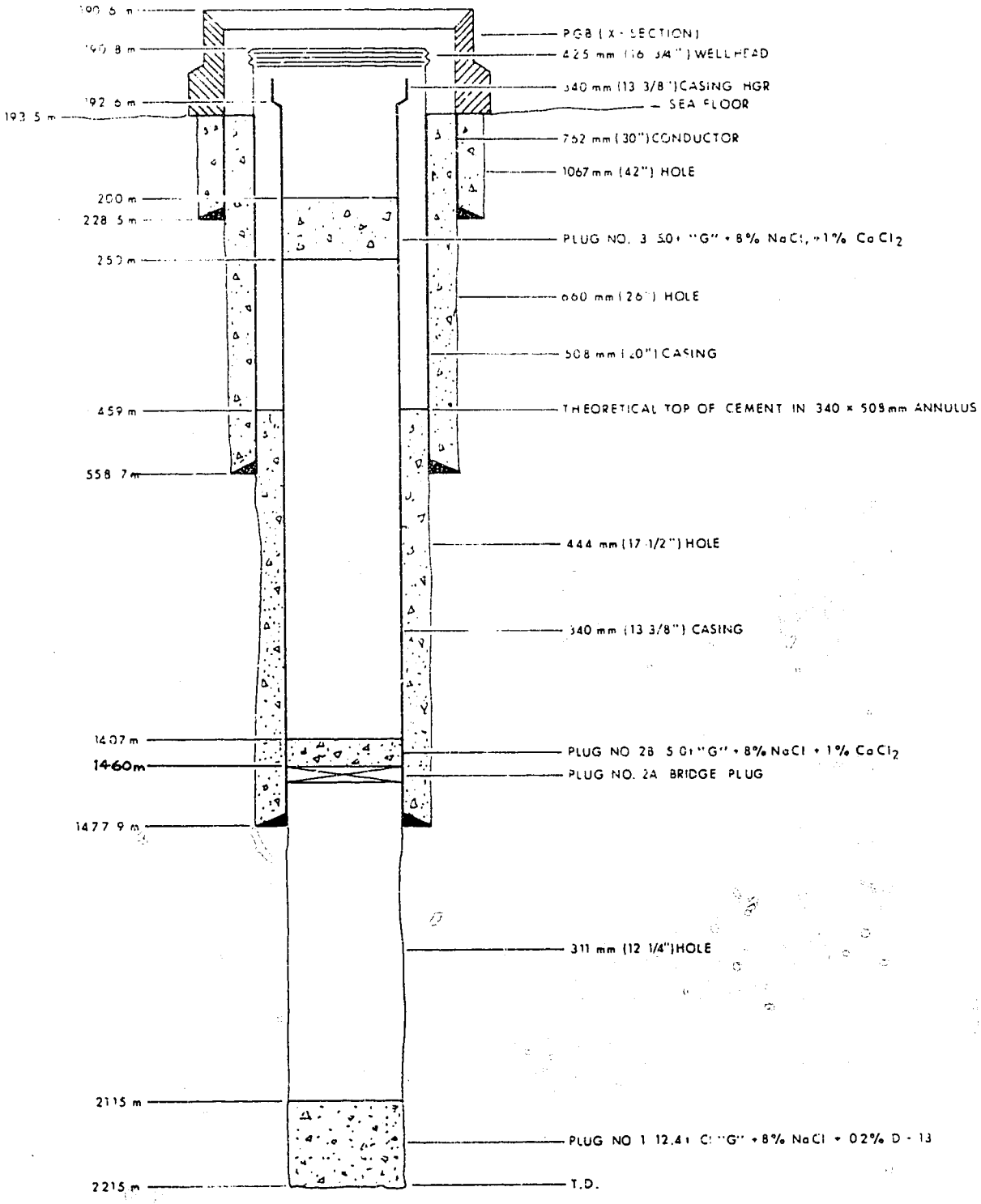
AUTOREPORT

TIME DISTRIBUTION -- BGL A-O-23

MONTH	OPERATION	CODE	DURING MONTH TIME	DURING MONTH %	SINCE START DATE TIME	SINCE START DATE %
8	LOADING UNLOADING	M1				
	MOVING	M2			188.40	17.05
	POSITIONING	M3	1.00	.13	2.00	.18
	ANCHOR HANDLING	M4				
	DRILLING	D1	153.00	21.20	207.50	18.78
	HOLE OPEN	D2	20.00	2.77	29.50	2.67
	UNDER REAMING	D3	126.00	17.46	126.00	11.40
	NORMAL CIRCULATION	D4	10.00	1.38	12.00	1.08
	SURVEY	D5	9.50	1.31	10.50	.95
	TRIP	D6	132.00	18.29	148.00	13.40
	REAMING AND RE-DRILLING	D7	2.50	.34	2.50	.22
	CASING CEMENT W.O.C.	D8	81.50	11.29	95.00	8.60
	RIG SERVICE	D9	2.50	.34	2.50	.22
	PLUG/ABANDON REMOVAL	D0				
	CIRC. SAMPLES	G1	1.00	.13	1.00	.09
	LOGGING	G2	45.50	6.30	45.50	4.11
	CORING	G3				
	PRODUCT TESTING	G4				
	W/L FORM TEST	G5				
	OTHER	G6				
	REPAIRS -OTHER THAN SUB SEA EQUIP	R1	13.00	1.80	15.50	1.40
	SUB SEA EQUIP REPAIRS	R2	91.00	12.61	91.00	8.23
	STICKING FISHING	R3	.50	.06	.50	.04
	LOST CIRCULATION	R4				
	WELL CONTROL	R5	1.00	.13	1.00	.09
	W.O.W.	R6	29.50	4.08	35.50	3.21
	W.O.I.	R7				
	OTHER WAITING	R8			88.50	8.01
	UNFORSEEN EVENTS	R9	.50	.06	2.00	.18
	TOTALS		721.50		1104.40	

TIME DISTRIBUTION - BE 0-23

MONTH	OPERATION	CODE	DURING MONTH TIME	DURING MONTH %	SINCE START DATE TIME	SINCE START DATE %
9	LOADING UNLOADING	M1				
	MOVING	M2			188.40	12.98
	POSITIONING	M3			2.00	.13
	ANCHOR HANDLING	M4				
	DRILLING	D1	158.50	48.84	385.00	26.53
	HOLE OPEN	D2			33.00	2.27
	UNDER REAMING	D3			126.00	8.68
	NORMAL CIRCULATION	D4	1.50	.46	13.50	.93
	SURVEY	D5			10.50	.72
	TRIP	D6	17.00	5.23	166.50	11.47
	REAMING AND RE-DRILLING	D7			2.50	.17
	CASING CEMENT W.O.C.	D8			95.00	6.54
	RIG SERVICE	D9			2.50	.17
	PLUG/ABANDON REMOVAL	D0	29.50	9.09	29.50	2.03
	CIRC. SAMPLES	G1			1.00	.06
	LOGGING	G2	46.50	14.32	92.00	6.34
	CORING	G3				
	PRODUCT TESTING	G4				
	W/L FORM TEST	G5				
	OTHER	G6				
	REPAIRS -OTHER THAN SUB SEA EQUIP	R1	59.00	18.18	74.50	5.13
	SUB SEA EQUIP REPAIRS	R2			91.00	6.27
	STICKING FISHING	R3			.50	.03
	LOST CIRCULATION	R4				
	WELL CONTROL	R5			1.00	.06
	W.O.W.	R6	10.00	3.08	45.50	3.13
	W.C.I.	R7				
	OTHER WAITING	R8	.50	.15	89.00	6.13
	UNFORSEEN EVENTS	R9			2.00	.13
	TOTALS		324.50		1450.90	



Canterra

TRILLIUM SOQUIP ONEXCO ET AL BELUGA 0-23

ABANDONMENT SCHEMATIC

IV GEOLOGY

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4.0 GEOLOGY

4.1 DRILL CUTTINGS

Cutting samples were taken at every 5 metre interval starting from below the 508 mm casing down to T.D. at 2215m. The casing was landed at 558.7m with samples not caught until 570m. Samples between 570 and 595m were heavily contaminated with cement and the sample 595-600m was missed.

Samples from 1482 to 1495m, immediately below the 340mm casing were also in heavily contaminated with cememt. Samples obtained from salt sections from 649 to 712m and from 791 to 84[illegible] were predominantly cavings because the salt was being dissolved into the mud. Also samples from 1082 to 1091m, from 1279 to 1295m and from 1304 to 1309m appear on logs to be halite section, though described otherwise from cuttings.

Cuttings were caught as unwashed samples. Two sets of vials were washed and dried on the drillship. These were retained by the operator. The remaining cuttings were shipped to Petrocraft Products Ltd. in Calgary and split as shown on the attached table. Partners have made their own arrangements for storage. Also note that samples were obtained in 6 1-litre geochem jars each 10 metres.

The further distribution of samples obtained by Canterra Energy Ltd. was as follows:

Washed Cuttings:	2 sets in vials 1 set prepared as a "Metrolog" 2 sets prepared as "Petrologs"
all are stored in Canterra's offices	
Unwashed Cuttings:	1 set sent to Robertson's Research Ltd. for biostratigraphic analysis. These will be destroyed in analysis.
	1 set used inhouse for geochemical analysis. These will be destroyed in analysis.

	1 set returned unused in Canterra's offices
Geochem Jars:	1 set used for geochemical analysis. These will be destroyed in analysis.
	1 set retained unused in Canterra's offices.

SAMPLE DISTRIBUTION

Resource Management and Conservation
Department of Energy, Mines and Resources
Bedford Institute of Oceanography
Box 1006
Dartmouth, Nova Scotia B2Y 4A2

ATTENTION: Mr. G. Karg

Instructions: Vials (7 dram), unwashed cuttings (bags), unwashed cuttings (geochem jars) (Set 1)

Resource Geology Division
Resource Management Branch
Department of Energy Mines and Resources
Ottawa, Ontario K1A 0E4

ATTENTION: Mr. D.F. Sherwin

Instructions: Vials (7 dram), unwashed cuttings (bags) (Set 2)

The Institute of Sedimentary and Petroleum Geology
Department of Energy, Mines and Resources
3303 - 33 Street N.W.
Calgary, Alberta T2G 2A7

ATTENTION: Mr. W. Banning

Instructions: Vials (3 dram) (Set 3)

Canterra Energy Ltd.
505 - 5 Street S.W.
Mailing Address: P.O. Box 1051
Calgary, Alberta T2P 2K7

ATTENTION: Mr. L.M. Zanussi

Instructions: Vials (3 dram), unwashed cuttings (bags), unwashed cuttings (geochem jars) (Sets 4-6)

Exploration SOQUIP
Place d'Iberville Deux
1175, rue de Lavigerie
Ste. Foy, Quebec G1V 4P5

ATTENTION: Mr. C. Denis

Instructions: Vials (3 dram), unwashed cuttings (bags) (Set 7)

SAMPLE DISTRIBUTION - Continued

Canadian Occidental Petroleum Ltd.
1500, 635 - 6 Avenue S.W.
Calgary, Alberta T2P 3Z1

ATTENTION: Ms. L. Olsen

Instructions: Vials (3 dram) (Set 8)

ICG Resources Ltd.
2700, 140 - 4 Avenue S.W.
Calgary, Alberta T2P 3S3

ATTENTION: Mr. W. Dean

Instructions: Vials (3 dram), unwashed cuttings (bags) (Set 9)

Sogepet Limited
Ste. 1118, 111 Richmond Street West
Toronto, Ontario M5H 2G4

Notify: ATTENTION: Mr. W.F. Atkins

Instructions: Vials (3 dram), unwashed cuttings (bags) to be sent to: Stacs Record Centre Ltd., 3651 - 23 Street N.E., Calgary, Alberta T2E 6T2 (Set 10)

Consumer's Gas Company Ltd.
P.O. Box 650
Scarborough, Ontario.
MIK 5E3

ATTENTION: Mr. Art Wootton

Instructions: Vials (3 dram) (Set 11)

Petro-Canada Resources
40 Research Place N.W.
Calgary, Alberta.

ATTENTION: Mr. R. Bresnahan

Instructions: Vials (3 dram), unwashed cuttings (bags), unwashed cuttings (Geochem jars) (Set 12)

4.2 CORES

No conventional cores were taken.

Sidewall cores were taken on each logging run. On Run #1, 45 cores were shot and 43 recovered. On run #2, 66 were shot and 36 recovered: of the remainder 11 were misfires, 17 were empty and 2 were lost.

The wellsite description of these cores is attached along with a subsequent and independant description done by Canterra's geologists.

The conventional testing for permeability, porosity and residual saturation was done for all samples and is summarized in the following tables.

Thin section petrography was done on all samples and X-ray diffraction and scanning electron microscopy was done on selected samples. The report on the sidewall cores obtained in run #1 was filed on 1st November, 1985 and the report on run #2 is enclosed with this report.

Further to this, some samples were selected for geochemical and biostratigraphic analysis. Results of this work will be referred to in the appropriate section.

Most cores were tested to destruction, those still remaining will be stored in Canterra's offices. A complete inventory of sidewall core disposal will be filed once all material is returned from contractors.

4.3 LITHOLOGY

A full lithological description is included as prepared by J. Tucker and D. Roberts

SIDEWALL CORE DESCRIPTIONS

Log Run #1: Shot 45 cores, Recovered 43

631.5	Dolomite: light yellowish-grey, microcrystalline to slightly sucrosic, clean, hard, no visible porosity.
636	Dolomite: light brown, microcrystalline (but slightly coarser than above), predominantly clean, but trace brown argillaceous material, firm to hard, no visible porosity.
743	Limestone: light grey, microcrystalline, very soft, abundant (40-50%) light grey, argillaceous material, no visible porosity.
751	Limestone: white to buff, cryptocrystalline to slightly chalky, soft to firm, clean, but streaks dark brown carbonaceous material, tight.
774	Limestone: white, cryptocrystalline to slightly sucrosic, clean, hard, tight.
1061.5	Limestone: buff (streaks light to medium brown), cryptocrystalline to slightly sucrosic, dolomitic (in part), soft to firm, in part clean, in part streaks dark brown carbonaceous material, no visible porosity.
1063.5	Limestone: light to medium brown, microcrystalline, clean (occasional trace argillaceous) firm, somewhat dolomitized (micro-crystals), no visible porosity.
1065.5	Limestone: white to light brown, cryptocrystalline to slightly chalky and slightly sucrosic in part, soft to firm, slightly dolomitic (micro-crystals), inclusions clear to white Anhydrite (crystalline), faint crude oil smell.
1068	Limestone: buff to light brown (faint medium brown laminations), microcrystalline, soft (disintegrating in water), slightly dolomitic, no visible porosity (possibly trace sucrosic), very faint crude oil smell.
1069	Limestone: buff to light brown, microcrystalline to very fine crystalline, soft, clean, slightly dolomitic (micro to very fine crystals), no visible porosity, but possible trace light brown patchy stain and very faint yellow fluorescence, essentially no cut, minor crude oil smell.
1070	Limestone: interlaminated medium brown, microcrystalline, very argillaceous, soft; and buff, cryptocrystalline to microcrystalline, clean to slightly argillaceous, firm, dolomitic (microcrystalline), slightly anhydritic, no visible porosity, faint crude oil smell.

1073	Limestone: light grey, cryptocrystalline to microcrystalline, firm to hard, clean, slightly dolomitic (micro-crystals), slightly anhydritic, occasional Anhydrite inclusions, no visible porosity.
1074.5	Dolomite: medium to dark grey (mottled), abundant very soft, black, argillaceous material, very anhydritic, micro and large inclusions Anhydrite (white, microcrystalline), no visible porosity.
1078	Dolomite: buff, sucrosic (very fine), clean, trace anhydritic, firm to hard, clean, no visible porosity (trace sucrosic?).
1096	Dolomite: light grey, crypto to slightly sucrosic, soft to firm, clean, no visible porosity.
1201.5	Limestone: buff, cryptocrystalline to trace sucrosic, very dolomitic (almost calcareous dolomite), hard, clean, no visible porosity.
1260	Dolomite: buff to light grey, cryptocrystalline, dense, clean, hard, tight.
1439	Dolomite: buff to light grey, cryptocrystalline, dense, very calcareous (almost dolomitic limestone), clean, hard, no visible porosity.
1457	Dolomite: reddish-brown, very soft, very silty (grading to very fine sand), clear silica (almost grading to red siltstone), matrix unstable (disintegrating) in water; white anhydrite inclusions. Note: lithology may be better described as "very silty, dolomitized mud".
1465	Dolomite: buff to light grey (occasional red streaks), very silty (occasional very fine sand), silica, "earthy" matrix, very soft, clean, no visible porosity.
1473.5	Shale: medium grey, blocky, firm, very dolomitic, somewhat silty, trace reddish streaks.
1479	Siltstone: pink, clean, clear silica, very soft, unconsolidated, probable salt matrix, no visible porosity.
1481	Siltstone: (some very fine grained sand), pink, clear silica, very soft, dolomitic matrix, no visible porosity, inclusions white anhydrite.

SIDEWALL CORE DESCRIPTIONS

Log Run #2: Shot 66, Misfire 11, Empty 17, Lost 2; Recovered 36

2200	Granitic Gneiss: coarse crystalline plus clear quartz, pink and white feldspar, extensively chloritized, trace only of mafic minerals, feldspars extensively alterted kaolinite.
2192	Granitic Gneiss: (possible boulder?) coarse crystalline, kaolinized feldspar, medium to coarse crystalline (?) quartz, trace mica (biotite), minor mafic mineral, abundant chlorite, soft and friable.
2192	Granitic Gneiss: as above, mafic minerals wrap around very coarse crystalline kaolinized feldspars, minor quartz, extensive chlorite patches, soft and friable.
2191	Granitic Gneiss: as above, extensively chloritized and kaolinized, soft and friable.
2191	Granitic Gneiss: as above
2189	Shale: grey/brown, soft, subfissile, rare calcareous patch, rare pyrite.
2120	Limestone: light brown, microcrystalline, trace fossiliferous, possible brachiopod fragments, mudstone, no visible porosity, no fluorescence.
2100	Limestone: off white, microcrystalline, possible rare bioclastic debris, mudstone, no visible porosity, possible earthy porosity, no fluorescence.
2080	Limestone: off white to light brown, cryptocrystalline to microcrystalline, no fossils, styolitic, mudstone, no visible porosity, no fluorescence.
2060	Limestone: off white, microcrystalline, no fossils, moderately dolomitized with very fine to fine rhombs of dolomite, mudstone, no visible porosity, slight mineral fluorescence.
2020	Limestone: off white to brown, cryptocrystalline, trace bioclastic debris, mudstone, very rare dolomite rhomb, no visible porosity.
1992.5	Limestone: (poor sample) off white to brown, microcrystalline, mudstone, no apparent fossils, bioclastic debris, no visible porosity, anhydritic?, no fluorescence, trace carbonaceous?, bituminous material?, on fractures?
1949	Anhydrite: white to clear, translucent, massive, cryptocrystalline, trace calcareous.

1920	Siltstone: (poor sample): buff to brown, very dolomitic, calcite filled microfractures, tight (sample gave abundant insoluable residue when dissolved in warm HCl--might be considered silty dolomite).
1880	Limestone (poor sample): off white and brown mottled, cryptocrystalline, extensively dolomitized with abundant very fine to fine crystalline, dolomite rhombs, dense, fossiliferous mudstone.
1876	Limestone? (poor sample): brown streaked with (trace) black organic material, microcrystalline, silty, no visible porosity, no apparent fluorescence, very slow weak cut fluorescence (interpreted as organic material in situ). (Limestone? does not stain yet dissolves in cold dilute HCl yielded a silty organic rich? residue.) Petroliferous odor.
1820.5	Siltstone (poor sample): off white to light grey/brown, dolomitic, tight, no fluorescence.
1765	Limestone: cryptocrystalline, bioclastic wackestone to packestone, trace black organic fragments and brown organic rich streaks. No visible porosity, no fluorescence, very slow cut fluorescence, crinoids.
1745	Siltstone: light grey/brown, dolomitic to slightly calcareous, tight, no fluorescence.
1745	Dolomite: off white to light grey, cryptocrystalline to very finely crystalline, calcareous matrix in part, soft and friable, black, carbonaceous streaks in part, no visible porosity, no fluorescence.
1720	Limestone: off white, cryptocrystalline, soft and friable, no fossils, mudstone, no visible porosity.
1710	Limestone (poor sample): off white, cryptocrystalline, firm to hard, trace fossiliferous, mudstone, no visible porosity. (Abundant large fragments of other lithologies, suspect that this sample is junk.)
1694	Limestone: off white to light brown, cryptocrystalline to microcrystalline, abundant bioclastic debris, bioclastic packestone, trace dolomite rhombs, styolitic in part, no visible porosity, no fluorescence.
1694	Limestone: off white to light brown, cryptocrystalline, commonly bioclastic, mudstone to wackestone, minor packestone, no visible porosity, dolomitized in part, trace argillaceous?, carbonaceous material along styolites, no fluorescence.

1680 Limestone: white to off white, trace brown streaks, cryptocrystalline to microcrystalline, no visible porosity, no fluorescence, no cut fluorescence, mudstone, no fossils.

1660 Siltstone?: white, nondolomitic, noncalcareous, tight, firm, friable (resembles weathered chert in appearance and texture?).

1620 Dolomite: buff to brown, mottled, very fine to fine crystalline, slightly calcareous, trace ghost fossils, probable replacement of bioclastic packestone, no visible porosity.

1620 Dolomite: Same as above, trace grey, carbonaceous, argillaceous material defining styolites. No visible porosity, no fluorescence.

1600 Dolomite: off white to light grey/brown, very silty, microcrystalline, possibly grading to dolomitic siltstone, no visible porosity, no fluorescence, noncalcareous, carbonaceous in part.

1578 Limestone: white, cryptocrystalline, massive, anhydritic?, no visible porosity (possibly salty?--salt taste).

1578 Limestone: as above, trace dolomitic, fine crystalline, dolomite rhombs, microcrystalline in part, no visible porosity.

1565 Liemstone: white to off white, cryptocrystalline to microcrystalline, massive, no visible porosity, trace dolomitic patches and scattered dolomite rhombs, styolites.

1565 Limestone: as above, looks like a chemical limestone--absolutely pure white.

1550 Limestone: white to off white, cryptocrystalline, very soft, friable, no visible porosity, trace salt (halite) crystals, trace bioclastic debris, mudstone.

1507 Dolomite (very poor sample): off white to light grey/brown, very fine to fine crystalline, appears to have 20%+ mouldic porosity, possibly a dolomitized patch in soft limestone?, no staining, no fluorescence, except mineral fluroescence.

1486 Siltstone: red/brown, minor white patches (terra cota), very fine to fine sandy grains dispersed throughout. Slightly to moderately argillaceous, grading in part to shale. Soft and friable, no visible porosity, slightly dolomitic.

Trillium Beluga O-23

Sidewall Core Description:

Schlumberger Sample No.	Depth	Description
44	631.5	Limestone, tan to light olive grey, finely crystalline, some visible intergranular porosity, poorly indurated, "earthy", mudstone (Dunham)
42	636.0	Limestone, tan to light olive grey, finely crystalline, some visible intergranular porosity, poorly indurated, a brown residue left when sample is dissolved
40	743.0	Limestone, tan to light olive grey, blebs of white crystalline calcite in sample, cylindrical in shape, possibly crinoid ossicles, finely crystalline with some visible intergranular porosity, poorly indurated, "earthy"
38	751.0	Limestone, predominantly tan to white, thin dark-coloured stringers through sample, possibly organic material, microcrystalline, poorly indurated, no visible porosity
36	774.0	Limestone, tan to brown coloured, thin dark-coloured stringer possibly organic material, microcrystalline, no visible porosity, moderately indurated, more competent than above samples
34	1061.5	Limestone, tan coloured to dark brown with increasing organic content, clear anhydrite blebs 10%, microcrystalline, no visible porosity, moderately indurated

Schlumberger Sample No.	Depth	Description
33	1063.5	Limestone, tan to brown coloured, microcrystalline, no visible porosity, considerable fracturing due to bullet impact, moderately indurated
30	1065.5	Limestone, tan to white, microcrystalline, no visible porosity, blebs of clear crystalline anhydrite 15-20%
29	1068.0	Limestone, tan to white, dark streaks of organic material in sample, microcrystalline, no visible porosity, petroliferous odour from dissolving sample, brown scum residue
21	1074.5	Limestone, argillaceous, dark grey, microcrystalline, no visible porosity, moderately indurated
19	107[illegible].0	Limestone, tan to white, slightly argillaceous, slightly dolomitic, some intergranular porosity, microcrystalline, poorly indurated, "earthy"
18	1096.0	Dolomite to limestone, light grey, microcrystalline, no visible porosity, poorly indurated, "earthy"
16	1201.5	Limestone, tan, microcrystalline, no visible porosity, soft, "earthy"
14	1260.0	Limey dolomite, light grey, slightly argillaceous, microcrystalline, no visible porosity, moderately indurated, vesicular mud matrix
12	1439.0	Limestone, light grey, slighly argillaceous, microcrystalline, no visible intergranular porosity, vesicular mud matrix, 1 mm bleb of very fine grained red-stained quartz sand, very friable, no cement

Schlumberger Sample No.	Depth	Description
		Note: Vesicular mud matrix "air bubbles"? and uncemented sand suggest this sample, as well as those above, have undergone little compaction compared to Western Canada Devonian carbonates
9	1457.0	Sandstone, very fine grained, red, dolomitic, grading to shaly siltstone, no visible porosity, fissile, anhydrite 10%
7	1465.0	Sandstone, very fine grained quartz, red to grey, dolomitic grading to shaly siltstone, no visible porosity, fissile, crystalline anhydrite 10%
5	1473.5	Siltstone grading to shale, grey to red, slightly dolomitic, no visible porosity, fissile
3	1479.0	Sandstone, very fine-grained quartz, red to siltstone grey, dolomitic, no visible porosity, fissile
1	1481.0	Dolomite, tan to grey, chalky, no visible porosity, moderately indurated

R.L. McKellar
August 27, 1985

Trillium Soquip Onexco et al Beluga O-23
Sidewall Core Description

Schlumberger Sample No.	Depth (m)	Description
66	1486	Dolomitic siltstone, reddish brown in colour, grading to shale, no visible porosity, poorly indurated
64	1507	Anhydrite, white, poorly indurated, minor amounts of grey dolomite in sample, < 10% recovery
62	1550	Anhydrite, white to grey, < 10% dolomite
61	1565	Limestone, white, grading to dolomite, buff-grey sparry calcite cemented (sparmicrite), minor amounts of shale, grey, no visible porosity
60	1565	Limestone, as above
59	1578	Limestone, as above
58	1578	Limestone, as above
57	1600	Limestone, grey to light grey, sparry calcite cemented, no visible porosity, minor amounts of shale
56	1620	Limestone, as above
55	1620	Limestone, as above
53	1660	Limestone to dolomite, grey to light grey, sparry calcite cemented (sparmicrite), no visible porosity, minor shale
52	1680	Limestone, tan to brown, sparry calcite cemented (sparmicrite), minor amounts dark organic material, no visible porosity
50	1694	Limestone, as above
49	1694	Limestone, as above

Schlumberger Sample No.	Depth (m)	Description
48	1710	Dolomite to limestone, buff to light grey, sparry calcite cemented, poorly indurated, no visible porosity, < 10% sample recovery
47	1720	Limestone, buff to light grey, sparry calcite cemented, poorly indurated, no visible porosity
46	1745	Limestone, as above
45	1745	Limestone, as above
43	1765	Limestone, as above
39	1820.5	Limestone, as above
34	1876	Limestone, tan to brown, sparmicrite grading to siltstone and shale, petroliferous odour given off in acid, brown organic residue left, coal fragments in sample, no visible porosity
33	1880	Limestone grading to siltstone and shale as above, petroliferous odour given off in acid
28	1920	Dolomite, tan to grey, sparmicrite, grading to limestone, minor amounts organic material
27	1949	Salt, clear, crystalline
23	1992.5	Limestone, tan to grey, sparmicrite, no visible porosity, poor sample recovery
20	2020	Limestone to dolomite, grey, sparmicrite, no visible porosity
17	2060	Dolomite to limestone, grey, sparmicrite, no visible porosity
16	2080	Limestone to dolomite, as above
14	2100	Dolomitic limestone, as above

Schlumberger Sample No.	Depth (m)	Description
13	2120	Dolomitic limestone, as above
8	2189	Shale, dark grey, calcareous
6	2191	Basement: calcite, chlorite, biotite, quartz, feldspar, gneissic texture, medium to very coarsely crystalline
5	2191	Basement: as above
4	2192	Basement: as above
3	2192	Basement: as above
2	2200	Basement: as above

RM/85-9-17

CORE LABORATORIES — CANADA LTD.

SMALL SAMPLE CORE ANALYSIS

COMPANY	CANTERRA ENERGY LTD.	FORMATION	PAGE 1 of 2
WELL	TILLIUM SOQUIP ONEXIO ET AL BELUGA	CORING EQUIPMENT	FILE 70175-85-1022
FIELD		CORE DIAMETER (mm)	DATE
LOCATION		CORING FLUID	ANALYSTS
ELEVATION			

CLEANING

- Solvent
- Extraction Equipment
- Extraction Time
- Drying Equipment
- Drying Time
- Drying Temperature

ANALYSIS

- ☐ Pore Volume measured by Boyle's Law in a Hassler holder using helium
- ☐ Grain Volume measured by Boyle's Law in a matrix cup using helium
- ☐ Porosity determined by summation of fluids (retort)
- ☐ Fluid saturations by retort
- ☐ Water saturation by Dean-Stark
- ☐ Oil saturation by weight difference (Dean-Stark)
- ☐ Permeability measured on mm diameter drilled plugs
- ☐ Permeability measured on 20 mm cubes

REMARKS

PERMEABILITY VALUES FOR PERCUSSION TYPE
SIDEWALL CORES DETERMINED EMPERICALLY

DESCRIPTIONS

Conglomerate = cgl
Sandstone = ss
Siltstone = sltst
Shale = sh, shy
Limestone = ls
Dolomite = dol
Gypsum = gyp
Anhydrite = anhy
Halite (salt) = hal
Ironstone = fe
Chert = cht
Pyrite = pyr
Sulphur = sulf
Coal = coal
Carbonaceous Matter = carb
Pyrobitumen = pyrbit

Slightly Shaly = sshy
Moderately Shaly = mshy or shy
Very Shaly = vshy

Calcareous = calc
Limy = lmy
Pyritic = pyr

Glauconitic = glauc
Silty = slt
Sandy = sdy
Carbonaceous = carb
Dolomitic = dol
Coal/Coal inclusions = coal
Laminae (Laminated) = lam
Fractures (vertical/horizontal/undifferentiated) = vert frac, hfrac, frac
Micaceous = mic
Stylolite (s) = sty
Oolitic = ool
Fossiliferous = foss
Intergranular = i

Vugs, Vugular, Vuggy
Pinpoint = ppv
Small Vug = sv
Medium Vug = mv
Large Vug = lv

CORE LABORATORIES — CANADA LTD.

COMPANY ...TERRA ENERGY LTD.
WELL TRILLIUM SOQUIP ONEXIO ET AL BELUGA 0-23
LOCATION

FORMATION DEVONIAN VARIOUS **
ANALYSTS

PAGE 2 OF
FILE 70175-85-1022
DATE

CORE ANALYSIS RESULTS

Sample Number	Depth-Metres (m)	cm Rec.	Permeability to Air Millidarcys	Porosity x m	Residual Saturation (Fraction of Pore Volume) Oil	Residual Saturation (Fraction of Pore Volume) Water	Gas Detector	Remarks	Visual Examination: Formation Description	Visual Examination: Odor	Visual Examination: Fluorescence
1	631.50	2.0	0.6	0.127	0.0	0.740	0	(6)	ls, i	no	min
2	636.00	2.0	2.0	0.192	0.0	0.714	0	(6)	ls, i	no	yellow
3	745.00	1.0	0.6	0.146	0.0	0.716	0	(6)	ls, i	no	min
4	751.00	2.0	<0.1	0.104	0.0	0.789	0	(6)	ls, i	no	min
5	774.00	1.0	<0.1	0.116	0.0	0.776	0	(6)	ls, i	no	min
6	1061.50	2.0	<0.1	0.105	0.0	0.886	0	(6)	ls, i	no	min
7	1063.50	2.0	<0.1	0.168	0.0	0.804	0	(6)	ls, i	no	min
---	1065.50	2.0	REMOVED FOR PETROGRAPHY (TS XRD SEM)								
8	1068.00	2.0	0.1	0.181	0.0	0.591	0	(6)	ls, i	no	min
9	1069.00	1.0	0.1	0.206	0.0	0.777	0	(6)	ls, i	no	min
---	1070.00	2.0	REMOVED FOR PETROGRAPHY (TS XRD SEM)								
10	1073.00	2.0	<0.1	0.174	0.0	0.776	0	(6)	ls, i	no	min
---	1074.50	2.0	REMOVED FOR PETROGRAPHY (TS XRD SEM)								
11	1078.00	1.5	<0.1	0.179	0.0	0.799	0	(6)	ls, i, frac	no	min
---	1096.00	2.0	REMOVED FOR PETROGRAPHY (TS XRD SEM)								
12	1201.50	1.5	0.05	0.187	0.0	0.808	0	(6)	ls, i	no	min
13	1260.00	1.0	0.05	0.205	0.0	0.873	0	(6)	ls, i	no	min
14	1439.00	1.5	0.03	0.169	Trace	0.734	0	(6)	ls, i	no	min
15	1457.00	2.0	<0.1	0.194	0.0	0.856	0	(6)	ls, i	no	no
16	1465.00	1.5	<0.1	0.171	0.0	0.778	0	(6)	ls, i	no	min
17	1473.60	1.5	<0.1	0.153	0.0	0.824	0	(6)	ls, i	no	no
18	1479.00	1.5	5.0	0.217	0.0	0.770	0	(6)	ss, vf slt, calc	no	no
19	1481.00	2.0	0.8	0.189	0.0	0.804	0	(6)	ss, vf slt, calc anhy	no	no

FORMATION	DEPTH RANGE (m)
MIDBAY	TO 700.00m
WALRUS	701.00-800.00m
POLAR BEAR	1050.00-1450.00m
KENOGAMIE	1450.00-1500.00m

(6) DENOTES LOW PERMEABILITY

TS - THIN SECTION
XRD - X-RAY DIFFRACTION
SEM - SCANNING ELECTRON MICROSCOPY
min. - MINERAL

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C.A. No. 2A

CORE LABORATORIES — CANADA LTD.

SMALL SAMPLE CORE ANALYSIS

COMPANY	CANTERRA ENERGY LTD.	FORMATION	
WELL	TILLIUM SOQUIP ONEXIO ET AL	BELUGA CORING EQUIPMENT	
FIELD		CORE DIAMETER (mm)	
LOCATION		CORING FLUID	
ELEVATION			

FILE 70175-85-1022
DATE
ANALYSTS

CLEANING

Solvent
Extraction Equipment
Extraction Time
Drying Equipment
Drying Time
Drying Temperature

ANALYSIS

- ☐ Pore Volume measured by Boyle's Law in a Hassler holder using helium
- ☐ Grain Volume measured by Boyle's Law in a matrix cup using helium
- ☐ Porosity determined by summation of fluids (retort)
- ☐ Fluid saturations by retort
- ☐ Water saturation by Dean-Stark
- ☐ Oil saturation by weight difference (Dean-Stark)
- ☐ Permeability measured on mm diameter drilled plugs
- ☐ Permeability measured on 20 mm cubes

REMARKS

**PERMEABILITY VALUES FOR PERCUSSION TYPE SIDEWALL CORES DETERMINED EMPIRICALLY

DESCRIPTIONS

Conglomerate = cgl
Sandstone = ss
Siltstone = sltst
Shale = sh, shy
Limestone = ls
Dolomite = dol
Gypsum = gyp
Anhydrite = anhy
Halite (salt) = hal
Ironstone = fe
Chert = cht
Pyrite = pyr
Sulphur = sulf
Coal = coal
Carbonaceous Matter = carb
Pyrobitumen = pyrbit

Slightly Shaly = sshy
Moderately Shaly = mshy or shy
Very Shaly = vshy

Calcareous = calc
Limy = limy
Pyritic = pyr

Glauconitic = glauc
Silty = slt
Sandy = sdy
Carbonaceous = carb
Dolomitic = dol
Coal/Coal inclusions = coal
Laminae (Laminated) = lam
Fractures (vertical/horizontal/undifferentiated) = vert frac, hfrac, frac
Micaceous = mic
Stylolite (s) = sty
Oolitic = ool
Fossiliferous = foss
Intergranular = i

Vugs, Vugular, Vuggy
Pinpoint = ppv
Small Vug = sv
Medium Vug = mv
Large Vug = lv

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COMPANY CANTERRA ENERGY LTD.
WELL TRILLIUM SOQUIP ONEXIO ET AL BELUGA 0-23
LOCATION

FORMATION **VARIOUS
ANALYSTS

FILE 70175-85-1022A
DATE

CORE ANALYSIS RESULTS

Sample Number	Depth-Metres (m)	cm Rec.	** Permeability to Air Millidarcys	Porosity x m	Residual Saturation (Fraction of Pore Volume) Oil	Water	Gas Detector	Remarks	Visual Examination: Formation Description	Odor	Fluorescence
1	1070	0	-----	---	---	---	---	----	EMPTY BOTTLE	---	-----
2	1073	0	-----	---	---	---	---	----	EMPTY BOTTLE	---	-----
3	1486	2.50	0.1	0.143	0.000	0.755	0		ls i dol	none	none
4	1507	0.75	-----	-----	---	---	---	(3)	ls i insufficient sample	---	-----
5	1550	1.50	< 0.01	0.165	0.000	0.727	0	(6)	ls i sdy anhy	none	min.
6	1565	3.0	< 0.01	0.120	0.000	0.750	0	(6)	ls i sshy	none	min.
7	1578	2.50	< 0.01	0.167	0.000	0.725	0	(6)	ls i	none	min.
8	1600	2.0	< 0.01	0.193	0.000	0.694	0	(6)	ls i	none	min.
9	1620	2.0	< 0.01	0.159	0.000	0.767	0	(6)	ls i	none	min.
10	1660	2.0	< 0.01	0.102	0.000	0.814	0	(6)	ls i	none	min.
11	1680	2.5	0.1	0.194	0.000	0.706	0	(6)	ls i	none	min.
12	1694	2.0	0.3	0.174	0.000	0.770	0		ls i	none	min.
13	1710	---	---	-----	----	-----	-	(3)	ls i insufficient sample	---	----
14	1720	1.50	< 0.01	0.111	0.000	0.811	0	(6)	ls i	none	min.
15	1745	2.00	< 0.01	0.136	0.000	0.765	0	(6)	ls i shy	none	min.
16	1765	2.00	< 0.01	0.107	0.000	0.813	0	(6)	ls i	none	min.
17	1820.5	0.30	< 0.01	-----	-----	-----	-	(1)	ls i	----	----
18	1876	0.20	< 0.01	-----	-----	-----	-	(1)	ls i	----	----
19	1880	1.15	< 0.01	-----	-----	-----	-	(1)(3)	ls i	----	----
20	1920	2.0	< 0.01	-----	-----	-----	-	(3)	ls i insufficient sample	----	----
21	1949	2.0	----	-----	-----	-----	-	-----	halite	----	----
22	1992.5	0.50	< 0.01	-----	-----	-----	-	(3)	ls i	----	----
23	2020	0.60	< 0.01	-----	-----	-----	-	(3)	ls i	----	----
24	2060	0.40	< 0.01	0.109	0.000	0.807	0	(6)	ls i	none	none
25	2080	1.10	< 0.01	0.123	0.000	0.764	0	(6)	ls i	none	min.
26	2100	1.0	< 0.01	0.176	0.000	0.778	0	(6)	ls i	none	min
27	2120	1.0	< 0.01	0.148	0.000	0.797	0	(3)	ls i	none	none
28	2189	3.0	----	-----	-----	-----	-	---	sh	----	----
29	2191	3.0	0.2	0.150	0.000	0.818	0		granitic	none	none
30	2192	3.0	0.1	0.155	0.000	0.832	0	(6)	granitic	none	none
31	2200	1.5	---	-----	-----	-----	-	(3)	grantiic	----	----

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COMPANY CANTERRA ENERGY LTD.
WELL TRILLIUM SOQUIP ONEXIO ET AL BELUGA 0-23
LOCATION

FORMATION **VARIOUS
ANALYSTS TS

FILE 70175-85-1022A
DATE

CORE ANALYSIS RESULTS

Sample Number	Depth-Metres (m)	cm Rec.	Permeability to Air Millidarcys	Porosity x m	Residual Saturation (Fraction of Pore Volume)		Gas Detector	Remarks	Visual Examination		
					Oil	Water			Formation Description	Odor	Fluorescence

REMARKS: **PERMEABILITY VALUES FOR PERCUSSION TYPE SIDEWALL CORES DETERMINED EMPIRICALLY

(1) ALTERED CORE - BROKEN
(3) INSUFFICIENT SAMPLE
(6) LOW PERMEABILITY

FORMATIONS	DEPTH RANGE (m.)
KENOGAMIE	1486
NARWHAL	1507-1550
ALTAWAPISKAT	1565-1620
EKWAN RIVER	1660-1680
SEVERN RIVER	1694-1765
RED HEAD RAPIDS	1820.5-2020
CHURCHILL	2060-2120
BAD CACHE	2189
BASEMENT	2191-2200

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C.A. No. 2A

4.3 Lithology

SAMPLE DESCRIPTION

570 - 580	Cement (100%)
580 - 595	Cement (95%); Mudstone (5%): medium red, very soft, trace crinoid fragments and unidentified calcareous fossil debris.
595 - 600	Missed sample
600 - 605	Mudstone (100%): light grey, slightly calcareous (streaks), locally silty grading to trace light grey, very clayey, soft siltstone, abundant crinoid fragments and occasional traces of other calcareous fossil debris. Trace shell fragments.
605 - 610	Mudstone (100%): as above, but grading to medium grey, trace locally silty grading to trace medium grey, very argillaceous, soft siltstone as above, trace crinoid fragments.
610 - 615	Mudstone (90%): as above, somewhat calcareous; siltstone (10%) as above, slightly pyritic in part, crinoid fragments as above (10%), trace pelecypod fragments and unidentified fossils.
615 - 620	Mudstone (100%): as above, extremely soft, trace calcareous, no visible silt, 5-10% crinoid and fossil debris as above.
620 - 625	Mudstone (95%): as above, locally slightly silty grading to very argillaceous, medium grey, soft siltstone (5%). Trace calcareous, occasional fossil fragment as above. Trace fossil assemblage with occasional associated siliceous inclusions.
625 - 630	Shale (90%): dark brown to black, very carbonaceous, blocky, microlaminated, coaly in part (very immature); contains stringers and lenses Limestone (10%): buff to light brown, predominantly cryptocrystalline, fossiliferous in part, soft to firm, tight.
630 - 640	Dolomite (100%): light brown, predominantly microcrystalline (locally cryptocrystalline), locally somewhat calcareous, slightly argillaceous in part, no visible porosity, trace Limestone stringers.
640 - 645	Mudstone (80%): in part reddish as above, in part buff to light grey, soft to firm; in part silty grading to soft siltstone (10%): as above, dolomite (10%) as above, microcrystalline, tight.

645 - 650	Mudstone (60%): light grey, soft to firm, blocky, 40% medium red, predominantly very soft; trace black, coaly shale.
650 - 655	Mudstone (40%): light grey as above, (40%) red as above, Anhydrite (20%): buff to light brown, cryptocrystalline, dense, medium hard.
655 - 660	Mudstone (80%): light grey and red as above; Anhydrite (10%) as above; Dolomite (10%): buff to light grey, cryptocrystalline to microcrystalline, predominantly anhydritic, blocky, dense, clean tight.
660 - 665	Mudstone (55%) medium red, very soft as above; 30% buff to light grey as above; Anhydrite (10%) as above, in part light grey, dense, cryptocrystalline, minor Dolomite (5%) as above, trace tight, fossiliferous limestone.
665 - 670	Mudstone (50%) medium red, 40% light grey, soft; Dolomite (5%) light grey, microcrystalline, clean tight; Anhdyrite (5%) as above, trace black coaly shale (cavings?).
670 - 675	Mudstone (50%) medium red as above, grading (mixed) to light grey (35%); Limestone (5%) light grey, microcrystalline, dolomitic tight; Anhydrite (10%) in part white, soft, in part light grey as above; trace Dolomite as above. Probable Salt stringers--chlorides increasing in mud.
675 - 680	Mudstone: medium red (50%) and light grey (40%) as above, trace pyrite inclusions; Dolomite (5%), buff to light brown, predominantly microcrystalline, anhydritic(?), tight, minor Siltstone (5%), argillaceous, firm to hard. Trace Anhydrite as above; trace black shale as above (cavings?). Probable Salt stringers.
680 - 685	Mudstone: predominantly red, soft as above (50%), grading to light grey as above (30%); Siltstone (15%); light grey, siliceous, firm to hard, calcareous in part, minor Limestone (5%), light grey, probably very fossiliferous, dolomitized in part, no visible porosity, salt stringers(?).
685 - 688	Probable Salt bed (Gamma Peak)
688 - 695	Mudstone light to medium grey, very soft as above (40%) and red as above (30%); Siltstone (10-15%) as above, calcareous in part, becoming somewhat harder. Anhydrite (5 to 15%) white to light grey, soft to firm, occasionally calcareous. Minor Limestone (5%), dolomitic, probably very fossiliferous (crinoids) no visible porosity, grading to 5% calcareous Dolomite. Trace to minor black, coaly shale (cavings?).

695 - 700	Anhydrite (60%): buff to light grey, increasingly dolomitic (in part); Siltstone (10%) as above, calcareous in part; mudstone (30%) predominantly light grey, soft to firm (5% red as above).
700 - 705	Anhydrite (60%) white to buff, soft to firm, predominantly clean, non-dolomitic to slightly dolomitic; Mudstone (30%) light grey as above, minor Siltstone (5%) as above; minor Limestone (5%) buff, microcrystalline, dolomitic, tight, occasionally fossiliferous.
705 - 710	Anhydrite (60%): occasionally hard, dolomitic in part grading to Dolomite (20%), cryptocrystalline to microcrystalline, hard, anhydritic in part, locally calcareous, Mudstone predominantly light grey as above (10%) and red as above (5%); 5% black, coaly shale (cavings?).
710 - 715	Anhydrite (90%) buff to light grey, predominantly cryptocrystalline, locally slightly dolomitic, minor stringers Limestone (5%), light brown, slightly dolomitic; minor Mudstone as above (5%) (cavings?).
715 - 720	Anhydrite (60%) as above, but predominantly very dolomitic; grading to Dolomite (40%), white to light grey and brown, slightly to very anhydritic, cryptocrystalline to microcrystalline, some mixed clay (swelling), no visible porosity.
720 - 725	Limestone (40%) buff to light brown, somewhat mottled, clean but slightly to very dolomitic and/or anhydritic; grading to Dolomite (25%) as above, but predominantly microcrystalline, slightly to very calcareous; Anhydrite (35%) white to buff as above, trace black shaley stringers (cavings?).
725 - 730	Limestone (70%): as above, clean but increasingly anhydritic and decreasingly dolomitic in part; grading to calcareous, white Anhydrite (20%) and calcareous Dolomite (10%) as above, no visible porosity. Trace black shaley stringers.
730 - 735	Limestone (90%) buff to light brown, cryptocrystalline, clean, moderately anhydritic, fairly soft, decreasingly dolomitic to trace; 10% grading to inclusions and streaks of Anhydrite, calcareous in part. No visible porosity.
735 - 740	Limestone (95%) buff to light brown, cryptocrystalline to somewhat "earthy", possibly fossiliferous (crinoids?), very clean, occasionally dolomitic, decreasingly anhydritic with minor grading to Anhydrite (5%) as above, No visible porosity.

740 - 745	Limestone (100%) as above, possibly bioclastic(?) (some visible crinoids), occasionally dolomitic and/or anhydritic (occasional inclusions), some shaley inclusions, tight.
745 - 750	Limestone (70%) predominantly as above, but in part increasingly dolomitic (microcrystalline to very fine crystalline); grading to Dolomite (30%) light to medium brown, very fine crystalline, slightly to very calcareous, somewhat argillaceous in part, occasional dolomitized crinoids. No visible porosity.
750 - 755	Dolomite (60%): medium brown, microcrystalline to very fine crystalline, predominantly very calcareous, clean to slightly argillaceous, occasional trace disseminated pyrite; Limestone as above (40%), tight.
755 - 760	Dolomite (70%) medium brown as above, occasional black shaley material, calcareous, occasionally anhydritic, predominantly tight, but occasional trace intercrystalline porosity(?); Limestone (30%) as above, clean, dolomitic in part, occasionally anhydritic.
760 - 765	Dolomite (75%): as above, no visible porosity; Limestone (20%) as above, minor Anhydrite (5%) white to buff, calcareous in part (inclusions and/or stringers).
765 - 770	Poor sample (trip). Predominantly cavings; abundant Mudstone (clay); Limestone and Dolomite as above.
770 - 775	Limestone (75%) buff to light grey, cryptocrystalline to microcrystalline, in part somewhat chalky, friable and/or very soft in part (argillaceous), in part very dolomitic, grading to Dolomite (25%), medium grey, microcrystalline, calcareous, tight.
775 - 780	Limestone (80%) as above, but predominantly light brown, soft, somewhat chalky and argillaceous, in part dolomitic as above; grading to dolomite (10%). Some clay (mudstone) (10%), light grey, very soft.
780 - 785	Dolomite (60%) light grey, cryptocrystalline to chalky, very argillaceous (grading to 10% grey, dolomitic Shale), very soft and friable, locally slightly harder, calcareous. Limestone (20%) as above, predominantly dolomitic. Mudstone (10%) reddish, noncalcareous.
785 - 790	Mudstone (80%) light grey mixed with pink to medium red, very soft, noncalcareous, but numerous inclusions of Limestone (20%), soft, as above.

790 - 825	Mudstone (100%): predominantly pink to red as above, some mixed light grey, very soft, swelling and disintegrating in water, occasional calcareous micro-inclusions.
825 - 835	Mudstone (70%): predominantly red as above, but increased competency in water; some (15%) light grey, soft. Limestone (30%) white to buff, predominantly cryptocrystalline, clean to moderately argiliaceous, locally very siliceous, somewhat dolomitic in part, trace gypsum.
835 - 840	Mudstone (75%) reddish with mixed light grey, noncalcareous; Limestone (25%) as above, clean to slightly argillaceous, occasionally dolomitic, trace crinoids.
840 - 845	Limestone (70%) white to buff, cryptocrystalline (micritic), occasional blebs argillaceous material, some dolomitization. Mudstone (30%) as above.
845 - 850	Salt (%?) buff and light brown, very coarsely crystalline (halite); Mudstone dull red, occasionally calcareous; Limestone as above.
850 - 940	Salt (100%) as above (halite).
940 - 960	Salt (100%) predominantly buff, translucent. Predominantly halite but occasional trace KCl (sylvite).
960 - 995	Salt (100%) as above but occasionally clear (transparent), some very coarse platey crystals. Some pink KCl as above.
995 - 1010	Salt (100%) clear to translucent, increasing platey crystals.
1010 - 1020	Salt (100%) becoming predominantly clear, crystalline, crystals somewhat platey, trace pink KCl (?). Trace reddish clay and medium grey Mudstone, very soft.
1020 - 1030	Salt (100%) clear to translucent (trace white), possible trace KCl salt. Decreasing clay to trace.
1030 - 1059	Salt (100%) as above, no clay.
1059 - 1065	Limestone (75%) white to buff, micritic to chalky, soft, slightly to very argillaceous, in part medium brown, cryptocrystalline to microcrystalline, hard, dolomitic in part, slightly argillaceous, tight; Dolomite (25%) medium brown, microcrystalline, calcareous, somewhat argillaceous, hard; grading to Limestone in part.

1065 - 1070	Limestone (75%) buff to light brown, cryptocrystalline (slightly chalky) to microcrystalline, clean but predominantly slightly to very dolomitic, trace crinoids and forams, trace pinpoint and "earthy" porosity; Dolomite (25%) (grading from Limestone), predominantly microcrystalline, calcareous, occasional intercrystalline and pinpoint porosity; possible very faint fluorescence, occasional medium white streaming cut fluorescence, light brown oil residue.
1070 - 1075	Limestone (80%) predominantly as above, occasional bituminous streaks; occasionally grading to calcareous Dolomite (20%) as above. Occasional traces (decreasing) porosity as above.
1075 - 1081	Limestone (30%) as above, dolomitized in part; grading to Dolomite (10%) as above, locally very argillaceous, grading to light to medium grey, soft, calcareous Shale (20%). Anhydrite (40%), milky to white, crystalline, clean, no visible porosity in Limestone/Dolomite.
1081 - 1085	Anhydrite: 15% white, silky clean, 25% buff to light grey, slightly to very dolomitic, grading to Dolomite (45%), light grey, cryptocrystalline, dense, moderately to very anhydritic, hard, tight; a few calcareous crincid fragments; Mudstone (10%), grey and red (cavings?), dolomitized Limestone (5%) as above.
1085 - 1090	Dolomite (60%) as above, very anhydritic; grading to Anhydrite (30%) as above (15% white, non-dolomitic, soft); trace pyrite inclusions, no visible fossils; Limestone (5%) and Mudstone (5%) as above.
1909 - 1095	Anhydrite (85%) white to buff as above, cryptocrystalline, slightly waxy; in part (10%) dolomitic with minor grading to Dolomite (10%) as above. Minor Limestone (5%) as above, white, cryptocrystalline to microcrystalline, dolomitic, tight, trace crinoid fragments.
1095 - 1100	Limestone (40%) light brown, cryptocrystalline to slightly sucrosic, firm, blocky, clean, in part anhydritic; Anhydrite (30%) as above and Dolomite (30%) as above, light grey, anhydritic in part, slightly argillaceous; no visible porosity.
1100 - 1105	Trip Sample: Limestone (20%) as above; Mudstone (25%) grey and red; abundant Claystone, very sticky ("gumbo"). Note: possible fault zone.

1105 - 1110	Abundant Claystone (50%?) as above; Dolomite (20%?), light grey, cryptocrystalline to microcrystalline, soft (locally white, hard), slightly anhydritic in part, tight; Anhydrite (10%?) white to buff, waxy; Mudstone light grey (10%?) and reddish (20%?); Limestone (5%?); dolomitic as above.
1110 - 1115	Clay (70%?) light to medium grey, very soft, calcareous, reddish Mudstone (5%?) as above; Dolomite (10%?); Anhydrite (10%?); Limestone (5%?) as above. Trace crinoids, sponge spicules; minor Salt (halite)(5%) coarse crystalline.
1115 - 1125	Salt (halite) (80-85%) as above, translucent, platey crystals, grey Clay (5-10%) as above; trace red Mudstone becoming slightly harder, dolomitic; trace to minor Dolomite; Limestone and Anhydrite as above. Trace Tentaculites (M. Devonian - Upper Silurian).
1125 - 1190	Salt (halite)(100%) clear to translucent, coarse crystalline, platey, clean.
1190 - 1195	Salt (95%) as above, minor white anhydrite inclusions (5%), hard.
1195 - 1200	Anhydrite (55%?) white to buff, slightly waxy, cryptocrystalline, locally somewhat calcareous; grading to minor buff to light brown, anhydritic Limestone (5%); Claystone (30%?), light to medium grey, very soft, noncalcaroeus, Mudstone (10%), medium red, soft to firm. Some Salt?
1200 - 1205	Limestone (80%) buff to light brown, cryptocrystalline, fairly soft, clean, anhydritic in part; Anhydrite (20%) white, soft, calcareous as above.
1205 - 1210	Salt (halite)(95%) clear to translucent, very coarse crystalline, occasional inclusions white Anhydrite (5%).
1210 - 1215	Salt (95%) as above, minor Dolomite (5%), white to buff, cryptocrystalline to microcrystalline, very argillaceous, hard. Trace Anhydrite as above, trace very soft, grey Claystone.
1215 - 1225	Salt (50-60%) as above, Mudstone (25-30%), grading to Shale, medium red, noncalcareous, firm; minor Dolomite as above, anhydritic; Anhydrite (10-15%) as above.
1225 - 1230	Salt (90%) as above, translucent; minor dolomite and anhydrite as above; tight; trace mudstone as above.
1230 - 1235	Salt (95%) as above; minor white Anhydrite (5%) inclusions.

1235 - 1250	Salt (100%) as above, halite, predominantly translucent, very coarse crystalline, clean.
1250 - 1255	Anhydrite (75%) white, microcrystalline (sucrosic), clean; interbeds and inclusions of Limestone (25%), cryptocrystalline to microcrystalline, clean but anhydritic, tight.
1255 - 1260	Limestone (80%) buff to light brown, predominantly clean (slightly argillaceous in part), anhydritic in part, tight; Anhydrite (20%) as above.
1260 - 1265	Dolomite (80%) buff, cryptocrystalline, dense, slightly argillaceous, fairly hard, tight; anhydrite (20%) white, as above.
1265 - 1275	Anhydrite (85-90%) predominantly white, cryptocrystalline, slightly waxy, clean; 10% buff to light brown, calcareous; grading to Limestone (10%), microcrystalline, very anhydritic, tight; trace clean, cryptocrystalline. Minor light to medium grey, very soft Claystone and red Mudstone (cavings?).
1275 - 1280	Anhydrite (95%) as above, in part light grey, cryptocrystalline, very dolomitic hard; minor grading to hard, anhydritic Dolomite, tight (possibly increasing grey Claystone?), trace Limestone as above.
1280 - 1285	Anhydrite (95%) as above, and minor Limestone inclusions as above; trace Tentaculites.
1285 - 1290	Anhydrite (70%) white to light grey to light brown, clean to argillaceous, in part very calcareous; grading to anhydritic, cryptocrystalline Limestone (15%), soft to firm Mudstone (15%), red and grey, soft (cavings?); trace large crinoid fragments.
1290 - 1295	Anhydrite (90%) as above, very calcareous in part; grading to Limestone (10%) as above; trace crinoid fragments.
1295 - 1300	Limestone (80%) white to light grey, cryptocrystalline, slightly to very anhydritic, trace fossiliferous (crinoids); Anhydrite (20%) as above.
1300 - 1310	Anhydrite (50-60%) predominantly white to buff, minor clear, microcrystalline to coarse crystalline, argillaceous in part (becoming cleaner downwards), calcareous in part; grading to Limestone (40-50%), anhydritic as above (streaks and inclusions), trace fossiliferous (crinoids and possible Amphipora), tight.

1310 - 1315	Limestone (80%) as above, interbedded with Anhydrite (20%) as above (some gradation); trace crinoids.
1315 - 1325	Limestone (40-50%) as above and Anhydrite (50-60%) as above, interbedded and gradational, tight; trace crionids (large).
1325 - 1330	Salt (halite)(80%?) very coarse crystalline, clean, translucent; Anhydrite (15%) as above, minor Limestone as above.
1330 - 1430	Salt (halite)(100%) as above, buff to slightly milky in part; possible occasional stringers Mudstone.
1430 - 1435	Predominantly Salt (65%) as above, trace Sylvite; hard, reddish, dolomitic Shale (15%) inclusions; some Anhydrite (25%?) white, microcrystalline to sucrosic, clean, soft to hard, slightly calcareous in part.
1435 - 1440	Limestone (60%) white to buff, cryptocrystalline, very anhydritic, soft; Salt (30%) as above, Anhydrite (10%) as above.
1440 1445	Salt (70%), buff, translucent; Limestone (15%) white to buff, cryptocrystalline, clean, but slightly anhydritic, firm, tight; Anhydrite (15%), white cryptocrystalline, slightly calcareous in part.
1445 - 1452	Salt (90%) as above, inclusions of Anhydrite (10%) white, cryptocrystalline.
1452 - 1455	Dolomite (45%) brownish-red, cryptocrystalline to microcrystalline (slightly sucrosic), very argillaceous grading to dolomitic Shale (20%), silty, firm to hard, somewhat friable in part occasionally anhydritic, tight; 10% buff, cryptocrystalline, clean, tight (hard); Limestone (10%), white cryptocrystalline, anhydritic, clean, tight. Anhydrite (5%) as above.
1455 - 1460	Dolomite (80%) as above but increasingly cryptocrystalline, silty; occasional Anhydrite (10%) inclusions; possible Salt (10%) stringers (probably cavings); trace Limestone as above.
1460 - 1465	Dolomite (75%) as above, in part increasingly shaley (grading to dolomitic, silty shale), possible trace pinpoint porosity; in part light grey; cryptocrystalline, argillaceous, hard, tight; inclusions Anhydrite (5%) and Limestone (5%), tight.
1465 - 1470	Dolomite (65%) very silty (some grading to dolomitic), somewhat anhydritic Siltstone (10%), argillaceous, occasional Anhydrite inclusions; Anhydrite (10%) and Limestone (5%) as above.

1470 - 1478	Dolomite (40%) red to brown, cryptocrystalline to "earthy", hard; decreasing silty in part (some grading to dolomitic, shaley, red Siltstone (10%); occasional anhydritic inclusions (10%); increasing shaley grading to Shale (40%?), very dolomitic, hydrating(?) to soft clay in mud. Trace Limestone.
1478 - 1481	Siltstone (100%) (to very fine grained sandstone), pink, clear, silica, very soft, unconsolidated, probable salt matrix, no visible porosity.
1481 - 1492	Dolomite (40-50%) in part buff to light grey, cryptocrystalline, argillaceous, firm to hard, tight; in part (%?) reddish, silty and argillaceous as above; grading to dolomitic, argillaceous Siltstone (10-20%), buff and reddish; and silty, dolomitic Shale (25-40%)(hydrating to soft mudstone); Anhydrite (5-10%), white, cryptocrystalline; Mudstone light to medium grey, soft to firm.

13 3/8" (340 mm casing landed at 1478 m K.B.

1492 - 1495	Very poor sample, predominantly cement.
1495 - 1500	Siltstone (55%) buff to light grey, clean to slightly argillaceous, non-dolomitic. Locally sandy, fine to medium grained, subrounded quartz and chert, occasional bituminous and calcareous streaks, also in part reddish, dolomitic, slightly argillaceous (5% sand grains). Anhydrite (15%) white, microcrystalline, slightly calcareous in part, minor clear gypsum. Shale (10%) red, silty. Cement (15%).
1500 - 1520	Anhydrite (85-95%) white, buff, light brown, cryptocrystalline to microcrystalline to finely crystalline, slightly calcareous, slightly to very dolomitic in part, red streaks in part, Siltstone (0-5%) pink, slightly calcareous and anhydritic. Dolomite (0-15%) buff to light grey, microcrystalline, anhydritic, dense.
1520 - 1543	Salt interpreted from rate of penetration. Samples consist of cavings only.
1543 - 1550	Dolomite (70-95%) light grey to grey, cryptocrystalline to microcrystalline, anhydritic, very silty to very fine sandy. Limestone (5-30%) buff to light brown, microcrystalline to very fine crystalline, trace fossiliferous, possible gastropod, anydritic. Anhydrite (trace) white to light grey, cryptocrystalline, massive.

1550 - 1560	Limestone (30%) light brown, cryptocrystalline to very fine crystalline, anhydritic in part, dolomitic in part, trace porosity in part; Dolomite (trace to 40%) white to light grey, cryptocrystalline, very silty to sandy. Anhydrite (30-70%) white to clear, cryptocrystalline to very fine crystalline, dolomitic in part.
1560 - 1595	Limestone (60-95%) buff to light brown, also white to off white, cryptocrystalline to very fine crystalline, rare fossils, trace very bioclastic with 10 to 15% intergranular porosity, no shows, dolomitic in part. Dolomite (5-40%) as above, very silty, occasionally very sandy, grading to sandstone/siltstone in part, dense; Shale (trace only) grey, limey, silty.
1595 - 1600	Dolomite (40%) white to light grey, cryptocrystalline to very finely crystalline, massive dense. Limestone (20%) as above, (40%) light brown to brown, cryptocrystalline to microcrystalline, microsucrosic, rare fossil fragments, no visible porosity, slightly argillaceous.
1600 - 1610	Siltstone (40-90%) light grey to light grey/brown, calcareous to slightly dolomitic, slightly argillaceous in part, calcite veins. Limestone (10-40%) as above. Dolomite (0-20%) as above. Shale (trace only) grey, noncalcareous or dolomitic, black (carbonaceous?) specks, silty.
1610 - 1615	Siltstone (20%) as above. Limestone (50%) white to off white, cryptocrystalline, rare fossil fragments, slight to very dolomitic, grading to dolomite in part, dense. Dolomite (30%) white, very fine to fine crystalline, very calcareous, dense.
1615 - 1635	Dolomite (40-70%) light grey, light brown, cryptocrystalline to microcrystalline, fossiliferous in part, commonly very calcareous, no visible porosity, silty in part. From 1615 - 1625 meters trace brown/black organic fragments, no fluorescence and a very weak cut fluorescence. Limestone (10-50%) off white to light brown, cryptocrystalline, slightly to very dolomitic, rare (unknown) fossils. Shale (0-5%) as above. Siltstone (0-20%) as above.
1635 - 1780	Limestone (70-100%) off white to light brown to brown, cryptocrystalline to microcrystalline, trace fossiliferous, crinoids, minor bioclastic streaks, non to very dolomitic, grading to limey dolomite in part, dense. Dolomite (0-30%) white to light grey, very fine to fine crystalline, commonly very calcareous (matrix), dense, locally fossiliferous (quartz and calcite filled veins/fractures from 1675 to 1680 meters).

1780 - 1805	Limestone (100%) off white to light brown, cryptocrystalline to microcrystalline, trace fossiliferous, trace crinoids, occasional bioclastic streaks, non to slightly dolomitic, dense, mudstone to minor packestone. Trace grey/brown slightly argillaceous. Dolomite (trace) light grey, very fine to fine crystalline, generally calcareous, fossiliferous in part.
1805 - 1815	Siltstone (5%) light grey, dolomitic, slightly argillaceous in part. Limestone (95%) as above. Dolomite (trace to 5%) as above, calcareous in part.
1815 - 1845	Siltstone (50-100%) off white to buff, dolomitic, calcareous patches in part, slightly argillaceous in part, tight, grading to silty dolomite in part. Limestone (5-50%) off white to light brown, as above. Anhydrite (trace in some samples) white/clear, translucent, massive.
1845 - 1855	Siltstone (70-100%) as above, sandy in part, grading to sandstone in part. Sandstone (trace to 20%) from siltstone, very fine to fine grained, fair sorting, angular, silty, dolomitic, tight. Limestone (trace to 10%) as above. Anhydrite (trace) as above.

NOTE: High rate of penetration from 1850 to 1880 meters may indicate salt (halite) which was not seen in samples.

1855 - 1865	Siltstone (100%) buff, dolomitic, grading to silty dolomite in part.
1865 - 1880	Siltstone (80-90%) as above, sandy in part. Sandstone (10-20%) buff, very fine to fine grained, silty, fair sorting, angular, tight, dolomitic, grading to sandy dolomite in part.
1880 - 1910	Siltstone (90-100%) as above, slightly calcareous in part, trace sandy in part. Limestone (trace-10%) off white to light brown, cryptocrystalline to microcrystalline, soft to firm, trace fossiliferous, very dolomitic in part, dense. Dolomite (trace) off white, very fine to fine crystalline, very calcareous in part (after limestone), bioclastic in part.
1910 - 1945	Limestone (70-100%) off white to light brown, cryptocrystalline to microcrystalline, soft to firm, trace fossiliferous, slightly to very dolomitic, rare crinoids, rare brachiopods, dense, grading to calcareous dolomite, locally abundant bioclastic debris. Dolomite (trace to 10%) light grey to light brown, very fine to fine crystalline, very calcareous (after limestone), slightly silty in part. Siltstone (trace to 10%) as above.

1945 - 1970	Siltstone (90-100%) buff to light brown, minor light grey to light grey/brown, trace sandy, argillaceous in part, tight, dolomitic (brown specks seen in 1955 meter sample--organic remains?) slightly calcareous in part, grading to silty dolomite in part. Limestone (trace to 10%) as above, abundant bioclastic debris in part packestone. Anhydrite (trace) white to clear, cryptocrystalline, massive.
1970 - 2000	Limestone (40-70%) off white to light brown, cryptocrystalline to microcrystalline, commonly very dolomitic, trace bioclastic debris, predominantly Mudstone trace fossiliferous, dense. Dolomite (trace to 10%) from limestone as above, very calcareous, fossiliferous in part. Siltstone (30-50%) buff to light brown, minor light grey to slightly argillaceous, dolomitic, minor slightly calcareous, tight.
2000 - 2005	Limestone (95%) off white to light brown, cryptocrystalline to microcrystalline, soft in part, generally non-dolomitic, rare fossils, dense. Siltstone (5%) as above.
2005 - 2015	Anhydrite (40-50%) white to clear, translucent in part, cryptocrystalline, massive, soft in part. Limestone (30%) as above, slightly to very dolomitic, dense. Siltstone (20-30%) as above.
2015 - 2035	Limestone (10-75%) off white to light brown, cryptocrystalline, dolomitic in part, rare fossils, dense. Siltstone (10-65%) off white to light brown, dolomitic, slightly calcareous, also minor light grey to grey, dolomitic, slightly argillaceous (interlaminated with clean siltstone). Dolomite (10-30%) off white to light brown, light grey, microcrystalline to very fine crystalline, calcareous, dense, after limestone grading to dolomitic limestone in part.
2035 - 2080	Limestone (70-90%) off white to light brown, cryptocrystalline to microcrystalline, very fine crystalline in part, trace rare fossils, very dolomitic in part, dense. Dolomite (10-30%) off white to light brown, minor light grey, very fine to fine crystalline, very calcareous, minor noncalcareous, dense after limestone.
2080 - 2185	Limestone (100%) off white to light brown, cryptocrystalline to microcrystalline, fossiliferous in part, slightly to very dolomitic in part, dense, mudstone to trace wackestone and rare bioclastic packestone (rare trace pyrite seen 2175 to 2185 meters). Dolomite (0 to trace) off white to light brown, very fine to fine crystalline, calcareous, rare fossils after limestone.

2185 - 2190	Limestone (100%) as above; Shale (trace) grey, soft/friable, slightly dolomitic.
2190 - 2193	Sandstone (30%) clear quartz, trace feldspar, rare lithic fragments, medium to very coarse grained, (plus?), poor sorting, angular to subangular, poor(?) consolidation with silica cement. No visible porosity, no shows, no fluorescence, no cut fluorescence.
2193 - 2194	Shale (trace) grey, soft/friable, dolomitic, sandy in part, medium grained, angular quartz. Limestone and Sandstone cavings (100%).
2194 - 2215	Granitic Gneiss: medium to very coarse crystalline, quartz, minor pink and white feldspar, trace biotite, mica-chloritized in part, and abundant mafic mineral showing a strong orientation/shearing in association with quartz.

GEOLOGICAL SUMMARY

Trillium Soquip Onexco et al Beluga O-23 was drilled in the basinal area to the west of a major Paleozoic (Silurian) ridge trending approximately north-northwest through the centre of Hudson's Bay. Of the three previous holes drilled within Hudson's Bay; Aquitaine et al Walrus A-71 was drilled almost on top of the ridge; Aquitaine et al Polar Bear C-11 slightly off the top of the ridge to the east; and Aquitaine et al Narwhal South N-58 well to the east of the ridge. Thus, the Beluga O-23 prospect is the first well in Hudson's Bay to be drilled in the deep westward basinal area and must therefore be considered rank wildcat in nature, especially in relation to that section above the Silurian Unconformity. Indeed, this section did turn out to be drastically different to the prognosed section, the major surprise being the very thick sequence of evaporitic sediments present, including approximately 450 to 500 meters of massive salt (halite).

Hudson Fm (Penn)(?)/Midbay Fm (U/M Dev)

It is thought that the outcropping formation (that is, below the Pleistocene glacial deposits) is the Hudson Formation, probably Pennsylvanian in age. Samples however, were not recovered until after the 20" casing was drilled out and new hole was begun at approximately 575 meters.

575 - 650 m: This section (Midbay Fm?) is essentially composed of light to medium grey (but increasing reddish downwards), slightly calcareous, somewhat silty mudstones but which apparently contain varying amounts of floating fossil debris, mainly consisting of pelecypod and crinoid fragments. Much of the debris is unidentifiable however.

It should be noted that large sections of this interval are badly washed out as seen on Log Run #1. It is very difficult to distinguish these sections as a mudstone or a salt on logs. Because this part of the hole was drilled with an undersaturated (with respect to chloride content) drilling mud, any salt penetrated would be dissolved into the mud and not occur in samples. However, the fact that the Cl^- percentage did not increase through this section suggests that these intervals are indeed a very soft mudstone which has been washed into the mud.

One feature of note in this section is a dark brown to black, very carbonaceous, somewhat coaly (but probably immature) shale occurring at about 626 to 628 meters. The presence of this coaly material would possibly suggest a Pennsylvanian rather than a Devonian age for this section. However, a "Paleo"-date at about 600 meters yielded a Lower Middle Devonian age.

Directly below this shale lies a light brown, microcrystalline, somewhat calcareous, tight dolomite section about seven to eight meters thick. This interval was sampled at two places by sidewall cores, a detailed description is to be found in the sidewall core descriptions.

Essentially no drilled gases were recorded through this section (only traces C1).

650 - 727 m: The interval from 650 to about 710 meters was marked by a fast, consistent penetration rate combined with a steadily climbing Cl^- count in the drilling mud from 17,000 to about 65,000 ppm, which indicated the presence of at least some salt. Only mudstone was recovered in samples (with minor siltstone, anhydrite, limestone) because any salt drilled was dissolved into the drilling mud. It was not known exactly how much salt existed in this section until Schlumberger logs showed this section to be probably massive salt.

A two meter shaley band at 685 meters was suggested by Computalog's MWD-GR tool while drilling and confirmed by Schlumberger later.

The interval from 710 to 725 meters consists of interbedded (gradational) light grey, cryptocrystalline, dolomitic anhydrites, and anhydritic, white to light grey and brown, cryptocrystalline to microcrystalline, tight dolomites.

Essentially no drilled gases were recorded through the section 650 to 727 meters (only traces C1).

Walrus Fm (MDev) Limestone @ 727 m

If this section is indeed the Walrus Limestone, it is the first indication of a major departure from the prognosis, as this top is approximately 400 meters higher than the prognosed top of the Walrus Limestone. This interval, extending down to about 781 meters, is essentially a limestone section, but grading downwards into interbedded limestone and dolomite. Sidewall cores were taken at three places in this section (see Sidewall Core Description). The limestones are basically cryptocrystalline (but possibly bioclastic in part) to slightly "earthy" or chalky in part, clean but usually somewhat anhydritic and/or dolomitic. Downwards, the limestone tends to become increasingly dolomitic (microcrystalline to very fine crystalline) and grading to dolomite, which is generally medium brown, microcrystalline to very fine crystalline, clean to slightly argillaceous, and predominantly very calcareous. The dolomite itself appeared to be harder than the limestone and was marked by slower penetration rates. No porosity was noted either in the limestone or the dolomite in samples or cores. Essentially no drilled gases were recorded through this section (trace C1 only).

Walrus Fm Shale @ 781 m

This short section, extending from 781 to 791 meters consists of mixed, light grey and pink to reddish, very soft claystone. It is noncalcareous, but seems to contain numerous inclusions of soft limestone and possibly traces of fibrous gypsum. Schlumberger logs show this section to get quite washed out.

Massive Salt (Walrus Fm) @ 791 m

791 - 1060 m: This section consists almost totally of massive, clean, buff to light brown, very coarse crystalline salt (halite). Although no salt was recovered in samples until about 850 meters, Schlumberger logs confirm that the upper 60 meters of this section is also salt. Just before this section was penetrated, salt had begun to be added to the mud system in order to completely saturate it in anticipation of salt sections in the hole to be drilled. Until the system was fully saturated (probably about 850 meters), however, any drilled salt dissolved into the mud, and was not recovered in samples. However, through the top 60 meters, very little was coming over the shaker, and what was, was mudstone similar in character to that drilled above. This suggested either that a very soft mudstone was being drilled and being washed into the mud, or that a completely different lithology (i.e. salt) was being drilled and was dissolving into the mud, leaving only remnants and sloughings coming over the shaker. Schlumberger logs confirmed that this was the case.

Polar Bear Fm (M-LDev) @ 1061 m

1060 - 1075 m: This interval was sampled at eight places by sidewall cores and consists predominantly of white to light brown, micritic to chalky to microcrystalline, clean to argillaceous, slightly to very dolomitic, firm to hard, slightly anhydritic limestone. Also, 20 to 25% microcrystalline, calcareous dolomite was noted in samples, although not recovered in sidewall cores. Traces of pinpoint, "earthy", and intercrystalline porosity were noted in samples in both the limestone and dolomite but the sidewall cores appeared fairly tight. Schlumberger logs, however, indicate a maximum porosity of about 15%. A possible very faint yellow fluorescence was noted in some of the dolomite, accompanied by occasional medium white streaming cut fluorescence, leaving a light brown oil residue on the spot plate. The porosity and shows both occurred in the interval 1066 to 1071 meters, corresponding to a drilling break. Some minor gas readings were also recorded from about 1067 to 1072 meters with a maximum total gas reading of 0.20% total gas (background trace). It also should be noted that a faint crude oil smell was present associated with the sidewall cores over this interval. Although Schlumberger logs suggested a water/hydrocarbon saturated porosity in this interval, the RFT results recorded no formation pressures suggesting little or no permeability, backing up the preliminary analysis of the sidewall cores.

1075 - 1100 m: This interval is basically an interbedded series of dolomites, limestones, salt and anhydrite. Dolomites at the top and the bottom of this interval were sampled by sidewall cores. They can be quickly described as buff to light grey, cryptocrystalline to sucrosic, soft to hard, clean with no visible porosity (but possible traces of sucrosic porosity?). A very small amount of drilled gas was recorded through this section (maximum of 0.1% total gas). The anhydrites are white to buff, cryptocrystalline, slightly dolomitic in part, and tight. The minor amount of limestone is light brown, cryptocrystalline to slightly sucrosic, firm, clean but anhydritic in part, with no visible porosity.

Polar Bear Fm Salt

1100 - 1196 m: This is a massive Halite salt section, clear to translucent and crystalline, and was marked by a steady, fast penetration rate with essentially no background gases recorded in the mud.

1196 - 1206 m: The top of this section was marked by a sudden decrease in penetration rate, and consists mainly of interbedded (with some gradation) white to buff, cryptocrystalline, locally calcareous anhydrite, and tight, buff to light brown, anhydritic limestones. A few beds of soft, light to medium grey, noncalcareous mudstones also probably occur in this section. Essentially no background gases were recorded.

1206 - 1248 m: This section is essentially a very coarsely crystalline Halite salt section, but containing occasional bands of anhydrite, and tight limestones and anhydrites. Essentially no background gas was recorded.

PEN Fm (LDev) @ 1248 m

1248 - 1278 m: This section is predominantly composed of white, cryptocrystalline to microcrystalline, clean anhydrites with interbeds of limestone and dolomite. One sidewall core was taken in this interval, at 1260 meters, in a dense, buff to light grey, cryptocrystalline, clean, hard, tight dolomite. The limestones are cryptocrystalline to microcrystalline, clean, but predominantly anhydritic, and also tight. Essentially no drilled gas was recorded in this interval.

1278 - 1314 m: A very irregular penetration rate, accompanied by a moderate to a high degree of torque on the bit characterized this section. Although no salt was obtained in samples, Schlumberger logs indicated that the intervals 1278 to 1295 meters and 1304 to 1308 meters consist of massive salt. It is evident (and seen in other parts of the hole), that, although the mud system is saturated with respect to salt (Cl^- 175-180,000 ppm), usually the upper 20 to 40 meters of any salt section drilled (and the total of any thinner sections) is not recovered in samples, but the cuttings are dissolved into the mud. Then it is obvious that when the mud reaches a certain level of saturation (or "over-saturation"), all the salt drilled is recovered in samples. The result of this is that the sloughings from the hole above (often without a decrease in the volume of cuttings) are the only lithology recovered in samples until this point is reached, and the presence of salt can only be guessed at from the penetration rate and confirmed later by Schlumberger logs.

The interval from 1295 to 1304 meters (and other non-salt lithologies) was recovered in samples, however, and consists of interbedded white to light grey, clean, cryptocrystalline, slightly to very anhydritic, slightly fossiliferous limestone, and white to buff, microcrystalline to coarse crystalline anhydrite.

From 1308 to 1314 meters, also occurs an interbedded unit of limestone and anhydrite, predominantly as described above. No porosity, shows and essentially no background gases were recorded through this interval. No sidewall cores were taken.

1314 - 1452 m: Except for possible anhydrite stringers occurring between 1400 to 1410 meters, and a carbonate/anhydrite unit from 1433 to 1440 meters as described below, this section consists of massive buff to slightly milky, clear to translucent, very coarsely crystalline salt (halite). Because of the abundance of salt mentioned in the above interval, a one hundred percent recovery in samples right from the top of the interval was obtained.

The interval from 1433 to 1440 meters, marked by an abrupt change to a very slow penetration rate, is an interbedded unit of limestone, anhydrite and dolomite. The anhydrite (marked by the slowest drilling) is white, microcrystalline to sucrosic, clean, soft to hard, and slightly calcareous in part. The limestone is white to buff, cryptocrystalline, very anhydritic, soft and tight. The dolomite was not seen in samples, but was sampled by a sidewall core taken at 1439 meters. It is buff to light grey, cryptocrystalline, dense, very calcareous, clean, hard and tight. A minor amount of gas (maximum 0.16% total gas) was recorded starting about 1436 meters (on top of the limestone unit) and decreasing to trace by about 1439 meters.

Kenogami River Fm (LDev - U. Sil) @ 1452 m

The top of the Kenogami River Formation (?) was marked not only by an abrupt slowdown in penetration rate, but a distinct change to a completely new type of lithology.

1452 - 1467 m: The upper part of the formation (very slow drilling) consists generally of a reddish-brown (to occasionally light to medium grey), very soft, very silty (grading to a very fine, siliceous sand) dolomite, almost grading to a red dolomitic siltstone with an unstable (in water) matrix of "dolomitized mud". In fact this lithology might be better described as a "very silty, dolomitized mud". It is in part clean and in part shaley to varying degrees. Samples of this dolomite were obtained in sidewall cores taken at 1457 and 1465 meters. No visible porosity or shows were noted in this interval.

1467 - 1478 m: The top of this interval was marked by an increase in penetration rate. The lithology is somewhat a continuation of the above except that it becomes increasingly shaley, grading to a reddish and greyish, dolomitic shale which is apparently hydrating(?) in the drilling mud to a very soft reddish and greyish clay by the time it reaches the surface. One sidewall core was taken in this interval, at 1473.5 meters, and was described as a medium grey shale, blocky, firm, very dolomitic, somewhat silty, with traces reddish streaks. The fact that it is firm in consistency rather than soft (clay) as is that in samples, is probably due to the lesser exposure of the shale to the drilling mud. This may possibly also be applicable to the dolomite above.

1478 - 1482 m: This lithology was sampled twice in sidewall cores and was described as siltstone, pink, clean, clear, silica, very soft (unconsolidated) with probably a salt matrix. There was no visible porosity.

1482 - 1496 m: This section of hole consists of reddish, sandy, slightly argillaceous, dolomitic siltstones and shales with minor anhydrite.

Narwhal Fm (U.Sil) @ 1496 m

The Narwhal formation consists of massive anhydrite and salt (halite) with a minor component of silty, anhydritic dolomite and limestone.

1496 - 1519 m: This interval consists of massive anhydrite with minor interbeds of calcareous siltstone and dense, argillaceous dolomite.

1519 - 1543 m: This interval was interpreted from high rate of penetration to consist of massive salt (halite), none of which was seen in sample despite a salt saturated drilling mud.

1543 - 1561 m: The base of the Narwhal formation(?) consists predominantly of dense limestone interbedded with silty anhydritic dolomite and anhydrite and traces of shale.

Attawapiskat Member Ekwan River Fm (U.SIL) @ 1561 m

The Attawapiskat Member was picked at the top of a major limestone interval which was characterized by a steady, slightly faster rate of penetration than the preceding lithologies.

1561 - 1593 m: This member consists almost entirely of limestone which is typically cryptocrystalline to microcrystalline mudstone with, only occasional, beds of bioclastic debris which rarely have developed an intergranular, leached, porosity in bioclastic packestone. No shows were indicated in samples or on the gas detection equipment. This limestone is dolomitic in part and grades to limey dolomite in part occasional beds of silty dolomite were also seen.

Lower Member, Ekwan River Fm (Sil) @ 1599 m

The top of the Lower Member, Ekwan River formation is marked by the first appearance of siltstone, below the Attawapiskat, and a dramatic decrease in the rate of penetration. This formation shows a highly variable penetration rate characteristic of a variable/interbedded lithology.

1599 - 1620 m: This interval consists of calcareous, slightly to nonargillaceous siltstone interbedded with dolomitic limestone and limey silty dolomites.

1620 - 1704 m: This interval consists dolomitic doloimtic limestone and limey dolomites interbedded. The limestones form the predominant lithology and are typically cryptocrystalline to microcrystalline, fossiliferous mudstone with occasional streaks of bioclastic debris making thin beds of wackestone to packestone. Crinoids were discerned in some samples. Black organic specks were seen in the 1645 to 1650 meter samples. These appear to be organic remains in situ and no porosity was noted. No porosity or shows were seen in this member.

Severn River Fm (Sil) @ 1704 m

The Severn River consists of a monotonous massive limestone which is occasionally dolomitic in part and in part grades to limey dolomite and to a lesser extent to dolomite.

1704 - 1816 m: This interval consists of a cryptocrystalline to microcrystalline limestone. For the most part sparsely fossiliferous mudstone with minor wackestone to packestone beds. Crinoids were seen in some samples. This limestone is dolomitized in part and grades to dolomite in part. This formation is entirely dense with no visible porosity and no shows. Minor interbeds of dolomitic siltstone appear near the base of the unit.

Red Head Rapids Fm (Ord) @ 1816 m

The top of the Red Head Rapids is placed at the first appearance of massive dolomitic siltstone below the Severn formation.

1816 - 1850 m: This interval consists of dolomitic siltstone with limestone interbeds. The siltstones are usually off white to buff, dolomitic with a thin, grey, slightly argillaceous bed at the top. (This lithology is frequently very dolomitic and is visually not distinguishable from dolomite, but leaves an insoluble residue of silt when dissolved in warm HCl.) The limestones are off white to light brown, cryptocrystalline to microcrystalline, rare to trace fossils, slightly to very dolomitic in part, mudstone to minor wackestone. Traces of anhydrite were also seen.

1850 - 1907 m: This interval consists of mostly siltstone as described above, generally buff in color and sandy in part. This siltstone is gradational with dolomite and is not visually distinguishable from dolomite or silty dolomite. A sandstone bed was interpreted to exist at 1873 to 1877metrers. Only a few cuttings were seen and they consisted of buff, very fine to fine grained, silty, very dolomitic sandstone with possibly a trace of porosity. A trace of gas was noted here also which would verify a marginal porosity, no indications of oil were seen. The base of the interval contains several beds of limestone the same as the previous interval.

1907 - 1946 m: This interval predominantly consists of limestone which is typically off white to light brown, cryptocrystalline to microcrystalline, soft and friable in part, and is slightly to very dolomitic (i.e. dolomitized) in part and grades into thin beds of limey dolomite. This limestone is usually a mudstone with traces of bioclastic packestone. Infrequent crinoids were noted.

1946 - 1956 m: This interval drilled at a high rate of penetration and from samples, siltstone was indicated. However, the appearance of the siltstone did not indicate it should drill fast so possible salt was noted on the log - this was later proved by electric logs.

1956 - 2005 m: This interval consists of siltstone and limestone interbedded with occasional streaks of limey dolomite. All lithologies as described previously.

2005 - 2015 m: This interval consists primarily of a white to clean, translucent, massive anhydrite with thin interbeds of limestone and dolomite and siltstone.

2015 - 2027 m: This interval consists of siltstone and limestone interbedded. Both lithologies are as described previously.

Churchill Fm (Ord) @ 2027 m

The Churchill formation consists almost entirely of cryptocrystalline to microcrystalline, dolomitized in part, limestone. This limestone is sparsely fossiliferous mudstone to minor wackestone. Rare crinoids were seen. Thin beds of dolomite are common from 2030 to 2080 metres, and after that dolomitization is rare.

Bad Cache Rapids Fm (Ord) @ 2153 m

The Bad Cache Rapids consists entirely of a dense limestone. This limestone is sparsely fossiliferous and bioclastic mudstone to minor wackestone. Rare pyrite is seen throughout the unit.

Cambrian Sandstone (Granite Wash) @ 2189 m

The top of the Cambrian was marked by a sudden increase in penetration rate and by the first appearance of grey, dolomitic shale then quartz sandstone in samples.

The sandstone consists of clear quartz, trace pink feldspar, and rare mica flakes. These clasts range in size from medium to very coarse grained (and possible greater), are poorly sorted, angular to subangular where a porosity was apparent and no indications of hydrocarbons were seen (no fluorescence or cut fluorescence observed.)

Pre Cambrian Granitic Gneiss @ 2194 m

The top of the PreCambrian was seen as a decrease in penetration rate and the appearance of cuttings showing a Gneissic texture.

The Gneiss consists of medium to very coarse crystalline, clear quartz, trace pink and white feldspar, trace biotite, and an abundance of black mafic mineral with a strong preferred orientation surrounding and encapsuled by quartz. Some mafic minerals are extensively chloritized. Traces of blue translucent quartz were also seen.

4.4 STRATIGRAPHIC COLUMN

The full table of stratigraphic information cannot be completed at present because the biostratigraphic analysis is still ongoing. The following table shows the information available to date.

Preliminary Tops for Beluga O-23

When the biostratigraphy report is received, these tops will be upgraded to "final". However, given the extreme change in lithology relative to other wells in Hudson Bay, the tops can really be considered as "best guess" only.

All tops are relative to KB at 13.7 m above MSL.

Formation	Log Top	Subsea	Thickness	Lithology
Water Bottom	192m	178m	178	
Base Pleistocene	not picked		n/a	mudstone with minor dolomite, limestone & siltstone; basal halite unit
Devonian:				
Walrus	727m	713m	334	upper unit: limestone with dolomite, anhydrite & minor mudstone. Lower unit: halite
Polar Bear	1061m	1047m	187	upper unit: dolomitic limestone and anhydrite with minor halite. Lower unit: halite
Pen	1248m	1234m	204	upper unit: interbeds of halite, anhydrite, dolomite & limestone. Lower unit: halite with minor anhydrite & limestone

Formation	Log Top	Subsea	Thickness	Lithology
Kenogami	1452m	1438m	44	red dolomitic siltstone
Silurian:				
Narwhal	1496m	1482m	65	upper unit: anhydrite with minor siltstone, middle unit: halite Lower unit: limestone with dolomite & anhydrite
Attawapiskat	1561m	1547m	38	limestone, partly bioclastic, with minor dolomite & siltstone
Ekwan River	1599m	1585m	105	Upper unit: dolomitic siltstone Lower unit: limestone with minor dolomite
Severn River	1704m	1690m	112	limestone
Ordovician:				
Red Head Rapids	1816m	1802m	211	dolomitic siltstone grading to interbeds of siltstone & dolomitic limestone. Minor anhydrite at base.
Churchill	2027m	2013m	126	limestone, slightly fossiliferous, with minor dolomite near top
Bad Cache Rapids	2153m	2139m	36	limestone
Cambrian	2189m	2175m	4	poorly sorted, angular, feldspar rich sandstone
Pre-Cambrian	2193m	2179m	n/a	granite gneiss
Total Depth	2215m	2201m		

V WELL EVALUATION

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5.0 WELL EVALUATION

5.1 Downhole Logs Run on Beluga O-23

Service Company: Schlumberger of Canada Ltd.

Logging Run 1 — 14 - 16 August 1985

Depth — 558 - 1492m

Logs Run

Type	Interval	Scale
DL-Micro SFL	1492 - 558m	1:600/1:240
DISFL	1492 - 558m	1:600/1:240
DDBHC Long Spacing Sonic	1492 - 558m	1:600/1:240
LDT-CNL-GR	1492 - 558m	1:240
Natural GR Spectroscopy	1492 - 558m	1:240
Stratigraphic Dipmeter	1492 - 558m	1:240
Repeat Formation Tests	Selected points	
Core Sample Taker	45 cores at selected points	

Logging Run 2 — 12 - 14 September 1985

Depth — 1478 - 2215m

Logs Run

Type	Interval	Scale
DL-Micro SFL	2215 - 1478m	1:600/1:240
LDT-CNL-GR	2215 - 1478m	1:600/1:240
Stratigraphic Dipmeter	2215 - 1478m	1:240
DDBHC Long Spacing Sonic	2215 - 1478m	1:600/1:240
Repeat Formation Tests	Selected intervals	
WST (VSP)	2215 - 1250m shots @ 25m intervals	
Core Sample Taker	66 shots at selected points.	

Core sample taker results and an x-ray diffraction analysis of the core follow in this section. This information should be kept confidential for five years.

5.0 WELL EVALUATION (Cont'd)

5.2 - A computed dipmeter log was filed 17 September 1985.

- A summary of the deviation and drift surveys is included in this section.

- Gas logging and mud logging were performed by Geoservices North America Ltd. Only minor amounts of C1 with occasional traces of C2 and C3 were encountered. The complete Hydrocarbon Mud Log is enclosed as an appendix.

5.3 Velocity Survey

Results of the VSP obtained from the Beluga well are attached, along with the wavelet extracted and the reprocessing done in a portion of line CO-15 over the well using the wavelet. (This information should be held confidential for five years under the provisions of the Canada Oil and Gas Act <Section 50>).

5.4 Formation Stimulation

No formation stimulation was attempted.

5.5 Formation and Production Testing

A Repeat Formation Tester was run on each of the logging runs on 15th August 1985 and 13th September 1985. A summary of the intervals tested and the results achieved is attached.

No production testing was performed.

SURVEYS

Depth (m)	Deviation (°)	Direction
210	0.50	
230	0.50	
232	0.75	N36E
252	0.22	S71E
300	0.10	S65W
326	0.13	
415	0.42	N28W
501	0.23	N38E
566	0.05	N89E
252	0.45	N33W
589	0.25	S84W
649	0.57	S15E
684	0.20	S04E
703	0.12	S56E
722	0.17	S39W
1082	0.25	
1106	0.26	N54E
1144	0.30	N74E
1173	0.44	S19E
1220	0.28	S28E
1268	0.31	S56E
1316	0.60	S06W
1363	0.50	S13E
1382	0.38	S14W

SURVEYS

Depth (m)	Deviation (°)	Direction
1411	0.35	S55E
1448	0.42	S16E
1482	0.62	S18E
1496	0.43	S64E
1545	0.36	S15E
1620	0.49	S55E
1642	1.00	S40E
1656	1.12	S26E
1666	1.10	S33E
1693	1.24	S20E
1743	1.02	S64W
1768	1.75	S44E
1788	0.75	S72E
1806	1.26	S35E
1835	1.50	S00E
1855	2.00	S08E
1862	2.10	S52E
1891	2.30	S06E
1929	2.00	S60W
1948	1.75	S60E
1968	1.25	S35E
1987	1.10	N48W
2204	1.08	S58W

(Mud survey tool not working 1987 to T.D.)

CST SHOT SUMMARY LISTING PERFORMED 85-08-15 04:24 Run #1

SHOT	STATUS	DEPTH	TENSION
1	FIRED	1481.0	204.3
2	FIRED	1481.0	99.06
3	FIRED	1478.9	112.1
4	FIRED	1479.0	117.4
5	FIRED	1473.4	123.5
6	FIRED	1473.5	188.0
7	FIRED	1464.9	80.93
8	FIRED	1465.0	151.5
9	FIRED	1457.0	133.5
10	FIRED	1457.0	169.5
11	FIRED	1439.0	83.06
12	FIRED	1439.0	163.5
13	FIRED	1259.9	128.1
14	FIRED	1260.0	98.25
15	FIRED	1201.4	100.8
16	FIRED	1201.5	68.12
17	FIRED	1095.8	113.8
18	FIRED	1096.0	90.25
19	FIRED	1077.9	110.1
20	FIRED	1078.0	105.3
21	FIRED	1074.5	99.31
22	FIRED	1074.5	164.8
23	FIRED	1073.0	158.2
24	EMPTY	1073.0	166.8
25	FIRED	1070.0	126.7
26	EMPTY	1070.0	143.5
27	FIRED	1069.0	162.2
28	FIRED	1068.0	125.0
29	FIRED	1068.0	121.3
30	FIRED	1065.4	75.81
31	FIRED	1065.4	136.1
32	FIRED	1063.5	159.0
33	FIRED	1063.5	121.7
34	FIRED	1061.4	154.2
35	FIRED	1061.4	168.0
36	FIRED	773.9	193.5
37	FIRED	774.0	107.2
38	FIRED	750.9	86.37
39	FIRED	751.0	127.0
40	FIRED	742.9	120.6
41	FIRED	742.9	120.6
42	FIRED	635.9	118.7
43	FIRED	635.8	133.3
44	FIRED	631.5	120.5
45	FIRED	631.5	121.2

DEPTH UNITS : METE BIT SIZE : 14.750 IN

RING TYPE : LARG BULLET TYPE : DHOL

POWDER LOAD : 8.00 G POWDER TYPE : AHT

CST SHOT SUMMARY LISTING PERFORMED 85-09-13 01:44 Run #2

SHOT	STATUS	DEPTH	TENSION
1	EMPTY	2209.9	198.8
2	FIRED	2200.0	168.7
3	FIRED	2192.0	1207.
4	FIRED	2192.0	969.0
5	FIRED	2191.0	1296.
6	FIRED	2191.0	1050.
7	LOST	2190.5	1078.
8	FIRED	2189.5	1543.
9	MISFIRED	2180.0	173.1
10	EMPTY	2160.0	114.5
11	LOST	2160.0	301.2
12	MISFIRED	2139.9	110.1
13	FIRED	2120.0	160.5
14	FIRED	2100.0	137.2
15	MISFIRED	2100.0	106.0
16	FIRED	2080.0	156.2
17	FIRED	2060.0	103.6
18	MISFIRED	2040.0	123.9
19	EMPTY	2020.0	85.50
20	FIRED	2020.0	105.5
21	MISFIRED	2000.0	118.8
22	EMPTY	1992.5	123.5
23	FIRED	1992.5	195.3
24	MISFIRED	1980.0	165.3
25	EMPTY	1959.0	162.2
26	EMPTY	1959.0	143.2
27	FIRED	1949.8	105.1
28	FIRED	1920.0	100.5
29	EMPTY	1905.0	77.06
30	EMPTY	1905.0	135.6
31	EMPTY	1893.9	99.50
32	EMPTY	1893.8	219.8
33	FIRED	1880.0	127.5
34	FIRED	1875.9	113.4
35	MISFIRED	1876.0	125.0
36	EMPTY	1852.0	129.2
37	EMPTY	1852.0	98.75
38	EMPTY	1840.0	166.3
39	FIRED	1820.5	228.8
40	EMPTY	1820.5	194.1
41	MISFIRED	1800.0	165.7
42	EMPTY	1780.0	124.0
43	FIRED	1765.0	85.62
44	MISFIRED	1765.0	67.87
45	FIRED	1745.0	84.43
46	FIRED	1745.0	112.0
47	FIRED	1720.0	131.6
48	FIRED	1710.0	123.9
49	FIRED	1694.0	123.5
50	FIRED	1694.0	85.62
51	EMPTY	1680.0	126.0
52	FIRED	1680.0	125.8
53	FIRED	1660.0	88.81
54	MISFIRED	1659.9	149.8
55	FIRED	1620.0	99.87
56	FIRED	1620.0	131.0
57	FIRED	1600.0	128.2
58	FIRED	1577.9	130.5
59	FIRED	1578.0	119.8
60	FIRED	1565.0	86.00
61	FIRED	1565.0	127.1
62	FIRED	1550.0	91.25
63	MISFIRED	1510.9	93.87
64	FIRED	1507.0	92.50
65	EMPTY	1507.0	89.18
66	FIRED	1486.0	97.75

DEPTH UNITS : METE BIT SIZE : 311.150 MM

RING TYPE : NONE BULLET TYPE : DHOL

NUMBER LOST [illegible] TYPE : AHT

RFT RESULTS

Log Run #1

NO.	DEPTH	IHP (kPa)	FHP (kPa)	SEAT?	PERM?	COMMENTS
1	1480.5	19461	19461	Yes	No	Tight
2	1479.5	19454	19454	No	--	Lost Seat
3	1480.0	19468	19461	No	--	Lost Seat
4	1479.7	19461	19461	No	--	Lost Seat
5	1438.8	18889	18882	No	--	Lost Seat
6	1439.0	18903	--	No	--	Almost Good
7	1438.0	18903	--	No	--	Lost Seat
8	1436.5	18875	--	No	--	Lost Seat
9	1259.5	16545	16572	Yes	No	Tight
10	1259.8	16586	16600	Yes	No	Tight
11	1260.0	16614	16607	Yes	No	Tight
12	1202.0	15828	15835	Yes	No	Tight
13	1201.5	15835	15842	No	--	Lost seat
14	1201.0	15842	15848	Yes	No	Tight
15	1096.0	14470	14463	Yes	No	Tight
16	1096.5	14470	14463	Yes	No	Tight
17	1095.5	14456	14449	Yes	No	Tight
18	1078.5	14221	14228	Yes	No	Tight
19	1078.0	14228	14242	Yes	No	Tight
20	1077.5	14235	14235	Yes	No	Tight
21	1073.0	14180	14173	Yes	No	Tight
22	1070.5	14139	14139	Yes	No	Tight
23	1069.0	14111	14090	Yes	No	Tight
24	1068.0	14083	14090	Yes	No	Tight
25	1066.0	14070	14077	Yes	No	Tight
26	774.0	10264	10264	No	--	Lost Seat
27	772.5	10250	10250	No	--	Lost Seat
28	751.0	9974	9948	Yes	No	Tight
29	743.0	9850	9871	Yes	No	Tight
30	732.0	9719	9726	Yes	No	Tight
31	635.0	8519	8554		No	Leaky Packer (tight)

NO.	DEPTH	IHP (kPa)	FHP (kPa)	SEAT?	PERM?	COMMENTS
Log Run #2						
1	1565.5	20758	20758	No	--	No Seat
2	1578.0	20916	20909	No		No Seat
3	1578.5	20930	20930	No	--	No Seat
4	1620	21454	21454	Yes	No	Tight
5	1660	21964	21971	Yes	No	Tight
6	1682	22261	22254	Yes	No	Tight
7	1694	22412	22405	Yes	No	Tight
8	1694	22405	22405	Yes	No	Tight
9	1745	23100	23100			Check tool for pluggir
10	1765	23371	23364	Yes	No	Tight
11	1821	24095	24095	No	--	No Seat
12	1820.5	24095	24081	Yes	No	Tight
13	1852	24494	24494	No	--	No Seat
14	1876	24819	24819	Yes	No	Tight
15	1894	25067	25060	Yes	No	Tight
16	1905	25212	25205	Yes	No	Tight
17	1959	25929	25922	Yes	No	Tight
20	1992.5	26377	26370	Yes	No	Tight
21	2017	26694	26687	Yes	No	Tight
22	2191	28955	28942	Yes	No	Tight
23	2193	28976	28969	Yes	No	Tight
24	1950	25900	25900	No	--	Check tool

X-RAY DIFFRACTION ANALYSIS

FOR

CANTERRA ENERGY LTD.

TRILLIUM SOQUIP ONEXCO ET AL BELUGA O-23

Our File: 70687-85-519

Date: 1985 10 15

Petrographic Services

CORE

INTRODUCTION

Twenty-three sidewall samples, from Trillium Soquip Onexco et al Beluga O-23 were submitted by Mr. John Thorpe of Canterra Energy Ltd. for analysis as listed below. This report contains only the X-ray diffraction analysis of four samples. The scanning electron microscope study will follow in approximately one week with the final report including twenty-three thin sections, four scanning electron microscope and four X-ray diffraction analyses as soon as possible thereafter. Expected completion date will be no later than 1985 09 20. The thermal extraction chromatography on six samples will be issued under separate cover.

Sample Number	Depth (m)	Analysis
2	1481.00	TS
4	1479.00	TS
6	1473.50	TS
8	1465.00	TS
10	1457.00	TS
12	1439.00	TS, TEC
13	1260.00	TS
15	1201.50	TS
17	1096.00	TS, SEM, XRD
20	1078.00	TS, TEC
22	1074.50	TS, SEM, XRD
23	1073.00	TS, TEC
25	1070.00	TS, SEM, XRD

INTRODUCTION (CONTINUED)

Sample Number	Depth (m)	Analysis
27	1069.00	TS, TEC
28	1068.00	TS, TEC
31	1065.50	TS, SEM, XRD
32	1063.50	TS, TEC
35	1061.50	TS
37	774.00	TS
39	751.00	TS
41	743.00	TS
43	636.00	TS
45	631.50	TS

CORE LABORATORIES - CANADA LTD

X-RAY DIFFRACTION ANALYSIS

Sample Number: 17
Depth: 1096.00 metres

	Material Less than 5 Microns	Material Greater than 5 Microns	Calculated Bulk Composition
Quartz	Trace	Trace	Trace
Feldspar	Nil	Nil	Nil
Calcite	Trace	Trace	Trace
Dolomite	100	100	100
Siderite	Nil	Trace	Trace
Pyrite	Nil	Nil	Nil
Kaolinite	Nil	Nil	Nil
Illite	Nil	Nil	Nil
Chlorite	Nil	Nil	Nil
Smectite	Nil	Nil	Nil
Mixed Layer Clays (Swelling)	Nil	Nil	Nil
Anhydrite	Trace	Trace	Trace

CLAY SEPARATION BY FLOATATION

Material Less Than 5 Microns: 30.0%

Material Greater Than 5 Microns: 70.0%

CORE LABORATORIES-CANADA LTD.

X-RAY DIFFRACTION ANALYSIS

Sample Number: 22
Depth: 1074.50 metres

	Material Less than 5 Microns	Material Greater than 5 Microns	Calculated Bulk Composition
Quartz	Trace	Trace	Trace
Feldspar	Nil	Nil	Nil
Calcite	Trace	Trace	Trace
Dolomite	76	37	49
Siderite	Trace	Trace	Trace
Pyrite	Nil	Nil	Nil
Kaolinite	Trace	Trace	Trace
Illite	9	3	5
Chlorite	Nil	Nil	Nil
Smectite	Nil	Nil	Nil
Mixed Layer Clays (Swelling)	Trace	Nil	Trace
Anhydrite	15	60	46

CLAY SEPARATION BY FLOATATION

Material Less Than 5 Microns: 31.0%

Material Greater Than 5 Microns: 69.0%

CORE LABORATORIES - CANADA LTD.

X-RAY DIFFRACTION ANALYSIS

Sample Number: 25
Depth: 1070.00 metres

	Material Less than 5 Microns	Material Greater than 5 Microns	Calculated Bulk Composition
Quartz	Trace	Trace	Trace
Feldspar	Nil	Nil	Nil
Calcite	42	29	32
Dolomite	58	71	68
Siderite	Trace	Trace	Trace
Pyrite	Nil	Nil	Nil
Kaolinite	Nil	Nil	Nil
Illite	Nil	Nil	Nil
Chlorite	Nil	Nil	Nil
Smectite	Nil	Nil	Nil
Mixed Layer Clays (Swelling)	Nil	Nil	Nil
Anhydrite	Trace	Nil	Trace

CLAY SEPARATION BY FLOATATION

Material Less Than 5 Microns: 21.3%

Material Greater Than 5 Microns: 78.7%

CORE LABORATORIES · CANADA LTD.

X-RAY DIFFRACTION ANALYSIS

Sample Number: 31
Depth: 1065.50 metres

	Material Less than 5 Microns	Material Greater than 5 Microns	Calculated Bulk Composition
Quartz	Trace	Trace	Trace
Feldspar	Nil	Nil	Nil
Calcite	90	85	86
Dolomite	10	15	14
Siderite	Trace	Nil	Trace
Pyrite	Nil	Nil	Nil
Kaolinite	Nil	Nil	Nil
Illite	Nil	Nil	Nil
Chlorite	Nil	Nil	Nil
Smectite	Nil	Nil	Nil
Mixed Layer Clays (Swelling)	Nil	Nil	Nil
Anhydrite	Nil	Trace	Trace

CLAY SEPARATION BY FLOATATION

Material Less Than 5 Microns: 29.0%

Material Greater Than 5 Microns: 71.0%

INTRODUCTION

Twenty-eight sidewall samples selected by Mr. John Thorpe of Canterra Energy Ltd. from Trillium Soquip Onexco et al Beluga O-23 were submitted for analysis as listed below from Run number 2.

Shot Number	Depth (m)	Analysis
2	2200.00	Ø, K, TS
4	2192.00	Ø, K, TS
6	2191.00	Ø, K, TS
8	2189.00	Ø, K, TS, TEC
13	2120.00	Ø, K, TS
14	2100.00	Ø, TS, XRD, SEM
16	2080.00	Ø, K, TS
17	2060.00	Ø, K, TS, TEC
20	2020.00	Ø, K, TS
23	1992.50	Ø, K, TS, XRD
27	1949.00	Ø, K, TS
28	1920.00	Ø, K, TS, TEC
33	1880.00	Ø, K, TS, XRD, SEM
34	1876.00	Ø, K, TS, TEC, XRD, SEM
39	1820.50	Ø, K, TS, XRD, SEM
43	1765.00	Ø, K, TS
45	1745.00	Ø, K, TS, TEC
47	1720.00	Ø, K, TS
48	1710.00	Ø, K, TS
50	1694.00	Ø, K, TS, XRD, SEM

INTRODUCTION (CONTINUED)

Shot Number	Depth (m)	Analysis
52	1680.00	Ø, K, TS, TEC
53	1660.00	Ø, K, TS
56	1620.00	Ø, K, TS, XRD, SEM
57	1600.00	Ø, K, TS
58	1578.00	Ø, K, TS, TEC, XRD, SEM
60	1565.00	Ø, K, TS, XRD, SEM
62	1550.00	Ø, K, TS
64	1507.00	Insufficient Sample
66	1486.00	Ø, K, TS, XRD, SEM, TEC

Porosity and permeability data has been issued under separate cover as well as the thermal extraction chromatography. This report contains only the X-ray diffraction analysis of ten samples. The scanning electron microscope study of nine samples will follow as soon as possible. The final report including the X-ray diffraction, scanning electron microscopy and thin section analysis of twenty-eight samples will follow.

CORE LABORATORIES - CANADA LTD.

X-RAY DIFFRACTION ANALYSIS

Sample Number: 14
Depth: 2100.00 metres

	Material Less than 5 Microns	Material Greater than 5 Microns	Calculated Bulk Composition
Quartz	7	4	6
Feldspar	Nil	Nil	Nil
Calcite	93	96	94
Dolomite	Nil	Nil	Nil
Siderite	Nil	Nil	Nil
Pyrite	Nil	Nil	Nil
Kaolinite	Nil	Nil	Nil
Illite	Nil	Nil	Nil
Chlorite	Nil	Nil	Nil
Smectite	Nil	Nil	Nil
Mixed Layer Clays (Swelling)	Trace	Nil	Trace

CLAY SEPARATION BY FLOATATION

Material Less Than 5 Microns: 51.0%

Material Greater Than 5 Microns: 49.0%

CORE LABORATORIES - CANADA LTD.

X-RAY DIFFRACTION ANALYSIS

Sample Number: 23
Depth: 1992.50 metres

	Material Less than 5 Microns	Material Greater than 5 Microns	Calculated Bulk Composition
Quartz	4	3	3
Feldspar	Nil	Nil	Nil
Calcite	63	41	50
Dolomite	33	56	47
Siderite	Nil	Nil	Nil
Pyrite	Nil	Nil	Nil
Kaolinite	Nil	Nil	Nil
Illite	Trace	Nil	Trace
Chlorite	Trace	Nil	Trace
Smectite	Nil	Nil	Nil
Mixed Layer Clays (Swelling)	Trace	Nil	Trace

CLAY SEPARATION BY FLOATATION

Material Less Than 5 Microns: 41.1%

Material Greater Than 5 Microns: 59.9%

CORE LABORATORIES - CANADA LTD.

X-RAY DIFFRACTION ANALYSIS

Sample Number: 33
Depth: 1880.00 metres

	Material Less than 5 Microns	Material Greater than 5 Microns	Calculated Bulk Composition
Quartz	Trace	Nil	Trace
Feldspar	Nil	Nil	Nil
Calcite	89	100	97
Dolomite	11	Nil	3
Siderite	Nil	Trace	Trace
Pyrite	Nil	Nil	Nil
Kaolinite	Nil	Nil	Nil
Illite	Nil	Nil	Nil
Chlorite	Nil	Nil	Nil
Smectite	Nil	Nil	Nil
Mixed Layer Clays (Swelling)	Nil	Nil	Nil

CLAY SEPARATION BY FLOATATION

Material Less Than 5 Microns: 29.4%

Material Greater Than 5 Microns: 70.6%

CORE LABORATORIES - CANADA LTD.

X-RAY DIFFRACTION ANALYSIS

Sample Number: 34
Depth: 1876.00 metres

	Material Less than 5 Microns	Material Greater than 5 Microns	Calculated Bulk Composition
Quartz	36	6	16
Feldspar	Nil	Nil	Nil
Calcite	7	Trace	2
Dolomite	45	94	78
Siderite	Nil	Nil	Nil
Pyrite	Nil	Nil	Nil
Kaolinite	Trace	Nil	Trace
Illite	7	Nil	2
Chlorite	Nil	Nil	Nil
Smectite	5	Nil	2
Mixed Layer Clays (Swelling)	Trace	Nil	Trace
Anhydrite	Trace	Nil	Trace

CLAY SEPARATION BY FLOATATION

Material Less Than 5 Microns: 32.0%

Material Greater Than 5 Microns: 68.0%

CORE LABORATORIES - CANADA LTD.

X-RAY DIFFRACTION ANALYSIS

Sample Number: 39
Depth: 1820.50 metres

	Material Less than 5 Microns	Material Greater than 5 Microns	Calculated Bulk Composition
Quartz	3	Nil	1
Feldspar	Nil	Nil	Nil
Calcite	7	Nil	2
Dolomite	90	100	97
Siderite	Nil	Nil	Nil
Pyrite	Nil	Nil	Nil
Kaolinite	Trace	Nil	Trace
Illite	Trace	Nil	Trace
Chlorite	Nil	Nil	Nil
Smectite	Nil	Nil	Nil
Mixed Layer Clays (Swelling)	Trace	Nil	Trace
Barite	Trace	Nil	Trace
Anhydrite	Trace	Nil	Trace

CLAY SEPARATION BY FLOATATION

Material Less Than 5 Microns: 27.7%

Material Greater Than 5 Microns: 72.3%

CORE LABORATORIES - CANADA LTD.

X-RAY DIFFRACTION ANALYSIS

Sample Number: 50
Depth: 1694.00 metres

	Material Less than 5 Microns	Material Greater than 5 Microns	Calculated Bulk Composition
Quartz	81	87	85
Feldspar	Nil	Nil	Nil
Calcite	19	13	15
Dolomite	Trace	Nil	Trace
Siderite	Nil	Nil	Nil
Pyrite	Nil	Nil	Nil
Kaolinite	Nil	Nil	Nil
Illite	Trace	Nil	Trace
Chlorite	Trace	Nil	Trace
Smectite	Nil	Nil	Nil
Mixed Layer Clays (Swelling)	Trace	Nil	Trace

CLAY SEPARATION BY FLOATATION

Material Less Than 5 Microns: 32.9%

Material Greater Than 5 Microns: 67.1%

CORE LABORATORIES-CANADA LTD.

X-RAY DIFFRACTION ANALYSIS

Sample Number: 56
Depth: 1620.00 metres

	Material Less than 5 Microns	Material Greater than 5 Microns	Calculated Bulk Composition
Quartz	11	5	7
Feldspar	Nil	Nil	Nil
Calcite	39	37	38
Dolomite	39	58	52
Siderite	Nil	Nil	Nil
Pyrite	Nil	Nil	Nil
Kaolinite	Trace	Nil	Trace
Illite	11	Nil	3
Chlorite	Trace	Nil	Trace
Smectite	Nil	Nil	Nil
Mixed Layer Clays (Swelling)	Trace	Nil	Trace

CLAY SEPARATION BY FLOATATION

Material Less Than 5 Microns: 30.8%

Material Greater Than 5 Microns: 69.2%

CORE LABORATORIES - CANADA LTD.

X-RAY DIFFRACTION ANALYSIS

Sample Number: 58
Depth: 1578.00 metres

	Material Less than 5 Microns	Material Greater than 5 Microns	Calculated Bulk Composition
Quartz	Trace	Trace	Nil
Feldspar	Nil	Nil	Nil
Calcite	94	97	96
Dolomite	3	3	3
Siderite	Nil	Nil	Nil
Pyrite	Nil	Nil	Nil
Kaolinite	Nil	Nil	Nil
Illite	Trace	Nil	Trace
Chlorite	Nil	Nil	Nil
Smectite	3	Nil	1
Mixed Layer Clays (Swelling)	Trace	Nil	Trace
Barite	Trace	Nil	Trace

CLAY SEPARATION BY FLOATATION

Material Less Than 5 Microns: 38.7%

Material Greater Than 5 Microns: 61.3%

CORE LABORATORIES - CANADA LTD.

X-RAY DIFFRACTION ANALYSIS

Sample Number: 60
Depth: 1565.00 metres

	Material Less than 5 Microns	Material Greater than 5 Microns	Calculated Bulk Composition
Quartz	Trace	Nil	Trace
Feldspar	Nil	Nil	Nil
Calcite	74	86	83
Dolomite	Nil	Nil	Nil
Siderite	Nil	Nil	Nil
Pyrite	Nil	Nil	Nil
Kaolinite	Trace	Nil	Trace
Illite	18	Nil	5
Chlorite	Trace	Nil	Trace
Smectite	Nil	Nil	Nil
Mixed Layer Clays (Swelling)	Trace	Nil	Trace
Anhydrite	8	14	12

CLAY SEPARATION BY FLOATATION

Material Less Than 5 Microns: 27.9%

Material Greater Than 5 Microns: 72.1%

CORE LABORATORIES - CANADA LTD.

X-RAY DIFFRACTION ANALYSIS

Sample Number: 66
Depth: 1486.00 metres

	Material Less than 5 Microns	Material Greater than 5 Microns	Calculated Bulk Composition
Quartz	11	48	33
Feldspar	6	21	15
Calcite	3	2	2
Dolomite	23	27	25
Siderite	Nil	Nil	Nil
Pyrite	Nil	Nil	Nil
Kaolinite	Trace	Nil	Trace
Illite	3	Trace	1
Chlorite	5	Trace	2
Smectite	Nil	Nil	Nil
Mixed Layer Clays (Swelling)	Trace	Nil	Trace
Anhydrite	49	2	22

CLAY SEPARATION BY FLOATATION

Material Less Than 5 Microns: 43.2%

Material Greater Than 5 Microns: 56.8%

CORE LABORATORIES — CANADA LTD.

SMALL SAMPLE CORE ANALYSIS

COMPANY	CANTERRA ENERGY LTD.	FORMATION	PAGE 1 of 3
WELL	TILLIUM SOQUIP ONEXIO ET AL BELUGA	CORING EQUIPMENT	FILE 70175-85-1022
FIELD		CORE DIAMETER (mm)	DATE
LOCATION		CORING FLUID	ANALYSTS
ELEVATION			

CLEANING

- Solvent
- Extraction Equipment
- Extraction Time
- Drying Equipment
- Drying Time
- Drying Temperature

ANALYSIS

- ☐ Pore Volume measured by Boyle's Law in a Hassler holder using helium
- ☐ Grain Volume measured by Boyle's Law in a matrix cup using helium
- ☐ Porosity determined by summation of fluids (retort)
- ☐ Fluid saturations by retort
- ☐ Water saturation by Dean-Stark
- ☐ Oil saturation by weight difference (Dean-Stark)
- ☐ Permeability measured on mm diameter drilled plugs
- ☐ Permeability measured on 20 mm cubes

REMARKS

**PERMEABILITY VALUES FOR PERCUSSION TYPE SIDEWALL CORES DETERMINED EMPIRICALLY

DESCRIPTIONS

Conglomerate = cgl
Sandstone = ss
Siltstone = sltst
Shale = sh, shy
Limestone = ls
Dolomite = dol
Gypsum = gyp
Anhydrite = anhy
Halite (salt) = hal
Ironstone = fe
Chert = cht
Pyrite = pyr
Sulphur = sulf
Coal = coal
Carbonaceous Matter = carb
Pyrobitumen = pyrbit

Slightly Shaly = sshy
Moderately Shaly = mshy or shy
Very Shaly = vshy

Calcareous = calc
Limy = lmy
Pyritic = pyr

Glauconitic = glauc
Silty = slt
Sandy = sdy
Carbonaceous = carb
Dolomitic = dol
Coal/Coal inclusions = coal
Laminae (Laminated) = lam
Fractures (vertical/horizontal/ undifferentiated) = vert frac, hfrac, frac
Micaceous = mic
Stylolite (s) = sty
Oolitic = ool
Fossiliferous = foss
Intergranular = i

Vugs, Vugular, Vuggy
Pinpoint = ppv
Small Vug = sv
Medium Vug = mv
Large Vug = lv

CORE LABORATORIES – CANADA LTD.

COMPANY CANTERRA ENERGY LTD.
WELL TRILLIUM SOQUIP ONEXIO ET AL BELUGA 0-23
LOCATION

FORMATION **VARIOUS
ANALYSTS

FILE 70175-85-1022A
DATE

CORE ANALYSIS RESULTS

Sample Number	Depth-Metres (m)	cm Rec.	** Permeability to Air Millidarcys	Porosity x m	Residual Saturation (Fraction of Pore Volume) Oil	Residual Saturation (Fraction of Pore Volume) Water	Gas Detector	Remarks	Visual Examination: Formation Description	Visual Examination: Odor	Visual Examination: Fluorescence
1	1070	0	-----	---	---	---	---	----	EMPTY BOTTLE	---	-----
2	1073	0	-----	---	---	---	---	----	EMPTY BOTTLE	---	-----
3	1486	2.50	0.1	0.143	0.000	0.755	0		ls i dol	none	none
4	1507	0.75	-----	-----	---	---	---	(3)	ls i insufficient sample	---	-----
5	1550	1.50	< 0.01	0.165	0.000	0.727	0	(6)	ls i sdy anhy	none	min.
6	1565	3.0	< 0.01	0.120	0.000	0.750	0	(6)	ls i sshy	none	min.
7	1578	2.50	< 0.01	0.167	0.000	0.725	0	(6)	ls i	none	min.
8	1600	2.0	< 0.01	0.193	0.000	0.694	0	(6)	ls i	none	min.
9	1620	2.0	< 0.01	0.159	0.000	0.767	0	(6)	ls i	none	min.
10	1660	2.0	< 0.01	0.102	0.000	0.814	0	(6)	ls i	none	min.
11	1680	2.5	0.1	0.194	0.000	0.706	0	(6)	ls i	none	min.
12	1694	2.0	0.3	0.174	0.000	0.770	0		ls i	none	min.
13	1710	---	---	-----	----	-----	-	(3)	ls i insufficient sample	---	----
14	1720	1.50	< 0.01	0.111	0.000	0.811	0	(6)	ls i	none	min.
15	1745	2.00	< 0.01	0.136	0.000	0.765	0	(6)	ls i shy	none	min.
16	1765	2.00	< 0.01	0.107	0.000	0.813	0	(6)	ls i	none	min.
17	1820.5	0.30	< 0.01	-----	-----	-----	-	(1)	ls i	----	----
18	1876	0.20	< 0.01	-----	-----	-----	-	(1)	ls i	----	----
19	1880	1.15	< 0.01	-----	-----	-----	-	(1)(3)	ls i	----	----
20	1920	2.0	< 0.01	-----	-----	-----	-	(3)	ls i insufficient sample	----	----
21	1949	2.0	----	-----	-----	-----	-	-----	halite	----	----
22	1992.5	0.50	< 0.01	-----	-----	-----	-	(3)	ls i	----	----
23	2020	0.60	< 0.01	-----	-----	-----	-	(3)	ls i	----	----
24	2060	0.40	< 0.01	0.109	0.000	0.807	0	(6)	ls i	none	none
25	2080	1.10	< 0.01	0.123	0.000	0.764	0	(6)	ls i	none	min.
26	2100	1.0	< 0.01	0.176	0.000	0.778	0	(6)	ls i	none	min
27	2120	1.0	< 0.01	0.148	0.000	0.797	0	(3)	ls i	none	none
28	2189	3.0	----	-----	-----	-----	-	---	sh	----	----
29	2191	3.0	0.2	0.150	0.000	0.818	0		granitic	none	none
30	2192	3.0	0.1	0.155	0.000	0.832	0	(6)	granitic	none	none
31	2200	1.5	---	-----	-----	-----	-	(3)	grantiic	----	----

These analyses, opinions or interpretations are based on observations and material supplied by the client to whom, and for whose exclusive and confidential use, this report is made. The interpretations or opinions expressed represent the best judgement of Core Laboratories – Canada Ltd., (all errors or omissions excepted), but Core Laboratories – Canada Ltd., and its officers and employees, assume no responsibility and make no warranty or representations as to the productivity, proper operation, or profitableness of any oil, gas or other mineral well or sand in connection with which such report is used or relied upon.

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COMPANY CANTERRA ENERGY LTD.
WELL TRILLIUM SOQUIP ONEXIO ET AL BELUGA 0-23
LOCATION

FORMATION **VARIOUS
ANALYSTS TS

FILE 70175-85-1022A
DATE

CORE ANALYSIS RESULTS

Sample Number	Depth-Metres (m)	cm Rec.	Permeability to Air Millidarcys	Porosity x m	Residual Saturation (Fraction of Pore Volume)		Gas Detector	Remarks	Visual Examination		
					Oil	Water			Formation Description	Odor	Fluorescence

REMARKS: **PERMEABILITY VALUES FOR PERCUSSION TYPE SIDEWALL CORES DETERMINED EMPIRICALLY

(1) ALTERED CORE - BROKEN
(3) INSUFFICIENT SAMPLE
(6) LOW PERMEABILITY

FORMATIONS	DEPTH RANGE (m.)
KENOGAMIE	1486
NARWHAL	1507-1550
ALTAWAPISKAT	1565-1620
EKWAN RIVER	1660-1680
SEVERN RIVER	1694-1765
RED HEAD RAPIDS	1820.5-2020
CHURCHILL	2060-2120
BAD CACHE	2189
BASEMENT	2191-2200

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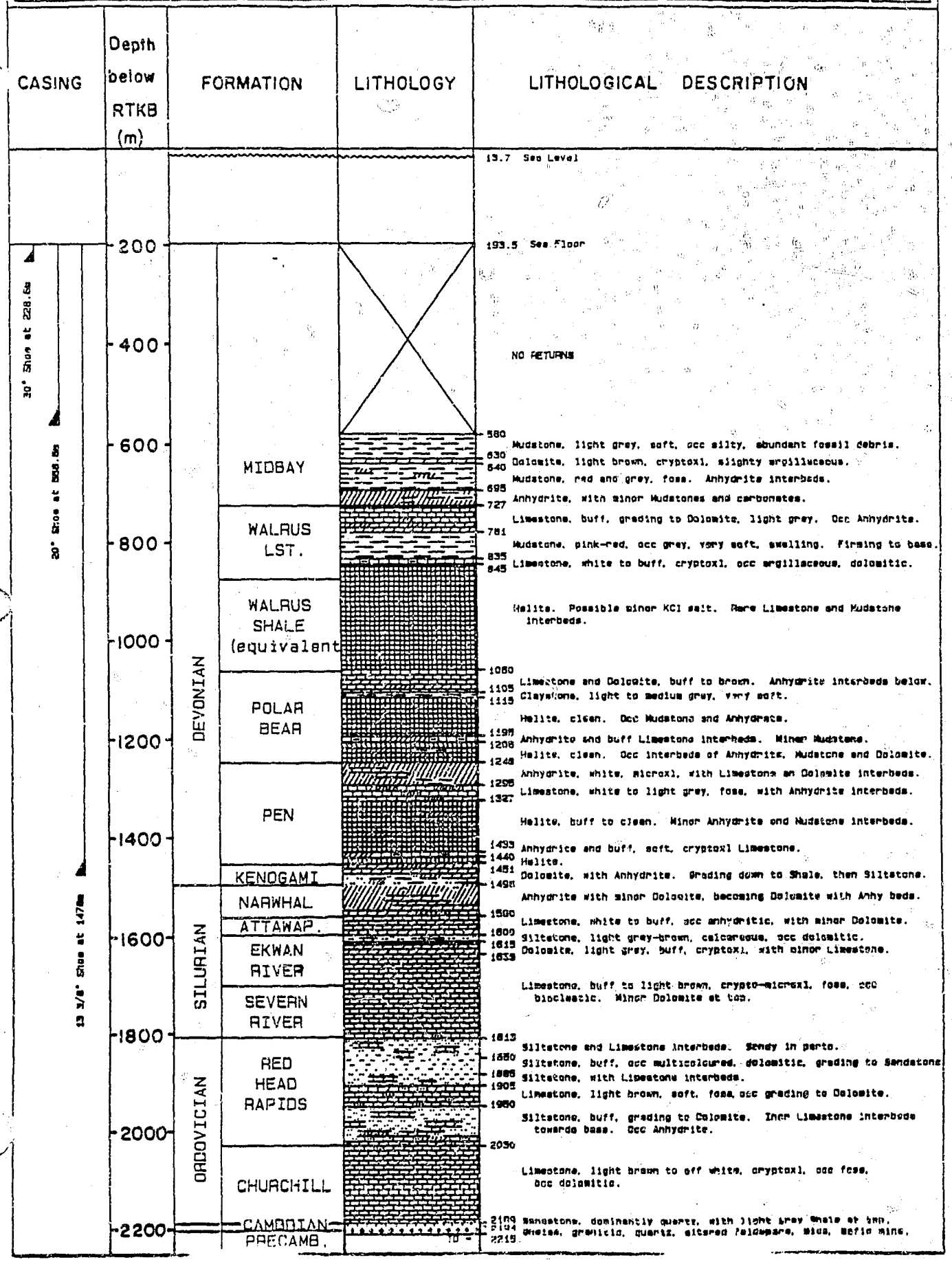
CANTERRA ENERGY BELUGA O-23

Appendix A
SCALE: 1/10000

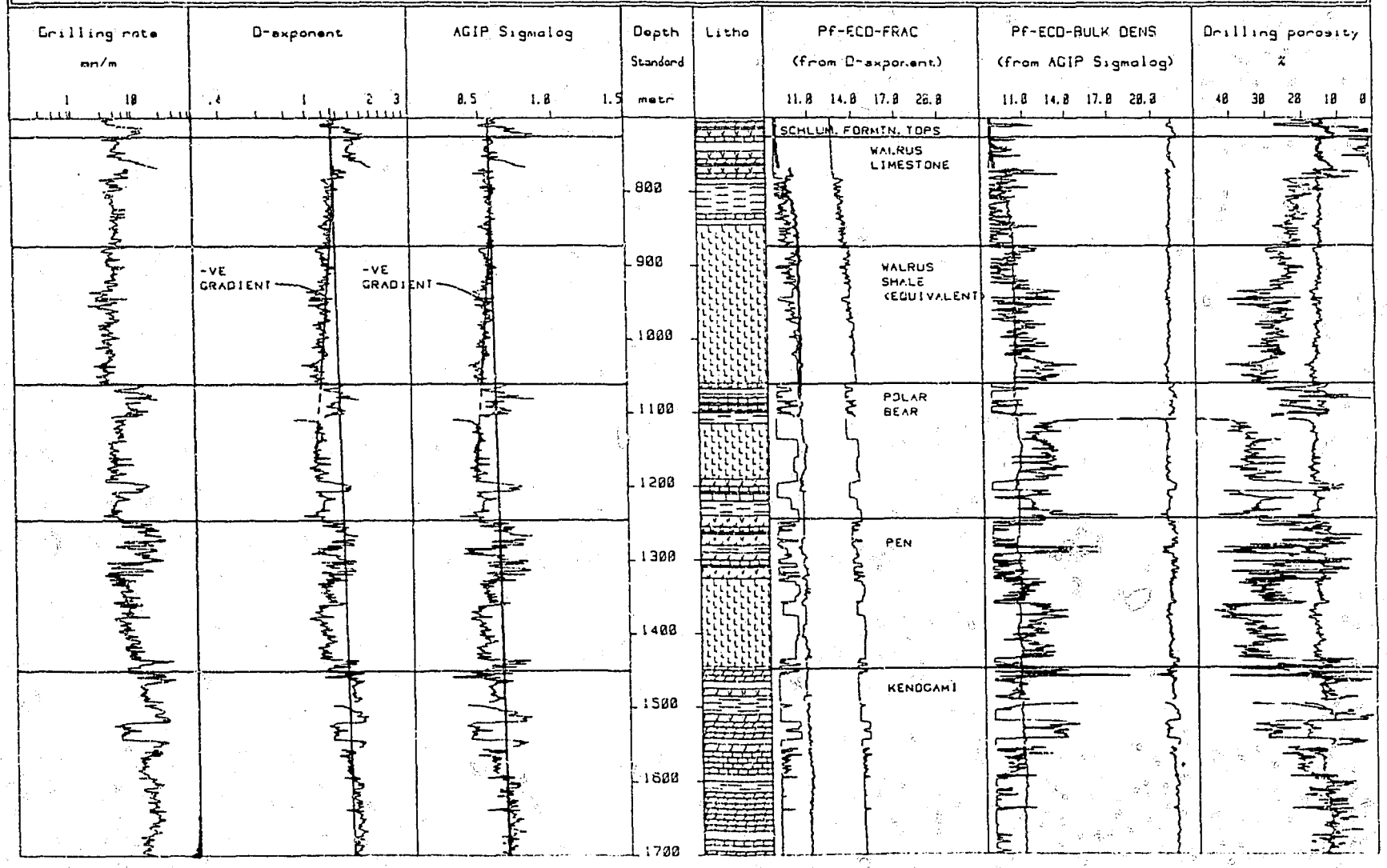


GEOSERVICES

CANTERRA ENERGY BELUGA O-23

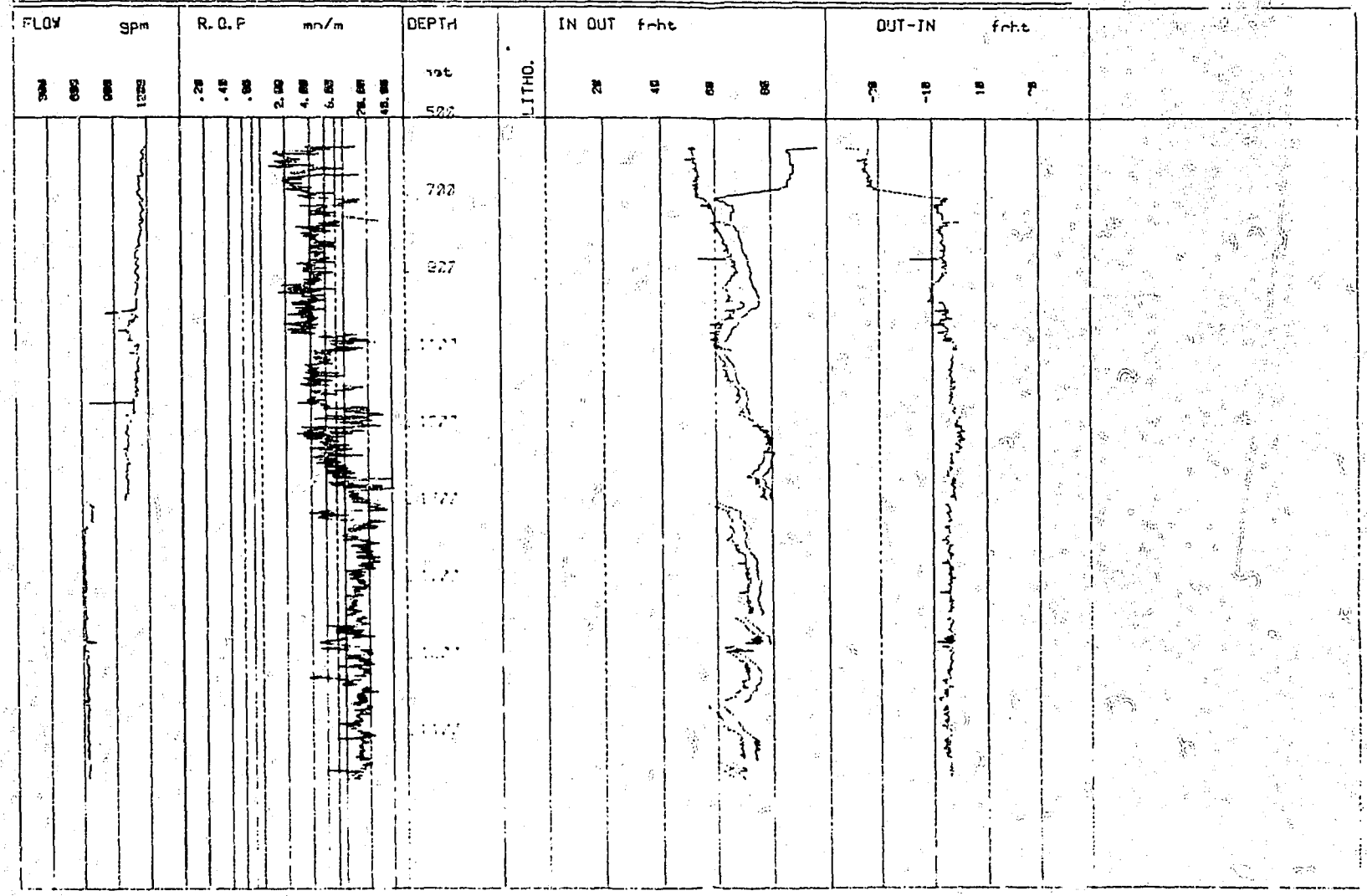
COMPOSITE LOG

Scale : 1/ 5000



CEDSERVICES ON-LINE TOC TEMPERATURE PLOT

14/ 9/ 85 BELUGA 0-23 SCALE 1/10000



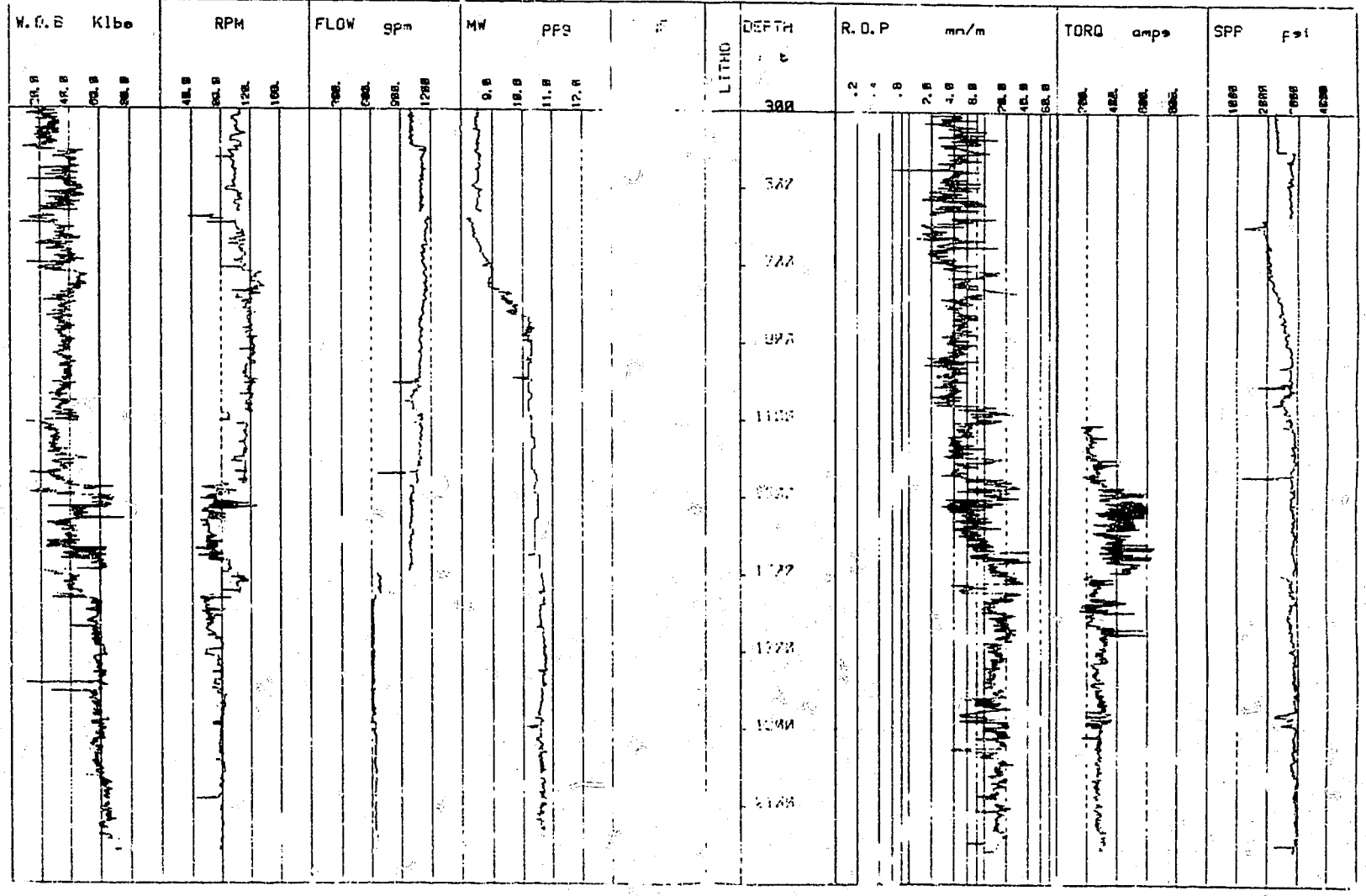
CFOSERVICES ON-LINE TDC

BIT PERFORMANCE VERSUS DEPTH

13/ 9/ 85

BELUGA 0-23

SCALE 1/10000



APPENDIX B: DOBROCKY SEATECH REPORT

- to be forwarded under separate cover

APPENDIX C

Our Reference No. (2-401/1/2)

September 26, 1985

Cruise 2-401/1/2
Beluga O-23
Netsiq N-01

M.V. ARCTIC SHIKO

Canterra Energy Ltd.
July 16 - August 16, 1985
August 31 - September 18, 1985

by

Dobrocky Seatech Ltd.
P.O. Box 2278, Stn. C
St. John's, NF
A1C 6E6

for

Canterra Energy Ltd.
P.O. Box 1051
Calgary, AB
T2P 2K7

Dobrocky
SEATECH

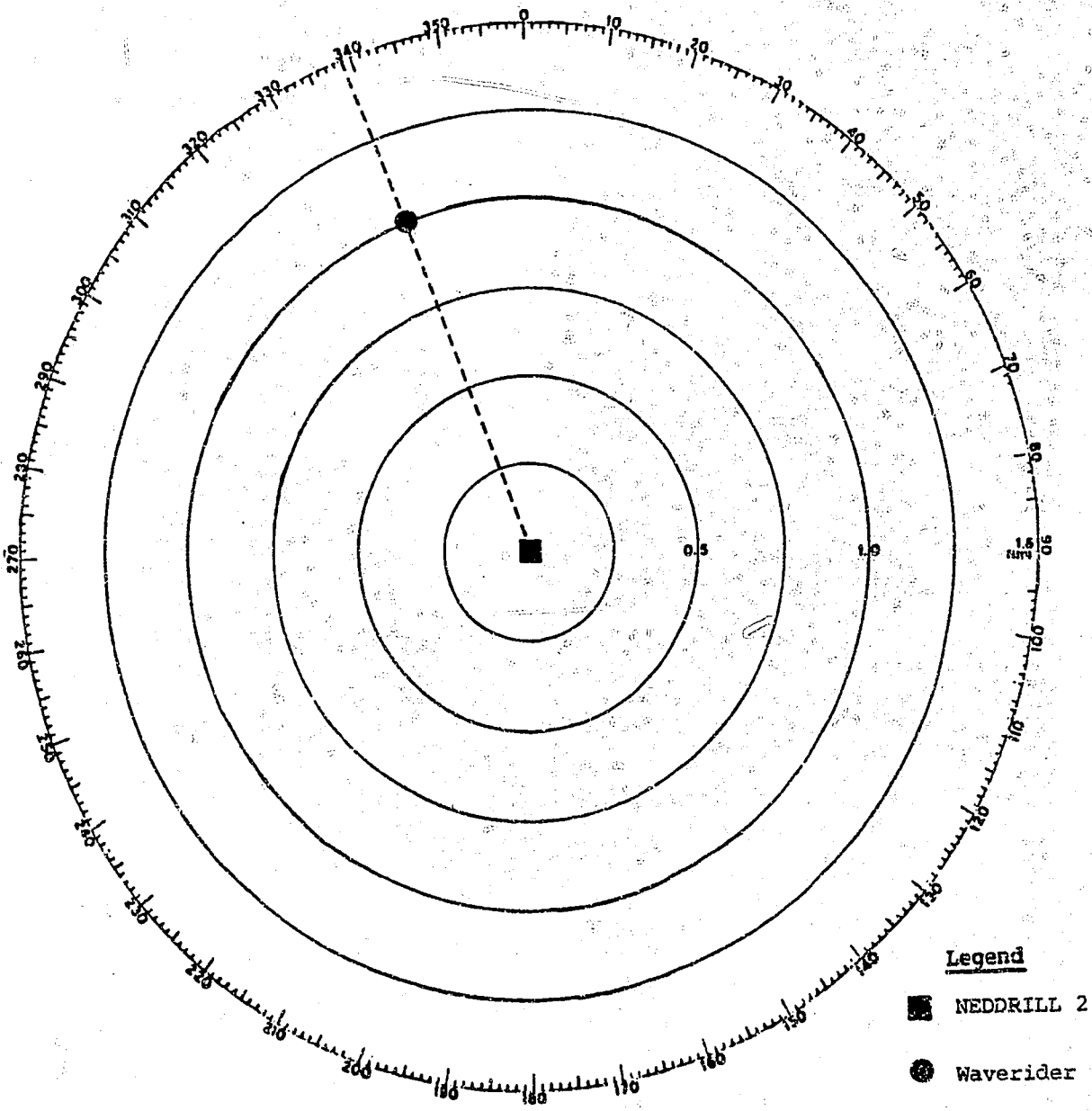
This report describes the technical activities of Dobrocky Seatech Ltd. personnel during the recent oceanographic cruises to Canterra's two Hudson Bay wellsites, Beluga O-23 and Netsiq N-01. Dobrocky Seatech Ltd. is under contract to Canterra to provide instruments and moorings for deployment and retrieval at both wellsites. Included in the report are positional and mooring diagrams along with a timetable of activities.

On July 16, 1985, the M.V. ARCTIC SHIKO departed St. John's enroute to Hudson Bay with Dobrocky Seatech personnel, D. Gates and H. Humphries, on board. Due to pack ice and icebergs encountered, the ARCTIC SHIKO did not arrive at the Beluga wellsite until July 27, 1985. Upon arrival, survey personnel from Nortech Surveys began dropping positioning beacons in preparation for the arrival of the NEDDRILL 2. Dobrocky Seatech personnel on board the ARCTIC SHIKO were placed on standby until they received orders from the Canterra office on where and when to deploy their instruments. During the standby period, pre-deployment checks were performed on all of the instruments; and everything was found to be operating correctly. On August 3, 1985, Dobrocky Seatech personnel received permission from the NEDDRILL 2 to deploy the waverider in the morning.

At 0905, August 4, Dobrocky Seatech personnel deployed waverider buoy, S/N 67974-7, at 1 nmi, 339°T from the NEDDRILL 2. Correct operation of the waverider was confirmed by the weather observer on the NEDDRILL 2 before and after deployment (see Figures 1 and 2 for mooring diagram and positional data). On August 5 at 0825, Dobrocky Seatech personnel received permission from the NEDDRILL 2 to deploy current meters. During the three hour trip to the deployment site, the instrument and mooring lines were put together on the deck. Deployment began at 1250 but the mooring had to be recovered. The top floatation buoy on the near-surface current meter leg remained afloat. The mooring was remeasured and the water depth was checked again with the ship's sounder. The mooring lengths were correct. It was concluded that the subsurface buoys were floating the double wheel anchor. Adding more weight would make recovery very difficult if the

Deployment Date: August 4, 1985
Required Service Date:

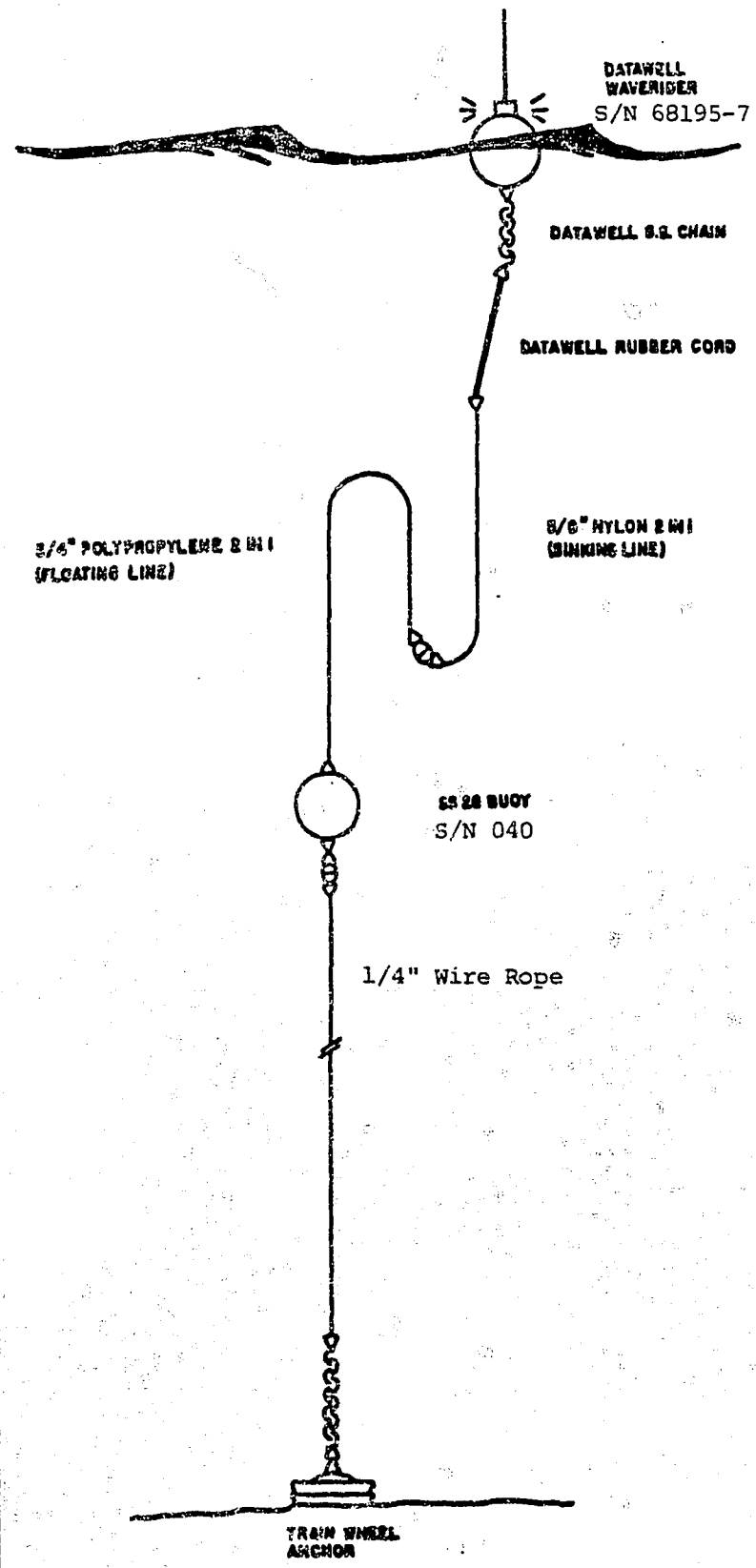
Site: Beluga O-23
Drilling Vessel: NEDDRILL 2
Depth: 185m



Mooring Leg	Depth of Top Component (m)	Range from Rig (Nmi)	Bearing from Rig (°T)
Waverider	Surface	1	339°
Neil Brown	17	19	112°
Aanderaa	95.5	19.35	112°
Surface	Surface	19.7	112°
		Current Meters not shown because of distance.	

Figure 1.

Dobrocky SEATECH



LOCATION

Beluga O-23
Netsiq N-01

RIG

NEDDRILL 2

DEPTH AT SITE

Beluga: 185m
Netsiq: 195m

COMMENTS

Figure 2.

LEGEND

- 1/2" GALV. CHAIN
- SHACKLE
- SWIVEL
- RING

Datawell SEATECH

WAVERIDER MOORING DESIGN

PREPARED FOR:
Cangerra En[illegible]

DESIGNED: J.D.
DRAWN: WOOF DESIGN
CHECKED: J.D.
APPROVED: B.L.

SCALE: NOT TO SCALE

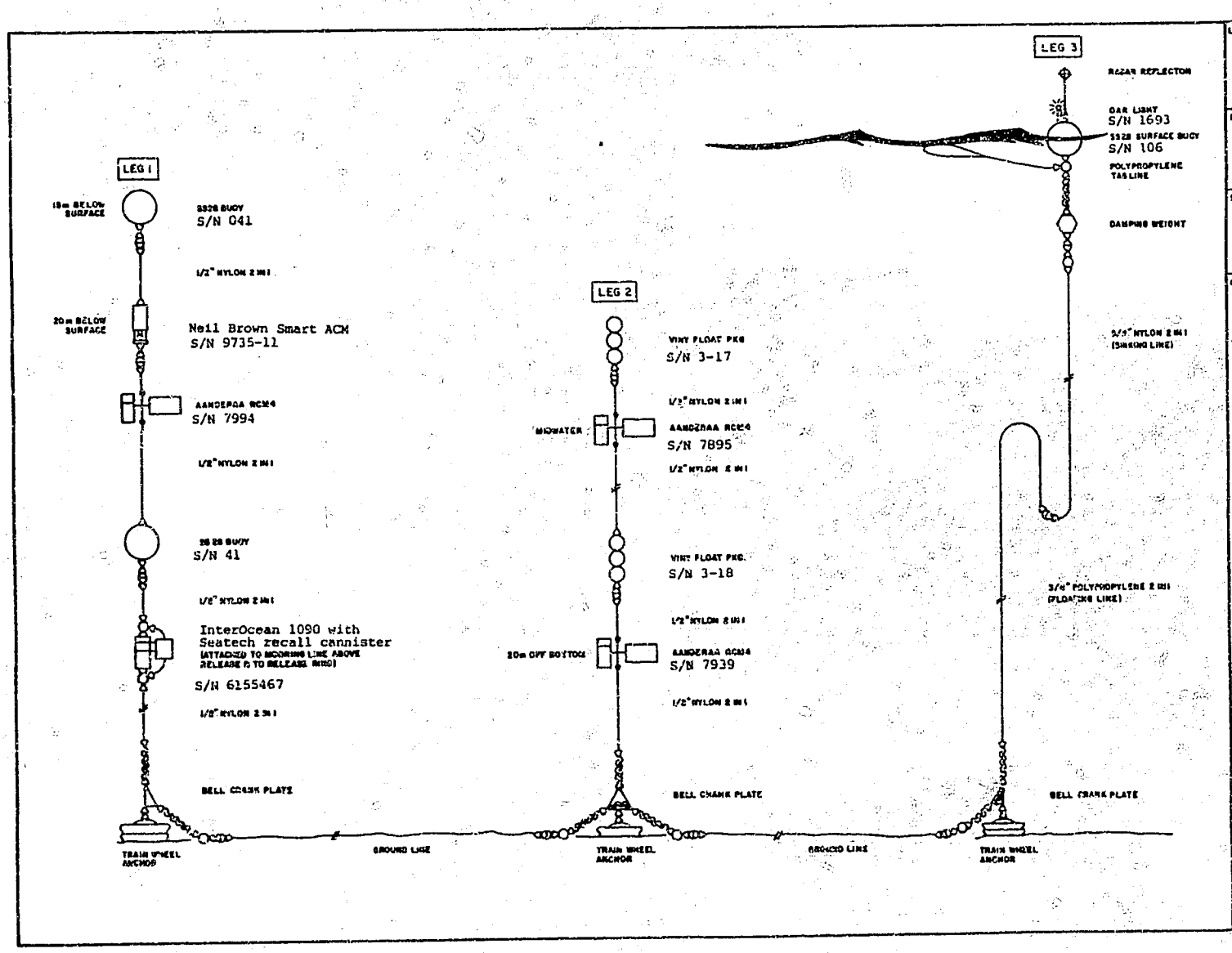
Datawell SEATECH

acoustic release had to be used, as the line in the recall cannister, being only 1/2" nylon, might break under the extra strain. The problem was rectified by removing the middle SS28B buoy. The mooring was then redeployed with no further problems. The current meters were deployed at position 59° 05.10'N, 87° 59.91'W, 19 nmi, 112°T from the NEDDRILL 2 (see Figures 1 and 3 for positional data and mooring description). This area was one of two sites suggested by Dobrocky Seatech's physical oceanographer as the best for new data acquisitions.

On August 12, 1985, while the ARCTIC SHIKO was in Churchill taking on supplies, the Dobrocky Seatech technicians were contacted by Canterra personnel and Dobrocky Seatech's office in St. John's concerning the installation of a profiling current metering system on board the NEDDRILL 2.

On August 13, a current profiling system and one of Dobrocky Seatech's physical oceanographers arrived in Churchill from St. John's, Newfoundland. Because of foggy conditions at the NEDDRILL 2, there were no helicopter flights until late in the evening of August 14. Upon arrival at the NEDDRILL 2, Dobrocky Seatech personnel immediately began installation of the current profiling system. A few slight problems were encountered with the power pack and cable rigging. Otherwise, installation went as expected and the system was fully operational by the evening of August 15, 1985. On August 15, the two Dobrocky Seatech technicians who had previously been on the ARCTIC SHIKO, were flown back to Churchill for returning flights to St. John's and Halifax. Dobrocky Seatech's physical oceanographer stayed on board the NEDDRILL 2 to continue doing current profiles as per Canterra's request.

On August 26, 1985, J.P. Gregnon of Canterra requested that Dobrocky Seatech provide technicians to relocate the Beluga current meter mooring to the Netsiq wellsite and collect as much current data as possible before the NEDDRILL 2 arrived at that location. At 1535 local time, August 31, 1985, Dobrocky Seatech technicians, W. Williams and H. Humphries, departed St.



LOCATION

Beluga O-23
Netsiq N-01

RIG

NEDDRILL 2

DEPTH AT SITE

Beluga: 105m
Netsiq: 195m

COMMENTS

Figure 3.

LEGEND

1/2" GALV CHAIN
SHACKLE
SWIVEL
RING

Dobrocky SEATECH

3 LEG CURRENT METER MOORING DESIGN

PREPARED FOR: Canterra Energy Ltd.

DESIGNED J.D	SCALE: NOT TO SCALE
DRAWN WOOF DESIGN	
CHECKED J.D	DATE: Sept./85
APPROVED B.L	

Dobrocky SEATECH

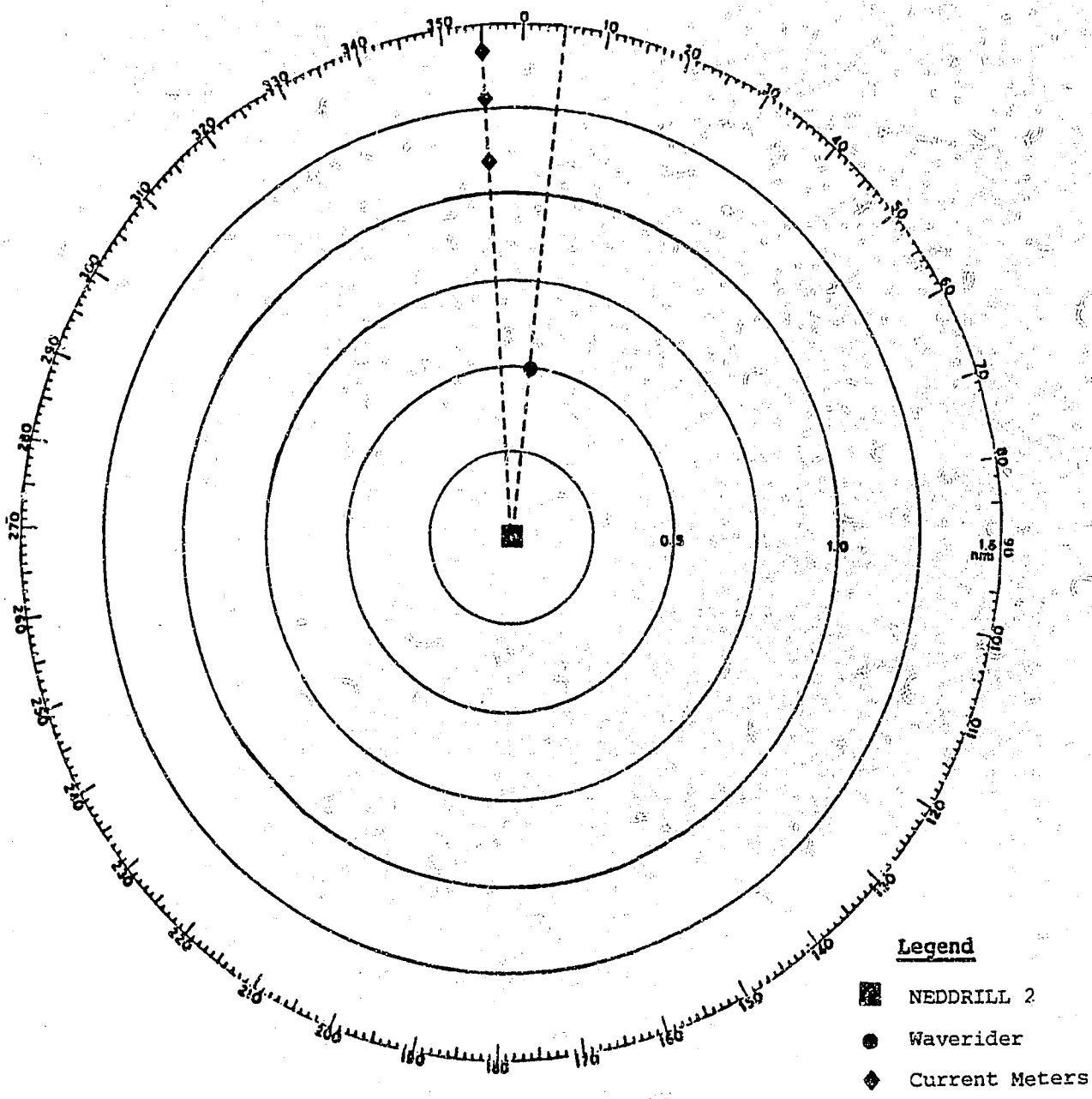
John's airport enroute to the NEDDRILL 2 arriving at 1200 local time on September 2, 1985. The Dobrocky Seatech technicians were immediately transferred to the ARCTIC SHIKO upon arrival. At 2230, the ARCTIC SHIKO was given permission to proceed to the Beluga location. On the morning of September 3, the current meter mooring was recovered with the exception of one Aanderaa current meter, S/N 7940, which was lost when the line was swept into the ship's propellor by the current. The damage to the mooring lines was repaired, and the mooring was redeployed minus the mid-water current meter which was lost. The spare Aanderaa developed a clock failure prior to deployment but was repaired in time for the next deployment.

The current meters at the Netsiq N-01 site were deployed at 59° 50.37'N, 87° 31.06'W with the groundline running 090°T. On September 14, 1985, Dobrocky Seatech technicians were requested by the captain of the NEDDRILL 2 to remove the waverider because the rig was moving on September 16. At 1207 the same day, the waverider buoy was removed from the water with no difficulties. Dobrocky Seatech technician, W. Williams, was then requested to proceed to the Netsiq N-01 site and remove the current meters before the rig moved onto the new location. On the evening of September 15, the current meters at the Netsiq site were recovered using the acoustic release. This alternate method of recovery was required when the surface line parted during the initial recovery attempt earlier in the morning.

At 1800 on September 15, the NEDDRILL 2 arrived at the Netsiq location, a day earlier than expected. The waverider buoy, S/N 68195-7, was deployed on the morning of September 16, as per the request of the NEDDRILL 2. The current meters were redeployed on September 17 including a replacement for the mid-water current meter lost on the first recovery. The first current meter leg was deployed at 1.2 nmi, 355°T with the surface buoy being deployed at 1.9 nmi, 355°T from the NEDDRILL 2. All current meters and waverider positioning was done with the ship's navigation (see Figures 1, 3, and 4 for mooring description and positional data). Upon completion of the current meter deployment, Dobrocky Seatech technicians were transferred to the NEDDRILL 2 for transportation to Churchill to connect with flights to St. John's, Newfoundland.

Deployment Date: September 11, 1985
Required Service Date:

Site: Netsiq N-01
Drilling Vessel: NEDDRILL 2
Depth: 195m



Mooring Leg	Depth of Top Component (m)	Range from Rig (Nmi)	Bearing from Rig (°T)
Waverider	Surface	0.5	005°
Neil Brown	7	1.2	355°
Aanderaa	97.5	1.35	355°
Surface	Surface	1.9	355°

Dobrocky SEATECH

Figure 4.

PERSONNEL INVOLVED

Dobrocky Seatech Ltd.	D. Gates	- Senior Technician
	W. Williams	- Senior Technician
	H. Humphries	- Technician
	I. Webster	- Physical Oceanographer
M.V. ARCTIC SHIKO	F. Frietag	- Captain
	N. Larter	- First Mate
	B. Turner	- Chief Engineer
Canterra Energy Limited	R. Carstairs	- NEDDRILL 2
	T. May	- NEDDRILL 2
	J.P. Gregnon	- NEDDRILL 2
	S. Johnston	- Churchill

Dobrocky SEATECH

TIMETABLE OF EVENTS (All Times Central)

July 16, 1985	0615 - ARCTIC SHIKO pulls NEDDRILL 2 from the dock and follows her out of the harbour. 0730 - ARCTIC SHIKO starts on her way to Hudson Bay. 1800 - Ship proceeding slowly due to icebergs in the area.
July 17	Ship making good speed, several icebergs sighted. Winds 20-25 knots southwest, seas 3-5 feet, foggy with sunny periods.
July 18	Continuing at a slower speed, quite a lot of icebergs. Winds 20-25 knots west, seas 3-5 feet, sunny.
July 19	Making good speed, no ice. Winds 10-15 knots west, seas 2-3 feet, cloudy with showers.
July 20	Heading towards Resolution Island. Strong winds 30-35 knots, heavy seas 7-10 feet, slowing down pace.
July 21	Heading up Hudson Strait towards Big Island. Encountered several large icebergs and pack ice. Winds 10-15 knots southeast, seas 2-3 feet, foggy.
July 22	Jogging off at Resolution Island waiting for the NEDDRILL 2 to come up to our position. Loose pack ice, drillship waiting for good visibility. Winds 10-15 knots southeast, seas 2-3 feet, foggy.
July 23	Still jogging off Resolution Island. NEDDRILL 2 waiting for fog to lift before moving to our position.
July 24	ARCTIC SHIKO escorting NEDDRILL 2, TAKAPU, and TOANUI into the Hudson Strait. At day's end, the general position was off the Savage Islands. Loose pack ice, moving slow.

Dobrocky SEATECH

July 25	Escorting NEDDRILL 2, TAKAPU, and TOANUI through loose pack ice. At day's end, the general position was off Big Islands and no ice. ARCTIC SHIKO moving at top speed for Beluga to set up the positioning before the arrival of the drillship.
July 26	Still heading towards Beluga wellsite, no ice. D. Gates (D.G.) and H. Humphries (H.H.) prepare positioning buoys for deployment.
July 27	1415 - ARCTIC SHIKO arrives Beluga wellsite. Loose pack ice covering site. 1540 - Began deploying positioning beacons. 1640 - Finished deploying Nortech beacons. Checked all equipment in containers, positioning buoys, and waverider. Mooring ready for deployment.
July 28	0945 - D.G. and H.H. began instrument redeployment checks. 1245 - NEDDRILL 2 arrives on location. 1400 - All instruments checked and ready for deployment. 1800 - ARCTIC SHIKO moving around drillship to break up pack ice.
July 29	0800 - ARCTIC SHIKO on standby near NEDDRILL 2. 0900 - ARCTIC SHIKO begins sounding around drillship at 1/2 to one mile radius. 1250 - ARCTIC SHIKO alongside drillship to pick up anchor buoy and pennets. 1400 - ARCTIC SHIKO deploys anchor and buoy. 1800 - ARCTIC SHIKO anchored 1/2 mile from NEDDRILL 2.
July 30	ARCTIC SHIKO on standby duty.
July 31	1125 - ARCTIC SHIKO alongside NEDDRILL 2 transferring drillwater. 1300 - D.G. goes onto drillship to talk to the drilling superintendent, R. Carstairs (R.C.), about timetable for instrument deployments. R.C. said to hold off for a couple of days until Canterra office decided on a final position. 1500 - ARCTIC SHIKO back on standby. 2100 - D.G. receives a call from T. May wanting to know about the proposed position of the current meter mooring. He said he would call his office and straighten out the problem.

August 1		ARCTIC SHIKO on standby duty.
August 2	1130 -	D.G. talked to weather observer, S. Rosenthall, on the rig about deployment of the current meters. No word as yet.
August 3	1400 -	D.G. was informed by D. McDonald on the NEDDRILL 2 that the current meters and waverider could be deployed as soon as the TOANUI arrives on location from Churchill.
	1500 -	TOANUI arrives on location and moves alongside the drillship to offload containers.
	1700 -	ARCTIC SHIKO moves alongside drillship to pick up containers and two new personnel.
	1830 -	D.G. receives permission from NEDDRILL 2 to deploy waverider in the morning.
August 4	0800 -	D.G. and H.H. prepare waverider for deployment.
	0830 -	D.G. talks to weather observer on the drillship to confirm operation of buoy.
	0905 -	Buoy into the water, 339° at 1 nmi from NEDDRILL 2. Position: 59° 13.93'N, 88° 34.14'W.
	0935 -	D.G. requests permission to deploy current meter and was told to standby for reply.
	1430 -	Still no word on current meter deployment. ARCTIC SHIKO on standby.
August 5	0825 -	D.G. is informed that the SHIKO was released to deploy current meter at position B.
	0830 -	D.G. and H.H. prepare mooring for deployment.
	1150 -	Deployment site checked for water depth.
	1250 -	Began deployment.
	1320 -	Mooring was recovered again because the top float on the near-surface current meter buoy remained afloat.
	1415 -	Mooring remeasured and water depths rechecked, all correct. One of the three floats were removed to allow the anchor to sink to the bottom.
	1450 -	Began to redeploy current meter mooring.
	1510 -	Stopped deployment to repair bent rotor on RCM-4, S/N 7940.

August 5 (cont'd)	1534 - Surface buoy into the water 112°T at 19 nmi from the NEDDRILL 2. 1540 - Headed back to the NEDDRILL 2.
August 6	On standby at the NEDDRILL 2.
August 7	On standby at the NEDDRILL 2.
August 8	On standby at the NEDDRILL 2.
August 9	0945 - ARCTIC SHIKO backloading at the NEDDRILL 2. 1015 - ARCTIC SHIKO enroute to Churchill.
August 10	0250 - Alongside the dock in Churchill.
August 11	Alongside the dock in Churchill.
August 12	Alongside the dock in Churchill.
August 13	1815 - Canterra representative came on board the ARCTIC SHIKO and advised D.G. and H.H. that they would be flying to the NEDDRILL 2 at 1930 to install a current meter profiling system. 1840 - Plane arrives for Winnipeg with profiling system and I. Webster (I.W.) on board. 2020 - D.G. and I.W. board helicopter for flight to NEDDRILL 2. 2150 - Helicopter arrives at NEDDRILL 2. Too foggy to land, returned to Churchill. 2320 - Arrived back at Churchill. 2335 - D.G. and I.W. stay at the Arctic Inn for the night. H.H. stays on board the ARCTIC SHIKO.
August 14	0425 - D.G. and I.W. arrive at airport but it is still too foggy to fly. 1000 - Airport still fogged in. 1645 - D.S., H.H., and I.W. board helicopter for helicopter for flight to NEDDRILL 2. 1825 - Arrive at NEDDRILL 2. 1900 - Began installing profiling system. 2000 - Winch in place ready to be welded. Calling it a day.
August 15	0600 - Started working on current meter installation. 2050 - Installation completed and operating correctly.

August 16	0645 - Began profile no. 1. 0745 - Finished profile no. 1. 0900 - D.G. and H.H. informed that they would be flying to Churchill on the next helicopter. 1100 - Began profile no. 2. 1135 - Finished profile no. 2. 1620 - D.G. and H.H. board helicopter for Churchill. 1740 - Helicopter lands in Churchill. 1800 - D.G. and H.H. board plane for Winnipeg and connecting flights to Halifax and St. John's.
August 31	1535 - W. Williams (W.W.) and H.H. depart St. John's airport enroute to Winnipeg.
September 1	1055 - W.W. and H.H. depart Winnipeg airport for Churchill. 1230 - Arrived Churchill. Staying at Arctic Inn over night.
September 2	1030 - Boarded helicopter for NEDDRILL 2. 1200 - Arrived NEDDRILL 2. 1500 - Boarded ARCTIC SHIKO. 2230 - ARCTIC SHIKO given clearance to pull current meters in the morning.
September 3	0800 - On location preparing to retrieve current meters. 0900 - Surface buoy on board. 0930 - Lost RCM-4, S/N 7940. The line was swept into the propellor. 1000 - All gear on deck. 1010 - Began instrument service and mooring repair. 1930 - Mooring has been repaired. Will deploy in the morning.
September 4	0700 - W.W. called J. Dempsey (Dobrocky Seatech). It was decided to raise the near-surface current meter from 20m to 10m. 0800 - Splicing extra section of line. 0920 - All gear ready for deployment. Will wait for satellite position at 1015 for accurate positioning. 1035 - Began deployment at 54° 50.37'N, 87° 31.06'W. 1112 - Surface buoy into the water at 59° 50.37'N, 87° 30.82'W. Groundline running at 090°T. 1115 - ARCTIC SHIKO enroute to Churchill.

Dobrocky SEATECH

September 5	0730 - ARCTIC SHIKO arrives Churchill.
September 6	On standby in Churchill.
September 7	On standby in Churchill.
September 8	1040 - ARCTIC SHIKO departs Churchill for NEDDRILL 2. 1740 - ARCTIC SHIKO ordered to standby at 59° 05.2'N, 93° 02.9'W, until advised by Churchill office.
September 9	1000 - Proceeding to NEDDRILL 2. 1600 - On location, standing by the NEDDRILL 2.
September 10	0700 - Alongside the NEDDRILL 2 offloading fuel. 1142 - Proceeding to Netsiq.
September 11	0230 - Standing by current meter surface buoy. 1242 - Nortech deploying positioning pingers. 1330 - All pingers into the water.
September 12	0300 - Standing by the Netsiq site. 1130 - Nortech deployed another pinger. 1200 - Enroute to Churchill to take on fuel.
September 13	0800 - ARCTIC SHIKO arrives Churchill. 2233 - ARCTIC SHIKO departs Churchill for NEDDRILL 2.
September 14	1117 - Arrived NEDDRILL 2 location. 1118 - Request received from the NEDDRILL 2 captain to retrieve waverider. The rig plans to move on Monday. 1207 - Waverider on board the ARCTIC SHIKO. 1430 - ARCTIC SHIKO enroute to the Netsiq site to retrieve current meters.
September 15	0805 - Commenced retrieval of mooring. 0824 - Surface line parted. Will wait until fog lifts before using acoustic release. 1215 - Interrogated acoustic release. Buoys spotted 200m off starboard bow. 1322 - All gear on board. 1345 - Repairing broken surface line. 1800 - NEDDRILL 2 arrives on location.

Dobrocky SEATECH

September 16	0730 - ARCTIC SHIKO's crew pulled Nortech marker buoy out of the water. 0930 - Rigging waverider mooring for deployment. 1007 - Waverider, S/N 68195-7, deployed at 0.5 nmi, 005°T from NEDDRILL 2. 1050 - Alongside NEDDRILL 2. Current meter data tapes transferred for shipment to Churchill, then to British Columbia.
September 17	0800 - SHIKO alongside the NEDDRILL 2 tranferring water and cement. 1345 - Departed rig. Began preparing current meter mooring for deployment. 1500 - Deploying current meter. 1545 - Deployment completed. Surface buoy at 1.2 nmi, 355°T from the NEDDRILL 2. 2200 - W.W. and H.H. transfer to the NEDDRILL 2 to catch helicopter to Churchill.
September 18	0300 - Helicopter arrives at NEDDRILL 2. No room for Dobrocky Seatech technicians. Will have to stay all night. 1015 - W.W. and H.H. load helicopter for Churchill and connecting flights to St. John's.

Dobrocky SEATECH

APPENDIX D

MEASUREMENT WHILE DRILLING
Well Report
for
Canterra Energy
Beluga 0-23
Neddrill II

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3.....Operational Summary

4.....Efficiency Report

5.....Activity Summary

7.....Failure Analysis

8.....Survey (Short Form)

11.....Survey (Long Form)

24.....Plots & Logs

OPERATIONAL SUMMARY

Well Operator	Canterra Energy
Well Contractor	Bawden Western
Rig Name/Number	Neddrill II
Well Name	Beluga O-23
M.W.D. Services	Directional Surveys From 762 ft. to 7,232 ft. Gamma-Ray From 1,900 ft. to 2,500 ft./3,640 ft. to 4,900 ft. Dynamic Temperature updates from 4,877 ft to 7,232 ft.
Start Date	July 04, 1985
Completion Date	September 14, 1985
Hole Size	26", 14 3/4", 12 1/4"
M.W.D. Cost	$240,900.00
per day	3,300.00
per survey	2,937.00

M.W.D. EFFICIENCY REPORT

Well Name: Beluga O-23

Well Location: Hudson Bay

A) Job Started: July 04/85 B) Job Completed: Sept 14/85

C)	Days on Location	73
D)	Days below Rotary Table	27
E)	Days Operating	19
F)	Days Stand-By (charged)	45
G)	Stand-By & below Rotary (No charge days)	0
H)	M.W.D. Failures	5
I)	Non Computalog Gearhart Ltd induced failures	1
J)	Downhole Failure Days	8

$$\text{Overall Operating Efficiency} = \frac{D - J}{D} \times 100 = 70\ \%$$

$$\text{Overall Tool Efficiency} = \frac{D - (H - I)}{D} \times 100 = 81\ \%$$

ACTIVITY SUMMARY

July 04/85 to July 27/85	M.W.D. equipment on Neddrill II. Standby without crew.
July 28/85	Field Engineers arrive on location. Standby.
July 29/85	Standby.
July 30/85	M.W.D. ran in at 750 ft, 14 3/4" pilot hole. Drilling and surveying.
July 31/85	Drilling and surveying.
Aug 01/85	Drilling and surveying remaining pilot hole. M.W.D. failed during under reaming 26" hole. Reaming run was rough drilling, experiencing bit chatter and torque of 300-400 amps.
Aug 02/85	Same tool down.
Aug 03/85	Standby, while running 20" casing.
Aug 04/85	Standby.
Aug 05/85	M.W.D./gamma-ray ran in at 1,875 ft, 14 3/4" pilot hole. Drilling, surveying and logging.
Aug 06/85	M.W.D./gamma-ray failed at 2,460 ft. Tool string changed out during bit trip. Replacement tool string working during reaming 2464 ft to 2517 ft then failed during drilling from 2517 ft to 2720 ft. Tools not sending pulses.
Aug 07/85	Same tool down.
Aug 08/85	M.W.D. tool string changed out on bit trip. Drilling, surveying and logging.
Aug 09/85	Standby, while servicing B.O.P.
Aug 11/85	M.W.D./gamma-ray ran in at 3,528 ft, 14 3/4" hole. Picked up and layed down tubulars because of galling. Then test M.W.D. used 3 hours rig time.
Aug 12/85	Drilling, surveying and logging.

Aug 13/85	Drilling, surveying and logging.
Aug 14/85	Drilling, surveying and logging.
Aug 15/85	Standby.
Aug 16/85 to Aug 29/85	Standby, while under-reaming, casing, cementing, weather etc.
Aug 30/85	M.W.D. ran in at 4,894 ft, 12 1/4" hole. Drilling and surveying.
Aug 31/85	Drilling and surveying.
Sept 01/85	Drilling and surveying.
Sept 02/85	Drilling and surveying.
Sept 03/85	Drilling and surveying.
Sept 04/85	Drilling and surveying.
Sept 05/85	Drilling and surveying.
Sept 06/85	Drilling and surveying.
Sept 07/85	M.W.D. changed out on bit trip.
Sept 08/85	M.W.D. failed shallow test, did not change out tool by company request.
Sept 09/85	Same tool down.
Sept 10/85	Same tool down.
Sept 11/85	M.W.D. changed out during trip for wash out. Replacement tool working, drilling and surveying.
Sept 12/85	Drilling and surveying.
Sept 13/85	Standby, while logging, casing, etc.
Sept 14/85	Standby, while moving to new location.

FAILURE ANALYSIS

DATE Failed / Pulled	
Aug 01 / Aug 03	Tool String; P720, D198, E81/M14, B184 Tubulars; PS950-15, EC950-06
Non Computalog Gearhart Ltd induced failure	Driver and Electronics flooded with drilling mud. O-ring failed on tandem sub between driver and directional. Pulser found with contaminated oil and pressure compensation piston topped out. All lines on 17-pin connector (to driver) shorted because of flood.
Aug 06 / Aug 06	Tool string; P734, D229, E61/M420, B176, G13 Tubulars; PS950-13, EC950-06, SC950-02 Driver Electronics, found one bad 750 microfarad capacitor on open solenoid capacitor bank. This caused a high current drain from battery pack. Open solenoid on pulser would not activate.
Aug 06 / Aug 08	Tool string; P734, D180, E201/M911,B203,G17 Tubulars; PS950-13, EC950-06, SC950-02 Driver Electronics, found neg 25 volt power line, pin #8 shorted to resistor R2 on solenoid driver board. This dragged down the negative power source causing the tool to not send pulses.
Aug 10 / Aug 10	Tool String; P739, D180, E201/M911,B203,G17 Tubulars; PS950-15, EC950-06, SC950-08 Same problem as Aug 06. Previous tool string failed and only the pulser was changed leaving bad driver to be ran in again.
Sept 08 / Sept 11	Tool string; P739, D221, E191/M28, B176 Tubulars; PS950-15, EC950-08 Pulser was flooded. Shorting all lines to chassis on 17-pin connector. O-ring failure.

COMPUTALOG GEARHART LTD

UNITED DIRECTIONAL SERVICES

SUMMARY SURVEY REPORT

Short Form Summary

of

Directional Surveys

COMPUTALOG-GEARHART, LTD.
M256.MWDGP.0185.00.CRT

WELL REPORT

FIELD: BELUGA

WELL NO.: O-23

SURVEY NUMBER	RUN NUMBER	MEASURED DEPTH(F)	INCLINATION DEGREES	AZIMUTH DEG TRUE	TOTAL MAG FLUX	TOOL TEMP DEG C	DATE	TIME
0	0	635.00	0.00	0.00			TIE-IN	4: 3
1	0	689.00	.50	0.00			7-27-85	12: 0
2	0	753.00	.75	0.00			7-27-85	12: 0
3	1	762.00	.43	326.48	1.277	11.8	7-30-85	22: 1
4	1	826.00	.22	108.92	1.194	10.3	7-31-85	0:46
5	1	984.00	.10	244.97	1.195	10.8	7-31-85	4:42
6	1	1077.00	.22	281.08	1.192	11.3	7-31-85	7:13
7	1	1360.00	.40	331.92	1.187	10.3	7-31-85	15:22
8	1	1643.00	.22	38.40	1.192	10.3	7-31-85	23:15
9	1	1857.00	.05	88.92	1.191	10.8	8- 1-85	3:41
10	1	828.00	.45	327.37	1.199	9.3	8- 1-85	15:42
11	2	1900.19	.13	247.85	1.192	17.5	8- 5-85	13:42
12	2	1931.00	.25	264.83	1.189	17.5	8- 5-85	14: 4
13	2	2028.50	.17	193.40	1.188	18.0	8- 5-85	16:15
14	2	2058.00	.28	186.08	1.189	18.5	8- 5-85	17: 4
15	2	2089.42	.23	171.90	1.188	18.5	8- 5-85	17:36
16	2	2121.00	.57	165.62	1.187	18.5	8- 5-85	18:10
17	2	2152.30	.32	268.83	1.189	18.5	8- 5-85	18:42
18	2	2180.90	.03	49.07	1.185	18.5	8- 5-85	19:16
19	2	2243.22	.20	176.57	1.188	19.0	8- 5-85	21: 5
20	2	2306.45	.12	123.85	1.188	22.0	8- 6-85	0:55
21	2	2368.89	.17	219.05	1.182	22.5	8- 6-85	9:37
22	5	3595.72	.05	111.23	1.191	25.5	8-11-85	13:21
23	5	3628.20	.25	54.05	1.192	26.5	8-11-85	14:18
24	5	3721.20	.20	129.62	1.190	28.5	8-11-85	16:47
25	5	3752.90	.30	73.85	1.192	28.5	8-11-85	17:58
26	5	3847.60	.43	160.62	1.184	30.0	8-11-85	20:45
27	5	3879.19	.58	104.78	1.191	28.5	8-11-85	22:49
28	5	3941.00	.35	122.32	1.192	31.6	8-12-85	1:17
29	5	3972.84	.27	161.45	1.194	31.6	8-12-85	1:49
30	5	4001.14	.28	152.13	1.194	31.6	8-12-85	2:45
31	5	4032.67	.37	90.35	1.191	32.1	8-12-85	4:46
32	5	4064.26	.30	165.32	1.192	32.6	8-12-85	7:33
33	5	4096.40	.38	182.15	1.181	30.0	8-12-85	20:32
34	5	4127.43	.43	301.00	1.198	32.1	8-12-85	23:32
35	5	4159.28	.30	124.87	1.196	33.6	8-13-85	1:16
36	5	4221.38	.55	198.08	1.199	34.1	8-13-85	5:46
37	5	4252.84	.48	155.65	1.193	35.6	8-13-85	7:26
38	5	4284.37	.48	171.87	1.193	36.1	8-13-85	8:31
39	5	4315.98	.60	185.87	1.191	36.1	8-13-85	9:46
40	5	4378.44	.70	225.15	1.191	36.6	8-13-85	12:22
41	5	4472.73	.50	167.20	1.190	35.6	8-13-85	16:15
42	5	4503.74	.72	151.90	1.192	36.1	8-13-85	17:24
43	5	4535.20	.38	193.97	1.194	36.1	8-13-85	18:50
44	5	4596.55	.35	157.35	1.193	34.6	8-13-85	21:46

COMPUTALOG-GEARHART, LTD.
M256.MWDGP.0185.00.CRT

WELL REPORT

FIELD: BELUGA

WELL NO.: O-23

SURVEY NUMBER	RUN NUMBER	MEASURED DEPTH(F)	INCLINATION DEGREES	AZIMUTH DEG TRUE	TOTAL MAG FLUX	TOOL TEMP DEG C	DATE	TIME
45	5	4628.08	.35	124.98	1.196	33.6	8-14-85	0:22
46	5	4658.26	.43	137.35	1.193	34.1	8-14-85	2:41
47	5	4689.07	.38	152.77	1.194	35.1	8-14-85	4:55
48	5	4718.85	.57	136.27	1.192	36.1	8-14-85	9:16
49	5	4750.10	.42	164.17	1.191	37.1	8-14-85	11:44
50	5	4781.63	.43	136.62	1.193	37.1	8-14-85	13:56
51	5	4861.05	.62	162.53	1.194	36.6	8-14-85	17:31
52	6	4908.00	.72	115.10	1.200	22.6	8-31-85	2:56
53	6	5071.30	.60	164.62	1.218	28.7	8-31-85	17:32
54	7	5232.00	.48	125.02	.890	29.0	9- 1-85	18:15
55	7	5389.29	1.02	220.60	.890	32.1	9- 2-85	10:24
56	7	5434.00	1.12	153.78	.891	32.6	9- 2-85	20:23
57	7	5466.00	1.10	146.65	.890	33.1	9- 2-85	22:11
58	7	5528.00	.97	159.95	.891	32.6	9- 3-85	3:10
59	7	5556.82	1.23	200.45	.890	33.1	9- 3-85	6:16
60	7	5588.52	.87	191.22	.891	33.6	9- 3-85	8:49
61	7	5683.07	1.75	164.53	.889	34.1	9- 3-85	16: 3
62	7	5718.00	1.00	243.73	.888	34.1	9- 3-85	18:28
63	7	5751.00	.35	314.17	.894	34.6	9- 3-85	20:22
64	7	5782.00	.82	167.30	.891	34.1	9- 4-85	0: 6
65	7	5802.00	1.73	135.62	.896	30.0	9- 4-85	10:21
66	7	5833.90	1.47	64.70	.890	29.5	9- 4-85	13:16
67	7	5866.00	.45	252.12	.897	32.6	9- 4-85	16: 6
68	7	5928.88	1.25	144.70	.897	34.6	9- 4-85	20: 3
69	7	5960.32	1.43	163.85	.902	35.1	9- 4-85	22:10
70	7	6023.60	1.38	179.70	.900	34.6	9- 5-85	1:47
71	7	6085.93	2.00	171.87	.899	29.0	9- 5-85	15:27
72	7	6112.59	2.10	231.87	.899	27.0	9- 6-85	5:11
73	7	6205.00	2.32	173.65	.901	32.6	9- 6-85	13:20
74	7	6236.00	2.03	318.28	.898	33.1	9- 6-85	16: 9
75	7	6268.00	1.80	259.77	.897	33.6	9- 6-85	18:55
76	7	6330.90	2.15	240.12	.899	34.6	9- 6-85	22:57
77	7	6393.71	1.88	120.43	.901	34.6	9- 7-85	3:48
78	7	6456.90	1.33	144.97	.900	34.1	9- 7-85	10: 8
79	7	6519.50	1.17	312.45	.896	34.1	9- 7-85	15: 7
80	9	6961.00	.73	323.23	1.214	29.3	9-11-85	11: 1
81	9	7054.00	1.55	214.13	1.219	30.3	9-11-85	11: 2
82	9	7232.00	1.07	238.17	1.271	30.8	9-12-85	1:36

COMPUTALOG GEARHART LTD

UNITED DIRECTIONAL SERVICES

SURVEY REPORT

Summary of Directional Surveys

COMPUTALOG-GEARHART, LTD.
M256.MWDGP.0185.00.CRT

WELL REPORT

FIELD: BELUGA WELL NO.: 0-23

PROPOSED DRIFT DIRECTION N 0: 0E

SURVEY METHOD MC

SURVEY NO.	0	1	2	3	4	5	6
ELEC. NO.	81	81	81	81	81	81	81
MAG. NO.	14	14	14	14	14	14	14
DATE	TIE-IN	7-27-85	7-27-85	7-30-85	7-31-85	7-31-85	7-31-85
TIME	4: 3:40	12: 0:40	12: 0:44	22: 1: 0	0:46:19	4:42: 5	7:13:16
MS. DEPTH	635.00	689.00	753.00	762.00	826.00	984.00	1077.00
[illegible] OBSV.	0: 0	0:30	0:45	0:26	0:13	0: 6	0:13
DD OBSV.	N 0: 0E	N 0: 0E	N 0: 0E	N33:31W	S71: 5E	S64:58W	N78:55W
TOOL FACE	0L			84L	46R	30R	28R
COORD. NS	0.00N	.24N	.93N	1.02N	1.19N	1.03N	1.02N
COORD. EW	0.00E	0.00E	0.00E	.02W	.04W	.10E	.17W
T.V.D.	635.00	689.00	753.00	761.99	825.99	983.99	1076.99
SECTION	0.00	.24	.93	1.02	1.19	1.03	1.02
DOG LEG	0.00	.50	.25	.45	.63	.31	.15
DL/100FT	0.00	.93	.39	5.01	.99	.20	.16
TEMP (C)				11.8	10.3	10.8	11.3

COMPUTALOG-GEARHART, LTD.
M256.MWDGR.0185.00.CRT

WELL REPORT

FIELD: BELUGA

WELL NO.: 0-23

PROPOSED DRIFT DIRECTION N 0: 0E

SURVEY METHOD MC

SURVEY NO.	7	8	9	10	11	12	13
ELEC. NO.	81	81	81	81	61	61	61
MAG. NO.	14	14	14	14	420	420	420
DATE	7-31-85	7-31-85	8- 1-85	8- 1-85	8- 5-85	8- 5-85	8- 5-85
TIME	15:22:37	23:15:13	3:41:51	15:42:41	13:42:55	14: 4: 0	16:15:21
MS. DEPTH	1360.00	1643.00	1857.00	828.00	1900.19	1931.00	2028.50
DD OBSV.	0:24	0:13	0: 3	0:27	0: 8	0:15	0:10
DD OBSV.	N28: 5W	N38:24E	N88:55E	N32:38W	S67:51W	S84:50W	S13:24W
TOOL FACE	83R	115R	90R	90R	107R	9R	70L
COORD. NS	2.02N	3.37N	3.71N	.22N	3.25N	3.23N	3.07N
COORD. EW	1.17W	1.30W	.92W	.85E	2.69W	2.80W	3.05W
T.V.D.	1359.99	1642.99	1856.99	828.00	1900.17	1930.98	2028.48
SECTION	2.02	3.37	3.71	.22	3.25	3.23	3.07
DOG LEG	.32	.38	.20	.49	.45	.13	.26
DL/100FT	.11	.14	.09	-.05	.04	.42	.27
TEMP (C)	10.3	10.3	10.8	9.3	17.5	17.5	18.0

COMPUTALOG-GEARHART, LTD.
M256.MWDGP.0185.00.CRT

WELL REPORT

FIELD: BELUGA WELL NO.: 0-23

PROPOSED DRIFT DIRECTION N 0: 0E

SURVEY METHOD MC

	*********	*********	*********	*********	*********	*********	*********
SURVEY NO.	14	15	16	17	18	19	20
ELEC. NO.	61	61	61	61	61	61	61
MAG. NO.	420	420	420	420	420	420	420
DATE	8- 5-85	8- 5-85	8- 5-85	8- 5-85	8- 5-85	8- 5-85	8- 6-85
TIME	17: 4: 2	17:36:57	18:10:44	18:42:28	19:16:18	21: 5: 0	0:55:53
MS. DEPTH	2058.00	2089.42	2121.00	2152.30	2180.90	2243.22	2306.45
TO OBSV.	0:17	0:14	0:34	0:19	0: 2	0:12	0: 7
DD OBSV.	S 6: 5W	S 8: 6E	S14:23E	S88:50W	N49: 4E	S 3:26E	S56: 9E
TOOL FACE	29R	127R	148L	139L	80R	163L	135R
COORD. NS	2.95N	2.81N	2.59N	2.43N	2.44N	2.35N	2.19N
COORD. EW	3.07W	3.07W	3.02W	3.07W	3.14W	3.12W	3.05W
T.V.D.	2057.98	2089.40	2120.98	2152.28	2180.88	2243.20	2306.43
SECTION	2.95	2.81	2.59	2.43	2.44	2.35	2.19
DOG LEG	.13	.08	.35	.71	.35	.23	.16
DL/100FT	.43	.27	1.10	2.28	1.22	.37	.25
TEMP (C)	18.5	18.5	18.5	18.5	18.5	19.0	22.0

COMPUTALOG-GEARHART, LTD.
M256.MWDGP.0185.00.CRT

WELL REPORT

FIELD: BELUGA WELL NO.: O-23

PROPOSED DRIFT DIRECTION N 0: 0E

SURVEY METHOD MC

	*********	*********	*********	*********	*********	*********	*********
SURVEY NO.	21	22	23	24	25	26	27
ELEC. NO.	61	61	61	61	61	61	61
MAG. NO.	420	420	420	420	420	420	420
DATE	8- 6-85	8-11-85	8-11-85	8-11-85	8-11-85	8-11-85	8-11-85
TIME	9:37: 7	13:21: 7	14:18:49	16:47:21	17:58:28	20:45:31	22:49:27
MS. DEPTH	2368.89	3595.72	3628.20	3721.20	3752.90	3847.60	3879.19
DD OBSV.	0:10	0: 3	0:15	0:12	0:18	0:26	0:35
DD OBSV.	S39: 3W	S68:46E	N54: 3E	S50:23E	N73:51E	S19:23E	S75:13E
TOOL FACE	143L	82L	77L	74R	88L	35R	69R
COORD. NS	2.08N	.48N	.52N	.53N	.52N	.25N	.09N
COORD. EW	3.06W	3.62W	3.55W	3.26W	3.13W	2.78W	2.58W
T.V.D.	2368.87	3595.70	3628.18	3721.18	3752.88	3847.58	3879.17
SECTION	2.08	.48	.52	.53	.52	.25	.09
DOG LEG	.22	.19	.24	.28	.25	.51	.50
DL/100FT	.36	.02	.73	.30	.80	.54	1.57
TEMP (C)	22.5	25.5	26.5	28.5	28.5	30.0	28.5

COMPUTALOG-GEARHART, LTD.
M256.MWDGP.0185.00.CRT

WELL REPORT

FIELD: BELUGA WELL NO.: 0-23

PROPOSED DRIFT DIRECTION N 0: 0E

SURVEY METHOD MC

	*********	*********	*********	*********	*********	*********	*********
SURVEY NO.	28	29	30	31	32	33	34
ELEC. NO.	61	61	61	61	61	61	61
MAG. NO.	420	420	420	420	420	420	420
DATE	8-12-85	8-12-85	8-12-85	8-12-85	8-12-85	8-12-85	8-12-85
TIME	1:17:42	1:49: 2	2:45:48	4:46:20	7:33:17	20:32:20	23:32:31
MS. DEPTH	3941.00	3972.84	4001.14	4032.67	4064.26	4096.40	4127.43
[illegible] OBSV.	0:21	0:16	0:17	0:22	0:18	0:23	0:26
DD OBSV.	S57:41E	S18:33E	S27:52E	S89:39E	S14:41E	S 2: 9W	N59: 0W
TOOL FACE	8L	67R	89R	73L	162R	89R	20R
COORD. NS	.09S	.21S	.34S	.41S	.49S	.69S	.73S
COORD. EW	2.11W	2.00W	1.95W	1.81W	1.69W	1.67W	1.77W
T.V.D.	3940.97	3972.81	4001.11	4032.64	4064.23	4096.37	4127.40
SECTION	-.09	-.21	-.34	-.41	-.49	-.69	-.73
DOG LEG	.26	.22	.06	.34	.41	.14	.70
DL/100FT	.42	.69	.20	1.09	1.31	.44	2.27
TEMP (C)	31.6	31.6	31.6	32.1	32.6	30.0	32.1

COMPUTALOG-GEARHART, LTD.
M256.MWDGP.0185.00.CRT

WELL REPORT

FIELD: BELUGA WELL NO.: O-23

PROPOSED DRIFT DIRECTION N 0: 0E

SURVEY METHOD MC

	*********	*********	*********	*********	*********	*********	*********
SURVEY NO.	35	36	37	38	39	40	41
ELEC. NO.	61	61	61	61	61	61	61
MAG. NO.	420	420	420	420	420	420	420
DATE	8-13-85	8-13-85	8-13-85	8-13-85	8-13-85	8-13-85	8-13-85
TIME	1:16:11	5:46: 8	7:26:20	8:31:11	9:46:40	12:22:18	16:15:38
MS. DEPTH	4159.28	4221.38	4252.84	4284.37	4315.98	4378.44	4472.73
DD OBSV.	0:18	0:33	0:29	0:29	0:36	0:42	0:30
DD OBSV.	S55: 8E	S18: 5W	S24:21E	S 8: 8E	S 5:52W	S45: 9W	S12:48E
TOOL FACE	161L	100R	156R	143R	65R	129R	89L
COORD. NS	.72S	1.10S	1.37S	1.62S	1.92S	2.53S	3.34S
COORD. EW	1.81W	1.76W	1.76W	1.68W	1.68W	1.99W	2.31W
T.V.D.	4159.25	4221.35	4252.81	4284.34	4315.95	4378.40	4472.69
SECTION	-.72	-1.10	-1.37	-1.62	-1.92	-2.53	-3.34
DOG LEG	.74	.55	.38	.14	.18	.45	.61
DL/100FT	2.33	.89	1.22	.43	.57	.72	.65
TEMP (C)	33.6	34.1	35.6	36.1	36.1	36.6	35.6

COMPUTALOG-GEARHART, LTD.
M256.MWDGP.0185.00.CRT

WELL REPORT

FIELD: BELUGA WELL NO.: 0-23

PROPOSED DRIFT DIRECTION N 0: 0E

SURVEY METHOD MC

	*********	*********	*********	*********	*********	*********	*********
SURVEY NO.	42	43	44	45	46	47	48
ELEC. NO.	61	61	61	61	61	61	61
MAG. NO.	420	420	420	420	420	420	420
DATE	8-13-85	8-13-85	8-13-85	8-14-85	8-14-85	8-14-85	8-14-85
TIME	17:24: 4	18:50:21	21:46:28	0:22: 5	2:41: 1	4:55: 7	9:16:35
MS. DEPTH	4503.74	4535.20	4596.55	4628.08	4658.26	4689.07	4718.85
DD OBSV.	0:43	0:23	0:21	0:21	0:26	0:23	0:34
DD OBSV.	S28: 6E	S13:58W	S22:39E	S55: 1E	S42:39E	S27:14E	S43:44E
TOOL FACE	39R	119R	88L	44L	53L	66R	10R
COORD. NS	3.64S	3.92S	4.29S	4.44S	4.58S	4.75S	4.95S
COORD. EW	2.19W	2.12W	2.10W	1.98W	1.83W	1.70W	1.55W
T.V.D.	4503.70	4535.16	4596.50	4628.03	4658.21	4689.02	4718.80
SECTION	-3.64	-3.92	-4.29	-4.44	-4.58	-4.75	-4.95
DOG LEG	.27	.50	.23	.20	.12	.12	.23
DL/100FT	.87	1.58	.38	.63	.39	.39	.76
TEMP (C)	36.1	36.1	34.6	33.6	34.1	35.1	36.1

COMPUTALOG-GEARHART, LTD.
M256.MWDGP.0185.00.CRT

WELL REPORT

FIELD: BELUGA

WELL NO.: 0-23

PROPOSED DRIFT DIRECTION N 0: 0E

SURVEY METHOD MC

********* ********* ********* ********* ********* ********* *********

SURVEY NO.	49	50	51	52	53	54	55
ELEC. NO.	61	61	61	191	191	228	228
MAG. NO.	420	420	420	28	28	908	908
DATE	8-14-85	8-14-85	8-14-85	8-31-85	8-31-85	9- 1-85	9- 2-85
TIME	11:44:54	13:56:40	17:31:32	2:56:54	17:32:28	18:15:11	10:24:43
MS. DEPTH	4750.10	4781.63	4861.05	4908.00	5071.30	5232.00	5389.29
OBSV.	0:25	0:26	0:37	0:43	0:36	0:29	1: 1
DD OBSV.	S15:50E	S43:23E	S17:28E	S64:54E	S15:23E	S54:59E	S40:36W
TOOL FACE	159R	89L	118L	2L	66L	131L	87R
COORD. NS	5.17S	5.37S	6.01S	6.38S	7.65S	8.85S	10.30S
COORD. EW	1.41W	1.30W	.95W	.61W	.55E	1.33E	.95E
T.V.D.	4750.05	4781.58	4861.00	4907.94	5071.23	5231.93	5389.21
SECTION	-5.17	-5.37	-6.01	-6.38	-7.65	-8.85	-10.30
DOG LEG	.28	.21	.29	.55	.56	.38	1.18
DL/100FT	.89	.66	.37	1.16	.35	.24	.75
TEMP (C)	37.1	37.1	36.6	22.6	28.7	29.0	32.1

COMPUTALOG-GEARHART, LTD.
M256.MWDGP.0185.00.CRT

WELL REPORT

FIELD: BELUGA WELL NO.: 0-23

PROPOSED DRIFT DIRECTION N 0: 0E

SURVEY METHOD MC

	*********	*********	*********	*********	*********	*********	*********
SURVEY NO.	56	57	58	59	60	61	62
ELEC. NO.	228	228	228	228	228	228	228
MAG. NO.	908	908	908	908	908	908	908
DATE	9- 2-85	9- 2-85	9- 3-85	9- 3-85	9- 3-85	9- 3-85	9- 3-85
TIME	20:23:14	22:11:23	3:10: 9	6:16:38	8:49: 7	16: 3:25	18:28: 7
MS. DEPTH	5434.00	5466.00	5528.00	5556.82	5588.52	5683.07	5718.00
OBSV.	1: 7	1: 6	0:58	1:14	0:52	1:45	1: 0
DD OBSV.	S26:13E	S33:21E	S20: 3E	S20:27W	S11:13W	S15:28E	S63:44W
TOOL FACE	98L	98L	116R	35R	37L	14L	26R
COORD. NS	11.00S	11.54S	12.53S	13.05S	13.60S	15.70S	16.36S
COORD. EW	.89E	1.20E	1.71E	1.68E	1.51E	1.76E	1.63E
T.V.D.	5433.91	5465.90	5527.89	5556.71	5588.40	5682.93	5717.85
SECTION	-11.00	-11.54	-12.53	-13.05	-13.60	-15.70	-16.36
DOG LEG	1.18	.14	.27	.80	.40	1.06	1.85
DL/100FT	2.64	.44	.44	2.79	1.25	1.12	5.30
TEMP (C)	32.6	33.1	32.6	33.1	33.6	34.1	34.1

COMPUTALOG-GEARHART, LTD.
M256.MWDGP.0185.00.CRT

WELL REPORT

FIELD: BELUGA

WELL NO.: O-23

PROPOSED DRIFT DIRECTION N 0: 0E

SURVEY METHOD MC

SURVEY NO.	63	64	65	66	67	68	69
ELEC. NO.	228	228	228	228	228	228	228
MAG. NO.	908	908	908	908	908	908	908
DATE	9- 3-85	9- 4-85	9- 4-85	9- 4-85	9- 4-85	9- 4-85	9- 4-85
TIME	20:22:21	0: 6:15	10:21:46	13:16:22	16: 6: 6	20: 3: 5	22:10:58
MS. DEPTH	5751.00	5782.00	5802.00	5833.90	5866.00	5928.88	5960.32
OBSV.	0:21	0:49	1:44	1:28	0:27	1:15	1:26
DD OBSV.	N45:50W	S12:42E	S44:23E	N64:42E	S72: 7W	S35:18E	S16: 9E
TOOL FACE	28R	86R	163R	150L	76R	36L	165L
COORD. NS	16.41S	16.56S	16.91S	17.08S	16.95S	17.59S	18.25S
COORD. EW	1.29E	1.27E	1.51E	2.22E	2.47E	2.64E	2.95E
T.V.D.	5750.35	5781.85	5801.84	5833.73	5865.83	5928.71	5960.14
SECTION	-16.41	-16.56	-16.91	-17.08	-16.95	-17.59	-18.25
DOG LEG	.94	1.14	1.12	1.87	1.92	1.46	.48
DL/100FT	2.86	3.67	5.62	5.86	5.97	2.32	1.53
TEMP (C)	34.6	34.1	30.0	29.5	32.6	34.6	35.1

COMPUTALOG-GEARHART, LTD.
M256.MWDGP.0185.00.CRT

WELL REPORT

FIELD: BELUGA

WELL NO.: O-23

PROPOSED DRIFT DIRECTION N 0: 0E

SURVEY METHOD MC

SURVEY NO.	70	71	72	73	74	75	76
ELEC. NO.	228	228	228	228	228	228	228
MAG. NO.	908	908	908	908	908	908	908
DATE	9- 5-85	9- 5-85	9- 6-85	9- 6-85	9- 6-85	9- 6-85	9- 6-85
TIME	1:47:23	15:27:40	5:11:52	13:20:37	16: 9:45	18:55:29	22:57:17
MS. DEPTH	6023.60	6085.93	6112.59	6205.00	6236.00	6268.00	6330.90
DM OBSV.	1:23	2: 0	2: 6	2:19	2: 2	1:48	2: 9
DD OBSV.	S 0:18E	S 8: 8E	S51:52W	S 6:21E	N41:43W	S79:46W	S60: 7W
TOOL FACE	153L	164R	149L	163L	119L	146L	153L
COORD. NS	19.78S	21.61S	22.37S	25.28S	25.49S	25.15S	25.92S
COORD. EW	3.17E	3.33E	3.01E	1.88E	1.58E	.70E	1.29W
T.V.D.	6023.40	6085.70	6112.34	6204.70	6235.69	6267.67	6330.54
SECTION	-19.78	-21.61	-22.37	-25.28	-25.49	-25.15	-25.92
DOG LEG	.39	.66	2.06	2.16	4.16	1.90	.76
DL/100FT	.62	1.06	7.73	2.34	13.42	5.93	1.21
TEMP (C)	34.6	29.0	27.0	32.6	33.1	33.6	34.6

COMPUTALOG-GEARHART, LTD.
M256.MWDGP.0185.00.CRT

WELL REPORT

FIELD: BELUGA WELL NO.: O-23

PROPOSED DRIFT DIRECTION N 0: OE

SURVEY METHOD MC

SURVEY NO.	77	78	79	80	81	82
ELEC. NO.	228	228	228	201	201	201
MAG. NO.	908	908	908	911	911	911
DATE	9- 7-85	9- 7-85	9- 7-85	9-11-85	9-11-85	9-12-85
TIME	3:48:19	10: 8:27	15: 7:55	11: 1:42	11: 2:47	1:36:50
MS. DEPTH	6393.71	6456.90	6519.50	6961.00	7054.00	7232.00
OBSV.	1:53	1:20	1:10	0:44	1:33	1: 4
DD OBSV.	S59:34E	S35: 2E	N47:33W	N36:46W	S34: 8W	S58:10W
TOOL FACE	156R	143R	145L	7L	38R	57R
COORD. NS	27.03S	28.16S	28.32S	22.99S	23.55S	26.43S
COORD. EW	1.42W	.10W	.16W	5.19W	6.27W	9.05W
T.V.D.	6393.33	6456.49	6519.09	6960.52	7053.51	7231.47
SECTION	-27.03	-28.16	-28.32	-22.99	-23.55	-26.43
DOG LEG	3.49	.87	2.49	.46	1.94	.71
DL/100FT	5.56	1.37	3.98	.10	2.09	.40
TEMP (C)	34.6	34.1	34.1	29.3	30.3	30.8

DIRECTIONAL PLOTS

Copy of each of the following plots:

INCLINATION vs DEPTH

SECTION VIEW

TEMPERATURE vs DEPTH (STATIC)

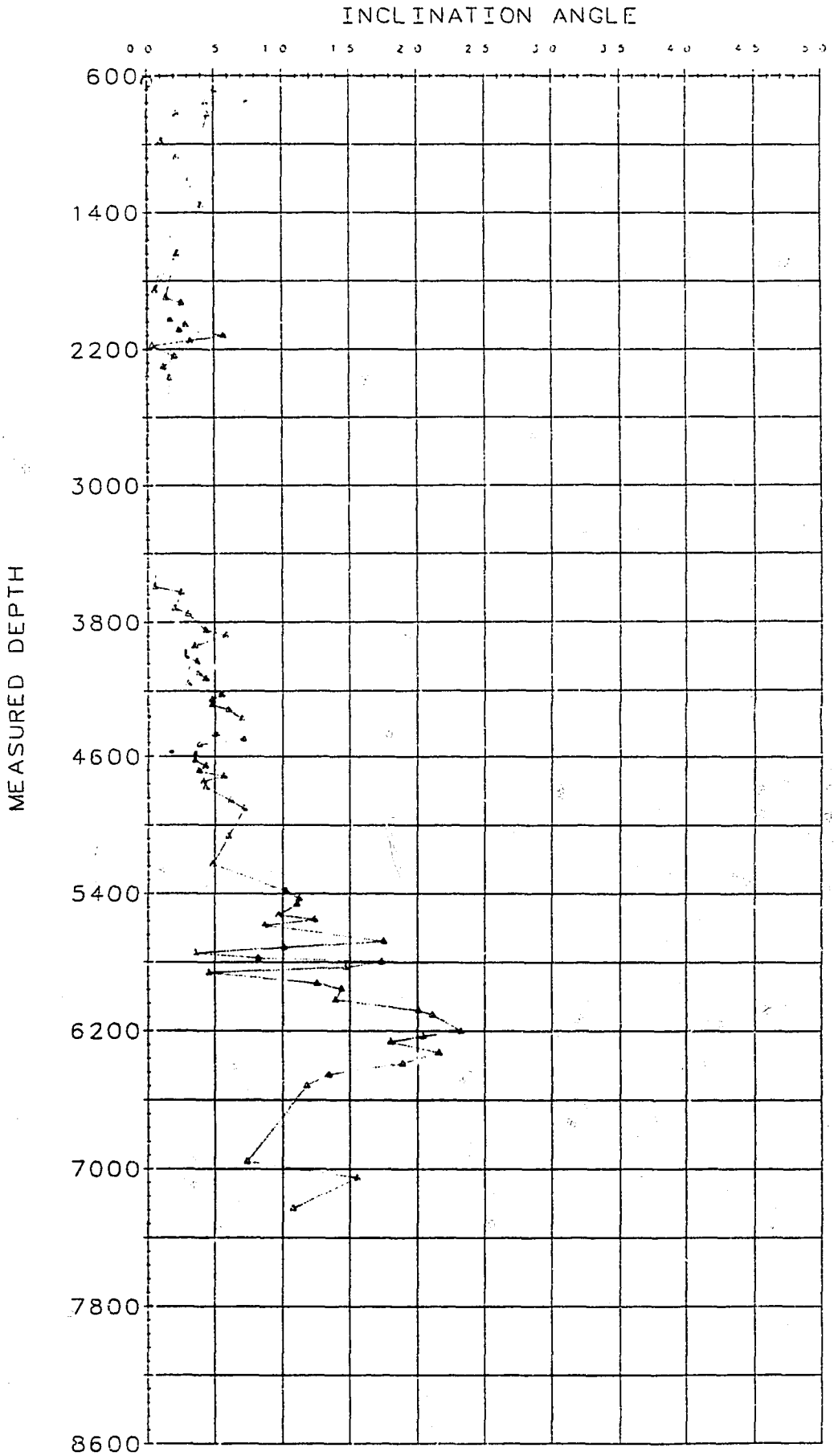
TEMPERATURE vs DEPTH (DYNAMIC)

GAMMA RAY LOG

CANTERRA ENERGY LTD

BELUGA O-23

INCLINATION VS MEASURED DEPTH PLOT

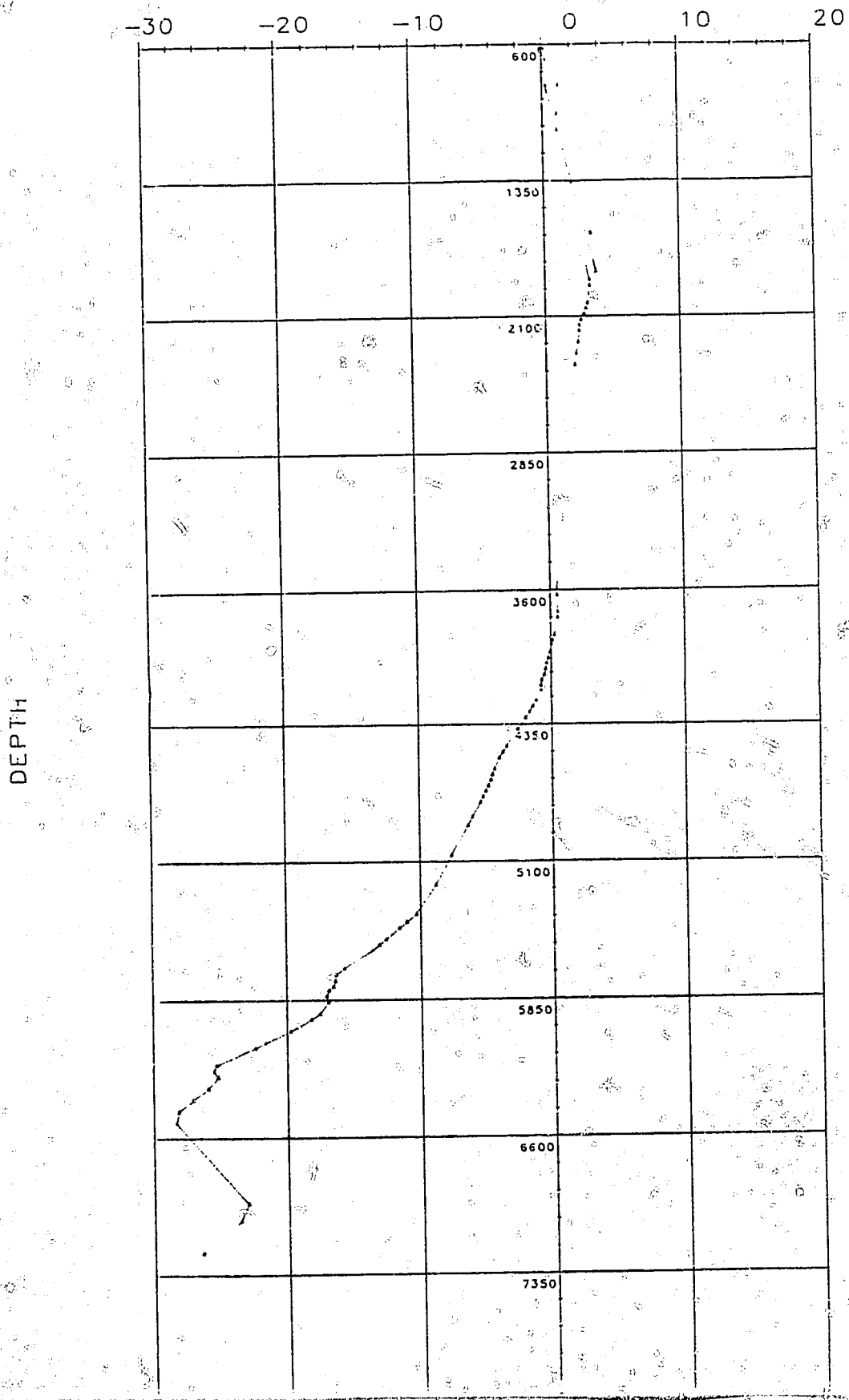


CANTERRA ENERGY LTD

BELUGA 0-23

SECTION VIEW - SECTION VS DEPTH

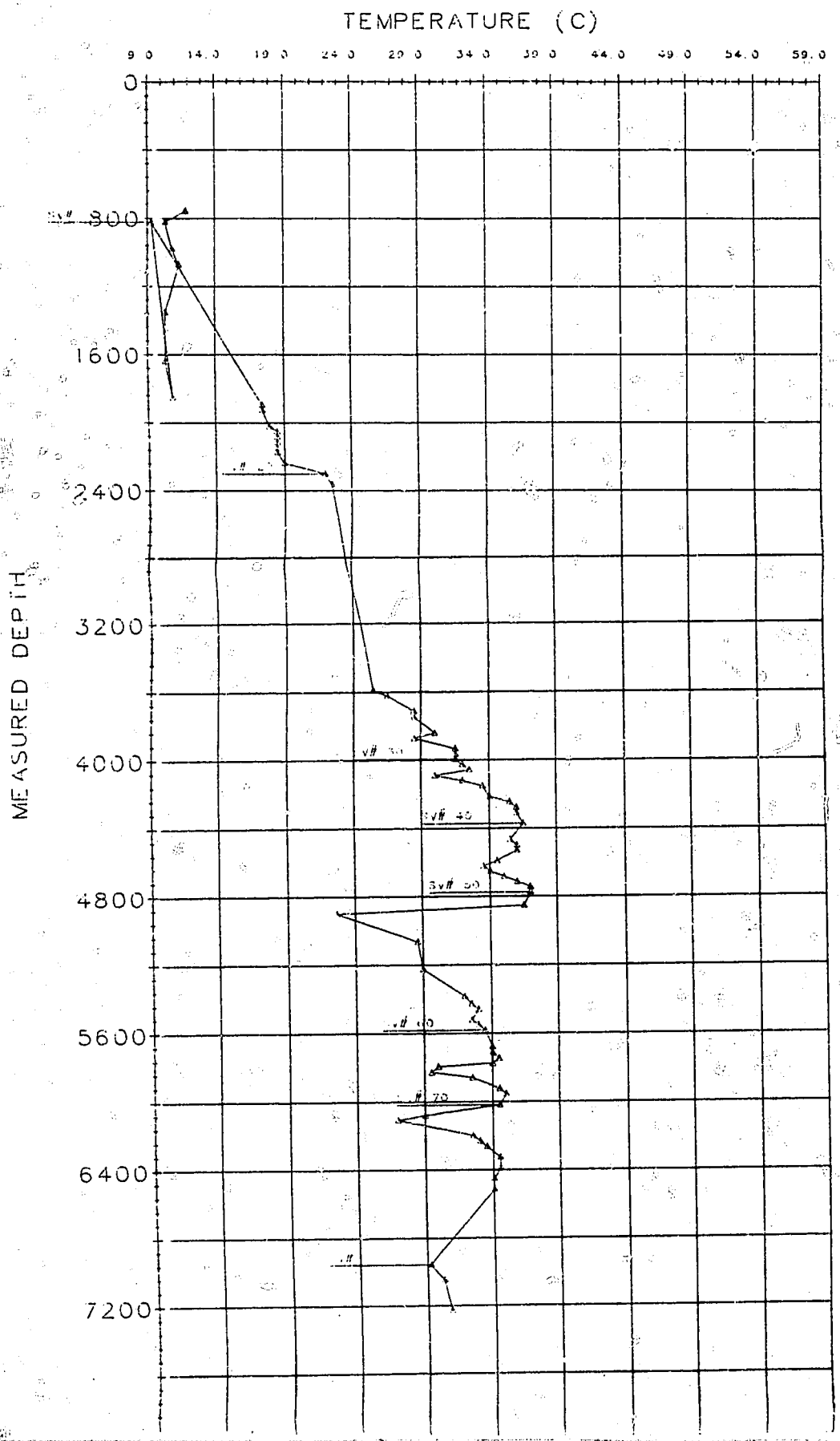
SECTION ALONG DRIFT DIRECTION OF N 0.0 E



CANTERRA ENERGY LTD

BELUGA O-23

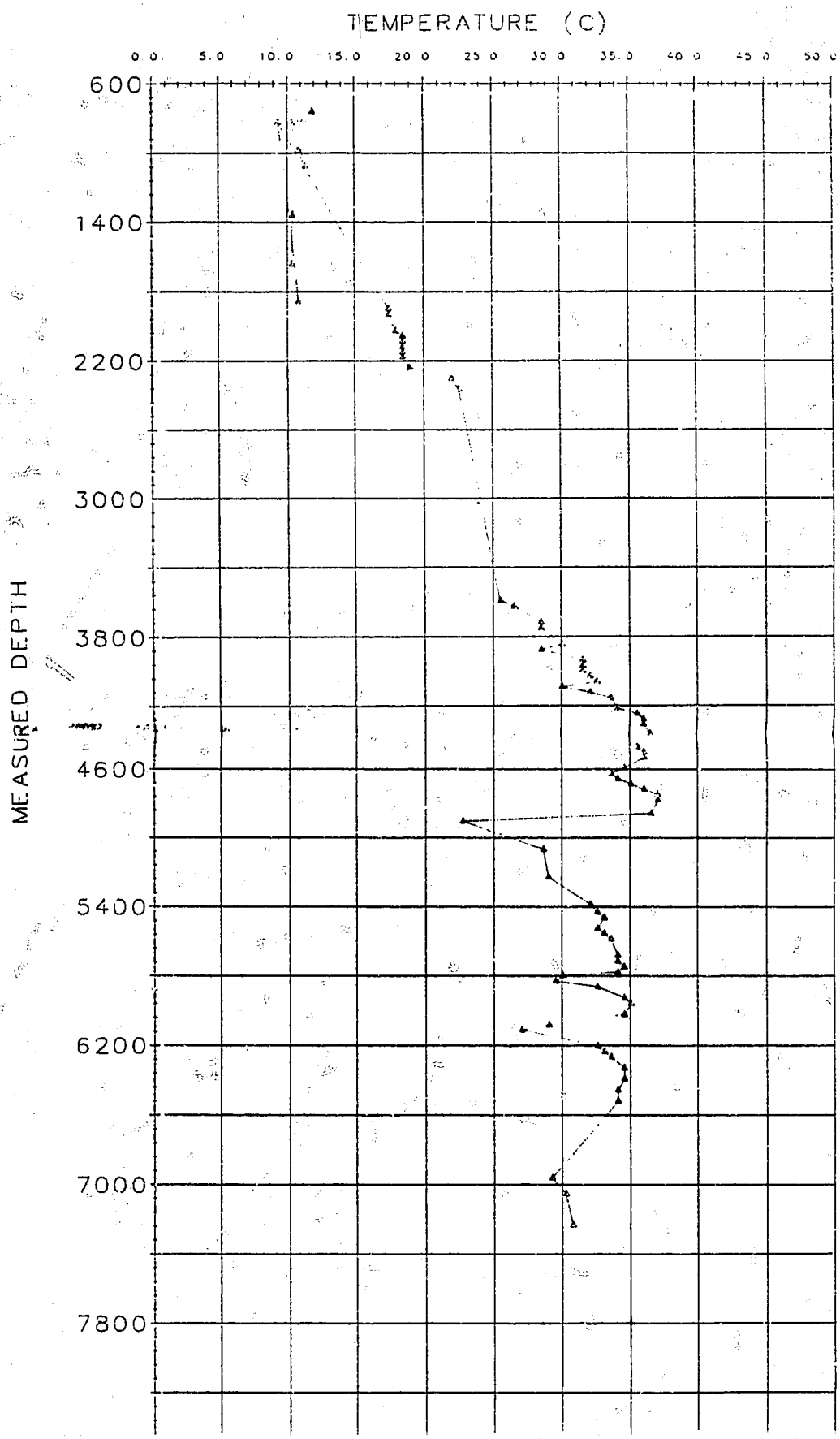
TEMPERATURE VS MEASURED DEPTH PLOT



CANTERRA ENERGY LTD

BELUGA O-23

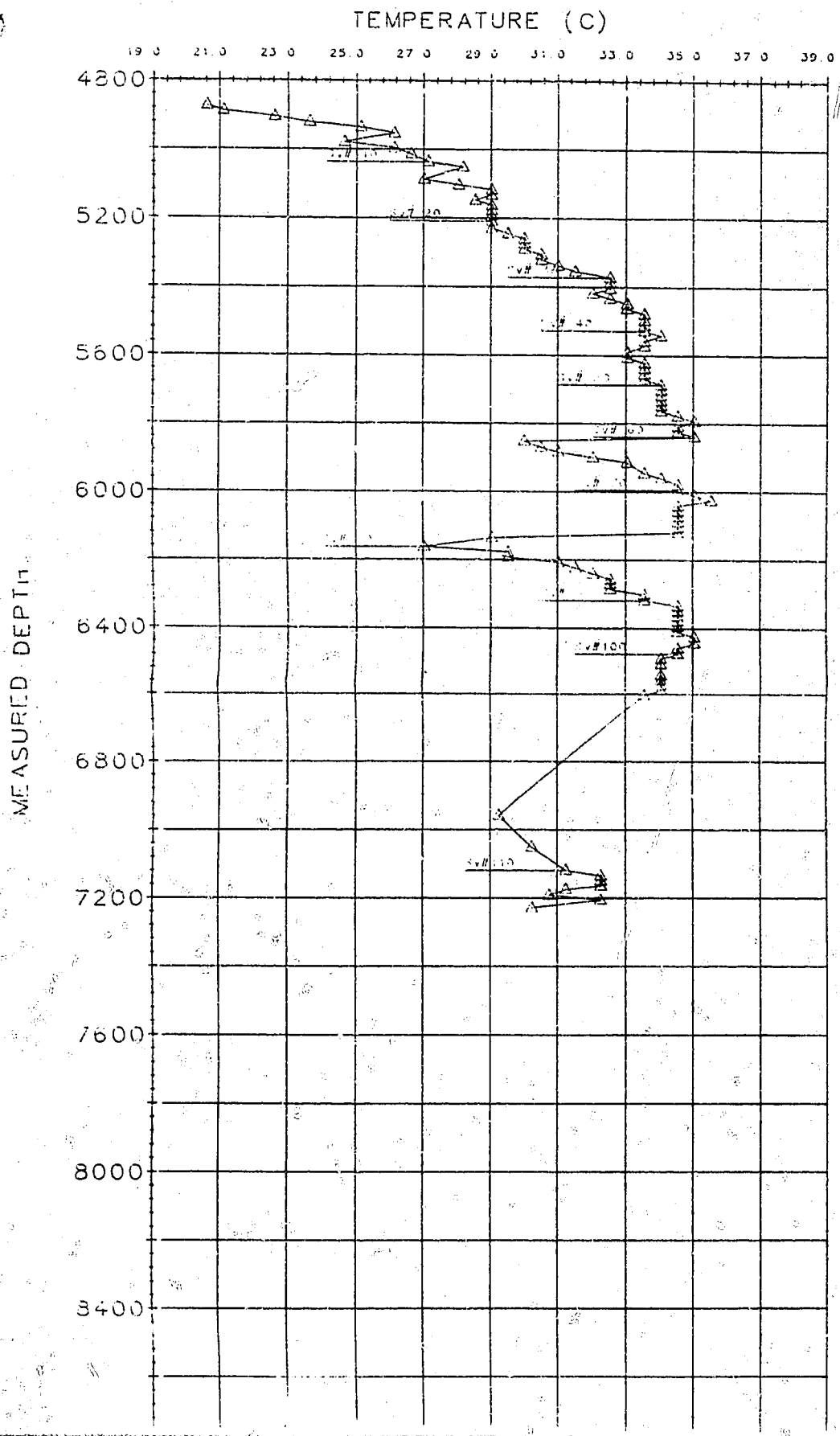
TEMPERATURE VS MEASURED DEPTH PLOT

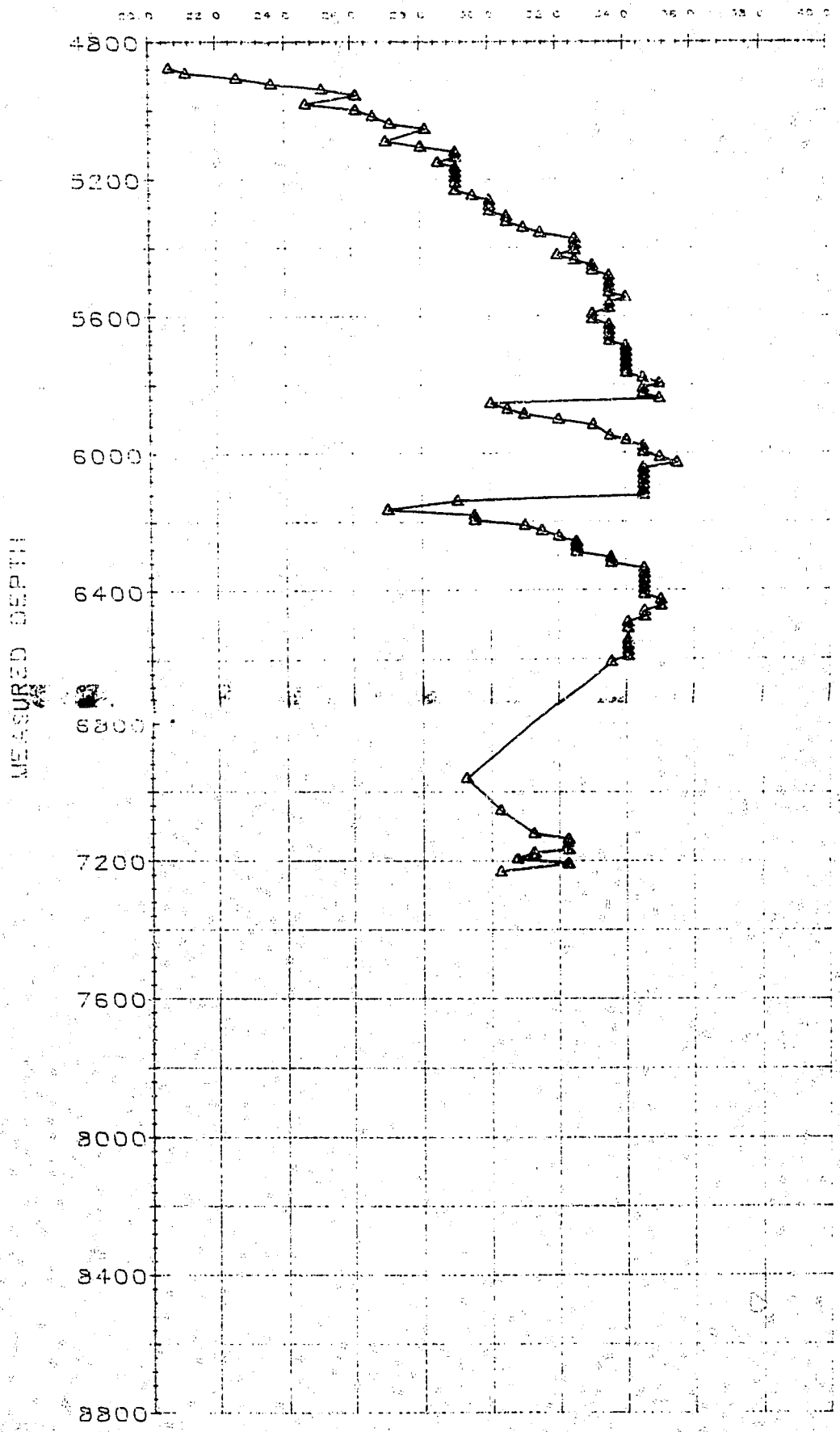


CANTERRA ENERGY LTD.

BELUGA O-23 DYNAMIC TEMPERATURE

TEMPERATURE VS MEASURED DEPTH PLOT




4800
5200
5600
6000
6400
6800
7200
7600
8000
8400
8800
MEASURED DEPTH

8710-C55-1-1

CORE LABORATORIES — CANADA LTD.

SMALL SAMPLE CORE ANALYSIS

SEP 26 1985

COMPANY CANTERRA ENERGY LTD.
WELL TILLIUM SOQUIP ONEXIO ET AL BELUGA
FIELD
LOCATION
ELEVATION

FORMATION
CORING EQUIPMENT
CORE DIAMETER (mm)
CORING FLUID

CANADA OIL AND GAS LANDS ADMINISTRATION
ADMINISTRATION DU PÉTROLE ET DU GAZ DES TERRES DU CANADA
OCT 11 1985
ENGINEERING AND CONTROL BRANCH
TECHNIQUE ET DU CONTRÔLE

PAGE 1 of 3
FILE 70175-85-1022
DATE
ANALYSTS

PRELIMINARY REPORT

CLEANING

Solvent
Extraction Equipment
Extraction Time
Drying Equipment
Drying Time
Drying Temperature

ANALYSIS

- ☐ Pore Volume measured by Boyle's Law in a Hassler holder using helium
- ☐ Grain Volume measured by Boyle's Law in a matrix cup using helium
- ☐ Porosity determined by summation of fluids (retort)
- ☐ Fluid saturations by retort
- ☐ Water saturation by Dean-Stark
- ☐ Oil saturation by weight difference (Dean-Stark)
- ☐ Permeability measured on mm diameter drilled plugs
- ☐ Permeability measured on 20 mm cubes

REMARKS

**PERMEABILITY VALUES FOR PERCUSSION TYPE SIDEWALL CORES DETERMINED EMPIRICALLY

DESCRIPTIONS

Conglomerate = cgl
Sandstone = ss
Siltstone = sltst
Shale = sh, shy
Limestone = ls
Dolomite = dol
Gypsum = gyp
Anhydrite = anhy
Halite (salt) = hal
Ironstone = fe
Chert = cht
Pyrite = pyr
Sulphur = suif
Coal = coal
Carbonaceous Matter = carb
Pyrobitumen = pyrbit

Slightly Shaly = sshy
Moderately Shaly = mshy or shy
Very Shaly = vshy

Calcareous = calc
Limy = limy
Pyritic = pyr

Glauconitic = glauc
Silty = slt
Sandy = sdy
Carbonaceous = carb
Dolomitic = dol
Coal/Coal inclusions = coal
Laminae (Laminated) = lam
Fractures (vertical/horizontal/undifferentiated) = vert frac, hfrac, frac
Micaceous = mic
Stylolite (s) = sty
Oolitic = ool
Fossiliferous = foss
Intergranular = i

Vugs, Vugular, Vuggy
Pinpoint = ppv
Small Vug = sv
Medium Vug = mv
Large Vug = lv

CORE LABORATORIES -- CANADA LTD.

IPANY CANTERRA ENERGY LTD.
L TRILLIUM SOQUIP ONEXIO ET AL BELUGA 0-23
ATION

FORMATION **VARIOUS
ANALYSTS TS

FILE 70175-85-1022A
DATE SEP 26 1985

PRELIMINARY REPORT

ple ber	Depth-Metres (m)	cm Rec.	** Permeability to Air Millidarcys	Porosity	Residual Saturation (Fraction of Pore Volume)		Gas Detector	Remarks	Visual Examination		
					Oil	Water			Formation Description	Odor	Fluorescence
	1070	0	-----	---	---	---	---	----	EMPTY BOTTLE	---	-----
	1073	0	-----	---	---	---	---	----	EMPTY BOTTLE	---	-----
	1486	2.50	.1	.143	0.000	.755	0		ls, i, dol	none	none
	1507	.75	-----	---	---	---	---	(3)	ls, i, insufficient sample	---	-----
	1550	1.50	<.01	.165	0.000	.727	0	(6)	ls, i, sdy, anhy	none	min.
	1565	3.0	<.01	.120	0.000	.750	0	(6)	ls, i, sshy	none	min.
	1578	2.50	<.01	.167	0.000	.725	0	(6)	ls, i	none	min.
	1600	2.0	<.01	.193	0.000	.694	0	(6)	ls, i	none	min.
	1620	2.0	<.01	.159	0.000	.767	0	(6)	ls, i	none	min.
0	1660	2.0	<.01	.102	0.000	.814	0	(6)	ls, i	none	min.
1	1680	2.5	.1	.194	0.000	.706	0	(6)	ls, i	none	min.
2	1694	2.0	.3	.174	0.000	.770	0		ls, i	none	min.
3	1710	---	-----	----	---	----	-	(3)	ls, i, insufficient sample	---	----
4	1720	1.50	<.01	.111	0.000	.811	0	(6)	ls, i	none	min.
5	1745	2.00	<.01	.136	0.000	.765	0	(6)	ls, i, shy	none	min.
6	1765	2.00	<.01	.107	0.000	.813	0	(6)	ls, i	none	min.
7	1820.5	.30	<.01	----	---	----	-	(1)	ls, i	----	----
8	1876	.20	<.01	----	---	----	-	(1)	ls, i	----	----
9	1880	1.15	<.01	----	---	----	-	(1)(3)	ls, i	----	----
20	1920	2.0	<.01	----	---	----	-	(3)	ls, i, insufficient sample	----	----
21	1949	2.0	----	----	---	----	-	----	halite	----	----

**PERMEABILITY VALUES FOR PERCUSSION TYPE SIDEWALL CORES DETERMINED EMPIRICALLY.

vations and material supplied by the client to whom
best judgement of Core Laboratories -- Canada Ltd
nsibility and make no warranty or representations
ral well or sand in connection with which such repo

(1) ALTERED CORE - BROKEN
(3) INSUFFICIENT SAMPLE
(6) LOW PERMEABILITY

CORE LABORATORIES — CANADA LTD.

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L TRILLIUM SOQUIP ONEXIO ET AL BELUGA 0-23
ATION

FORMATION **VARIOUS
ANALYSTS TS

PRELIMINARY REPORT

FILE 70175-85-1022A
DATE

SEP 26 1985

ple ber	Depth-Metres (m)	cm Rec.	** Permeability to Air Millidarcys	Porosity	Residual Saturation (Fraction of Pore Volume) Oil	Residual Saturation (Fraction of Pore Volume) Water	Gas Detector	Remarks	Visual Examination: Formation Description	Visual Examination: Odor	Visual Examination: Fluorescence
2	1992.5	.50	<.01	----	----	----	---	(3)	ls, i	---	-----
3	2020	.60	<.01	----	----	----	---	(3)	ls, i	---	-----
4	2060	.40	<.01	.109	0.000	.807	0	(6)	ls, i	none	none
5	2080	1.10	<.01	.123	0.000	.764	0	(6)	ls, i	none	min.
6	2100	1.0	<.01	.176	0.000	.778	0	(6)	ls, i	none	min.
7	2120	1.0	<.01	.148	0.000	.797	0	(3)	ls, i	none	none
8	2189	3.0	----	----	---	---	--	---	sh	---	----
9	2191	3.0	.2	.150	0.000	.818	0		granitic	none	none
0	2192	3.0	.1	.155	0.000	.832	0	(6)	granitic	none	none
1	2200	1.5	---	----	----	----	--	(3)	granitic	---	----

FORMATIONS	DEPTH RANGE (m.)
KENOGAMIE	1486
NARWHAL	1507-1550
ALTAWAPISKAT	1565-1620
EKWAN RIVER	1660-1680
SEVERN RIVER	1694-1765
RED HEAD RAPIDS	1820.5-2020
CHURCHILL	2060-2120
BAD CACHE	2189
BASEMENT	2191-2200

PERMEABILITY VALUES FOR PERCUSSION TYPE SIDEWALL CORES DETERMINED EMPIRICALLY.

iservations and material supplied by the client to who the best judgement of Core Laboratories — Canada L sponsibility and make no warranty or representations ineral well or sand in connection with which such rep

(1) ALTERED CORE - BROKEN
(2) INSUFFICIENT SAMPLE
(6) LOW PERMEABILITY

A. No. 2A

8710-C55-1-1

OIL AND GAS LANDS ADMINISTRATION
ADMINISTRATION DU PÉTROLE ET DU GAZ DES TERRES DU CANADA
OCT 24 1985
ENGINEERING AND CONTROL BRANCH
TECHNIQUE ET DU CONTROLE

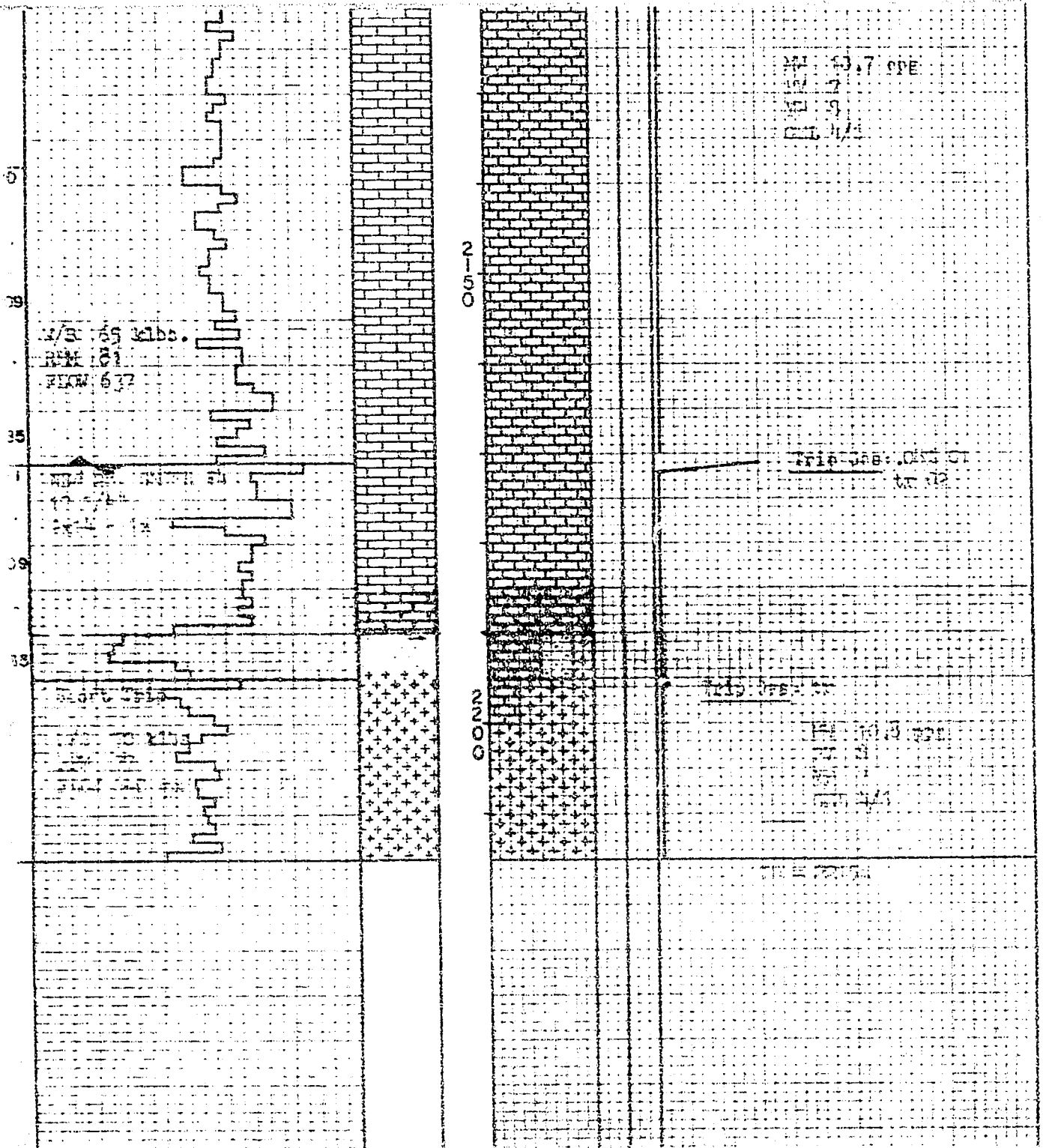
Trillium Soquip Onexco et al Beluga 0-23
Sidewall Core Description

Schlumberger Sample No.	Depth (m)	Description
66	1486	Dolomitic siltstone, reddish brown in colour, grading to shale, no visible porosity, poorly indurated
64	1507	Anhydrite, white, poorly indurated, minor amounts of grey dolomite in sample, < 10% recovery
62	1550	Anhydrite, white to grey, < 10% dolomite
61	1565	Limestone, white, grading to dolomite, buff-grey sparry calcite cemented (sparmicrite), minor amounts of shale, grey, no visible porosity
60	1565	Limestone, as above
59	1578	Limestone, as above
58	1578	Limestone, as above
57	1600	Limestone, grey to light grey, sparry calcite cemented, no visible porosity, minor amounts of shale
56	1620	Limestone, as above
55	1620	Limestone, as above
53	1660	Limestone to dolomite, grey to light grey, sparry calcite cemented (sparmicrite), no visible porosity, minor shale
52	1680	Limestone, tan to brown, sparry calcite cemented (sparmicrite), minor amounts dark organic material, no visible porosity
50	1694	Limestone, as above
49	1694	Limestone, as above

Schlumberger Sample No.	Depth (m)	Description
48	1710	Dolomite to limestone, buff to light grey, sparry calcite cemented, poorly indurated, no visible porosity, < 10% sample recovery
47	1720	Limestone, buff to light grey, sparry calcite cemented, poorly indurated, no visible porosity
46	1745	Limestone, as above
45	1745	Limestone, as above
43	1765	Limestone, as above
39	1820.5	Limestone, as above
34	1876	Limestone, tan to brown, sparmicrite grading to siltstone and shale, petroliferous odour given off in acid, brown organic residue left, coal fragments in sample, no visible porosity
33	1880	Limestone grading to siltstone and shale as above, petroliferous odour given off in acid
28	1920	Dolomite, tan to grey, sparmicrite, grading to limestone, minor amounts organic material
27	1949	Salt, clear, crystalline
23	1992.5	Limestone, tan to grey, sparmicrite, no visible porosity, poor sample recovery
20	2020	Limestone to dolomite, grey, sparmicrite, no visible porosity
17	2060	Dolomite to limestone, grey, sparmicrite, no visible porosity
16	2080	Limestone to dolomite, as above
14	2100	Dolomitic limestone, as above

Schlumberger Sample No.	Depth (m)	Description
13	2120	Dolomitic limestone, as above
8	2189	Shale, dark grey, calcareous
6	2191	Basement: calcite, chlorite, biotite, quartz, feldspar, gneissic texture, medium to very coarsely crystalline
5	2191	Basement: as above
4	2192	Basement: as above
3	2192	Basement: as above
2	2200	Basement: as above

RM/85-9-17

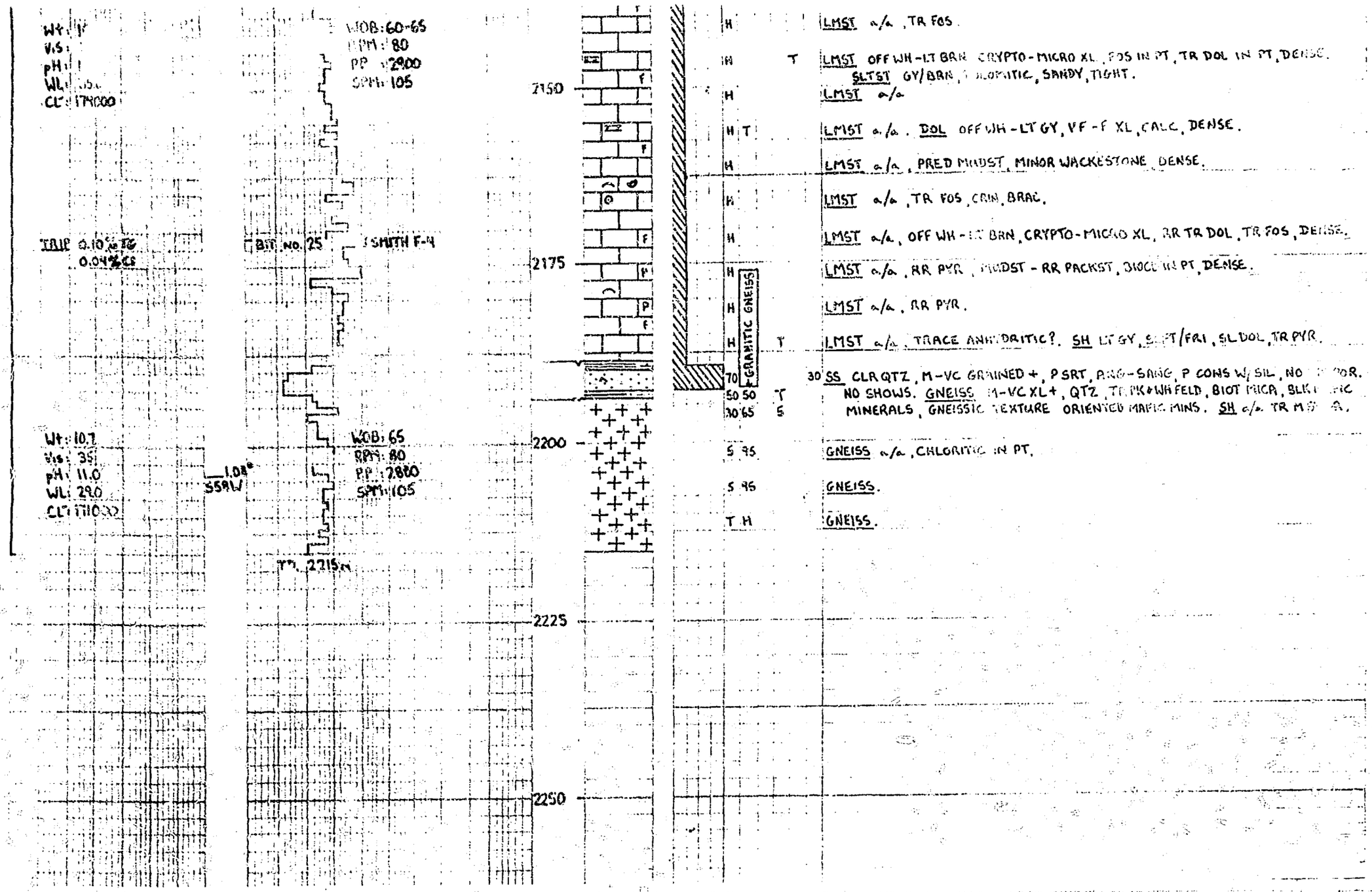


[illegible] off wh-lt [illegible], [illegible], mnr microxi, [illegible], [illegible], tr [illegible], [illegible], [illegible].

tr SH lt gy, sft, fri, sl dol
osc pyr.

[illegible] clr qtz, m-vc, poor sort, sub [illegible], poor [illegible], no vis por.

[illegible] granitic, m-vc xls, [illegible], tr pk [illegible] felis, [illegible], [illegible], [illegible] mins, osc chloritic.



Wt: 1
Vis:
pH: 1
WL:
CL: 174000
WOB: 60-65
RPM: 80
PP: 2900
SPM: 105
TRIP 0.10% TG
0.04% CL
BIT NO. 25
SMITH F-4
Wt: 10.7
Vis: 35
pH: 11.0
WL: 29.0
CL: 171000
1.08°
S59W
WOB: 65
RPM: 80
PP: 2880
SPM: 105
TD 2215
2150
2175
2200
2225
2250
GRANITIC GNEISS
H LMST a/a, TR FOS.
H T LMST OFF WH-LT BRN CRYPTO-MICRO XL, FOS IN PT, TR DOL IN PT, DENSE.
SLTST GY/BRN, DOLOMITIC, SANDY, TIGHT.
H LMST a/a
H T LMST a/a. DOL OFF WH-LT GY, VF-F XL, CALC, DENSE.
H LMST a/a, PRED MUDST, MINOR WACKESTONE, DENSE.
H LMST a/a, TR FOS, CRIN, BRAC.
H LMST a/a, OFF WH-LT BRN, CRYPTO-MICRO XL, RR TR DOL, TR FOS, DENSE.
H LMST a/a, RR PYR, MUDST - RR PACKST, BIOCL IN PT, DENSE.
H LMST a/a, RR PYR.
H T LMST a/a, TRACE ANHYDRITIC?. SH LT GY, SLFT/FRI, SL DOL, TR PYR.
70 30 SS CLR QTZ, M-VC GRAINED +, P SRT, ANG-SANG, P CONS W/ SIL, NO POR.
50 50 T NO SHOWS. GNEISS M-VC XL+, QTZ, TR PK+WH FELD, BIOT MICA, BLK MAFIC
30 65 S MINERALS, GNEISSIC TEXTURE ORIENTED MAFIC MINS. SH a/a TR M
S 95 GNEISS a/a, CHLORITIC IN PT.
S 95 GNEISS.
T H GNEISS.

TRIP 0.33
0.98
0.91
TR C

Wt: 10.6
Vis: 55
pH: 11.0
WL: 35.0
Cl: 178000

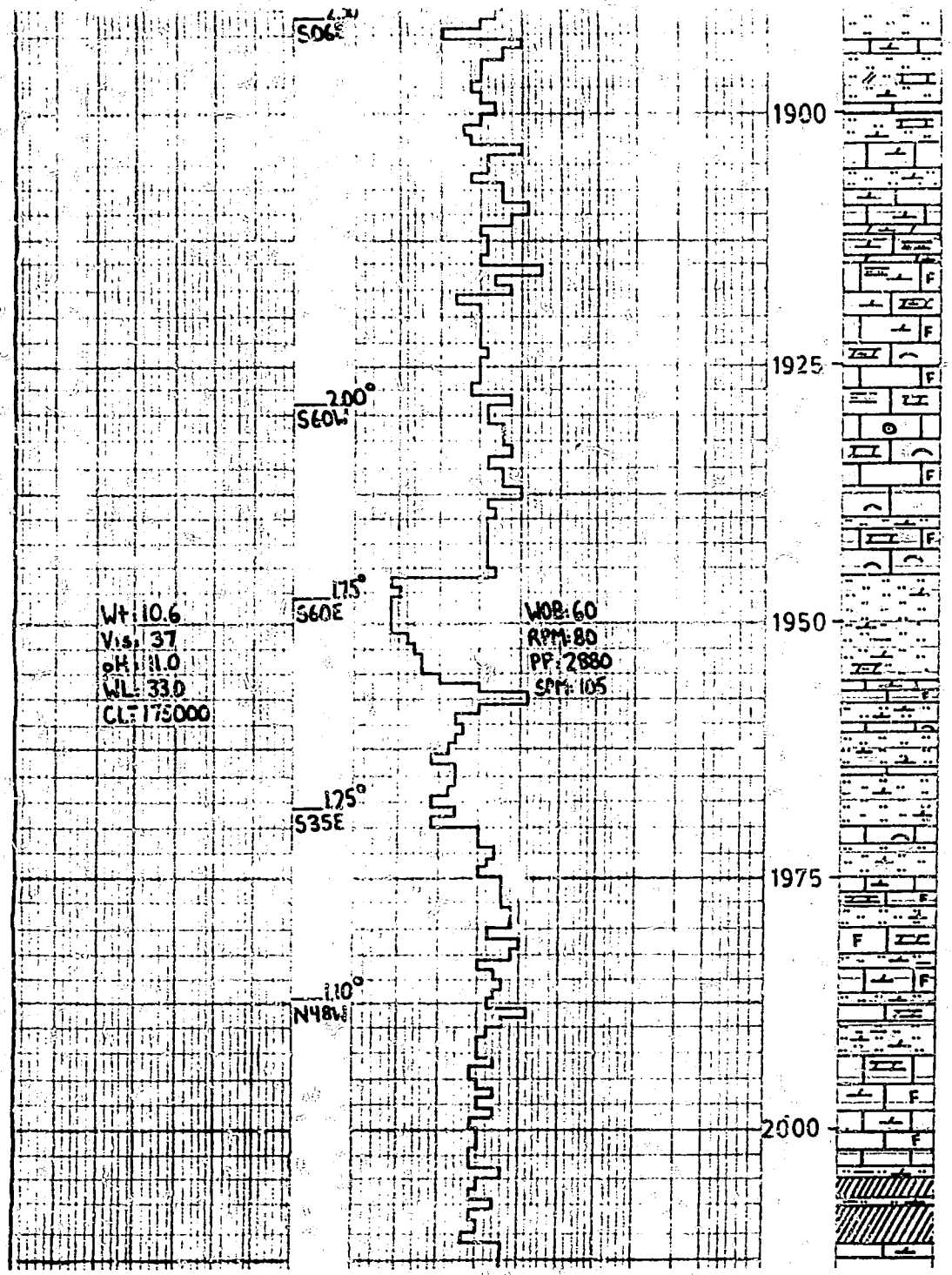
BIT NO. 24 SMITH F-4

NO SURVEYS THIS BIT RUN.

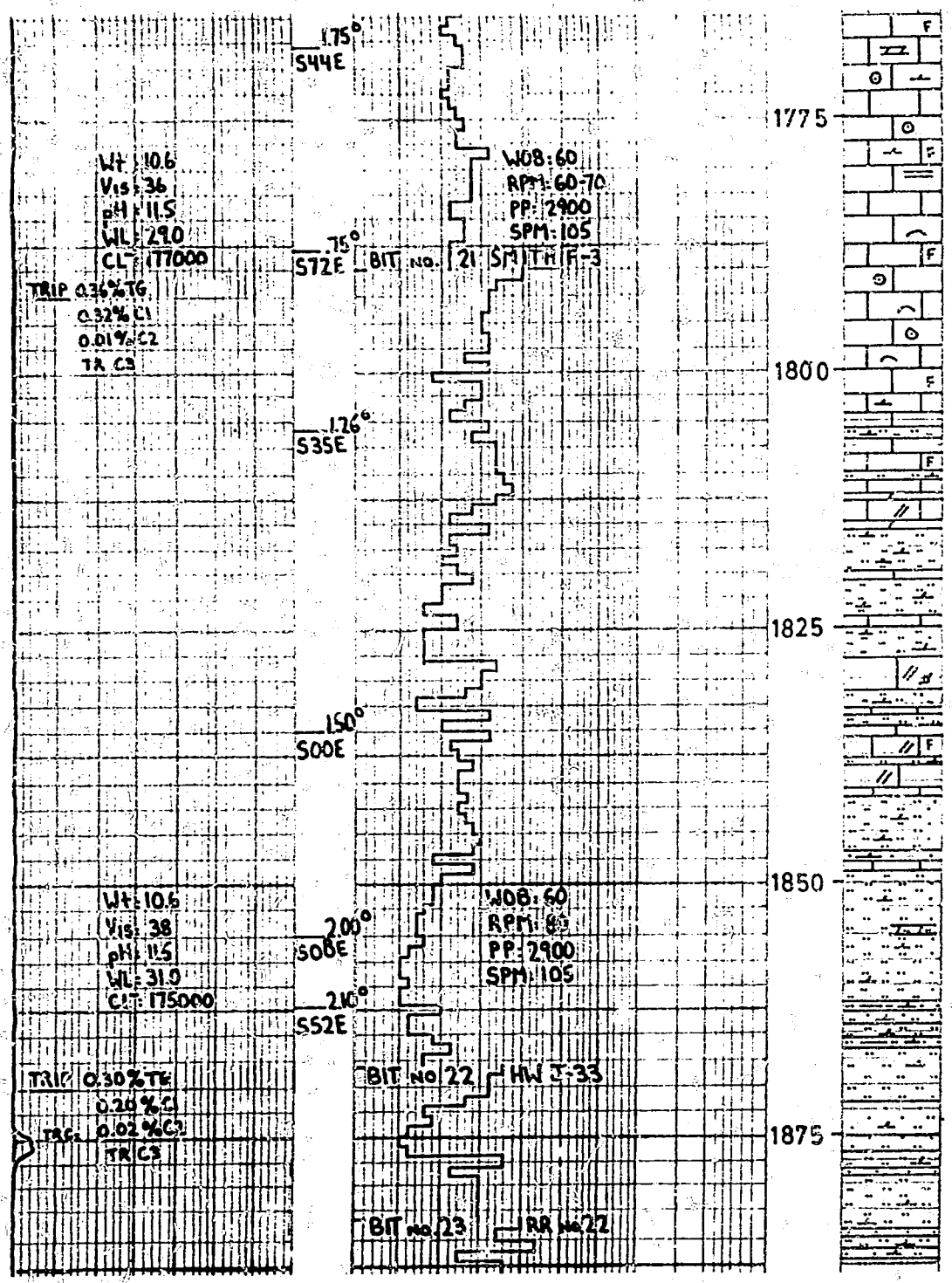
WOB 60-65
RPM 185
PP 2800
SPM 100

2025
2050
2075
2100
2125

10 20 5	65		SLTST BUFF-LT BRN, V DOL, GRDG TO SLTY DOL IN PT, TIGHT. DOL LT BRN, CRYPTO-MICRO XL, SL SLTY, SL CALC IN PT. LMST BUFF-LT BRN, DENSE.
40 30 T	30		DOL OFF WH-LT BRN, MICRO XL, SL SLTY, SL CALC, V CALC-VF XL IN PT, DNS. LMST OFF WH-LT BRN, CRYPTO XL, TR DOL IN PT, RR FOS. SLTST a/a.
70 10 T	20		LMST a/a. SLTST LT GY-GY, MNR LT BRN, V DOL, SL CALC, SL ARG, CLN IN PT, TIGHT.
75 10 5	10		LMST a/a DOL FROM LMST.
90 10			LMST OFF WH-LT BRN, CRYPTO-MICRO XL, MNR VF XL, RR FOS, SL-V DOL, GRDG TO LIMEY DOL, DENSE. DOL OFF WH-LT BRN, LT GY, CALC, TR NON CALC.
90 10			LMST a/a, DOL a/a, FROM LMST.
80 20			LMST a/a.
70 30			LMST a/a, RR FOS. DOL a/a.
90 10			LMST a/a.
90 10			LMST a/a.
90 10			LMST a/a GRDG TO DOL IN PT.
80 20			LMST a/a.
90 10			LMST a/a. DOL a/a FROM LIMESTONE.
H T			LMST OFF WH-LT BRN, CRYPTO XL, MNR MICRO XL, TR-RR FOS, BRAC, TR SL DOL, SOFT IN PT, DENSE.
H T			LMST a/a.
H			LMST a/a.
H			LMST a/a. SOFT IN PT
H T			LMST a/a. DOL GY/BRN, VF XL, SL SLTY, SL ARG, SL CALC.
H T			LMST a/a, RR FOS, SL DOL IN PT.
H			LMST a/a, LT GY/BRN, TR FOS.
H			LMST a/a
H			LMST a/a, V RR PYR, TR BRN/BLK ORGANIC FRAGMENTS, NO VIS Ø, NON DOL, RR FOS.
H			LMST a/a, RR TR DOL.
H			LMST a/a, CRIN, BRAC, MUDSTONE-WACKESTONE.
H			LMST a/a.



5			95	SLTST a/a INCR CALC.
10	T	T	90	SLTST a/a SL CALC IN PT. LMST LT BRN, CRYPTO XL, V DOL IN PT. DOL OFF WH, VF XL, BIOCL TEXTURE, V CALC IN PT, DENSE.
10	T		90	SLTST a/a, GRDG TO SLTY DOLOMITE. LMST SL DOL, BIOCL IN PT, a/a, DENSE. DOL a/a, BIOCL.
80			20	LMST OFF WH - LT BRN, CRYPTO - MICRO XL, SOFT IN PT, TR FOS, V DOL IN PT, DENSE. SLTST a/a.
70	20		10	LMST a/a V DOL IN PT. SLTST a/a. DOL LT GY, VF-F XL, V CALC, TIGHT, V SL SLTY.
80	10		10	LMST a/a V DOL IN PT. DOL a/a V CALC.
70	20		10	LMST TR FOS, BRAC, V DOL IN PT. DOL V CALC.
90	T		10	LMST OFF WH - LT BRN, CRYPTO - MICRO XL, SOFT IN PT, FOS IN PT, V DOL IN PT, LOC GRDG TO LIMEY DOL, DENSE. SLTST CAVINGS.
95	T		5	LMST a/a V DOL IN PT, CRIN, BIOCL IN PT.
H	T			LMST a/a, TR BIOCL, BRAC, DENSE, SL DOL.
90	T		10	LMST a/a TR BIOCL PACKSTONE. SLTST a/a.
50	10	T	40	SLTST LT BRN - LT GY - LT GY/BRN, ARG IN PT, V DOLOMITIC, GRDG TO SLTY DOL, TR SDY. LMST a/a TR FOS, MUDST. DOL FROM LMST. ANHY LT GY, CRYPTO XL.
10		T	90	SLTST a/a BRN (ORG?) SPECS IN PT, SL ARG IN PT, SOFT IN PT. LMST ABNT BIOCL PACKSTONE, DENSE. POSSIBLE SALT BED 1946-1956m
T			H	SLTST BUFF - LT BRN, DOLOMITIC, GRADING TO SILTY DOLOMITE IN PT, SL CALC IN PT, TIGHT.
5		T	95	SLTST a/a, SL CALC IN PT. LMST DOLOMITIC IN PT, MUDSTONE, DENSE.
5			95	SLTST a/a.
40			60	LMST OFF WH - LT BRN, CRYPTO XL, BIOCL IN PT, GEN V DOL, DENSE. SLTST a/a
50	10		40	LMST FOS, MUDSTONE. DOL LT GY, VF-F XL, V CALC, FROM LMST, DENSE.
40	10	T	50	LMST a/a, FOS, V DOL. DOL a/a, FOS. SLTST a/a ALSO MNR LT GY, SL ARG, DOL.
50	10	T	40	LMST a/a SLTST a/a
40	T	T	60	LMST a/a, V DOL IN PT. SLTST BUFF - LT BRN, MNR LT GY, V DOL, SL ARG IN PT, SL CALC IN PT.
70			30	LMST OFF WH - LT BRN, CRYPTO - MICRO XL, V DOL IN PT, TR FOS, SOFT IN PT, DENSE. SLTST a/a TR LT GY, SL ARG, SL CALC IN PT.
95			5	LMST a/a GEN NON DOL, RR FOS, DENSE.
30	40		30	ANHY WH, CLR TRNSL, MASSIVE, SOFT TO FIRM. LMST a/a SL DOL. SLTST a/a ALSO TRACE, LT GY - GY, SL ARG.
30	50		20	ANHY a/a LMST a/a V DOL IN PT. SLTST a/a TR GY, SL ARG.



	H T				LMST OFF WH - LT BRN, CRYPTO - MICRO XL, TR FOS, NON DOL - SL DOL.
	H T				LMST a/a CRIN, SL DOL IN PT. DOL a/a, CALC IN PT.
	H T				LMST a/a, V SL DOL IN PT, CRIN MUDST - WACKESTONE IN PT, DENSE.
	H T				LMST a/a, DOL LTGY, VF-F XL, GEN CALC, TR FOS, FROM LMST.
	H T				LMST a/a, TR DOL, TR FOS, MNR BIOCL STREAKS, DENSE.
	H				LMST a/a, TR FOS.
	H T				LMST GEN NON DOL, TR CRIN, TR BIOCL. DOL a/a
	H				LMST a/a ALSO TRACE GY/BRN, MICRO XL, SL ARG, DENSE.
	95		5		SLTST LT GY, DOLOMITIC, V SL ARG IN PT, TIGHT. LMST a/a, TR DOL IN PT, FOS, DENSE.
	90 5		5		SLTST OFF WH - BUFF, DOL, GEN NON ARG. DOL LT GY, VF-F XL, CALC IN PT, DENSE. LMST a/a.
	40		60		SLTST a/a. LMST a/a.
	5		95		SLTST a/a DOLOMITIC, TIGHT, TR CALC PATCHES.
	5		95		SLTST a/a
	95	T	5		LMST a/a OFF WH - LT BRN, CRYPTO - MICRO XL, RR FOS, SL-V DOL IN PT, POSSIBLE PELLETS, DENSE. ANHY WH/CLR, MASSIVE.
	40	T	60		SLTST a/a, MNR LT GY - SL ARG, TIGHT. LMST a/a TR FOS, MUDST - WACKEST, DENSE.
	50		50		LMST a/a SLTST a/a
	10		70	20	SLTST PRED BUFF, MNR OFF WH, DOLOMITIC, COMMONLY SANDY - VF-F GR, GRADING TO SLTY SS IN PT, TIGHT.
	T	T	H	T	SLTST a/a, SDY IN PT. ANHY WH, CLR, CRYPTO - MICRO XL, SOFT-FIRM.
	T	T	H		SLTST a/a, GRDG TO SLTY DOLOMITE IN PT.
		T	H		SLTST a/a.
			80	20	SLTST a/a ALSO RARE RED/ORNG & RED/PURP, SDY & ARG. SS - BUFF, VF-F, ANG, F SRT, MOD CONS W/ DOL CMT, GRDG FROM SLTST, TRACE Ø?
			80	20	SLTST a/a V SDY IN PT. SS a/a GRDG TO SDY DOLOMITE IN PT, TIGHT.
			90	10	SLTST a/a, FOS?, DOLOMITIC, TIGHT.
	30		70		SLTST a/a, V SDY IN PT, NO VIS Ø. LMST PROBABLE CAVINGS AS ABOVE.
	T		H	T	SLTST a/a, GRDG TO SLTY DOL IN PT, SL CALC IN PT, V SDY IN PT.

TRILLIUM SOQUIP ONEXCO ET AL BELUGA O-23 8110-C55-1-1

Lat. 59°12'54.4"N, Long. 88°33'26.6"W

GEOLOGICAL REPORT

Dawson-Long & Associates Ltd.

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PERTINENT WELL DATA

Name: Trillium Soquip Onexco et al Beluga O-23 Licence No:

Location: Lat. 59°12'54.4"N; Long. 88°33'26.6"W

Operator: Canterra Energy Ltd.

Drilling Contractor: Drillship Nedrill 2

Well Status:

Hole Size: 42" to 230 m; 26" to 571 m; 17½" to 1492 m; 12¼" to T.D.

Surface Casing: 30" landed at 228.5 m; 20" landed at 558.7 m

Other Casing: 13 3/8" landed at 1478 m

Spud Date: July 28, 1985 Rig Release:

Elevations: Water Depth: 179.8 m K.B.: 13.7 m

Total Depth: 2215.0 m driller; 2214.7 m logger

Cored Intervals: Sidewall cores at selected intervals

Logs Run:	Type	Interval	Scale
Run #1	DL-Micro SFL	1492-558 m	1:600/1:240
	DISFL	1492-558 m	1:600/1:240
	DDBHC Long spacing sonic	1492-558 m	1:600/1:240
	LDT-CNL-GR	1492-558 m	1:240
	Natural GR Spectroscopy	1492-558 m	1/240
	Stratigraphic Dipmeter	1492-558 m	1:240
	Repeat Formation Tests	Selected points	
	Core Sample Taker	45 cores at selected points	
Run #2	DL-Micro SFL	2215-1478 m	1:600/1:240
	LDT-CNL-GR	2215-1478 m	1:600/1:240
	Stratigraphic Dipmeter	2215-1478 m	1:240
	Repeat Formation Tests	Selected intervals	
	Core Sample Taker	66 shots at selected points	

GEOLOGICAL MARKERS Water Depth: 179.8 m RT-SL: 13.7 m

Formation	Sample Top	Subsea (Sample)	Log Top	Subsea (Log)
Midbay	Behind surface casing			
Walrus Limestone	721	+ 707.3	727	+ 713.3
Walrus Shale	781	+ 767.3	874	+ 860.3
Polar Bear ?	1061	+1047.3	1061	+1047.3
Pen	1248	+1234.3	1248	+1234.3
Kenogami River	1452	+1438.3	1452	+1438.3
Narwhal	1498	+1484.3	1496.5	+1482.8
Attawapiskat	1563	+1549.3	1561	+1547.3
Lower Ekwan River	1600	+1586.3	1599	+1585.3
Severn River	1695	+1681.3	1700 (?)	+1686.3
Red Head Rapids	1806	+1792.3	1807	+1793.3
Churchill	2030	+2016.3	2027	+2013.3
Cambrian Sandstone	2189	+2175.3	2188.7	+2175.0
Precambrian Gneiss	2194	+2180.3	2193.5	+2179.8
T.D.	2215	+2201.3	2214.7	+2201.0

RFT RESULTS

Log Run #1

NO.	DEPTH	IHP (kPa)	FHP (kPa)	SEAT?	PERM?	COMMENTS
1	1480.5	19461	19461	Yes	No	Tight
2	1479.5	19454	19454	No	--	Lost Seat
3	1480.0	19468	19461	No	--	Lost Seat
4	1479.7	19461	19461	No	--	Lost Seat
5	1438.8	18889	18882	No	--	Lost Seat
6	1439.0	18903	--	No	--	Almost Good
7	1438.0	18903	--	No	--	Lost Seat
8	1436.5	18875	--	No	--	Lost Seat
9	1259.5	16545	16572	Yes	No	Tight
10	1259.8	16586	16600	Yes	No	Tight
11	1260.0	16614	16607	Yes	No	Tight
12	1202.0	15828	15835	Yes	No	Tight
13	1201.5	15835	15842	No	--	Lost seat
14	1201.0	15842	15848	Yes	No	Tight
15	1096.0	14470	14463	Yes	No	Tight
16	1096.5	14470	14463	Yes	No	Tight
17	1095.5	14456	14449	Yes	No	Tight
18	1078.5	14221	14228	Yes	No	Tight
19	1078.0	14228	14242	Yes	No	Tight
20	1077.5	14235	14235	Yes	No	Tight
21	1073.0	14180	14173	Yes	No	Tight
22	1070.5	14139	14139	Yes	No	Tight
23	1069.0	14111	14090	Yes	No	Tight
24	1068.0	14083	14090	Yes	No	Tight
25	1066.0	14070	14077	Yes	No	Tight
26	774.0	10264	10264	No	--	Lost Seat
27	772.5	10250	10250	No	--	Lost Seat
28	751.0	9974	9948	Yes	No	Tight
29	743.0	9850	9871	Yes	No	Tight
30	732.0	9719	9726	Yes	No	Tight
31	635.0	8519	8554		No	Leaky Packer (tight)

NO.	DEPTH	IHP (kPa)	FHP (kPa)	SEAT?	PERM?	COMMENTS
Log Run #2						
1	1565.5	20758	20758	No	--	No Seat
2	1578.0	20916	20909	No		No Seat
3	1578.5	20930	20930	No	--	No Seat
4	1620	21454	21454	Yes	No	Tight
5	1660	21964	21971	Yes	No	Tight
6	1682	22261	22254	Yes	No	Tight
7	1694	22412	22405	Yes	No	Tight
8	1694	22405	22405	Yes	No	Tight
9	1745	23100	23100			Check tool for plugging
10	1765	23371	23364	Yes	No	Tight
11	1821	24095	24095	No	--	No Seat
12	1820.5	24095	24081	Yes	No	Tight
13	1852	24494	24494	No	--	No Seat
14	1876	24819	24819	Yes	No	Tight
15	1894	25067	25060	Yes	No	Tight
16	1905	25212	25205	Yes	No	Tight
17	1959	25929	25922	Yes	No	Tight
20	1992.5	26377	26370	Yes	No	Tight
21	2017	26694	26687	Yes	No	Tight
22	2191	28955	28942	Yes	No	Tight
23	2193	28976	28969	Yes	No	Tight
24	1950	25900	25900	No	--	Check tool

DAILY DRILLING PROGRESS

July 28	2030 hrs: Spud 1066.8 mm hole at sea bottom at 193.5 m KB 2030 - 2400 hrs: Wash and drill 193.6 - 200 m (very hard)
July 29	0600 hrs depth: 207 m 0000 - 2030 hrs: Drill and survey 660.4 mm hole 200 - 230 m 2030 - 2300 hrs: Pump 200 bbls sea water; 200 bbls Hi-vis pill; drop survey, displace hole to heavy mud; pull out of hole to run casing 2300 - 2400 hrs: Rig up to run 762 mm casing
July 30	0600 hrs depth: 230 m 0000 - 0430 hrs: Run 762 mm casing 0430 - 0700 hrs: Wash 9 m fill to bottom, circulate hole clean 0700 - 0900 hrs: Cement casing 0900 - 1200 hrs: Back out 762 mm running tool, pull out of hole with TV camera, lay down 1067 mm hole openers 1200 - 1630 hrs: Make up 660 mm bit and bottom hole assembly and run in hole, enter casing, pull TV camera 1630 - 1700 hrs: Run in hole, drill out cement and shoe, drill new 660 mm hole 230 - 231.6 m 1700 - 2100 hrs: Pull out of hole with Bit #2, make up 375 mm bit, run in hole, re-enter well 2100 - 2400 hrs: Drill 375 mm pilot hole 231.6 - 264 m
July 31	0600 hrs depth: 331 m 0000 - 2400 hrs: Drill and survey 375 mm hole 264 to 531 m (spot connections with high vis mud)
August 1	0600 hrs depth: 570 m 0000 - 0300 hrs: Drill 375 mm pilot hole 531 - 570 m 0300 - 0530 hrs: Circulate 100 bbls high vis mud 0530 - 1200 hrs: Pull out of hole, lay down drill pipe 1200 - 1330 hrs: Run in hole with 660 mm bit, wash to bottom 1330 - 2400 hrs: Ream pilot hole to 660 mm 231.6 - 372 m
August 2	0600 hrs depth: 570 m (reaming at 428 m) 0000 - 1945 hrs: Ream pilot hole to 660 m, 372-571 m 1945 - 2045 hrs: Pump high vis mud to condition hole 2045 - 2300 hrs: Pull out of hole to casing shoe, run in hole, wash 3 m fill to bottom 2300 - 2400 hrs: Circulate, pump 1000 bbls high vis mud

August 3	0600 hrs depth: 571 m	
	0000 - 0200 hrs:	Pull out of hole to run casing
	0200 - 0400 hrs:	Rig up to and run 508 mm casing
	0400 - 0500 hrs:	Run TV camera, stab into 762 mm housing with casing
	0500 - 1100 hrs:	Run 508 mm casing, landed shoe at 558.7 m
	1100 - 1400 hrs:	Cement casing
	1400 - 1530 hrs:	Disconnect casing running tool; pulled external TV, pull out of hole with landing string, running tool, drill pipe stinger
	1530 - 2330 hrs:	Skid BOP stack into moonpool; rig up to and run BOP's on riser
	2330 - 2400 hrs:	Repair power unit for riser spider
August 4	0600 hrs depth: 571 m	
	0000 - 0100 hrs:	Repair power unit for riser spider
	0100 - 0800 hrs:	Rig down riser running equipment
	0800 - 1030 hrs:	Run internal TV camera; land BOP stack on wellhead, pull TV camera
	1030 - 1200 hrs:	Install diverter
	1200 - 1300 hrs:	Rig down riser running equipment
	1300 - 1930 hrs:	Run in BOP test tool; pressure test BOP stack; pull out with test tool
	1930 - 2030 hrs:	Pressure test hydril and kelly valve
	2030 - 2130 hrs:	Set seat protector
	2130 - 2400 hrs:	Make up bottom hole assembly, check out MWD-Gamma Ray tool
August 5	0600 hrs depth: 571 m	
	0000 - 0400 hrs:	Change out MWD-Gamma Ray tool and function test, continue to run in hole, tag top of cement at 553 m
	0400 - 0630 hrs:	Drill out 20" shoe (firm cement 553-559 m; washed 559-572 m)
	0630 - 0730 hrs:	Drill 375 mm pilot hole 572-575 m while displacing hole to mud
	0730 - 0900 hrs:	Repair valve on sandtrap
	0900 - 1000 hrs:	Drill 575-579 m
	1000 - 1130 hrs:	Conduct formation leak off test to 1600 psi surface pressure without leaking off. Mud in hole 8.6 lbs/gal; FLOT 23.3 lbs/gal mud weight equivalent
	1130 - 2400 hrs:	Drill 579 - 724 m
August 6	0600 hrs depth: 764 m	
	0000 - 0630 hrs:	Drill 375 mm pilot hole 724-766 m
	0630 - 0930 hrs:	Repair hoses on BOP stack
	0930 - 1000 hrs:	Drill 766-767 m
	1000 - 1030 hrs:	Repair mud pump blower
	1030 - 1700 hrs:	Trip for Bit #5 (1 hr work on bottom hole assembly, check MWD tools)
	1700 - 1730 hrs:	Ream 751-767 m
	1730 - 2400 hrs:	Drill 767-829 m

August 7	0600 hrs depth:	889 m
	0000 - 2400 hrs:	Drill 375 mm pilot hole 829-1072 m
August 8	0600 hrs depth:	1082 m
	0000 - 0330 hrs:	Drill 375 mm pilot hole 1072-1082 m
	0330 - 0600 hrs:	Wait on weather, circulate and change positions of BOP hoses to permit turning of ship
	0600 - 1000 hrs:	Drop survey, pull out of hole
	1000 - 1130 hrs:	Service MWD and Gamma Ray tool
	1130 - 1230 hrs:	Repair lock on hook
	1230 - 1400 hrs:	Function test BOP--leaking
	1400 - 2400 hrs:	Rig to pull LMRP, displace riser to sea water, unlatch LMRP and hang off support ring, pull LMRP, repair leak
August 9	0600 hrs depth:	1082 m
	0000 - 1600 hrs:	Work on lower marine riser package (repair leaks)
	1600 - 2400 hrs:	Run LMRP, pressure test line
August 10	0600 hrs depth:	1082 m
	0000 - 1230 hrs:	Run LMRP, install diverter and function test, pressure test BOP's and lines
	1230 - 1730 hrs:	Run in Bit #7, ream 617-634 m; 1061-1082 m; work junk sub
	1730 - 1900 hrs:	Circulate and survey
	1900 - 2400 hrs:	Drill 375 mm pilot hole 1082-1106 m
August 11	0600 hrs depth:	1106 m
	0000 - 0030 hrs:	High, erratic torque on bit; circulate and work junk sub
	0030 - 0430 hrs:	Pull out of hole with Bit #7
	0430 - 0730 hrs:	Install and test MWD-GR tools
	0730 - 1100 hrs:	Run in hole, ream 1098-1106 m; work junk sub
	1100 - 2400 hrs:	Drill 375 mm pilot hole 1106-1219 m
August 12	0600 hrs depth:	1260 m
	0000 - 0900 hrs:	Drill 375 mm pilot hole 1219-1267 m
	0900 - 1800 hrs:	Trip for Bit #8 (1½ hrs rig repair)
	1800 - 2400 hrs:	Drill 1267-1287 m
August 13	0600 hrs depth:	1312 m
	0000 - 2400 hrs:	Drill 375 mm pilot hole 1287-1435 m
August 14	0600 hrs depth:	1457 m
	0000 - 1630 hrs:	Drill 375 mm pilot hole 1435-1492 m (casing point)
	1630 - 2100 hrs:	Circulate bottoms up, pull out of hole to log
	2100 - 2200 hrs:	Lay down MWD-GR, mowel collar
	2200 - 2400 hrs:	Rig up and run DLL-MSFL-GR (Schlumberger)

August 15	0600 hrs depth:	1492 m
	0000 - 0430 hrs:	Run DLL-MSFL-GR
	0430 - 1000 hrs:	Rig up and run LS-BHCS-DISFL-SP
	1000 - 1730 hrs:	Rig up and run CNL-LDT-NGT
	1730 - 2200 hrs:	Rig up and run HDT log
	2200 - 2400 hrs:	Rig up RFT
August 16	0600 hrs depth:	1492 m
	0000 - 0630 hrs:	Run RFT log
	0630 - 0800 hrs:	Rig down Schlumberger, slip and cut line
	0800 - 1000 hrs:	Make up underreamer bottom hole assembly and test
	1000 - 1300 hrs:	Change of orders--Schlumberger CST to be run, lay out underreamer, pick up casing, shoe and float; wait on sidewall core guns to be loaded
	1300 - 1800 hrs:	Rig up and run CST - 45 cores shot, recovered 43 (no bullets lost), rig down Schlumberger
	1800 - 2000 hrs:	Make up underreamer bottom hole assembly and run in hole
	2000 - 2030 hrs:	Function test BOP's
	2030 - 2400 hrs:	Underream 375 mm hole to 445 mm; 564-651 m
August 17	0600 hrs depth:	986 m (underreaming)
	0000 - 1900 hrs:	Underream 375 mm hole to 445 mm; 651-1488 m
	1900 - 2200 hrs:	Circulate bottoms up, pump slug; pull out of hole to 550 m (inside casing shoe)
	2200 - 2230 hrs:	Underream cement and caisng shoe 558-559 m
	2230 - 2400 hrs:	Pull out of hole
August 18	0600 hrs depth:	1488 m (underreamed to 387 mm)
	0000 - 0200 hrs:	Pull out of hole, discovered Diamant Boart underreamer 60 mm undergauge
	0200 - 0300 hrs:	Make up casing hanger on running tool, stand pack in derrick
	0300 - 0730 hrs:	Rig up and run Schlumberger Caliper log--indicated underreamer 60 mm undergauge from 630 m to T.D., rig down Schlumberger
	0730 - 1430 hrs:	Make up underreamer #2 and test, run in to 1468 m, pump slug and pull out to 550 m (break down into singles and lay in pipe racker)
	1430 - 2400 hrs:	Run in hole, tag cement at 555 m, underream to 445 mm; 555-725 m

August 19	0600 hrs depth:	813 m (underreaming)
	0000 - 0930 hrs:	Underream to 445 mm, 725-907 m; lost 1000 psi pump pressure
	0930 - 1230 hrs:	Pull out of hole looking for washout (leak at underreamer)
	1230 - 1530 hrs:	Make up underreamer #3, run in hole
	1530 - 2400 hrs:	Ream 866-878 m (torquing), pull back 4 singles, underream to 445 mm; 831-1029 m
August 20	0600 hrs depth:	1070 m (underreaming)
	0000 - 0400 hrs:	Underream to 445 mm 1029-1070 m
	0400 - 1030 hrs:	Trip for underreamer #3
	1030 - 1830 hrs:	Underream to 445 mm 1070-1096 m
	1830 - 2400 hrs:	Trip for underreamer #4
August 21	0600 hrs depth:	1146 m (underreaming)
	0000 - 0030 hrs:	Run in hole with underreamer #5
	0030 - 1030 hrs:	Underream to 445 mm 1096-1197 m
	1030 - 1600 hrs:	Trip for underreamer #5
	1600 - 2400 hrs:	Underream to 445 mm 1197-1262 m
August 22	0600 hrs depth:	1262 m (underreaming)
	0000 - 0700 hrs:	Trip for underream #6
	0700 - 0900 hrs:	Work underreamer--would not open properly
	0900 - 1500 hrs:	Trip for underreamer #7
	1500 - 2100 hrs:	Underream to 445 mm 1262-1296 m
	2100 - 2400 hrs:	Trip for underreamer #8
August 23	0600 hrs depth:	1303 m (underreaming)
	0000 - 0230 hrs:	Run in hole with underreamer #9
	0230 - 0800 hrs:	Underream to 445 mm 1296-1310 m
	0800 - 1330 hrs:	Trip for underream #9
	1330 - 2400 hrs:	Underream to 445 mm 1310-1388 m
August 24	0600 hrs depth:	1432 m (underreaming)
	0000 - 0500 hrs:	Underream to 445 mm 1388-1432 m
	0500 - 1230 hrs:	Trip for underream #10 (1½ hrs slip and cut line)
	1230 - 1830 hrs:	Underream to 445 mm 1432-1462 m
	1830 - 2400 hrs:	Trip for underreamer #11
August 25	0600 hrs depth:	1470 m
	0000 - 0230 hrs:	Run in hole with underreamer #12
	0230 - 0800 hrs:	Underream to 445 mm 1462-1491 m
	0800 - 0930 hrs:	Circulate
	0930 - 1200 hrs:	Pull out of hole
	1200 - 1630 hrs:	Rig up to and run 4 arm caliper with Schlumberger
	1630 - 1730 hrs:	Run inhole and retrieve seat protector, pull out of hole
	1730 - 2400 hrs:	Rig up to and run 13 3/8" casing

August 26	0600 hrs depth:	1492 m
	0000 - 0730 hrs:	Run 13 3/8" casing and land in wellhead
	0730 - 0900 hrs:	Rig up and circulate 600 bbls mud
	0900 - 1000 hrs:	Test liners to 4000 pis, pump preflush
	1000 - 1330 hrs:	Mix and pump cement
	1330 - 1430 hrs:	Drop dart and displace cement, test casing to 3000 psi
	1430 - 1630 hrs:	Torque pack-off test to 3000 psi
	1630 - 1730 hrs:	Displace riser to sea water, pull out of hole
	1730 - 1930 hrs:	Rig up and pull diverter, lay out slip joint
	1930 - 2400 hrs:	Unlatch and pull BOP's
August 27	0600 hrs depth:	1492 m
	0000 - 0430 hrs:	Pull BOP's
	0430 - 0530 hrs:	Rig down riser handling equipment
	0530 - 2200 hrs:	Repair BOP stack
	2200 - 2400 hrs:	Wait on weather
August 28	0600 hrs depth:	1492 m
	0000 - 2200 hrs:	Wait on weather
	2200 - 2400 hrs:	Run BOP's
August 29	0600 hrs depth:	1492 m
	0000 - 1200 hrs:	Run BOP's, test kill and choke lines, run slip joint
	1200 - 1300 hrs:	Position rig over wellhead and land BOP's
	1300 - 1500 hrs:	Pull internal TV camera, rig up and run diverter
	1500 - 2000 hrs:	Run in test tool, test all rams, fail safe valves, kill and choke lines, annular, pull out and lay down test tools
	2000 - 2230 hrs:	Pick up and run in and install wellhead wear bushing, function test BOP's, pull out of hole
	2230 - 2400 hrs:	RUn in hole and install ball joint wear busing
August 30	0600 hrs depth:	1492 m
	0000 - 0030 hrs:	Lay out wear bushing running tool
	0030 - 0100 hrs:	Stand back 10" collars
	0100 - 0730 hrs:	Pick up MWD (Computalog), run in hole
	0730 - 1100 hrs:	Tag cement at 1453 m, drill out float at 1453 m, good cement and shoe at 1478 m, wash trhough rat hole to 1490 m
	1100 - 1200 hrs:	Circulate
	1200 - 1300 hrs:	Run leak-off test: Equiv. mud wt.: 20.5 ppg
	1300 - 1530 hrs:	Wash to 1491 m, drill 311 mm hole to 1494 m
	1530 - 2130 hrs:	Trip for bit (metal in hole--run junk subs)
	2130 - 2200 hrs:	Work junk subs
	2200 - 2400 hrs:	Drill 1494-1498 m

August 31	0600 hrs depth:	1513 m
	0000 - 0930 hrs:	Drill 1498-1521 m
	0930 - 1030 hrs:	Circulate bottoms up, drill break at 1517-1521 m
	1030 - 1730 hrs:	Drill 1521-1553 m
	1730 - 2030 hrs:	Pump pill, pull out of hole, break off bit and junk subs, retrieve 13 lbs junk
	2030 - 2100 hrs:	Service MWD tool
	2100 - 2400 hrs:	Make up bit and bottom hole assembly, run in hole
September 1	0600 hrs depth:	1557 m
	0000 - 0130 hrs:	Run in hole, tight spot at 1521 m
	0130 - 0500 hrs:	Ream from 1521-1553 m
	0500 - 2400 hrs:	Drill 1553-1620 m
September 2	0600 hrs depth:	1637 m
	0000 - 2400 hrs;	Drill 1620-1697 m
September 3	0600 hrs depth:	1715 m
	0000 - 2400 hrs:	Drill 1697-1790 m
September 4	0600 hrs depth:	1790 m
	0000 - 0830 hrs:	Trip for bit, change bottom hole assembly
	0830 - 2400 hrs:	Drill 1790-1852 m
September 5	0600 hrs depth:	1869 m
	0000 - 0400 hrs:	Drill 1852-1869 m
	0400 - 0430 hrs:	Check mud system for leaks, lost of drill pipe pressure
	0430 - 0800 hrs:	Trip for washout, lay down MWDP and XO
	0800 - 1230 hrs:	Run in hole
	1230 - 1600 hrs:	Drill 1869-1884 m, loss of drill pipe pressure
	1600 - 2400 hrs:	Trip for washout, lay down 2 drill collars
September 6	0600 hrs depth:	1891 m
	0000 - 0300 hrs:	Run in hole, slip and cut line
	0300 - 2400 hrs:	Drill 1884-1960 m
September 7	0600 hrs depth:	1983 m
	0000 - 1630 hrs:	Drill 1960-2019 m
	1630 - 2230 hrs:	Trip for washout, loss of drill pipe pressure
	2230 - 2400 hrs:	Wait on weather, look for washout
September 8	0600 hrs depth:	2019 m
	0000 - 0830 hrs:	Wait on weather, run in hole with bottom hole assembly, replace valve in standpipe manifold
	0830 - 1030 hrs:	Pressure test bottom hole assembly and 15 stands drill pipe
	1030 - 1300 hrs:	Pull out of hole, check drill string, lay down washed out heavy weight pipe
	1300 - 1500 hrs:	Run in hole to drill
	1500 - 2400 hrs:	Drill 2019-2047 m

September 9	0600 hrs depth: 2070 m 0000 - 2400 hrs: Drill 2047-2139 m
September 10	0600 hrs depth: 2161 m 0000 - 0900 hrs: Drill 2139-2171 m 0900 - 2400 hrs: Trip for washout, loss of drill pipe pressure, pump down soft line, inspect drill collars and heavy weight drill pipe
September 11	0600 hrs depth: 2171 m 0000 - 0630 hrs: Finish trip 0630 - 1330 hrs: Drill 2171-2195 m 1330 - 1830 hrs: Trip for washout in drill pipe 1830 - 2330 hrs: Drill ahead to T.D. 2195-2215 m 2330 - 2400 hrs: Circulate and condition hole to log
September 12	0600 hrs depth: 2215 m 0000 - 0100 hrs: Circulate 0100 - 0630 hrs: Strap out to log with Schlumberger 0630 - 0700 hrs: Rig up loggers 0700 - 1200 hrs: Run DLL-MSFL-GR-Cal 1200 - 1630 hrs: Run CNL-LDT-GR-Cal 1630 - 2100 hrs: Run HDT 2100 - 2400 hrs: Run BHCS-GR-Cal
September 13	0600 hrs depth: 2215 m 0000 - 0100 hrs: Run BHCS-GR-Cal 0100 - 0330 hrs: Run CBL/VDL 0330 - 1130 hrs: Run RFT 1130 hrs: Run WST

SURVEYS

Depth (m)	Deviation (°)	Direction
210	0.50	
230	0.50	
232	0.75	N36E
252	0.22	S71E
300	0.10	S65W
326	0.13	
415	0.42	N28W
501	0.23	N38E
566	0.05	N89E
252	0.45	N33W
589	0.25	S84W
649	0.57	S15E
684	0.20	S04E
703	0.12	S56E
722	0.17	S39W
1082	0.25	
1106	0.26	N54E
1144	0.30	N74E
1173	0.44	S19E
1220	0.28	S28E
1268	0.31	S56E
1316	0.60	S06W
1363	0.50	S13E
1382	0.38	S14W

SURVEYS

Depth (m)	Deviation (°)	Direction
1411	0.35	S55E
1448	0.42	S16E
1482	0.62	S18E
1496	0.43	S64E
1545	0.36	S15E
1620	0.49	S55E
1642	1.00	S40E
1656	1.12	S26E
1666	1.10	S33E
1693	1.24	S20E
1743	1.02	S64W
1768	1.75	S44E
1788	0.75	S72E
1806	1.26	S35E
1835	1.50	S00E
1855	2.00	S08E
1862	2.10	S52E
1891	2.30	S06E
1929	2.00	S60W
1948	1.75	S60E
1968	1.25	S35E
1987	1.10	N48W
2204	1.08	S58W

(Mud survey tool not working 1987 to T.D.)

BIT RECORD

Bit No: 1
Size: 660 mm
Make: HTC
Type:
Jets: 3/14
Serial No: FA828
Depth In: 193 m
Depth Out: 229.5 m
Hours: 20
Condition: 2-4-I

Bit No: 2
Size: 660 mm
Make: HTC
Type:
Jets:
Serial No: 963KC
Depth In: 229.5 m
Depth Out: 232 m
Hours:
Condition: 1-1-I

Bit No: 3
Size: 375 mm
Make: Smith
Type: SDT
Jets: 3/18
Serial No: ER3548
Depth In: 232 m
Depth Out: 571.5 m
Hours: 30 1/2
Condition: 3-3-I

Bit No: 4
Size: 660 mm
Make: Smith
Type: DSJ
Jets: 3/22
Serial No: ER6303
Depth In: 232 m
Depth Out: 571.5 m
Hours: 29 1/2 (reaming)
Condition: 3-6-I

Bit No: 5
Size: 375 mm
Make: Smith
Type: SDT
Jets: 3/22
Serial No: XR481
Depth In: 553 m cement; 571.5 m form
Depth Out: 767 m
Hours: 19 1/2
Condition: 3-6-I

Bit No: 6
Size: 375 mm
Make: Smith
Type: SDT
Jets: 3/22
Serial No: ER3406
Depth In: 767 m
Depth Out: 1083 m
Hours: 28
Condition: 6-4-i

BIT RECORD

Bit No: 7
Size: 375 mm
Make: H.W.
Type: J22
Jets: 3/24
Serial No: 90575
Depth In: 1083 m
Depth Out: 1106 m
Hours: 5
Condition: 1-1-I

Bit No: 8
Size: 375 mm
Make: H.W.
Type: R3
Jets: 3/24
Serial No: 90557
Depth In: 1106 m
Depth Out: 1267 m
Hours: 22
Condition: 3-6-I

Bit No: 9
Size: 375 mm
Make: Smith
Type: F3
Jets: 3/24
Serial No: SBA828
Depth In: 1267 m
Depth Out: 1492 m
Hours: 46 1/2
Condition: 2-3-I

Bit No: 10, 11, 12, 13
Size: 375 mm
Make: Smith
Type: F3
Jets: 3/15
Serial No: SBA828
Depth In: 564 m
Depth Out: 1093 m
Hours: 62
Condition: (Run with UR1-UR4)

Bit No: UR1
Size: 445 mm
Make:
Type: Diamant Boart
Jets: 3/14
Serial No:
Depth In: 564 m
Depth Out: 1493 m
Hours: 23
Condition: Worn to 387 mm O.D.

Bit No: UR2
Size: 445 mm
Make: Tri-State
Type: LWVF3
Jets: 3/20
Serial No: T526
Depth In: 555 m
Depth Out: 907 m
Hours: 19
Condition: 4-8-O

BIT RECORD

Bit No: UR3
Size: 445 mm
Make: Tri-State
Type: 10LWV
Jets: 3/20
Serial No: 4071
Depth In: 907 m
Depth Out: 1070 m
Hours: 12
Condition:

Bit No: UR4
Size: 445 mm
Make: Tri-State
Type: 10LWV
Jets: 3/20
Serial No: 1712
Depth In: 1070 m
Depth Out: 1093 m
Hours: 8
Condition: 4-4-I

Bit No: 14R
Size: 375 mm
Make: H.W.
Type: J22
Jets: 3/15
Serial No: 90575
Depth In: 1093 m
Depth Out: 1237 m
Hours: 18
Condition: 4-6-I (Run with UR5, UR6)

Bit No: UR5
Size: 445 mm
Make: Tri-State
Type: 10LWV
Jets: 3/20
Serial No: 1714
Depth In: 1093 m
Depth Out: 1192 m
Hours: 10
Condition:

Bit No: UR6
Size: 445 mm
Make: A-2
Type: UM13 (bullnose)
Jets: 1/32
Serial No: 2125
Depth In: 1197 m
Depth Out: 1237 m
Hours: 8
Condition: 4-8-I

Bit No: 15R, 16R, 17R
Size: 375 mm
Make: H.W.
Type: R3
Jets: 3/15
Serial No: 9055
Depth In: 1237 m
Depth Out: 1491 m
Hours: 38 1/2
Condition: 1-1-I (Run with UR7-UR12)

BIT RECORD

Bit No: UR7
Size: 445 mm
Make:
Type: DBG
Jets: 3/13
Serial No: 4008
Depth In: 1237 m
Depth Out: 1237 m
Hours: 0
Condition: 2- -I

Bit No: UR8
Size: 445 mm
Make: A2
Type: UM13 (Bullnose)
Jets: 1/32
Serial No: 2125
Depth In: 1237 m
Depth Out: 1296 m
Hours: 6
Condition: 4-8-I

Bit No: UR9
Size: 445 mm
Make: Tri-State
Type: 10KWA
Jets: 3/14
Serial No: 1303
Depth In: 1296 m
Depth Out: 1310 m
Hours: 5 1/2
Condition: 6-7-I

Bit No: UR10
Size: 445 mm
Make: Tri-State
Type: 10KWA
Jets: 3/16
Serial No: 8299
Depth In: 1310 m
Depth Out: 1432 m
Hours: 15 1/2
Condition: 5-7-I

Bit No: UR11
Size: 445 mm
Make: A2
Type: UM13 (Bullnose)
Jets: 1/32
Serial No: 2125
Depth In: 1432 m
Depth Out: 1462 m
Hours: 6
Condition: 6-8-4

Bit No: UR12
Size: 445 mm
Make: A2
Type: UM13 (Bullnose)
Jets: 1/32
Serial No: 2125
Depth In: 1462 m
Depth Out: 1491 m
Hours: 5 1/2
Condition: 6-6-I

BIT RECORD

Bit No: 18
Size: 311 mm
Make: H.W.
Type: XDV
Jets: 3/13
Serial No: 25307
Depth In: 1492 m
Depth Out: 1494 m
Hours: 2 1/2
Condition: 6-8-I

Bit No: 19
Size: 311 mm
Make: H.W.
Type: XDV
Jets: 3/15
Serial No: 38718
Depth In: 1494 m
Depth Out: 1553 m
Hours: 19
Condition: 5-2-I

Bit No: 20
Size: 311 mm
Make: Smith
Type: F3
Jets: 3/14
Serial No: XB3809
Depth In: 1553 m
Depth Out: 1790 m
Hours: 67
Condition: 4-3-I

Bit No: 21
Size: 311 mm
Make: Smith
Type: F3
Jets: 3/14
Serial No: XD5128
Depth In: 1790 m
Depth Out: 1868 m
Hours: 20
Condition: 3-2-I

Bit No: 22
Size: 311 mm
Make: H.W.
Type: J33
Jets: 3/14
Serial No: 88019
Depth In: 1868 m
Depth Out: 1884 m
Hours: 3 1/2
Condition: Rerun

Bit No: 23 (22RR)
Size: 311 mm
Make: H.W.
Type: J33
Jets: 3/14
Serial No: 88019
Depth In: 1868 m
Depth Out: 2019 m
Hours: 41
Condition: 3-3-I

BIT RECORD

Bit No: 24
Size: 311 mm
Make: Smith
Type: F4
Jets: 3/14
Serial No: EV4786
Depth In: 2019 m
Depth Out: 2171 m
Hours: 42
Condition: 2-2-I

Bit No: 25
Size: 311 mm
Make: Smith
Type: F4
Jets: 2/14, 1/15
Serial No: EV4871
Depth In: 2171 m
Depth Out: 2215 m
Hours: 12
Condition: 3-2-I

DAILY MUD ADDITIVES

July 28	Gel 2 tons, Barite 10 tons
July 29	Gel 4 tons, Barite 5 tons, Caustic 5 sx, Core Vis 20 sx, D-Foam 1 sx
July 30	Gel 3 tons, Caustic 25 sx, Core Vis 5 sx, SM(R) 35 sx
July 31	Gel 2 tons, Casutic 5 sx, Core Vis 24 sx, SM(R) 9 sx
August 1	Caustic 2 sx, Core Vis 78 sx, SM(R) 220 sx
August 2	Core Vis 18 sx
August 3	Gel 7 tons, Caustic 7 sx, FLR-100 7 sx
August 4	Gel 4 tons, Barite 25 tons, Caustic 11 sx, FLR-100 5 sx, DF-Vis 8 sx
August 5	Gel 3 tons, Barite 10 tons, Caustic 24 sx, FLR-100 18 sx, DF-Vis 16 sx, Soda Ash 5 sx
August 6	Gel 3 tons, Barite 2 sx, Caustic 13 sx, DF-Vis 2 sx, Lime 8 sx, Salt 560 sx
August 7	Gel 3 tons, Barite 12 tons, Caustic 37 sx, FLR-100 5 sx, DF-Vis 2 sx, Lime 10 sx, Salt 570 sx
August 8	Caustic 2 sx, FLR-100 2 sx, DF-Vis 1 sx
August 9	--
August 10	Caustic 11 sx, Lime 7 sx, Techniflo 14 sx, Soda Ash 9 sx
August 11	Gel 3 tons, Barite 9 tons, Caustic 17 sx, DF-Vis 13 sx, Lime 6 sx, Salt 50 sx
August 12	Gel 3 tons, Caustic 20 sx, DF-Vis 4 sx, Lime 9 sx, Techniflo 13 sx, Soda Ash 6 sx
August 13	Barite 2 tons, Caustic 4 sx, DF-Vis 15 sx, Lime 1 sx, Techniflo 12 sx, Soda Ash 29 sx
August 14	Gel 3 tons, Barite 2 tons, Caustic 14 sx, DF-Vis 2 sx, Soda Ash 1 sx, Salt 50 sx
August 15	Foam Kontrol 1 sx
August 16	Caustic 1 sx

August 17	Caustic 10 sx, Salt 100 sx
August 18	--
August 19	Caustic 29 sx, DF-Vis 1 sx, Techniflo 3 sx, Soda Ash 9 sx
August 20	Barite 3 tons, Caustic 12 sx, DF-Vis 11 sx, Techniflo 30 sx
August 21	Barite 4 tons, Caustic 24 sx, DF-Vis 7 sx
August 22	Gel 3 tons, Caustic 19 sx
August 23	Caustic 31 sx, DF-Vis 10 sx, Techniflo 31 sx, Soda Ash 9 sx
August 24	Caustic 10 sx, DF-Vis 2 sx, Salt 150 sx
August 25	Caustic 2 sx
August 26	Gel 1 ton, Salt 42 sx, Bicarb 14 sx
August 27	--
August 28	--
August 29	--
August 30	Biotrol 2 drums
August 31	Caustic 7 sx, Salt 183 sx, Soda Ash 10 sx
September 1	Caustic 1 sx, Techniflo 35 sx, Salt 50 sx, Soda Ash 8 sx
September 2	Caustic 2 sx, Foam Control 1 drum
September 3	Caustic 2 sx, Techniflo 13 sx, Salt 60 sx, Bicarb 2 sx
September 4	Barite 8 tonnes, Gel 3 tonnes, Caustic 1 sx
September 5	Barite 5 tonnes, Gel 2 tonnes, Caustic 2 sx, Salt 30 sx
September 6	Caustic 4 sx, Salt 120 sx, Soda Ash 20 sx, Peltex 6 sx
September 7	Gel 2 tonnes, DF-Vis 2 sx, Biotrol 1 drum, Peltex 3 sx, Caustic 7 sx
September 8	Caustic 14 sx, Salt 60 sx, Techniflo 10 sx, Peltex 6 sx, Technigard 1 sx
September 9	Caustic 6 sx, DF-Vis 1 sx, Techniflo 1 sx, Soda Ash 6 sx
September 10	Caustic 6 sx
September 11	Barite 2 tonnes, Caustic 10 sx, Salt 20 sx, Foam Control 1 drum, Lime 1 sx

DAWSON - LONG & ASSOCIATES LTD.

LEGEND

SHOWS:

- O POOR, SLIGHT, TRACE
- FAIR, MEDIUM
- GOOD, STRONG, HEAVY
- SATURATED, EXCELLENT
- Q QUESTIONABLE
- F FLUORESCENCE

POROSITY TYPES:

AM	ALGAL MAT	IG	INTERGRANULAR
CK	CHALKY	PP	PINPOINT
FR	FRACTURE	SU	SUCROSIC
IC	INTERCRYSTALLINE	VU	VUGGY

COLOURED STRIP LOG:

LITHOLOGY

- SHALE
- CLAYSTONE
- COAL
- CHERT (BEDDED)
- GLACIAL TILL
- CONGLOMERATE
- SILTSTONE
- SANDSTONE
- MARLSTONE
- LIMESTONE
- DOLOMITE
- ANHYDRITE
- GYPSUM
- SALT
- IGNEOUS
- METAMORPHIC

ACCESSORIES

- SILTY
- SANDY
- PEBBLES
- LT. CHERT/DK. CHERT
- ARGILLACEOUS/SHALEY
- MINOR COAL
- CALCAREOUS
- DOLOMITIC
- ANHYDRITIC
- GLAUCONITE
- PLANT FRAGMENTS
- FISH FRAGMENTS
- fs. FISH SCALES

ORGANICS

- CRINOID
- BIOCLASTIC
- AMPHIPORA
- STROMS
- BRACHIOPOD
- PELECYPOD
- OOLITES
- PELLETS

COLOURS:

BF	BUFF	GN	GREEN	SP	SALT & PEPPER
BK	BLACK	GY	GREY	TN	TAN
BL	BLUE	OR	ORANGE	VC	VARICOLOURED
BR	BROWN	PK	PINK	WH	WHITE
CL	CLEAR	PU	PURPLE	YL	YELLOW
CR	CREAM	RD	RED		

DESCRIPTION OF LITHOLOGY:
STANDARD ABBREVIATIONS USED

SIDEWALL CORE DESCRIPTIONS

Log Run #1: Shot 45 cores, Recovered 43

631.5	Dolomite: light yellowish-grey, microcrystalline to slightly sucrosic, clean, hard, no visible porosity.
636	Dolomite: light brown, microcrystalline (but slightly coarser than above), predominantly clean, but trace brown argillaceous material, firm to hard, no visible porosity.
743	Limestone: light grey, microcrystalline, very soft, abundant (40-50%) light grey, argillaceous material, no visible porosity.
751	Limestone: white to buff, cryptocrystalline to slightly chalky, soft to firm, clean, but streaks dark brown carbonaceous material, tight.
774	Limestone: white, cryptocrystalline to slightly sucrosic, clean, hard, tight.
1061.5	Limestone: buff (streaks light to medium brown), cryptocrystalline to slightly sucrosic, dolomitic (in part), soft to firm, in part clean, in part streaks dark brown carbonaceous material, no visible porosity.
1063.5	Limestone: light to medium brown, microcrystalline, clean (occasional trace argillaceous) firm, somewhat dolomitized (micro-crystals), no visible porosity.
1065.5	Limestone: white to light brown, cryptocrystalline to slightly chalky and slightly sucrosic in part, soft to firm, slightly dolomitic (micro-crystals), inclusions clear to white Anhydrite (crystalline), faint crude oil smell.
1068	Limestone: buff to light brown (faint medium brown laminations), microcrystalline, soft (disintegrating in water), slightly dolomitic, no visible porosity (possibly trace sucrosic), very faint crude oil smell.
1069	Limestone: buff to light brown, microcrystalline to very fine crystalline, soft, clean, slightly dolomitic (micro to very fine crystals), no visible porosity, but possible trace light brown patchy stain and very faint yellow fluorescence, essentially no cut, minor crude oil smell.
1070	Limestone: interlaminated medium brown, microcrystalline, very argillaceous, soft; and buff, cryptocrystalline to microcrystalline, clean to slightly argillaceous, firm, dolomitic (microcrystalline), slightly anhydritic, no visible porosity, faint crude oil smell.

1073 Limestone: light grey, cryptocrystalline to microcrystalline, firm to hard, clean, slightly dolomitic (micro-crystals), slightly anhydritic, occasional Anhydrite inclusions, no visible porosity.

1074.5 Dolomite: medium to dark grey (mottled), abundant very soft, black, argillaceous material, very anhydritic, micro and large inclusions Anhydrite (white, microcrystalline), no visible porosity.

1078 Dolomite: buff, sucrosic (very fine), clean, trace anhydritic, firm to hard, clean, no visible porosity (trace sucrosic?).

1096 Dolomite: light grey, crypto to slightly sucrosic, soft to firm, clean, no visible porosity.

1201.5 Limestone: buff, cryptocrystalline to trace sucrosic, very dolomitic (almost calcareous dolomite), hard, clean, no visible porosity.

1260 Dolomite: buff to light grey, cryptocrystalline, dense, clean, hard, tight.

1439 Dolomite: buff to light grey, cryptocrystalline, dense, very calcareous (almost dolomitic limestone), clean, hard, no visible porosity.

1457 Dolomite: reddish-brown, very soft, very silty (grading to very fine sand), clear silica (almost grading to red siltstone), matrix unstable (disintegrating) in water; white anhydrite inclusions. Note: lithology may be better described as "very silty, dolomitized mud".

1465 Dolomite: buff to light grey (occasional red streaks), very silty (occasional very fine sand), silica, "earthy" matrix, very soft, clean, no visible porosity.

1473.5 Shale: medium grey, blocky, firm, very dolomitic, somewhat silty, trace reddish streaks.

1479 Siltstone: pink, clean, clear silica, very soft, unconsolidated, probable salt matrix, no visible porosity.

1481 Siltstone: (some very fine grained sand), pink, clear silica, very soft, dolomitic matrix, no visible porosity, inclusions white anhydrite.

SIDEWALL CORE DESCRIPTIONS

Log Run #2: Shot 66, Misfire 11, Empty 17, Lost 2; Recovered 36

2200	Granitic Gneiss: coarse crystalline plus clear quartz, pink and white feldspar, extensively chloritized, trace only of mafic minerals, feldspars extensively alterted kaolinite.
2192	Granitic Gneiss: (possible boulder?) coarse crystalline, kaolinized feldspar, medium to coarse crystalline (?) quartz, trace mica (biotite), minor mafic mineral, abundant chlorite, soft and friable.
2192	Granitic Gneiss: as above, mafic minerals wrap around very coarse crystalline kaolinized feldspars, minor quartz, extensive chlorite patches, soft and friable.
2191	Granitic Gneiss: as above, extensively chloritized and kaolinized, soft and friable.
2191	Granitic Gneiss: as above
2189	Shale: grey/brown, soft, subfissile, rare calcareous patch, rare pyrite.
2120	Limestone: light brown, microcrystalline, trace fossiliferous, possible brachiopod fragments, mudstone, no visible porosity, no fluorescence.
2100	Limestone: off white, microcrystalline, possible rare bioclastic debris, mudstone, no visible porosity, possible earthy porosity, no fluorescence.
2080	Limestone: off white to light brown, cryptocrystalline to microcrystalline, no fossils, styolitic, mudstone, no visible porosity, no fluorescence.
2060	Limestone: off white, microcrystalline, no fossils, moderately dolomitized with very fine to fine rhombs of dolomite, mudstone, no visible porosity, slight mineral fluorescence.
2020	Limestone: off white to brown, cryptocrystalline, trace bioclastic debris, mudstone, very rare dolomite rhomb, no visible porosity.
1992.5	Limestone: (poor sample) off white to brown, microcrystalline, mudstone, no apparent fossils, bioclastic debris, no visible porosity, anhydritic?, no fluorescence, trace carbonaceous?, bituminous material?, on fractures?
1949	Anhydrite: white to clear, translucent, massive, cryptocrystalline, trace calcareous.

1920 Siltstone: (poor sample): buff to brown, very dolomitic, calcite filled microfractures, tight (sample gave abundant insoluable residue when dissolved in warm HCl--might be considered silty dolomite).

1880 Limestone (poor sample): off white and brown mottled, cryptocrystalline, extensively dolomitized with abundant very fine to fine crystalline, dolomite rhombs, dense, fossiliferous mudstone.

1876 Limestone? (poor sample): brown streaked with (trace) black organic material, microcrystalline, silty, no visible porosity, no apparent fluorescence, very slow weak cut fluorescence (interpreted as organic material in situ). (Limestone? does not stain yet dissolves in cold dilute HCl yielded a silty organic rich? residue.) Petroliferous odor.

1820.5 Siltstone (poor sample): off white to light grey/brown, dolomitic, tight, no fluorescence.

1765 Limestone: cryptocrystalline, bioclastic wackestone to packestone, trace black organic fragments and brown organic rich streaks. No visible porosity, no fluorescence, very slow cut fluorescence, crinoids.

1745 Siltstone: light grey/brown, dolomitic to slightly calcareous, tight, no fluorescence.

1745 Dolomite: off white to light grey, cryptocrystalline to very finely crystalline, calcareous matrix in part, soft and friable, black, carbonaceous streaks in part, no visible porosity, no fluorescence.

1720 Limestone: off white, cryptocrystalline, soft and friable, no fossils, mudstone, no visible porosity.

1710 Limestone (poor sample): off white, cryptocrystalline, firm to hard, trace fossiliferous, mudstone, no visible porosity. (Abundant large fragments of other lithologies, suspect that this sample is junk.)

1694 Limestone: off white to light brown, cryptocrystalline to microcrystalline, abundant bioclastic debris, bioclastic packestone, trace dolomite rhombs, styolitic in part, no visible porosity, no fluorescence.

1694 Limestone: off white to light brown, cryptocrystalline, commonly bioclastic, mudstone to wackestone, minor packestone, no visible porosity, dolomitized in part, trace argillaceous?, carbonaceous material along styolites, no fluorescence.

1680 Limestone: white to off white, trace brown streaks, cryptocrystalline to microcrystalline, no visible porosity, no fluorescence, no cut fluorescence, mudstone, no fossils.

1660 Siltstone?: white, nondolomitic, noncalcareous, tight, firm, friable (resembles weathered chert in appearance and texture?).

1620 Dolomite: buff to brown, mottled, very fine to fine crystalline, slightly calcareous, trace ghost fossils, probable replacement of bioclastic packestone, no visible porosity.

1620 Dolomite: Same as above, trace grey, carbonaceous, argillaceous material defining styolites. No visible porosity, no fluorescence.

1600 Dolomite: off white to light grey/brown, very silty, microcrystalline, possibly grading to dolomitic siltstone, no visible porosity, no fluorescence, noncalcareous, carbonaceous in part.

1578 Limestone: white, cryptocrystalline, massive, anhydritic?, no visible porosity (possibly salty?--salt taste).

1578 Limestone: as above, trace dolomitic, fine crystalline, dolomite rhombs, microcrystalline in part, no visible porosity.

1565 Liemstone: white to off white, cryptocrystalline to microcrystalline, massive, no visible porosity, trace dolomitic patches and scattered dolomite rhombs, styolites.

1565 Limestone: as above, looks like a chemical limestone--absolutely pure white.

1550 Limestone: white to off white, cryptocrystalline, very soft, friable, no visible porosity, trace salt (halite) crystals, trace bioclastic debris, mudstone.

1507 Dolomite (very poor sample): off white to light grey/brown, very fine to fine crystalline, appears to have 20%+ mouldic porosity, possibly a dolomitized patch in soft limestone?, no staining, no fluorescence, except mineral fluroescence.

1486 Siltstone: red/brown, minor white patches (terra cota), very fine to fine sandy grains dispersed throughout. Slightly to moderately argillaceous, grading in part to shale. Soft and friable, no visible porosity, slightly dolomitic.

GEOLOGICAL SUMMARY

Trillium Soquip Onexco et al Beluga O-23 was drilled in the basinal area to the west of a major Paleozoic (Silurian) ridge trending approximately north-northwest through the centre of Hudson's Bay. Of the three previous holes drilled within Hudson's Bay; Aquitaine et al Walrus A-71 was drilled almost on top of the ridge; Aquitaine et al Polar Bear C-11 slightly off the top of the ridge to the east; and Aquitaine et al Narwhal South N-58 well to the east of the ridge. Thus, the Beluga O-23 prospect is the first well in Hudson's Bay to be drilled in the deep westward basinal area and must therefore be considered rank wildcat in nature, especially in relation to that section above the Silurian Unconformity. Indeed, this section did turn out to be drastically different to the prognosed section, the major surprise being the very thick sequence of evaporitic sediments present, including approximately 450 to 500 meters of massive salt (halite).

Hudson Fm (Penn)(?)/Midbay Fm (U/M Dev)

It is thought that the outcropping formation (that is, below the Pleistocene glacial deposits) is the Hudson Formation, probably Pennsylvanian in age. Samples however, were not recovered until after the 20" casing was drilled out and new hole was begun at approximately 575 meters.

575 - 650 m: This section (Midbay Fm?) is essentially composed of light to medium grey (but increasing reddish downwards), slightly calcareous, somewhat silty mudstones but which apparently contain varying amounts of floating fossil debris, mainly consisting of pelecypod and crinoid fragments. Much of the debris is unidentifiable however.

It should be noted that large sections of this interval are badly washed out as seen on Log Run #1. It is very difficult to distinguish these sections as a mudstone or a salt on logs. Because this part of the hole was drilled with an undersaturated (with respect to chloride content) drilling mud, any salt penetrated would be dissolved into the mud and not occur in samples. However, the fact that the Cl^- percentage did not increase through this section suggests that these intervals are indeed a very soft mudstone which has been washed into the mud.

One feature of note in this section is a dark brown to black, very carbonaceous, somewhat coaly (but probably immature) shale occurring at about 626 to 628 meters. The presence of this coaly material would possibly suggest a Pennsylvanian rather than a Devonian age for this section. However, a "Paleo"-date at about 600 meters yielded a Lower Middle Devonian age.

Directly below this shale lies a light brown, microcrystalline, somewhat calcareous, tight dolomite section about seven to eight meters thick. This interval was sampled at two places by sidewall cores, a detailed description is to be found in the sidewall core descriptions.

Essentially no drilled gases were recorded through this section (only traces C1).

650 - 727 m: The interval from 650 to about 710 meters was marked by a fast, consistent penetration rate combined with a steadily climbing Cl^- count in the drilling mud from 17,000 to about 65,000 ppm, which indicated the presence of at least some salt. Only mudstone was recovered in samples (with minor siltstone, anhydrite, limestone) because any salt drilled was dissolved into the drilling mud. It was not known exactly how much salt existed in this section until Schlumberger logs showed this section to be probably massive salt.

A two meter shaley band at 685 meters was suggested by Computalog's MWD-GR tool while drilling and confirmed by Schlumberger later.

The interval from 710 to 725 meters consists of interbedded (gradational) light grey, cryptocrystalline, dolomitic anhydrites, and anhydritic, white to light grey and brown, cryptocrystalline to microcrystalline, tight dolomites.

Essentially no drilled gases were recorded through the section 650 to 727 meters (only trace C1).

Walrus Limestone(?) @ 727 m

If this section is indeed the Walrus Limestone, it is the first indication of a major departure from the prognosis, as this top is approximately 400 meters higher than the prognosed top of the Walrus Limestone. This interval, extending down to about 781 meters, is essentially a limestone section, but grading downwards into interbedded limestone and dolomite. Sidewall cores were taken at three places in this section (see Sidewall Core Description). The limestones are basically cryptocrystalline (but possibly bioclastic in part) to slightly "earthy" or chalky in part, clean but usually somewhat anhydritic and/or dolomitic. Downwards, the limestone tends to become increasingly dolomitic (microcrystalline to very fine crystalline) and grading to dolomite, which is generally medium brown, microcrystalline to very fine crystalline, clean to slightly argillaceous, and predominantly very calcareous. The dolomite itself appeared to be harder than the limestone and was marked by slower penetration rates. No porosity was noted either in the limestone or the dolomite in samples or cores. Essentially no drilled gases were recorded through this section (trace C1 only).

Walrus Shale(?) @ 781 m

This short section, extending from 781 to 791 meters consists of mixed, light grey and pink to reddish, very soft claystone. It is noncalcareous, but seems to contain numerous inclusions of soft limestone and possibly traces of fibrous gypsum. Schlumberger logs show this section to get quite washed out.

Massive Salt (Polar Bear?) @ 791 m

791 - 1060 m: This section consists almost totally of massive, clean, buff to light brown, very coarse crystalline salt (halite). Although no salt was recovered in samples until about 850 meters, Schlumberger logs confirm that the upper 60 meters of this section is also salt. Just before this section was penetrated, salt had begun to be added to the mud system in order to completely saturate it in anticipation of salt sections in the hole to be drilled. Until the system was fully saturated (probably about 850 meters), however, any drilled salt dissolved into the mud, and was not recovered in samples. However, through the top 60 meters, very little was coming over the shaker, and what was, was mudstone similar in character to that drilled above. This suggested either that a very soft mudstone was being drilled and being washed into the mud, or that a completely different lithology (i.e. salt) was being drilled and was dissolving into the mud, leaving only remnants and sloughings coming over the shaker. Schlumberger logs confirmed that this was the case.

Polar Bear? @ 1061 m

1060 - 1075 m: This interval was sampled at eight places by sidewall cores and consists predominantly of white to light brown, micritic to chalky to microcrystalline, clean to argillaceous, slightly to very dolomitic, firm to hard, slightly anhydritic limestone. Also, 20 to 25% microcrystalline, calcareous dolomite was noted in samples, although not recovered in sidewall cores. Traces of pinpoint, "earthy", and intercrystalline porosity were noted in samples in both the limestone and dolomite but the sidewall cores appeared fairly tight. Schlumberger logs, however, indicate a maximum porosity of about 15%. A possible very faint yellow fluorescence was noted in some of the dolomite, accompanied by occasional medium white streaming cut fluorescence, leaving a light brown oil residue on the spot plate. The porosity and shows both occurred in the interval 1066 to 1071 meters, corresponding to a drilling break. Some minor gas readings were also recorded from about 1067 to 1072 meters with a maximum total gas reading of 0.20% total gas (background trace). It also should be noted that a faint crude oil smell was present associated with the sidewall cores over this interval. Although Schlumberger logs suggested a water/hydrocarbon saturated porosity in this interval, the RFT results recorded no formation pressures suggesting little or no permeability, backing up the preliminary analysis of the sidewall cores.

1075 - 1100 m: This interval is basically an interbedded series of dolomites, limestones, salt and anhydrite. Dolomites at the top and the bottom of this interval were sampled by sidewall cores. They can be quickly described as buff to light grey, cryptocrystalline to sucrosic, soft to hard, clean with no visible porosity (but possible traces of sucrosic porosity?). A very small amount of drilled gas was recorded through this section (maximum of 0.1% total gas). The anhydrites are white to buff, cryptocrystalline, slightly dolomitic in part, and tight. The minor amount of limestone is light brown, cryptocrystalline to slightly sucrosic, firm, clean but anhydritic in part, with no visible porosity.

Polar Bear Salt?

1100 - 1196 m: This is a massive Halite salt section, clear to translucent and crystalline, and was marked by a steady, fast penetration rate with essentially no background gases recorded in the mud.

1196 - 1206 m: The top of this section was marked by a sudden decrease in penetration rate, and consists mainly of interbedded (with some gradation) white to buff, cryptocrystalline, locally calcareous anhydrite, and tight, buff to light brown, anhydritic limestones. A few beds of soft, light to medium grey, noncalcareous mudstones also probably occur in this section. Essentially no background gases were recorded.

1206 - 1248 m: This section is essentially a very coarsely crystalline Halite salt section, but containing occasional bands of anhydrite, and tight limestones and anhydrites. Essentially no background gas was recorded.

PEN @ 1248 m

1248 - 1278 m: This section is predominantly composed of white, cryptocrystalline to microcrystalline, clean anhydrites with interbeds of limestone and dolomite. One sidewall core was taken in this interval, at 1260 meters, in a dense, buff to light grey, cryptocrystalline, clean, hard, tight dolomite. The limestones are cryptocrystalline to microcrystalline, clean, but predominantly anhydritic, and also tight. Essentially no drilled gas was recorded in this interval.

1278 - 1314 m: A very irregular penetration rate accompanied by a moderate to a high degree of torque on the bit characterized this section. Although no salt was obtained in samples, Schlumberger logs indicated that the intervals 1278 to 1295 meters and 1304 to 1308 meters consist of massive salt. It is evident (and seen in other parts of the hole), that, although the mud system is saturated with respect to salt (Cl^- 175-180,000 ppm), usually the upper 20 to 40 meters of any salt section drilled (and the total of any thinner sections) is not recovered in samples, but the cuttings are dissolved into the mud. Then it is obvious that when the mud reaches a certain level of saturation (or "over-saturation"), all the salt drilled is recovered in samples. The result of this is that the sloughings from the hole above (often without a decrease in the volume of cuttings) are the only lithology recovered in samples until this point is reached, and the presence of salt can only be guessed at from the penetration rate and confirmed later by Schlumberger logs.

The interval from 1295 to 1304 meters (and other non-salt lithologies) was recovered in samples, however, and consists of interbedded white to light grey, clean, cryptocrystalline, slightly to very anhydritic, slightly fossiliferous limestone, and white to buff, microcrystalline to coarse crystalline anhydrite.

From 1308 to 1314 meters, also occurs an interbedded unit of limestone and anhydrite, predominantly as described above. No porosity, shows and essentially no background gases were recorded through this interval. No sidewall cores were taken.

1314 - 1452 m: Except for possible anhydrite stringers occurring between 1400 to 1410 meters, and a carbonate/anhydrite unit from 1433 to 1440 meters as described below, this section consists of massive buff to slightly milky, clear to translucent, very coarsely crystalline salt (halite). Because of the abundance of salt mentioned in the above interval, a one hundred percent recovery in samples right from the top of the interval was obtained.

The interval from 1433 to 1440 meters, marked by an abrupt change to a very slow penetration rate, is an interbedded unit of limestone, anhydrite and dolomite. The anhydrite (marked by the slowest drilling) is white, microcrystalline to sucrosic, clean, soft to hard, and slightly calcareous in part. The limestone is white to buff, cryptocrystalline, very anhydritic, soft and tight. The dolomite was not seen in samples, but was sampled by a sidewall core taken at 1439 meters. It is buff to light grey, cryptocrystalline, dense, very calcareous, clean, hard and tight. A minor amount of gas (maximum 0.16% total gas) was recorded starting about 1436 meters (on top of the limestone unit) and decreasing to trace by about 1439 meters.

Kenogami River Fm? (U. Sil) @ 1452 m

The top of the Kenogami River Formation (?) was marked not only by an abrupt slowdown in penetration rate, but a distinct change to a completely new type of lithology.

1452 - 1467 m: The upper part of the formation (very slow drilling) consists generally of a reddish-brown (to occasionally light to medium grey), very soft, very silty (grading to a very fine, siliceous sand) dolomite, almost grading to a red dolomitic siltstone with an unstable (in water) matrix of "dolomitized mud". In fact this lithology might be better described as a "very silty, dolomitized mud". It is in part clean and in part shaley to varying degrees. Samples of this dolomite were obtained in sidewall cores taken at 1457 and 1465 meters. No visible porosity or shows were noted in this interval.

1467 - 1478 m: The top of this interval was marked by an increase in penetration rate. The lithology is somewhat a continuation of the above except that it becomes increasingly shaley, grading to a reddish and greyish, dolomitic shale which is apparently hydrating(?) in the drilling mud to a very soft reddish and greyish clay by the time it reaches the surface. One sidewall core was taken in this interval, at 1473.5 meters, and was described as a medium grey shale, blocky, firm, very dolomitic, somewhat silty, with traces reddish streaks. The fact that it is firm in consistency rather than soft (clay) as is that in samples, is probably due to the lesser exposure of the shale to the drilling mud. This may possibly also be applicable to the dolomite above.

1478 - 1482 m: This lithology was sampled twice in sidewall cores and was described as siltstone, pink, clean, clear, silica, very soft (unconsolidated) with probably a salt matrix. There was no visible porosity.

1482 - 1498 m: This section of hole consists of reddish, sandy, slightly argillaceous, dolomitic siltstones and shales with minor anhydrite.

Narwhal @ 1498 m

The Narwhal formation consists of massive anhydrite and salt (halite) with a minor component of silty, anhydritic dolomite and limestone.

1498 - 1519 m: This interval consists of massive anhydrite with minor interbeds of calcareous siltstone and dense, argillaceous dolomite.

1519 - 1543 m: This interval was interpreted from high rate of penetration to consist of massive salt (halite), none of which was seen in sample despite a salt saturated drilling mud.

1543 - 1563 m: The base of the Narwhal formation(?) consists predominantly of dense limestone interbedded with silty anhydritic dolomite and anhydrite and traces of shale.

Attawapiskat Member Ekwan River Formation @ 1563 m

The Attawapiskat Member was picked at the top of a major limestone interval which was characterized by a steady, slightly faster rate of penetration than the preceding lithologies.

1563 - 1593 m: This member consists almost entirely of limestone which is typically cryptocrystalline to microcrystalline mudstone with, only occasional, beds of bioclastic debris which rarely have developed an intergranular, leached, porosity in bioclastic packestone. No shows were indicated in samples or on the gas detection equipment. This limestone is dolomitic in part and grades to limey dolomite in part occasional beds of silty dolomite were also seen.

Lower Member, Ekwan River Formation @ 1600 m

The top of the Lower Member, Ekwan River formation is marked by the first appearance of siltstone, below the Attawapiskat, and a dramatic decrease in the rate of penetration. This formation shows a highly variable penetration rate characteristic of a variable/interbedded lithology.

1600 - 1620 m: This interval consists of calcareous, slightly to nonargillaceous siltstone interbedded with dolomitic limestone and limey silty dolomites.

1620 - 1700 m: This interval consists dolomitic doloimtic limestone and limey dolomites interbedded. The limestones form the predominant lithology and are typically cryptocrystalline to microcrystalline, fossiliferous mudstone with occasional streaks of bioclastic debris making thin beds of wackestone to packestone. Crinoids were discerned in some samples. Black organic specks were seen in the 1 45 to 1650 meter samples. These appear to be organic remains in situ and no porosity was noted. No porosity or shows were seen in this member.

Severn River @ 1695 m

The Severn River consists of a monotonous massive limestone which is occasionally dolomitic in part and in part grades to limey dolomite and to a lesser extent to dolomite.

1700 - 1807 m: This interval consists of a cryptocrystalline to microcrystalline limestone. For the most part sparsely fossiliferous mudstone with minor wackestone to packestone beds. Crinoids were seen in some samples. This limestone is dolomitized in part and grades to dolomite in part. This formation is entirely dense with no visible porosity and no shows.

Red Head Rapids Formation @ 1806 m

The top of the Red Head Rapids is placed at the first appearance of dolomitic siltstone below the Severn formation.

1807 - 1850 m: This interval consists of dolomitic siltstone with limestone interbeds. The siltstones are usually off white to buff, dolomitic with a thin, grey, slightly argillaceous bed at the top. (This lithology is frequently very dolomitic and is visually not distinguishable from dolomite, but leaves an insoluble residue of silt when dissolved in warm HCl.) The limestones are off white to light brown, cryptocrystalline to microcrystalline, rare to trace fossils, slightly to very dolomitic in part, mudstone to minor wackestone. Traces of anhydrite were also seen.

1850 - 1907 m: This interval consists of mostly siltstone as described above, generally buff in color and sandy in part. This siltstone is gradational with dolomite and is not visually distinguishable from dolomite or silty dolomite. A sandstone bed was interpreted to exist at 1873 to 1877metrers. Only a few cuttings were seen and they consisted of buff, very fine to fine grained, silty, very dolomitic sandstone with possibly a trace of porosity. A trace of gas was noted here also which would verify a marginal porosity, no indications of oil were seen. The base of the interval contains several beds of limestone the same as the previous interval.

1907 - 1945 m: This interval predominantly consists of limestone which is typically off white to light brown, cryptocrystalline to microcrystalline, soft and friable in part, and is slightly to very dolomitic (i.e. dolomitized) in part and grades into thin beds of limey dolomite. This limestone is usually a mudstone with traces of bioclastic packestone. Infrequent crinoids were noted.

1946 - 1956 m: This interval drilled at a high rate of penetration and from samples, siltstone was indicated. However, the appearance of the siltstone did not indicate it should drill fast so possible salt was noted on the log--this was later proved by electric logs.

1956 - 2005 m: This interval consists of siltstone and limestone interbedded with occasional streaks of limey dolomite. All lithologies as described previously.

2005 - 2015 m: This interval consists primarily of a white to clean, translucent, massive anhydrite with thin interbeds of limestone and dolomite and siltstone.

2015 - 2030 m: This final interval consists of siltstone and limestone interbedded. Both lithologies are as described previously.

Churchill Formation @ 2030 m

The Churchill formation consists almost entirely of cryptocrystalline to microcrystalline, dolomitized in part, limestone. This limestone is sparsely fossiliferous mudstone to minor wackestone. Rare crinoids were seen. Thin beds of dolomite are common from 2030 to 2080 meters, and after that dolomitization is rare.

Cambrian Sandstone (Granite Wash) @ 2189 m

The top of the Cambrian was marked by a sudden increase in penetration rate and by the first appearance of grey, dolomitic shale then quartz sandstone in samples.

The sandstone consists of clear quartz, trace pink feldspar, and rare mica flakes. These clasts range in size from medium to very coarse grained (and possibly greater), are poorly sorted, angular to subangular where a weathered surface was seen and appear to be cemented with silica. No porosity was apparent and no indications of hydrocarbons were seen (no fluorescence or cut fluorescence observed).

PreCambrian Granitic Gneiss @ 2194 m

The top of the PreCambrian was seen as a decrease in penetration rate and the appearance of cuttings showing a Gneissic texture.

The Gneiss consists of medium to very coarse crystalline, clear quartz, trace pink and white feldspar, trace biotite, and an abundance of a black mafic mineral with a strong preferred orientation surrounding and encapsuled by quartz. Some mafic minerals are extensively chloritized. Traces of blue translucent quartz were also seen.

SAMPLE DESCRIPTION

570 - 580	Cement (100%)
580 - 595	Cement (95%); Mudstone (5%): medium red, very soft, trace crinoid fragments and unidentified calcareous fossil debris.
595 - 600	Missed sample
600 - 605	Mudstone (100%): light grey, slightly calcareous (streaks), locally silty grading to trace light grey, very clayey, soft siltstone, abundant crinoid fragments and occasional traces of other calcareous fossil debris. Trace shell fragments.
605 - 610	Mudstone (100%): as above, but grading to medium grey, trace locally silty grading to trace medium grey, very argillaceous, soft siltstone as above, trace crinoid fragments.
610 - 615	Mudstone (90%): as above, somewhat calcareous; siltstone (10%) as above, slightly pyritic in part, crinoid fragments as above (10%), trace pelecypod fragments and unidentified fossils.
615 - 620	Mudstone (100%): as above, extremely soft, trace calcareous, no visible silt, 5-10% crinoid and fossil debris as above.
620 - 625	Mudstone (95%): as above, locally slightly silty grading to very argillaceous, medium grey, soft siltstone (5%). Trace calcareous, occasional fossil fragment as above. Trace fossil assemblage with occasional associated siliceous inclusions.
625 - 630	Shale (90%): dark brown to black, very carbonaceous, blocky, microlaminated, coaly in part (very immature); contains stringers and lenses Limestone (10%): buff to light brown, predominantly cryptocrystalline, fossiliferous in part, soft to firm, tight.
630 - 640	Dolomite (100%): light brown, predominantly microcrystalline (locally cryptocrystalline), locally somewhat calcareous, slightly argillaceous in part, no visible porosity, trace Limestone stringers.
640 - 645	Mudstone (80%): in part reddish as above, in part buff to light grey, soft to firm; in part silty grading to soft siltstone (10%): as above, dolomite (10%) as above, microcrystalline, tight.

645 - 650	Mudstone (80%): light grey, soft to firm, blocky, 40% medium red, predominantly very soft; trace black, coaly shale.
650 - 655	Mudstone (40%): light grey as above, (40%) red as above, Anhydrite (20%): buff to light brown, cryptocrystalline, dense, medium hard.
655 - 660	Mudstone (80%): light grey and red as above; Anhydrite (10%) as above; Dolomite (10%): buff to light grey, cryptocrystalline to microcrystalline, predominantly anhydritic, blocky, dense, clean tight.
660 - 665	Mudstone (55%) medium red, very soft as above; 30% buff to light grey as above; Anhydrite (10%) as above, in part light grey, dense, cryptocrystalline, minor Dolomite (5%) as above, trace tight, fossiliferous limestone.
665 - 670	Mudstone (50%) medium red, 40% light grey, soft; Dolomite (5%) light grey, microcrystalline, clean tight; Anhdyrite (5%) as above, trace black coaly shale (cavings?).
670 - 675	Mudstone (50%) medium red as above, grading (mixed) to light grey (35%); Limestone (5%) light grey, microcrystalline, dolomitic tight; Anhydrite (10%) in part white, soft, in part light grey as above; trace Dolomite as above. Probable Salt stringers--chlorides increasing in mud.
675 - 680	Mudstone: medium red (50%) and light grey (40%) as above, trace pyrite inclusions; Dolomite (5%), buff to light brown, predominantly microcrystalline, anhydritic(?), tight, minor Siltstone (5%), argillaceous, firm to hard. Trace Anhydrite as above; trace black shale as above (cavings?). Probable Salt stringers.
680 - 685	Mudstone: predominantly red, soft as above (50%), grading to light grey as above (30%); Siltstone (15%); light grey, siliceous, firm to hard, calcareous in part, minor Limestone (5%), light grey, probably very fossiliferous, dolomitized in part, no visible porosity, salt stringers(?).
685 - 688	Probable Salt bed (Gamma Peak)
688 - 695	Mudstone light to medium grey, very soft as above (40%) and red as above (30%); Siltstone (10-15%) as above, calcareous in part, becoming somewhat harder. Anhydrite (5 to 15%) white to light grey, soft to firm, occasionally calcareous. Minor Limestone (5%), dolomitic, probably very fossiliferous (crinoids) no visible porosity, grading to 5% calcareous Dolomite. Trace to minor black, coaly shale (cavings?).

695 - 700 Anhydrite (60%): buff to light grey, increasingly dolomitic (in part); Siltstone (10%) as above, calcareous in part; mudstone (30%) predominantly light grey, soft to firm (5% red as above).

700 - 705 Anhydrite (60%) white to buff, soft to firm, predominantly clean, non-dolomitic to slightly dolomitic; Mudstone (30%) light grey as above, minor Siltstone (5%) as above; minor Limestone (5%) buff, microcrystalline, dolomitic, tight, occasionally fossiliferous.

705 - 710 Anhydrite (60%): occasionally hard, dolomitic in part grading to Dolomite (20%), cryptocrystalline to microcrystalline, hard, anhydritic in part, locally calcareous, Mudstone predominantly light grey as above (10%) and red as above (5%); 5% black, coaly shale (cavings?).

710 - 715 Anhydrite (90%) buff to light grey, predominantly cryptocrystalline, locally slightly dolomitic, minor stringers Limestone (5%), light brown, slightly dolomitic; minor Mudstone as above (5%) (cavings?).

715 - 720 Anhydrite (60%) as above, but predominantly very dolomitic; grading to Dolomite (40%), white to light grey and brown, slightly to very anhydritic, cryptocrystalline to microcrystalline, some mixed clay (swelling), no visible porosity.

720 - 725 Limestone (40%) buff to light brown, somewhat mottled, clean but slightly to very dolomitic and/or anhydritic; grading to Dolomite (25%) as above, but predominantly microcrystalline, slightly to very calcareous; Anhydrite (35%) white to buff as above, trace black shaley stringers (cavings?).

725 - 730 Limestone (70%): as above, clean but increasingly anhydritic and decreasingly dolomitic in part; grading to calcareous, white Anhydrite (20%) and calcareous Dolomite (10%) as above, no visible porosity. Trace black shaley stringers.

730 - 735 Limestone (90%) buff to light brown, cryptocrystalline, clean, moderately anhydritic, fairly soft, decreasingly dolomitic to trace; 10% grading to inclusions and streaks of Anhydrite, calcareous in part. No visible porosity.

735 - 740 Limestone (95%) buff to light brown, cryptocrystalline to somewhat "earthy", possibly fossiliferous (crinoids?), very clean, occasionally dolomitic, decreasingly anhydritic with minor grading to Anhydrite (5%) as above. No visible porosity.

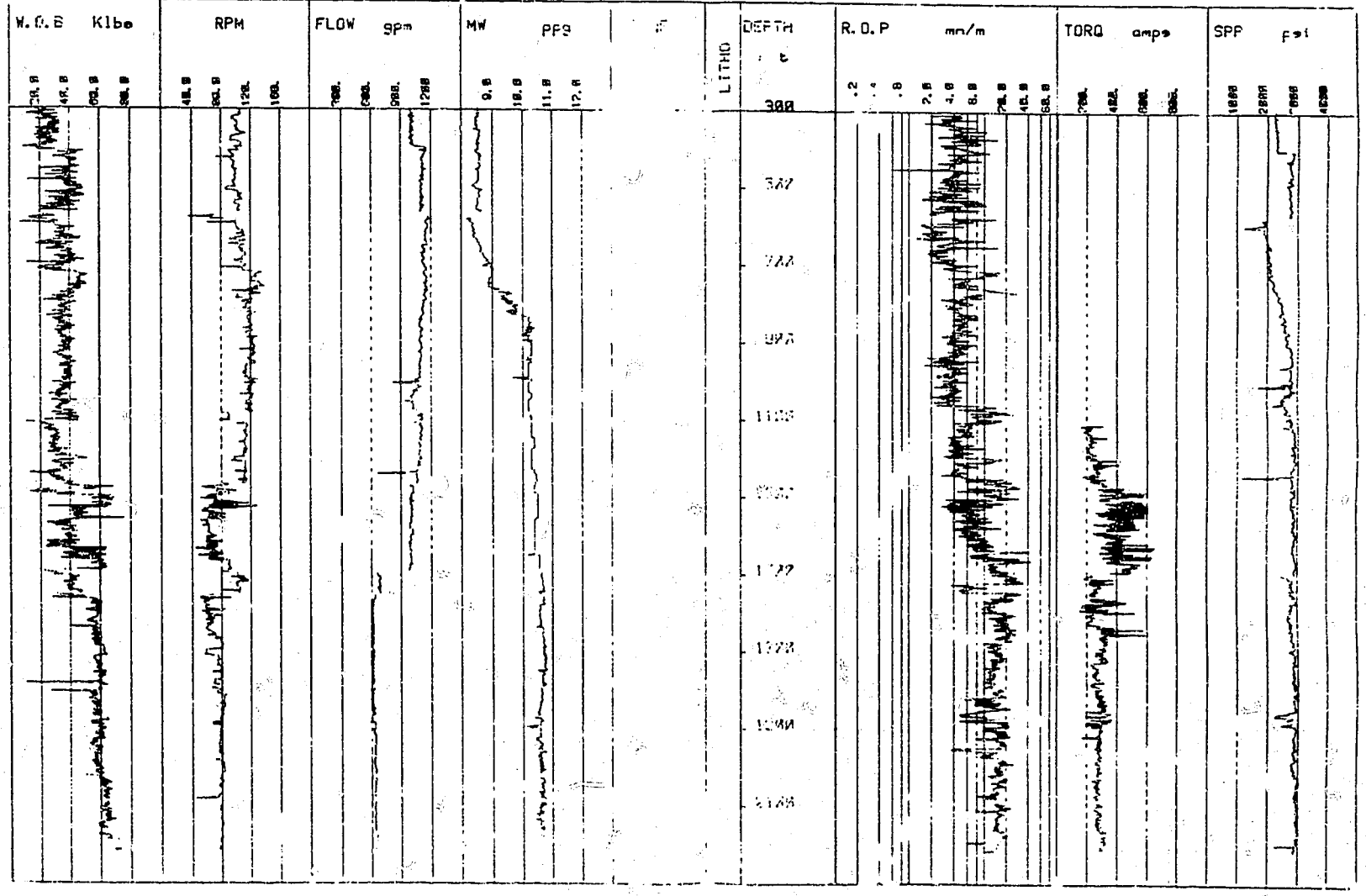
CFOSERVICES ON-LINE TDC

BIT PERFORMANCE VERSUS DEPTH

13/ 9/ 85

BELUGA 0-23

SCALE 1/10000



APPENDIX B: DOBROCKY SEATECH REPORT

- to be forwarded under separate cover

1065 - 1070	Limestone (75%) buff to light brown, cryptocrystalline (slightly chalky) to microcrystalline, clean but predominantly slightly to very dolomitic, trace crinoids and forams, trace pinpoint and "earthy" porosity; Dolomite (25%) (grading from Limestone), predominantly microcrystalline, calcareous, occasional intercrystalline and pinpoint porosity; possible very faint fluorescence, occasional medium white streaming cut fluorescence, light brown oil residue.
1070 - 1075	Limestone (80%) predominantly as above, occasional bituminous streaks; occasionally grading to calcareous Dolomite (20%) as above. Occasional traces (decreasing) porosity as above.
1075 - 1081	Limestone (30%) as above, dolomitized in part; grading to Dolomite (10%) as above, locally very argillaceous, grading to light to medium grey, soft, calcareous Shale (20%). Anhydrite (40%), milky to white, crystalline, clean, no visible porosity in Limestone/Dolomite.
1081 - 1085	Anhydrite: 15% white, silky clean, 25% buff to light grey, slightly to very dolomitic, grading to Dolomite (45%), light grey, cryptocrystalline, dense, moderately to very anhydritic, hard, tight; a few calcareous crinoid fragments; Mudstone (10%), grey and red (cavings?), dolomitized Limestone (5%) as above.
1085 - 1090	Dolomite (60%) as above, very anhydritic; grading to Anhydrite (30%) as above (15% white, non-dolomitic, soft); trace pyrite inclusions, no visible fossils; Limestone (5%) and Mudstone (5%) as above.
1909 - 1095	Anhydrite (85%) white to buff as above, cryptocrystalline, slightly waxy; in part (10%) dolomitic with minor grading to Dolomite (10%) as above. Minor Limestone (5%) as above, white, cryptocrystalline to microcrystalline, dolomitic, tight, trace crinoid fragments.
1095 - 1100	Limestone (40%) light brown, cryptocrystalline to slightly sucrosic, firm, blocky, clean, in part anhydritic; Anhydrite (30%) as above and Dolomite (30%) as above, light grey, anhydritic in part, slightly argillaceous; no visible porosity.
1100 - 1105	Trip Sample: Limestone (20%) as above; Mudstone (25%) grey and red; abundant Claystone, very sticky ("gumbo"). Note: possible fault zone.

1105 - 1110	Abundant Claystone (50%?) as above; Dolomite (20%?), light grey, cryptocrystalline to microcrystalline, soft (locally white, hard), slightly anhydritic in part, tight; Anhydrite (10%?) white to buff, waxy; Mudstone light grey (10%?) and reddish (20%?); Limestone (5%?); dolomitic as above.
1110 - 1115	Clay (70%?) light to medium grey, very soft, calcareous, reddish Mudstone (5%?) as above; Dolomite (10%?); Anhydrite (10%?); Limestone (5%?) as above. Trace crinoids, sponge spicules; minor Salt (halite)(5%) coarse crystalline.
1115 - 1125	Salt (halite) (80-85%) as above, translucent, platey crystals, grey Clay (5-10%) as above; trace red Mudstone becoming slightly harder, dolomitic; trace to minor Dolomite; Limestone and Anhydrite as above. Trace Tentaculites (M. Devonian - Upper Silurian).
1125 - 1190	Salt (halite)(100%) clear to translucent, coarse crystalline, platey, clean.
1190 - 1195	Salt (95%) as above, minor white anhydrite inclusions (5%), hard.
1195 - 1200	Anhydrite (55%?) white to buff, slightly waxy, cryptocrystalline, locally somewhat calcareous; grading to minor buff to light brown, anhydritic Limestone (5%); Claystone (30%?), light to medium grey, very soft, noncalcaroeus, Mudstone (10%), medium red, soft to firm. Some Salt?
1200 - 1205	Limestone (80%) buff to light brown, cryptocrystalline, fairly soft, clean, anhydritic in part; Anhydrite (20%) white, soft, calcareous as above.
1205 - 1210	Salt (halite)(95%) clear to translucent, very coarse crystalline, occasional inclusions white Anhydrite (5%).
1210 - 1215	Salt (95%) as above, minor Dolomite (5%), white to buff, cryptocrystalline to microcrystalline, very argillaceous, hard. Trace Anhydrite as above, trace very soft, grey Claystone.
1215 - 1225	Salt (50-60%) as above, Mudstone (25-30%), grading to Shale, medium red, noncalcareous, firm; minor Dolomite as above, anhydritic; Anhydrite (10-15%) as above.
1225 - 1230	Salt (90%) as above, translucent; minor dolomite and anhydrite as above; tight; trace mudstone as above.
1230 - 1235	Salt (95%) as above; minor white Anhydrite (5%) inclusions.

1235 - 1250	Salt (100%) as above, halite, predominantly translucent, very coarse crystalline, clean.
1250 - 1255	Anhydrite (75%) white, microcrystalline (sucrosic), clean; interbeds and inclusions of Limestone (25%), cryptocrystalline to microcrystalline, clean but anhydritic, tight.
1255 - 1260	Limestone (80%) buff to light brown, predominantly clean (slightly argillaceous in part), anhydritic in part, tight; Anhydrite (20%) as above.
1260 - 1265	Dolomite (80%) buff, cryptocrystalline, dense, slightly argillaceous, fairly hard, tight; anhydrite (20%) white, as above.
1265 - 1275	Anhydrite (85-90%) predominantly white, cryptocrystalline, slightly waxy, clean; 10% buff to light brown, calcareous; grading to Limestone (10%), microcrystalline, very anhydritic, tight; trace clean, cryptocrystalline. Minor light to medium grey, very soft Claystone and red Mudstone (cavings?).
1275 - 1280	Anhydrite (95%) as above, in part light grey, cryptocrystalline, very dolomitic hard; minor grading to hard, anhydritic Dolomite, tight (possibly increasing grey Claystone?), trace Limestone as above.
1280 - 1285	Anhydrite (95%) as above, and minor Limestone inclusions as above; trace Tentaculites.
1285 - 1290	Anhydrite (70%) white to light grey to light brown, clean to argillaceous, in part very calcareous; grading to anhydritic, cryptocrystalline Limestone (15%), soft to firm Mudstone (15%), red and grey, soft (cavings?); trace large crinoid fragments.
1290 - 1295	Anhydrite (90%) as above, very calcareous in part; grading to Limestone (10%) as above; trace crinoid fragments.
1295 - 1300	Limestone (80%) white to light grey, cryptocrystalline, slightly to very anhydritic, trace fossiliferous (crinoids); Anhydrite (20%) as above.
1300 - 1310	Anhydrite (50-60%) predominantly white to buff, minor clear, microcrystalline to coarse crystalline, argillaceous in part (becoming cleaner downwards), calcareous in part; grading to Limestone (40-50%), anhydritic as above (streaks and inclusions), trace fossiliferous (crinoids and possible Amphipora), tight.

1310 - 1315	Limestone (80%) as above, interbedded with Anhydrite (20%) as above (some gradation); trace crinoids.
1315 - 1325	Limestone (40-50%) as above and Anhydrite (50-60%) as above, interbedded and gradational, tight; trace crionids (large).
1325 - 1330	Salt (halite)(80%?) very coarse crystalline, clean, translucent; Anhydrite (15%) as above, minor Limestone as above.
1330 - 1430	Salt (halite)(100%) as above, buff to slightly milky in part; possible occasional stringers Mudstone.
1430 - 1435	Predominantly Salt (65%) as above, trace Sylvite; hard, reddish, dolomitic Shale (15%) inclusions; some Anhydrite (25%?) white, microcrystalline to sucrosic, clean, soft to hard, slightly calcareous in part.
1435 - 1440	Limestone (60%) white to buff, cryptocrystalline, very anhydritic, soft; Salt (30%) as above, Anhydrite (10%) as above.
1440 1445	Salt (70%), buff, translucent; Limestone (15%) white to buff, cryptocrystalline, clean, but slightly anhydritic, firm, tight; Anhydrite (15%), white cryptocrystalline, slightly calcareous in part.
1445 - 1452	Salt (90%) as above, inclusions of Anhydrite (10%) white, cryptocrystalline.
1452 - 1455	Dolomite (45%) brownish-red, cryptocrystalline to microcrystalline (slightly sucrosic), very argillaceous grading to dolomitic Shale (20%), silty, firm to hard, somewhat friable in part occasionally anhydritic, tight; 10% buff, cryptocrystalline, clean, tight (hard); Limestone (10%), white cryptocrystalline, anhydritic, clean, tight. Anhydrite (5%) as above.
1455 - 1460	Dolomite (80%) as above but increasingly cryptocrystalline, silty; occasional Anhydrite (10%) inclusions; possible Salt (10%) stringers (probably cavings); trace Limestone as above.
1460 - 1465	Dolomite (75%) as above, in part increasingly shaley (grading to dolomitic, silty shale), possible trace pinpoint porosity; in part light grey; cryptocrystalline, argillaceous, hard, tight; inclusions Anhydrite (5%) and Limestone (5%), tight.
1465 - 1470	Dolomite (65%) very silty (some grading to dolomitic), somewhat anhydritic Siltstone (10%), argillaceous, occasional Anhydrite inclusions; Anhydrite (10%) and Limestone (5%) as above.

1470 - 1478 Dolomite (40%) red to brown, cryptocrystalline to "earthy", hard; decreasing silty in part (some grading to dolomitic, shaley, red Siltstone (10%); occasional anhydritic inclusions (10%); increasing shaley grading to Shale (40%?), very dolomitic, hydrating(?) to soft clay in mud. Trace Limestone.

1478 - 1481 Siltstone (100%) (to very fine grained sandstone), pink, clear, silica, very soft, unconsolidated, probable salt matrix, no visible porosity.

1481 - 1492 Dolomite (40-50%) in part buff to light grey, cryptocrystalline, argillaceous, firm to hard, tight; in part (%?) reddish, silty and argillaceous as above; grading to dolomitic, argillaceous Siltstone (10-20%), buff and reddish; and silty, dolomitic Shale (25-40%)(hydrating to soft mudstone); Anhydrite (5-10%), white, cryptocrystalline; Mudstone light to medium grey, soft to firm.

13 3/8" (340 mm casing landed at 1478 m K.B.

1492 - 1495 Very poor sample, predominantly cement.

1495 - 1500 Siltstone (55%) buff to light grey, clean to slightly argillaceous, non-dolomitic. Locally sandy, fine to medium grained, subrounded quartz and chert, occasional bituminous and calcareous streaks, also in part reddish, dolomitic, slightly argillaceous (5% sand grains). Anhydrite (15%) white, microcrystalline, slightly calcareous in part, minor clear gypsum. Shale (10%) red, silty. Cement (15%).

1500 - 1520 Anhydrite (85-95%) white, buff, light brown, cryptocrystalline to microcrystalline to finely crystalline, slightly calcareous, slightly to very dolomitic in part, red streaks in part, Siltstone (0-5%) pink, slightly calcareous and anhydritic. Dolomite (0-15%) buff to light grey, microcrystalline, anhydritic, dense.

1520 - 1543 Salt interpreted from rate of penetration. Samples consist of cavings only.

1543 - 1550 Dolomite (70-95%) light grey to grey, cryptocrystalline to microcrystalline, anhydritic, very silty to very fine sandy. Limestone (5-30%) buff to light brown, microcrystalline to very fine crystalline, trace fossiliferous, possible gastropod, anydritic. Anhydrite (trace) white to light grey, cryptocrystalline, massive.

1550 - 1560 Limestone (30%) light brown, cryptocrystalline to very fine crystalline, anhydritic in part, dolomitic in part, trace porosity in part; Dolomite (trace to 40%) white to light grey, cryptocrystalline, very silty to sandy. Anhydrite (30-70%) white to clear, cryptocrystalline to very fine crystalline, dolomitic in part.

1560 - 1595 Limestone (60-95%) buff to light brown, also white to off white, cryptocrystalline to very fine crystalline, rare fossils, trace very bioclastic with 10 to 15% intergranular porosity, no shows, dolomitic in part. Dolomite (5-40%) as above, very silty, occasionally very sandy, grading to sandstone/siltstone in part, dense; Shale (trace only) grey, limey, silty.

1595 - 1600 Dolomite (40%) white to light grey, cryptocrystalline to very finely crystalline, massive dense. Limestone (20%) as above, (40%) light brown to brown, cryptocrystalline to microcrystalline, microsucrosic, rare fossil fragments, no visible porosity, slightly argillaceous.

1600 - 1610 Siltstone (40-90%) light grey to light grey/brown, calcareous to slightly dolomitic, slightly argillaceous in part, calcite veins. Limestone (10-40%) as above. Dolomite (0-20%) as above. Shale (trace only) grey, noncalcareous or dolomitic, black (carbonaceous?) specks, silty.

1610 - 1615 Siltstone (20%) as above. Limestone (50%) white to off white, cryptocrystalline, rare fossil fragments, slight to very dolomitic, grading to dolomite in part, dense. Dolomite (30%) white, very fine to fine crystalline, very calcareous, dense.

1615 - 1635 Dolomite (40-70%) light grey, light brown, cryptocrystalline to microcrystalline, fossiliferous in part, commonly very calcareous, no visible porosity, silty in part. From 1615 - 1625 meters trace brown/black organic fragments, no fluorescence and a very weak cut fluorescence. Limestone (10-50%) off white to light brown, cryptocrystalline, slightly to very dolomitic, rare (unknown) fossils. Shale (0-5%) as above. Siltstone (0-20%) as above.

1635 - 1780 Limestone (70-100%) off white to light brown to brown, cryptocrystalline to microcrystalline, trace fossiliferous, crinoids, minor bioclastic streaks, non to very dolomitic, grading to limey dolomite in part, dense. Dolomite (0-30%) white to light grey, very fine to fine crystalline, commonly very calcareous (matrix), dense, locally fossiliferous (quartz and calcite filled veins/fractures from 1675 to 1680 meters).

1780 - 1805 Limestone (100%) off white to light brown, cryptocrystalline to microcrystalline, trace fossiliferous, trace crinoids, occasional bioclastic streaks, non to slightly dolomitic, dense, mudstone to minor packestone. Trace grey/brown slightly argillaceous. Dolomite (trace) light grey, very fine to fine crystalline, generally calcareous, fossiliferous in part.

1805 - 1815 Siltstone (5%) light grey, dolomitic, slightly argillaceous in part. Limestone (95%) as above. Dolomite (trace to 5%) as above, calcareous in part.

1815 - 1845 Siltstone (50-100%) off white to buff, dolomitic, calcareous patches in part, slightly argillaceous in part, tight, grading to silty dolomite in part. Limestone (5-50%) off white to light brown, as above. Anhydrite (trace in some samples) white/clear, translucent, massive.

1845 - 1855 Siltstone (70-100%) as above, sandy in part, grading to sandstone in part. Sandstone (trace to 20%) from siltstone, very fine to fine grained, fair sorting, angular, silty, dolomitic, tight. Limestone (trace to 10%) as above. Anhydrite (trace) as above.

NOTE: High rate of penetration from 1850 to 1880 meters may indicate salt (halite) which was not seen in samples.

1855 - 1865 Siltstone (100%) buff, dolomitic, grading to silty dolomite in part.

1865 - 1880 Siltstone (80-90%) as above, sandy in part. Sandstone (10-20%) buff, very fine to fine grained, silty, fair sorting, angular, tight, dolomitic, grading to sandy dolomite in part.

1880 - 1910 Siltstone (90-100%) as above, slightly calcareous in part, trace sandy in part. Limestone (trace-10%) off white to light brown, cryptocrystalline to microcrystalline, soft to firm, trace fossiliferous, very dolomitic in part, dense. Dolomite (trace) off white, very fine to fine crystalline, very calcareous in part (after limestone), bioclastic in part.

1910 - 1945 Limestone (70-100%) off white to light brown, cryptocrystalline to microcrystalline, soft to firm, trace fossiliferous, slightly to very dolomitic, rare crinoids, rare brachiopods, dense, grading to calcareous dolomite, locally abundant bioclastic debris. Dolomite (trace to 10%) light grey to light brown, very fine to fine crystalline, very calcareous (after limestone), slightly silty in part. Siltstone (trace to 10%) as above.

1945 - 1970	Siltstone (90-100%) buff to light brown, minor light grey to light grey/brown, trace sandy, argillaceous in part, tight, dolomitic (brown specks seen in 1955 meter sample--organic remains?) slightly calcareous in part, grading to silty dolomite in part. Limestone (trace to 10%) as above, abundant bioclastic debris in part packestone. Anhydrite (trace) white to clear, cryptocrystalline, massive.
1970 - 2000	Limestone (40-70%) off white to light brown, cryptocrystalline to microcrystalline, commonly very dolomitic, trace bioclastic debris, predominantly Mudstone trace fossiliferous, dense. Dolomite (trace to 10%) from limestone as above, very calcareous, fossiliferous in part. Siltstone (30-50%) buff to light brown, minor light grey to slightly argillaceous, dolomitic, minor slightly calcareous, tight.
2000 - 2005	Limestone (95%) off white to light brown, cryptocrystalline to microcrystalline, soft in part, generally non-dolomitic, rare fossils, dense. Siltstone (5%) as above.
2005 - 2015	Anhydrite (40-50%) white to clear, translucent in part, cryptocrystalline, massive, soft in part. Limestone (30%) as above, slightly to very dolomitic, dense. Siltstone (20-30%) as above.
2015 - 2035	Limestone (10-75%) off white to light brown, cryptocrystalline, dolomitic in part, rare fossils, dense. Siltstone (10-65%) off white to light brown, dolomitic, slightly calcareous, also minor light grey to grey, dolomitic, slightly argillaceous (interlaminated with clean siltstone). Dolomite (10-30%) off white to light brown, light grey, microcrystalline to very fine crystalline, calcareous, dense, after limestone grading to dolomitic limestone in part.
2035 - 2080	Limestone (70-90%) off white to light brown, cryptocrystalline to microcrystalline, very fine crystalline in part, trace rare fossils, very dolomitic in part, dense. Dolomite (10-30%) off white to light brown, minor light grey, very fine to fine crystalline, very calcareous, minor noncalcareous, dense after limestone.
2080 - 2185	Limestone (100%) off white to light brown, cryptocrystalline to microcrystalline, fossiliferous in part, slightly to very dolomitic in part, dense, mudstone to trace wackestone and rare bioclastic packestone (rare trace pyrite seen 2175 to 2185 meters). Dolomite (0 to trace) off white to light brown, very fine to fine crystalline, calcareous, rare fossils after limestone.

2185 - 2190	Limestone (100%) as above; Shale (trace) grey, soft/friable, slightly dolomitic.
2190 - 2193	Sandstone (30%) clear quartz, trace feldspar, rare lithic fragments, medium to very coarse grained, (plus?), poor sorting, angular to subangular, poor(?) consolidation with silica cement. No visible porosity, no shows, no fluorescence, no cut fluorescence.
2193 - 2194	Shale (trace) grey, soft/friable, dolomitic, sandy in part, medium grained, angular quartz. Limestone and Sandstone cavings (100%).
2194 - 2215	Granitic Gneiss: medium to very coarse crystalline, quartz, minor pink and white feldspar, trace biotite, mica-chloritized in part, and abundant mafic mineral showing a strong orientation/shearing in association with quartz.

REPEAT FORMATION TESTER

CSU

COMPANY: CANTERRA ENERGY LTD.

WELL: TRILLIUM SDQUIP DNEXCO ET AL BELUGA D-23

FIELD: HUDSON BAY

PROV.: MANITOBA
NATION: CANADA
LOCATION:

SEC: TWP:
LATITUDE: 59 12' 54.4" N
LONGITUDE: 88 33' 26.6" W

CANADA OIL AND GAS LANDS ADMINISTRATION
ADMINISTRATION DES HYDROCARBURES ET DU GAZ DES TERRES DU CANADA
SEP 19 1985
RGE:
ENGINEERING BRANCH

PERMANENT DATUM: M.S.L.
ELEV. OF PERM. DATUM:
LOG MEASURED FROM: K.B.
13.7 M ABOVE PERM. DATUM
DRLG. MEASURED FROM: KELLY BUSHING

ELEVATIONS-
KB: 13.7 M
DF: 13.1 M
GL: -179.8 M

OTHER SERVICES-
DLL-MSFL
BHC-GR
CBL-VDL
CNL-LDT-NGT
SHDT
CST / VSP

PROGRAM TAPE NO: 26.2
SERVICE ORDER NO: 129404

DATE: 13 SEP 85
RUN NO: 2

DEPTH-DRILLER: 2215.0 M
DEPTH-LOGGER: 2215.0 M
BTM. LOG INTERVAL: 2193.0 M
TOP LOG INTERVAL: 1565.5 M

CASING-DRILLER:	559 M	1473 M
CASING-LOGGER:	558 M	1477 M
CASING:	508 MM	339.7 MM
WEIGHT:	197.9 KG/M	107.1 KG/M
BIT SIZE:	374.7 MM	311.2 MM

TYPE FLUID IN HOLE: MCGL SATURATED GEL POLYMER
DENSITY: 1282 K/M3
VISCOSITY: 35.0 S
PH: 11.0
FLUID LOSS: 29.0 C3
SOURCE OF SAMPLE: CIRC.
RM @ MEAS TEMP: .960 OHMM AT 20.0 DEGC
RMF @ MEAS TEMP: .648 OHMM AT 22.0 DEGC
RMC @ MEAS TEMP: .166 OHMM AT 21.0 DEGC
SOURCE RMF/RMC: PRESS /PRESS
RM @ BHT: .048 OHMM AT 30.0 DEGC
RMF @ BHT: .040 OHMM AT 30.0 DEGC
RMC @ BHT: .137 OHMM AT 30.0 DEGC

TIME CIRC. STOPPED: 00:40 / 12
TIME LOGGER ON BTM.: 10:00 / 13

MAX. REC. TEMP: 30.0 DEGC

LOGGING UNIT NO: 922
LOGGING UNIT LOC: ST. JOHN'S
RECORDED BY: SEBB
WITNESSED BY: L. ZANUSSI

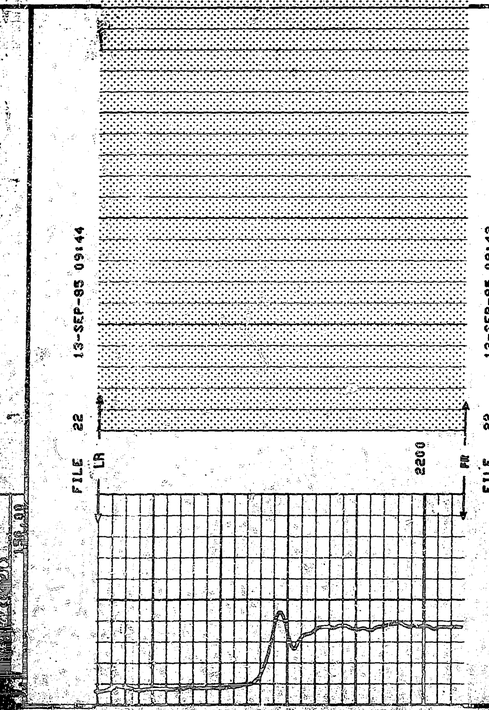
REMARKS:

STANDARD AREA PACKER RUN
STANDARD AREA PROBE USED
TOOL STRING GENERALIZED WITH CME-Z
PRESSURE CORRECTIONS MADE IN REAL TIME
PRESSURE CORRECTION TABLES ATTACHED
TOOL HAS BEEN PRESSURE TEST, PROBE WAS NOT PLUGGED,
TOOL HAS SET IN A MASH-OUT PROBE WHEN TESTS 7 & 8,
AS WELL AS AFTER TESTING WAS COMPLETED

EQUIPMENT NUMBERS-

RFT-AB 498	RFC-AB 498	RFS-A 42	RFS-B 42
RFP-AB 28	RFP-AB 183	RVP-AA 181	SGC-JC 1695
PIM-DA 965			

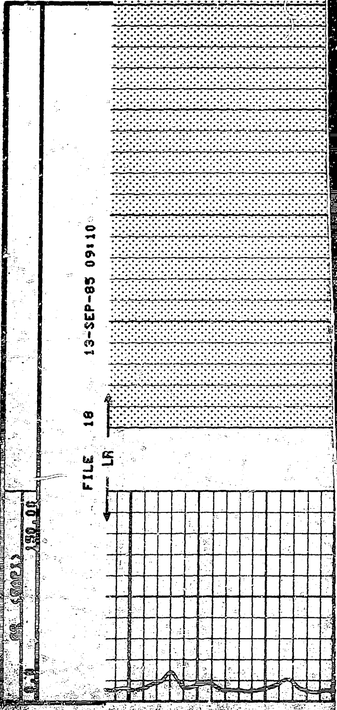
ALL INTERPRETATIONS ARE OPINIONS BASED ON INFERENCES FROM ELECTRICAL OR OTHER MEASUREMENTS AND WE CANNOT, AND DO NOT GUARANTEE THE ACCURACY OR CORRECTNESS OF ANY INTERPRETATIONS, AND WE SHALL NOT, EXCEPT IN THE CASE OF GROSS OR WILLFUL NEGLIGENCE ON OUR PART, BE LIABLE OR RESPONSIBLE FOR ANY LOSS, COSTS, 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 OUR GENERAL TERMS AND CONDITIONS AS SET OUT IN OUR CURRENT PRICE SCHEDULE.

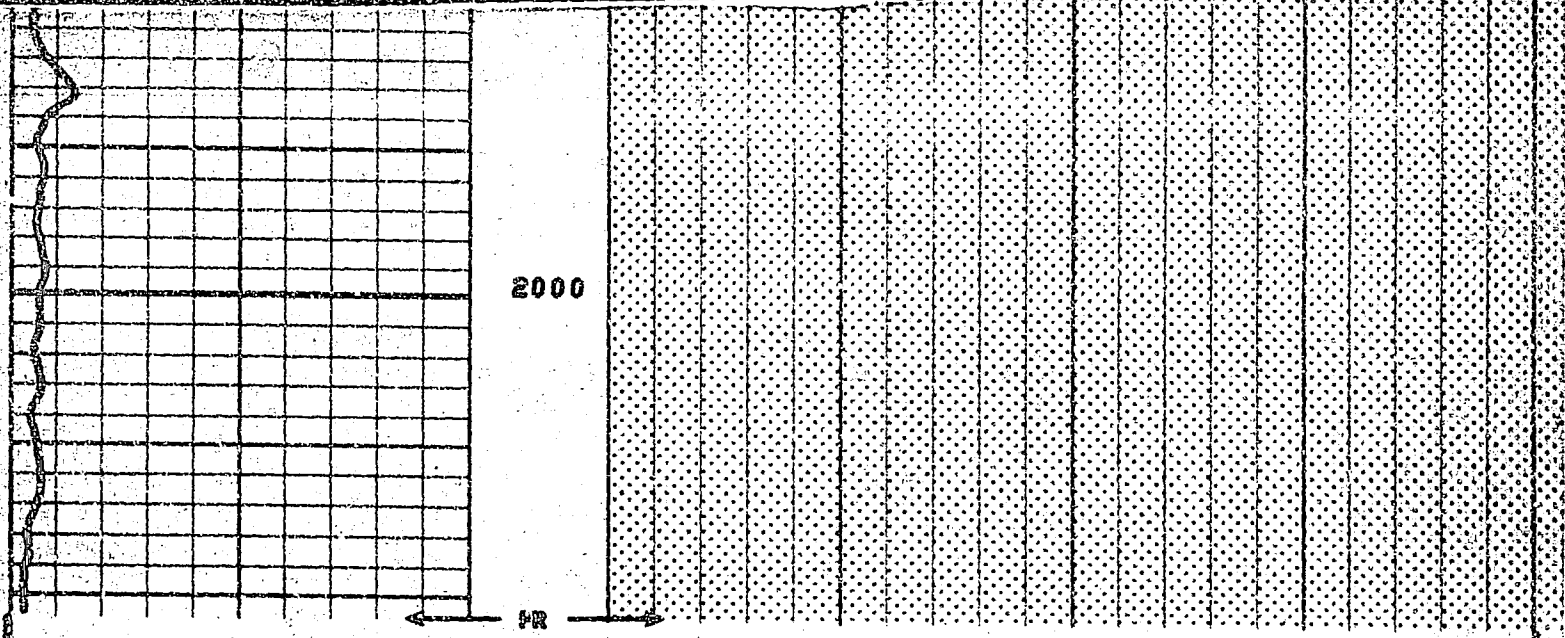


SENSOR: MEASURE POINT TO TOOL ZERO
TENS 4.8 METER GR 6.3 METER

PARAMETERS

NAME	VALUE	UNIT	NAME	VALUE	UNIT
FDEP	2017.09	M	SGSN	83760	
RPU	PC1G		RFTT	25.0000	DEGC
TCRV	251.450	OHMS	HPSN	00004-00	
WPT	9.78387	DEGC	T2RV	453.000	OHMS
DWS	OPEN		FLD	1.00000	G/C3
TS	311.200	MM			





FILE 18 13-SEP-05 09:07

GR (GAPI)	
0.0	150.00

SENSOR MEASURE POINT TO TOOL ZERO

TENS 4.0 METER GR 6.3 METER

PARAMETERS

NAME	VALUE	UNIT	NAME	VALUE	UNIT
FDEP	1905.09	M	SGSN	83760	
RPU	PSIG		RFTT	25.0000	DEGC
TCRV	761.450	OHMS	HPSN	0000A-00	
HPT	9.70387	DEGC	TZRV	453.000	OHMS
BHS	OPEN		FLD	1.00000	G/C3
BS	311.200	MM			

0.0	50000.	-10000	10000.	-100.0	100.00
SGP (KPA)		SGP (KPA)		SGP (KPA)	
-220.0	00.000	0.0	199999	0.0	2000.0
MSPE(RPS)		SGP (KPA)		SGP (KPA)	

PARAMETERS

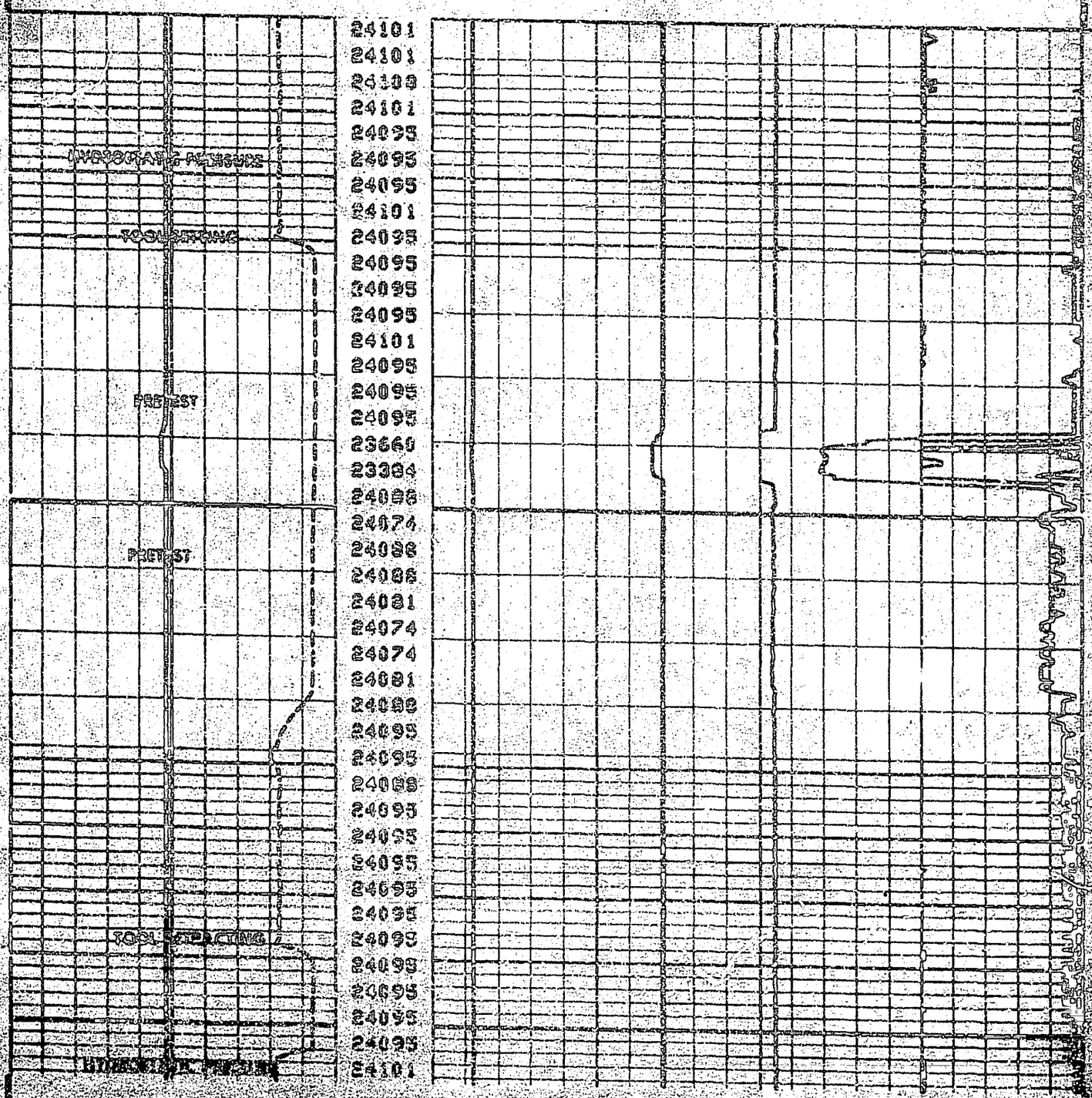
NAME	VALUE	UNIT	NAME	VALUE	UNIT
DS	311.200	MM	BHS	OPEN	
FLD	1.00000	G/C3	HPT	9.78387	DEGC
TZRV	453.000	OHMS	TCRV	761.450	OHMS
HPSN	0000A-00		RPU	PSIG	
RFTT	25.0000	DEGC	FDEP	1821.04	M
SGSN	83760				

SENSOR MEASURE POINT TO TOOL ZERO

TENS 7.8 METER GR 6.3 METER

0.0	50000.	-10000	10000.	-100.0	100.00
SGP (KPA)		SGP (KPA)		SGP (KPA)	
		0.0	199999	0.0	2000.0
		SGP (KPA)		SGP (KPA)	

FILE 12 13-SEP-85 08:21



FILE 12 13-SEP-85 08:27

FILE 2 04-SEP-95 09:26

TRANSMITTER MODEL: 3051C
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TRANSMITTER MODULE: 3051C
TRANSMITTER SERIAL: 1
PRESS TAPS #1 ---
TEMPERATURE 1 TOP CONN
TEMPERATURE 2 BOTTOM CONN
PRESS TAPS #2 ---
TEMPERATURE 1 TOP CONN
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PRESS TAPS #3 ---
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PRESS TAPS #6 ---
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FILE 2 04-SEP-95 09:28

FILE 2 04-SEP-95 09:29

COMPANY: ONTARIO HYDRO LTD.
PLANT: TRILLIUM GROUP PROCES ET AL. BLOCK D-23
PLANT: ANALYZER
PLANT: ANALYZER
PLANT: ANALYZER

CORE SAMPLE TAKER RESULTS

CSU

COMPANY: CANTERRA ENERGY LTD.

WELL: TRILLIUM SOQUIP ONEXCO ET AL BELUGA D-23

FIELD: HUDSON BAY

PROV. : MANITOBA
NATION: CANADA
LOCATION:

SEC: TWP: RGE:
LATITUDE: 59 12' 54.4" N
LONGITUDE: 88 33' 26.6" W

PERMANENT DATUM: M.S.L. ELEVATIONS-
ELEV. OF PERM. DATUM: KB: 13.7 M
LOG MEASURED FROM: K.B. DF: 13.1 M
13.7 M ABOVE PERM. DATUM GL: -179.8 M
DRLG. MEASURED FROM: KELLY BUSHING

DATE: 13 SEP 85
RUN NO: 2

DEPTH-DRILLER: 1492.0 M
DEPTH-LOGGER: 1490.5 M
BTM. LOG INTERVAL: 2210.0 M
TOP LOG INTERVAL: 1486.0 M

CASING-DRILLER: 558 M 1478 M
CASING-LOGGER: 558 M 1477 M
CASING: 508 MM 339.7 MM 0
WEIGHT: 197.9 KG/M 107.1 KG/M
BIT SIZE: 374.7 MM 311.2 MM

OTHER SERVICES-
DLL-MSFL
RFT
CNL-LDT-NGT
SHDT
CST
WST

PROGRAM
TAPE NO:
26.2
SERVICE
ORDER NO:
129404

TYPE FLUID IN HOLE: NACL SATURATED GEL POLYMER
DENSITY: 1288 K/M3
VISCOSITY: 35.0 S
PH: 11.0
FLUID LOSS: 29.0 C3
SOURCE OF SAMPLE: CIRC.
RM: .360 OHMM AT 20.0 DEGC
RMF: .048 OHMM AT 22.0 DEGC
RMC: .166 OHMM AT 21.0 DEGC
SOURCE RMF/RMC: PRESS /PRESS
RM AT BHT: .048 OHMM AT 30.0 DEGC
RMF AT BHT: .040 OHMM AT 30.0 DEGC
RMC AT BHT: .137 OHMM AT 30.0 DEGC

TIME CIRC. STOPPED: 00140/12
TIME LOGGER ON BTM.:

MAX. REC. TEMP: 30.0 DEGC

LOGGING UNIT NO: 922
LOGGING UNIT LOC: ST. JOHN'S
RECORDED BY: BEBB/MACNEILL
WITNESSED BY: L. ZANUSSI

REMARKS:

38MM STANDOFFS RUN ON CST GUNS.
36 CORES RECOVERED 54.5%
11 CORES MISFIRED 16.7%
17 CORES EMPTY 25.8%
02 CORES LOST 3.0%
66 BULLETS TOTAL 100.0 %

EQUIPMENT NUMBERS-

GFC-A 570 CST-V 2381 CST-V 1655 CST-U 1355
SHM-CA 1136 - -

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 OUR GENERAL TERMS AND CONDITIONS AS SET OUT IN OUR CURRENT PRICE SCHEDULE.

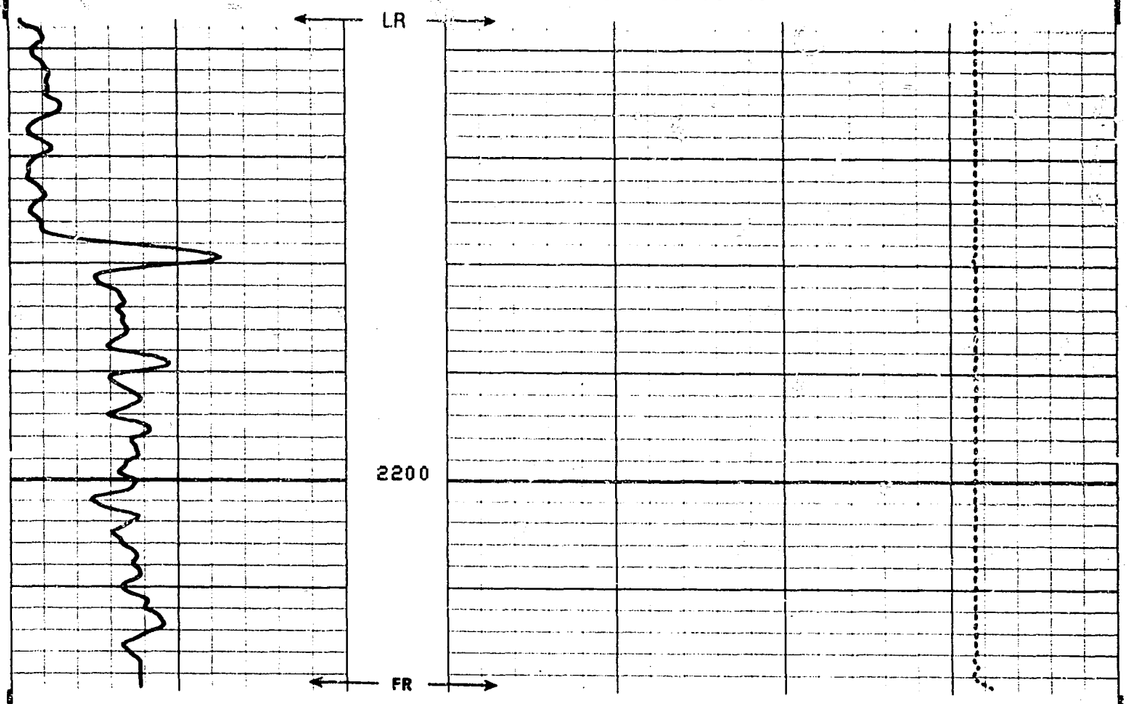
FILE 0 -00 02:03
DATA ACQUIRED 00- -00 00:00

SHOT SUMMARY LISTING PERFORMED 00- -00 01:44

SHOT	STATUS	DEPTH	TENSION
1	EMPTY	2209.9	198.8
2	FIRED	2200.0	165.7
3	FIRED	2192.0	1207.
4	FIRED	2192.0	969.0
5	FIRED	2191.0	1296.
6	LOST	2191.0	1050.
7	FIRED	2190.5	1078.
8	MISFIRED	2189.5	1343.
9	EMPTY	2180.0	173.1
10	LOST	2160.0	114.5
11	MISFIRED	2159.9	301.2
12	FIRED	2139.9	110.1
13	FIRED	2120.0	160.5
14	FIRED	2110.0	137.2
15	MISFIRED	2100.0	106.0
16	FIRED	2080.0	156.2
17	FIRED	2060.0	103.6
18	MISFIRED	2040.0	123.9
19	EMPTY	2030.0	85.50
20	FIRED	2020.0	175.5
21	MISFIRED	2000.0	123.8
22	EMPTY	1992.5	153.5
23	FIRED	1992.5	125.3
24	MISFIRED	1980.0	162.2
25	EMPTY	1959.0	143.2
26	EMPTY	1959.0	105.1
27	FIRED	1920.0	77.06
28	FIRED	1905.0	100.5
29	EMPTY	1905.0	135.6
30	EMPTY	1893.9	99.50
31	EMPTY	1893.8	219.8
32	FIRED	1880.0	127.5
33	EMPTY	1875.9	113.4
34	MISFIRED	1876.0	125.0
35	EMPTY	1852.0	129.2
36	EMPTY	1852.0	98.75
37	EMPTY	1840.0	166.3
38	FIRED	1820.5	228.8
39	EMPTY	1820.5	194.1
40	MISFIRED	1800.0	165.7
41	EMPTY	1780.0	124.0
42	FIRED	1765.0	85.62
43	MISFIRED	1765.0	67.87
44	FIRED	1745.0	84.43
45	FIRED	1745.0	112.0
46	FIRED	1720.0	131.6
47	FIRED	1710.0	123.9
48	FIRED	1694.0	123.5
49	FIRED	1694.0	85.52
50	EMPTY	1680.0	126.0
51	FIRED	1680.0	125.8
52	FIRED	1660.0	88.81
53	MISFIRED	1659.9	149.8
54	FIRED	1620.0	99.87
55	FIRED	1620.0	131.0
56	FIRED	1600.0	128.2
57	FIRED	1577.9	130.5
58	FIRED	1578.0	119.8
59	FIRED	1565.0	86.00
60	FIRED	1550.0	91.25
61	FIRED	1365.0	127.1
62	MISFIRED	1510.9	93.87
63	FIRED	1507.0	92.50
64	EMPTY	1507.0	89.18
65	FIRED	1486.0	97.75
66			

DEPTH UNITS : METE BIT SIZE : 311.150 MM
RING TYPE : NONE BULLET TYPE : SHOL
POWDER LOAD : 0.00 G POWDER TYPE : AHT

FILE 2 13-SEP-85 00:49



FILE 2 13-SEP-85 00:47

GR (GAPI)		TENS(N)
0.0 100.00		25000. 0.0

SENSOR MEASURE POINT TO TOOL ZERO

TENS 5.8 METER GR 7.3 METER

PARAMETERS

NAME	VALUE	UNIT	NAME	VALUE	UNIT
BS	311.150	MM	BHS	OPEN	

COMPANY: CANTERRA ENERGY LTD.

WELL: TRILLIUM SOQUIP ONEXCO ET AL BELUGA O-23

FIELD: HUDSON BAY

PROV. : MANITOBA
NATION: CANADA
LOCATION:

SEC: TWP: RGE:
LATITUDE: 59 12' 54.4" N
LONGITUDE: 88 33' 26.6" W

PERMANENT DATUM: M.S.L.
ELEV. OF PERM. DATUM:
LOG MEASURED FROM: K.B.
13.7 M ABOVE PERM. DATUM
DRLG. MEASURED FROM: KELLY BUSHING

ELEVATIONS-
KB: 13.7 M
DF: 13.1 M
GL: -179.8 M

DATE: 13 SEP 85
RUN NO: 2

OTHER SERVICES-
DLL-MSFL
RFT
CNL-LDT-NGT
SHDT
CST
WST

PROGRAM
TAPE NO:
26.2
SERVICE
ORDER NO:
129404

DEPTH-DRILLER:	1492.0 M	
DEPTH-LOGGER:	1490.5 M	
BTM. LOG INTERVAL:	2210.0 M	
TOP LOG INTERVAL:	1486.0 M	
CASING-DRILLER:	558 M	1478 M
CASING-LOGGER:	558 M	1477 M
CASING:	508 MM	339.7 MM 0
WEIGHT:	197.9 KG/M	107.1 KG/M
BIT SIZE:	374.7 MM	311.2 MM

Schlumberger

CORE SAMPLE TAKER RESULTS

CSU Field Log

CEMENT BOND LOG

CSU

COMPANY: CANYONS ENERGY LTD.

WELL: TAYLOR GROUP DRHSD FT W. RELOG-0-03

FIELD: HORSE BAY

PROV.: AMSTERM

NATION: CANADA

LOCATION:

LAT: 49 12' 24.0" N

LONGITUDE: 88 32' 26.0" W

PERMANENT DATUM: M.S.L. ELEVATION: 0

LOG MEASURED FROM: KB 25.0 ABOVE PERM. DATUM

DRILL MEASURED FROM: KELLY BUSHING DF: 24.0 M

GL: 24.0 M

DATE: 15 SEP 89

RUN NO.: 0

DEPTH-DRILLER: 2018.0 M

DEPTH-LOGGER: 2018.0 M

BTM LOG INTERVAL: 2016.0 M

TOP LOG INTERVAL: 1800.0 M

CASING-DRILLER: 508.0 M CASTN M

CASING-LOGGER: 508.0 M CASTN M

BIT SIZE: 241.3 MM 9.500 IN

TYPE FLUID IN HOLE: SALT WATER

DENSITY: 1.0 G/CC

VISCOSITY: 40.0 S

PH: 10.0

FLUID LOSS: 0.0 ML

SOURCE OF SAMPLE: PIT

RM @ MEASURED TEMP: 0.000 OHM-M @ 0.0 DEGF

RMF @ MEASURED TEMP: 0.000 OHM-M @ 0.0 DEGF

RMC @ MEASURED TEMP: 0.000 OHM-M @ 0.0 DEGF

RM @ BHT: 0.000 OHM-M @ 0.0 DEGF

TIME CIRC. STOPPED: 0 HRS

TIME LOGGER ON BOTTOM: 0 HRS

MAX. REC. TEMP.: 0.0 DEGF

EQUIP. LOCATION: 0 KM

RECORDED BY: D.SCHMIDT

WITNESSED BY: MR. DUANE CATHALIER ATH CRA-2

BOREHOLE RECORD

BIT RUN: 241.3MM 9.500 IN 0.0 M 2018.0 M

CASING RECORD

SURFACE STRING: 508.0 M 241.3MM 9.500 IN CASTN M

PRODUCTION STRING: 0.0 M 0.0MM 0.000 IN

REMARKS

MAIN, DUAL CATHALIER ATH CRA-2

OTHER SERVICES: BL-HDT, DIL-SP-HDT, DSL-LS-HDT, BHC, GR, CST / CET

PROGRAM NO. 0

PROCESSING CENTER

CSU

FILE # 1

CN, FN, CN, FN, LOG

CN, FN, CN, FN, LOG

24-SEP-89 10:49

TYPE CBL, Gain=2

Pulse, AM, AMPT, Gain=2

DEPTH

1800

1850

1900

1950

2000

2050

2100

2150

2200

2250

2300

2350

2400

2450

2500

2550

2600

2650

2700

2750

2800

2850

2900

2950

3000

3050

3100

3150

3200

3250

3300

3350

3400

3450

3500

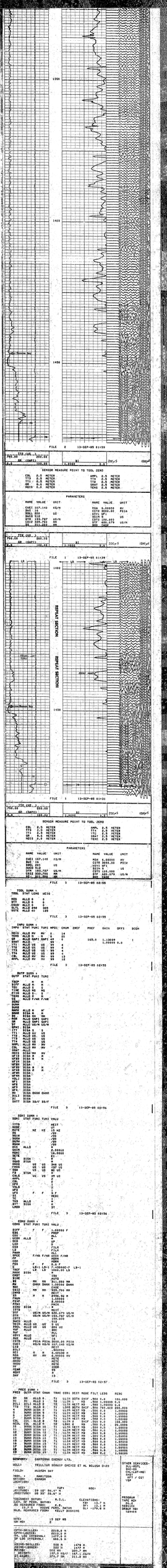
3550

3600

3650

3700

3750



SENSOR MEASURE POINT TO TOOL ZERO

CBL	0.0 METER		AMPL	0.0 METER	
TT3	0.0 METER		TT4	0.0 METER	
TT1	0.0 METER		TT2	0.0 METER	
GR	0.0 METER		SPD1	0.0 METER	
MSS1	0.0 METER		TEMP	0.0 METER	

PARAMETERS

NAME	VALUE	UNIT	NAME	VALUE	UNIT
CWEI	167.140	KG/M	MSA	0.00000	MV
BWI	10		CSTN	5000.000	PSIA
BBLI	850	US	WSVI	WF1	
BBLO	850	US	WSVO	WF1	US
STPR	193.727	US/M	CSTD	120.000	
CSIZ	339.725	MM	STP	526.579	US/M
CSIG	8.000	MM	BWS	2000	

TIE LVL 1 000.00
FOR GR (SAFE) 100.00 1.00000 0.0 100.0 5 100.0 6

FILE 1 13-SEP-95 01:59

REPLAY SECTION

FILE 1 13-SEP-95 01:31

SENSOR MEASURE POINT TO TOOL ZERO

CBL	0.0 METER		AMPL	0.0 METER	
TT3	0.0 METER		TT4	0.0 METER	
TT1	0.0 METER		TT2	0.0 METER	
GR	0.0 METER		SPD1	0.0 METER	
MSS1	0.0 METER		TEMP	0.0 METER	

PARAMETERS

NAME	VALUE	UNIT	NAME	VALUE	UNIT
CWEI	167.140	KG/M	MSA	0.00000	MV
BWI	10		CSTN	5000.000	PSIA
BBLI	850	US	WSVI	WF1	
BBLO	850	US	WSVO	WF1	US
STPR	193.727	US/M	CSTD	120.000	
CSIZ	339.725	MM	STP	526.579	US/M
CSIG	8.000	MM	BWS	2000	

FILE 3 13-SEP-95 02:55

FILE 3 13-SEP-95 02:55

FILE 3 13-SEP-95 02:56

FILE 3 13-SEP-95 02:56

FILE 3 13-SEP-95 02:57

FILE 3 13-SEP-95 02:57

PRES SUMM :

PRES	DUTY STAT	CHAN	TRAC	CODI	DCIT	MODE	FILT	LEGS	
00	OK	ALLS 0	72	LL1N	DCTN	DWOF	500 0.0		000.000
01	SELI ALLS	0	73	LL1N	DCTN	DWOF	500 0.0		000.000
02	SELI ALLS	0	74	LL1N	DCTN	NS	500 0.0		1.00000
03	TT1	ALLS 3	75	LL1N	DCTN	DWOF	500 0.0		000.000
04	TT2	ALLS 3	76	LL1N	DCTN	NS	500 0.0		1.00000
05	DUMM	DIBA 4	77	LL1N	DCTN	NS	500 0.0		1.00000
06	DUMM	DIBA 4	78	LL1N	DCTN	NS	500 0.0		1.00000
07	DUMM	DIBA 4	79	LL1N	DCTN	NS	500 0.0		1.00000
08	CBL	ALLS 5	80	LL1N	DCTN	NS	500 0.0		1.00000
09	CBL	ALLS 5	81	LL1N	DCTN	NS	500 0.0		01.0000
10	DUMM	DIBA 10	82	LL1N	DCTN	NS	500 0.0		1.00000
11	DUMM	DIBA 10	83	LL1N	DCTN	NS	500 0.0		1.00000
12	DUMM	DIBA 10	84	LL1N	DCTN	NS	500 0.0		1.00000
13	DUMM	DIBA 10	85	LL1N	DCTN	NS	500 0.0		1.00000
14	DUMM	DIBA 10	86	LL1N	DCTN	NS	500 0.0		1.00000
15	DUMM	DIBA 10	87	LL1N	DCTN	NS	500 0.0		1.00000
16	DUMM	DIBA 10	88	LL1N	DCTN	NS	500 0.0		1.00000
17	DUMM	DIBA 10	89	LL1N	DCTN	NS	500 0.0		1.00000
18	DUMM	DIBA 10	90	LL1N	DCTN	NS	500 0.0		1.00000
19	DUMM	DIBA 10	91	LL1N	DCTN	NS	500 0.0		1.00000

OTHER SERVICES:
BHC-GR
DIL-SP
DIL-LL3-MSFL
SFT / CST
VSP

PROGRAM
TAPE NO4
DILIC
DIL-LL3-MSFL
DUAL-IND
18940

COMPANY: CONTINENTAL ENERGY LTD.

WELL: TRILLIUM GROUP CHEVICE ET AL BLOCK D-23

FIELD: MUSKOX BAY

COUNTY: MANITOBA
STATE: CANADA

SECTION:	TWP:		
LATITUDE: 59 16' 56.4" N		RGE:	
LONGITUDE: 99 32' 28.4" W			

ELEVATIONS:
KB: 13.7 M
DF: 13.7 M
GL: -179.2 M

PERMANENT DATUM: M.S.L.
ELEV. OF PERM. DATUM: 0.0 M
LOG MEASURED FROM: K.B.
DRL. MEASURED FROM: KELLY BUSHING

NOTE:
13 SEP 95

DATE-DRILLED:	2016.8 M
DATE-LOGGED:	2016.8 M
TD. LOG INTERVAL:	2016.8 M
BP LOG INTERVAL:	565.4 M
CASING-DRILLED:	1679 M
CASING-LOGGED:	1677 M
BIT:	6377 MM
MUD TYPE:	POLYMER
DENSITY:	1.12 G/CM
VISCOSITY:	48 S
PH:	9.5
FLUID LOSS:	3.6 ml
MAX. REC. TEMP.	93 C

TEMPUT SGRH LOG

2710-C55-1-1

CEMENT BOND VARIABLE DENSITY LOG

PROVINCE	MANITOBA
FIELD	HUDSON BAY
WELL	TRILLIUM SOQUIP
WELL	ONEXCO ET AL BELUGA O-23
COMPANY	CANTERRA ENERGY LTD.

COMPANY CANTERRA ENERGY LTD.

WELL TRILLIUM SOQUIP ONEXCO ET AL BELUGA 0-23

FIELD HUDSON BAY

PROVINCE MANITORA

CANADA OIL AND GAS LANDS ADMINISTRATION
ADMINISTRATION DES TERRES ET DU GAZ DES TERRES DU CANADA

LOCATION: 59° 12' 54.4" NORTH LATITUDE, 88° 33' 26.6" WEST LONGITUDE

LSD | SEC. | TWP | RANGE

RUN 1 LOG

Other Services: RMKS

ENGINEERING BRANCH

Permanent Datum:	MSL	Elev.:	0.0 m
Log Measured From	KB 13.7 m Above Perm. Datum		
Drilling Measured From	KB		

Elev.: K.B. 13.7 m; D.F. 13.1 m; G.L. -179.8 m

Date	13 SEP 85	Maximum Temp	°F/°C
Run No.	ONE	Casing Fluid Type	SEE BELOW
T.D.D.T.D. Driller	2215.0 m	Casing Fluid Salinity	-
Depth-Logger (Total)	2215.0 m	Casing Fluid Level	-
Bott. Log Interval	1477.0 m	Annulus Fluid	-
Top Log Interval	800.0 m	Unit / District	922 / ST.J
Open Hole Size	374.7/311.2 mm	Recorded By	BEBB
Bottom Hole Temp.	30.0 °C	Witnessed By	ZANUSSI

TUBING & CASING RECORD

	Size (mm)	Wt. (kg/m)	DEPTH	CSG.DRILLER	CSG.LOGGER	BIT SIZE
	508.0	197.9	-	558	558	374.7
	339.7	107.1	-	1478	1477	311.2
Production Casing						
Liner						
Tubing						
Tubing						

CASING LINER | SHOT PERFORATIONS | TO | FROM | TO | FROM | TO

Production Packer m
Packer I.D. mm

REMARKS: 12 NOV 85 CAL AK
OTHER SERVICES: CNL-LDT-GR, DLL-MSFL, BHC-GR, NGT, CST, RFT, WST, COMP, CYBER, SHDT
PROGRAM TAPE NO. 26.2
SERVICE ORDER NO. 129404

TYPE FLUID IN HOLE: NACL SATURATED GEL POLYMER
DENSITY: 1292 K/M3
VISCOSITY: 35.0 S
PH: 11.0
FLUID LOSS: 29.0 C3
SOURCE OF SAMPLE: CIRC.
RM: .060 OHMM AT 20.0 DEGC
RMF: .048 OHMM AT 22.0 DEGC
RMC: .166 OHMM AT 21.0 DEGC
SOURCE RMF/RMC: PRESS /PRESS
RM AT BHT: .048 OHMM AT 30.0 DEGC
RMF AT BHT: .049 OHMM AT 30.0 DEGC
RMC AT BHT: .137 OHMM AT 30.0 DEGC

TIME CIRC. STOPPED: 00:40 / 12
TIME LOGGER ON BTM.: 23:00 / 12

MAX. REC. TEMP: 30.0 DEGC

LOGGING UNIT NO: 922
LOGGING UNIT LOC: ST. JOHN'S
RECORDED BY: BEBB
WITNESSED BY: L. ZANUSSI

REMARKS:

TOOL STRING CENTRALIZED WITH CME-Z

EQUIPMENT NUMBERS-

SLM-DA 2083	NSM 3727	IEM-BD 1497	SLC-FA 2011
SLS-HA 1283	SSC-JC 1695	MCD-DA 311	

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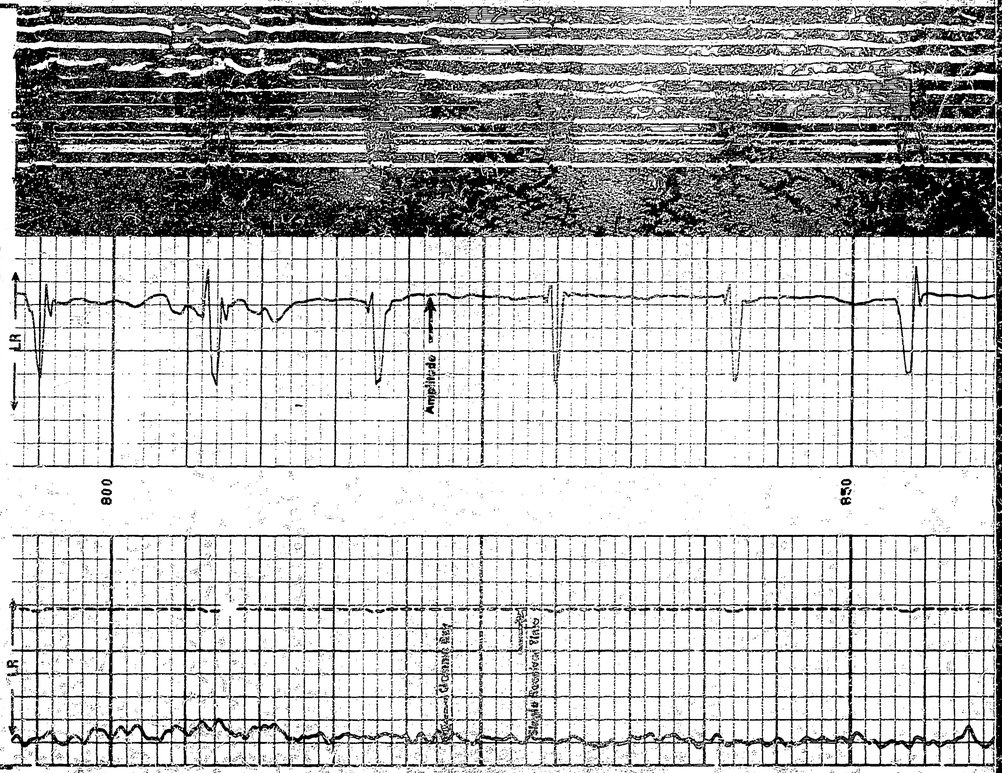
0.0	CBL (MV)	20.000	
0.0	CBL (MV)	100.00	200 US
700.00	TTT (US)	200.00	1200 US
0.0	GR (GAPI)	100.00	



FILE 3 13-SEP-85 02:55

TOOL SUMM :

TOOL	STAT	LENG	WEIG
NSM	ALLO	0	0
DTT	ALLO	0	0
CSUD	ALLO	0	0
SLTL	ALLO	292	385
SGTE	ALLO	60	125

FILE 3 13-SEP-85 02:55

INPU SUMM :

INPU	STAT	PUNI	TUNI	MPOI	CNUM	ZREF	PREF	GAIN	OFFS	DCON
NDIS	ALLO	MV	MV	0	14					
TENS	ALLO	M	M	0	20					
GR	ALLO	GAPI	GAPI	49	0		165.0	1.13089		1
SRAT	ALLO			99				1.00000	0.0	
TT1	ALLO	US	US	99	4					
TT2	ALLO	US	US	99	4					
TT3	ALLO	US	US	99	4					
TT4	ALLO	US	US	99	4					
CBL	ALLO	MV	MV	99	13					
AMPL	ALLO	MV	MV	99	12					

FILE 3 13-SEP-85 02:55

OUTP SUMM :

OUTP	STAT	PUNI	TUNI
TDEP		M	M
DIFF	ALLO	M	M
TOD	ALLO	S	S
TIME	ALLO	MS	MS
ETIM	ALLO	S	S
TENS	ALLO	M	M
CS	ALLO	F/HR	F/HR
ZERO			
DUMM			
DUM2			
MARK	ALLO	M	M
DMAR	DISA	M	M
BS	DISA	MM	MM
RGR	ALLO	GAPI	GAPI
GR	ALLO	GAPI	GAPI
DT	ALLO	US/M	US/M
SPHI	DISA		
ITT	DISA	S	S
TT1	ALLO	US	US
TT2	ALLO	US	US
TT3	ALLO	US	US
TT4	ALLO	US	US
AMPL	ALLO	MV	MV
CBL	ALLO	MV	MV
SRAT	ALLO		
NDIS	DISA	MV	MV
WF1D	DISA	M	M
WF2D	DISA	M	M
WF1N	DISA		
WF2N	DISA		
WF3D	DISA	M	M
WF4D	DISA	M	M
WF3N	DISA		
WF4N	DISA		
VDL1	DISA		
WF1	DISA		
WF2	DISA		
WF3	DISA		
WF4	DISA		
RO	DISA	OHMM	OHMM
BILI	DISA		
BI	DISA		
SATT	DISA	DB/F	DB/F

FILE 3 13-SEP-85 02:56

SONI SUMM :

SONI	STAT	PUNI	TUNI	VALU
ITTD				NEIT
MODE				UT
RATE		HZ	HZ	15 HZ
DG				/20
DG1W				/20
DG2W				/20
DG3W				/20
DG4W				/20
AGC	ALLO			*
GAIN				2.00000
MGAI				16.0000
DETE				E1
NC	DISA			*
SGAD	DISA			*
MMSG		US	US	346 US
FMSG		US	US	437 US
SGH		US	US	80 US
FD	DISA			*
CBLG		US	US	35 US
AMPL				2
CBL				2
WFM				1
VDLD				2
WFD				1
WFS		F	F	3 F
SS				MEDI
TC				1
TOD	ALLO			*
DTT	DISA			*
LMOD				DT

FILE 3 13-SEP-85 02:56

CONS SUMM :

CONS	STAT	PUNI	TUNI	VALU
DIFF		F	F	1.00000 F
EDS				PROP
CDS				ALL
UCON	ALLO			*
OMD				UP
LSN				0
CSD				FILM
LD				FILM
PANM				ALL
SPEE		F/HR	F/HR	6000 F/HR
PP				NORM
CGM				NORM
POS		F	F	0.0 F
E		LB-1	LB-1	7.43000E-7 LB-1
TREF		LB	LB	1000.00 LB
MARK	DISA			*
CMDT				IDW
DIRE				AUTO
BS		MM	MM	311.200 MM
RW		OHMM	OHMM	1.00000 OHMM
BHS				CASE
CSIZ		MM	MM	339.700 MM
IHVD				NEIT
SD		M	M	2496.92 M
FNUM				1.00000
FEXP				2.00000
FPHI				PHIX
SIMU	DISA			*
ITTD				NEIT
DTF		US/M	US/M	620.079 US/M
DTM		US/M	US/M	183.727 US/M
CDTS				100.000
DWCO	ALLO			512
DSIN	ALLO	US	US	5 US
DDEL	ALLO	US	US	200 US
VWF	ALLO			BHC
DWF				ALL
WSV1	ALLO			WF1
DWS	ALLO			16
CSTR		PSIA	PSIA	3000.00 PSIA
CWEI		KG/M	KG/M	107.140 KG/M
ZID				NEIT
BILI				.800000
MCI		M	M	6.60638 M
MSA		MV	MV	6.00000 MV
KPDU				METE
ORDU				METE
MMDU				METE
PF				SHOR
YEAR				85
MONT				9
DAY				13

FILE 3 13-SEP-85 02:57

PRES SUMM :

PRES	OUTP	STAT	CHAN	TRAC	CODI	DEST	MODE	FILT	LEDG	REDG
GR	GR	ALLO	0	T1	LLIN	BOTH	SHIF	.500	0.0	100.000
BI	BI	ALLO	1	T2	LLIN	1	NB	.500	1.00000	0.0
BILI	BILI	ALLO	2	T2	LLIN	NEIT	NB	.500	1.00000	0.0
TT2	TT2	ALLO	3	T1	LDAS	BOTH	SHIF	.500	700.000	300.000
4	DUMM	DISA	4	T1	LLIN	NEIT	NB	.500	0.0	1.00000
5	DUMM	DISA	5	T1	LLIN	NEIT	NB	.500	0.0	1.00000
6	DUMM	DISA	6	T1	LLIN	NEIT	NB	.500	0.0	1.00000
7	DUMM	DISA	7	T1	LLIN	NEIT	NB	.500	0.0	1.00000
CBL	CBL	ALLO	8	T2	LLIN	2	SHIF	.500	0.0	100.000
ACBL	CBL	ALLO	9	T2	LDAS	2	NB	.500	0.0	20.0000
10	DUMM	DISA	10	T1	LLIN	NEIT	NB	.500	0.0	1.00000
11	DUMM	DISA	11	T1	LLIN	NEIT	NB	.500	0.0	1.00000
12	DUMM	DISA	12	T1	LLIN	NEIT	NB	.500	0.0	1.00000
13	DUMM	DISA	13	T1	LLIN	NEIT	NB	.500	0.0	1.00000
14	DUMM	DISA	14	T1	LLIN	NEIT	NB	.500	0.0	1.00000
15	DUMM	DISA	15	T1	LLIN	NEIT	NB	.500	0.0	1.00000
16	DUMM	DISA	15	T1	LLIN	NEIT	NB	.500	0.0	1.00000
17	DUMM	DISA	15	T1	LLIN	NEIT	NB	.500	0.0	1.00000
18	DUMM	DISA	15	T1	LLIN	NEIT	NB	.500	0.0	1.00000
19	DUMM	DISA	15	T1	LLIN	NEIT	NB	.500	0.0	1.00000

COMPANY CANTERRA ENERGY LTD.

WELL TRILLIUM SOQUIP ONEXCO ET AL BELUGA 0-23

FIELD HUDSON BAY PROVINCE MANITOBA

Schlumberger

Dual Induction Spherically Focused Log

Schlumberger

COMPANY: CANADIAN SUPERIOR LTD.

WELL: 6-12

FIELD: WABASH EAST

PROVINCE: ALBERTA

Other Services: CNL-FDC-GR

Permanent Datum: GROUND LEVEL
Log Measured From: KB 12.0 m above Perm. Datum
Drilling Measured From: KB

Date	15-Jan-85			
Run Number	ONE			
Depth Driller (Feet)	1520.0	m		
Depth Logger (Feet)	1522.0	m		
Bottom Logged Interval	1522.0	m		
Top Logged Interval	1000.0	m		
Casing Driller	139.7	mm @ 0.00	m	m
Casing Logger	139.7	mm @ 0.00	m	m
Bit Size	114.3	mm		
Type Fluid in Hole	WATER			
Density	1.0	g/cm³		
Viscosity	40.0	s		
Fluid Loss	10.0	cm³		
Source of Sample	FLOWLINE			
Rm @ Measured Temp	0.200	@ 21.0	°C	
Rmf @ Measured Temp	0.200	@ 21.0	°C	
Rmc @ Measured Temp	0.200	@ 21.0	°C	
Source: Rmf / Rmc	FLOWLINE / CALC			
Rm @ BHT	0.200	@ 71.0	°C	
Time Since Circulation	12.0	hrs		
Max. Recorded Temp.	71.0	°C		
Equipment Number	5-DIL-NOCHIN			
Location	EDMONTON			
Recorded By	MAGNUSON			
Witnessed By	MR. BOSWORTH			

DUAL INDUCTION
SPHERICALLY FOCUSED LOG

Schlumberger

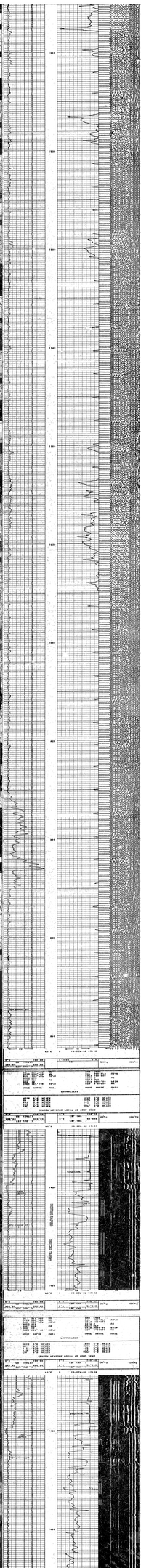
DUAL INDUCTION SPHERICALLY FOCUSED LOG
CANADIAN SUPERIOR LTD.
6-12
WABASH EAST
ALBERTA

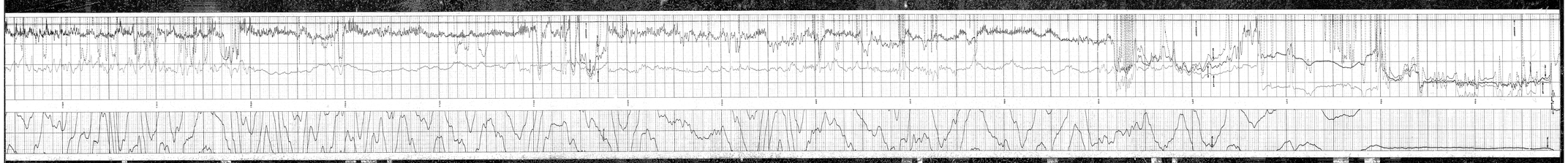
RUN ONE
DATE 15-JAN-85
DEPTH DRILLER 1520.0 m
DEPTH LOGGER 1522.0 m
BOTTOM LOGGED INTERVAL 1522.0 m
TOP LOGGED INTERVAL 1000.0 m
CASING DRILLER 139.7 mm @ 0.00 m
CASING LOGGER 139.7 mm @ 0.00 m
BIT SIZE 114.3 mm
TYPE FLUID IN HOLE WATER
DENSITY 1.0 g/cm³
VISCOSITY 40.0 s
PH
FLUID LOSS 10.0 cm³
SOURCE OF SAMPLE FLOWLINE
RM @ MEASURED TEMP 0.200 @ 21.0 °C
RMF @ MEASURED TEMP 0.200 @ 21.0 °C
RMC @ MEASURED TEMP 0.200 @ 21.0 °C
SOURCE: RMF / RMC FLOWLINE / CALC
RM @ BHT 0.200 @ 71.0 °C
TIME SINCE CIRCULATION 12.0 hrs
MAX. RECORDED TEMP. 71.0 °C
EQUIPMENT NUMBER 5-DIL-NOCHIN
LOCATION EDMONTON
RECORDED BY MAGNUSON
WITNESSED BY MR. BOSWORTH

RUN TYPE IN HOLE
BIT SIZE
FLUID TYPE
FLUID LOSS
DENSITY
VISCOSITY
PH
RM @ MEASURED TEMP
RMF @ MEASURED TEMP
RMC @ MEASURED TEMP
SOURCE RMF / RMC
RM @ BHT
TIME SINCE CIRCULATION
MAX. REC. TEMP
EQUIP. NO.
LOCATION
RECORDED BY
WITNESSED BY

CASING DRILLER
CASING LOGGER
BOTTOM LOGGED INTERVAL
TOP LOGGED INTERVAL
CASING SIZE
TUBING SIZE
TUBING WGT.
PACKER
TOTAL DEPTH

DATE 15-JAN-85
TIME 11:00:00 AM
DEPTH 1000.0 m
DATE 15-JAN-85
TIME 11:00:00 AM
DEPTH 1000.0 m


LATE
EARLY
SUMMARY
REVERSE REVERSING WATER LEG LOOP SEAWS
SEAWS RECORDS
SEAWS RECORDS
SUMMARY
REVERSE REVERSING WATER LEG LOOP SEAWS



```
                                                    TENSION
                                                    BOSSY          V.S
                                                    ILR (DOWN)
SP  -100  1
1:100 V.S.  BOSSY                                   SFL(DOWN)
```

SENSOR MEASURE POINT TO TOOL ZERO

CBL	14.0	METER	GPM1	14.0	METER
TT1	14.0	METER	TT2	14.0	METER
TT3	14.0	METER	TT4	14.0	METER
ILR	14.0	METER	SFL	14.0	METER
ILM	14.0	METER	SP	14.0	METER
MSS1	14.0	METER	TEN	14.0	METER

PARAMETERS

NAME	VALUE	UNIT	NAME	VALUE	UNIT
WTR1	WT1		BS1	16	
BSZ1	16		BSS1	BSS	
BSZ	BSZ		BSZ	BSZ	
BTF	1.00000		BTF	1.00000	
BTF	1.00000	ULIM	BTF	1.00000	ULIM
BTF	1.00000	DWNH	BTF	1.00000	DWNH
MSS1	0.0000		MSS1	0.0000	
BS	274.000	MM	BS	274.000	MM

```
                                                    TENSION
                                                    BOSSY          V.S
                                                    ILR (DOWN)
SP  -100  1
1:100 V.S.  BOSSY                                   SFL(DOWN)
```

SENSOR MEASURE POINT TO TOOL ZERO

CBL	14.0	METER	GPM1	14.0	METER
TT1	14.0	METER	TT2	14.0	METER
TT3	14.0	METER	TT4	14.0	METER
ILR	14.0	METER	SFL	14.0	METER
ILM	14.0	METER	SP	14.0	METER
MSS1	14.0	METER	TEN	14.0	METER

PARAMETERS

NAME	VALUE	UNIT	NAME	VALUE	UNIT
WTR1	WT1		BS1	16	
BSZ1	WT1		BSS1	BSS	
BSZ	BSZ		BSZ	BSZ	
BTF	1.00000		BTF	1.00000	
BTF	1.00000	ULIM	BTF	1.00000	ULIM
BTF	1.00000	DWNH	BTF	1.00000	DWNH
MSS1	0.0000		MSS1	0.0000	
BS	274.000	MM	BS	274.000	MM

```
                                                    TENSION
                                                    BOSSY          V.S
                                                    ILR (DOWN)
SP  -100  1
1:100 V.S.  BOSSY                                   SFL(DOWN)
```

SENSOR MEASURE POINT TO TOOL ZERO

CBL	14.0	METER	GPM1	14.0	METER
TT1	14.0	METER	TT2	14.0	METER
TT3	14.0	METER	TT4	14.0	METER
ILR	14.0	METER	SFL	14.0	METER
ILM	14.0	METER	SP	14.0	METER
MSS1	14.0	METER	TEN	14.0	METER

PARAMETERS

NAME	VALUE	UNIT	NAME	VALUE	UNIT
WTR1	WT1		BS1	16	
BSZ1	WT1		BSS1	BSS	
BSZ	BSZ		BSZ	BSZ	
BTF	1.00000		BTF	1.00000	
BTF	1.00000	ULIM	BTF	1.00000	ULIM
BTF	1.00000	DWNH	BTF	1.00000	DWNH
MSS1	0.0000		MSS1	0.0000	
BS	274.000	MM	BS	274.000	MM

```
AFTER SURVEY TOOL CHECK SUMMARY

  PERFORMED:      05/08/15
  PROGRAM FILE: SEBHC  :VERSION    06.0   03/11/17>

S170                TOOL CHECK
                    ZERO
                    BEFORE      AFTER        BEFORE  TLIM     UNITS
  ILR               0.0         0.0          48.5K   48.5K    MMHO
  ILM               0.0         0.0          49.0    49.0     MMHO
  SFL               0.0         0.0          50.0    50.0     MMHO
                                               0.0     0.0    MMHO
  ILR SENSE CHANGE CORRECTION :      0.0 MMHO
  ILM SENSE CHANGE CORRECTION :      0.0 MMHO

                                  FILE    5        15-AUG-95 09:32

                    BEFORE SURVEY CALIBRATION SUMMARY

  PERFORMED:      05/08/15
  PROGRAM FILE: SEBHC  :VERSION    06.0   03/11/17>

S170                ELECTROMETICS CALIBRATION SUMMARY
                    MEASURED                CALIBRATED
                    ZERO     FLUID          ZERO     FLUID        UNITS
  ILR               0.0      1.0            0.0      1.0          MMHO
  ILM               0.0      50.0           0.0      50.0         MMHO
  SFL               0.0      50.0           0.0      50.0         MMHO
  ILR SENSE CHANGE CORRECTION :      0.0 MMHO
  ILM SENSE CHANGE CORRECTION :      0.0 MMHO

                    SHOP SUMMARY

  PERFORMED:      05/07/17
  PROGRAM FILE: SHOP   :VERSION    06.0   05/11/17>

S170                ELECTROMETICS CALIBRATION SUMMARY
                    TEST SHOP CALIBRATION          TOOL CHECK
                    MEASURED        CALIBRATED     CALIBRATED
                    ZERO     FLUID  ZERO     FLUID  ZERO     FLUID   UNITS
  ILR               0.0      1.0    0.0      1.0    0.0      1.0     MMHO
  ILM               0.0      50.0   0.0      50.0   0.0      50.0    MMHO
  ILR SENSE CHANGE CORRECTION :      0.0 MMHO
                                  FILE    1        15-AUG-95 07:22

                    (SS14446: SS2A1 )

  TOOL SUMM >
  TOOL  START LOGS  VECS

  RSR   ALLS 0     0
  RSR   ALLS 0     0
  RSR   ALLS 0     0
  S170  ALLS 0A    0A   SHP
  S170  ALLS 0A    0A   SHP
  S170  ALLS 0     0    SHP
  S170  ALLS 4S    4S   LSS

                                  FILE    2        15-AUG-95 07:22

  SMPL SUMM >
  SMPL  START FUNC TUNS HPS1  CHUN  SMEP   PREF   GAIN   OFFS   DCSM

  MSS1  ALLS RV    RV   S    14
  GPM1  ALLS RV    RV   S    14
  GPM2  ALLS RV    RV   S    14                              5.0
  TT1   ALLS RV    RV   S    14
  TT2   ALLS RV    RV   S    14
  BS    ALLS (SAF) (SF) 4S   S     255.0  304.8   .700000 LR.BSAL
  BTF   ALLS (SAF) (SF) 4S   S     400.0          4.57000 LR.BTF
  BSZ   ALLS (SAF) (SF) 4S   S     400.0          .700000 LR.BSZ
  ILR   ALLS DWN DWN DWNH DWN  15   S     500.0  .700000 LR.ILR
  ILM   ALLS DWN DWN DWNH DWN  15   S     500.0  .700000 LR.ILM
  TT3   ALLS RV    RV   S    14                          1.00000 T.S
  TT4   ALLS RV    RV   S    14
  TT5   ALLS RV    RV   S    14
  GPM3  ALLS RV    RV   S    14
  GPM4  ALLS RV    RV   S    14
  GPM5  ALLS RV    RV   S    14

                                  FILE    3        15-AUG-95 07:22

  DIFF SUMM >
  DIFF  STAT FUNC TUNS TMAU

  DIFF  S    R    R
  TTM   ALLS S    R    R
  TTMC  ALLS RS   RS   R
  TTM   ALLS RS   RS   R
  TTMC  ALLS RS   RS   R
  TTM   ALLS F/VR F/VR

  ERROR
  MSSE  ALLS R    R    R
  MSSE  ALLS RV   RV   RV
  MSSE  ALLS RV   RV   RV
  MSSE  ALLS RV   RV   RV
  MSSE  ALLS RV   RV   RV
  ATC   ALLS DWN  DWN  DWN
  ATC   ALLS DWN  DWN  DWN
  BIAS  BIAS DW   DW   DW
  BIAS  BIAS DW   DW   DW
  BIAS  BIAS DW   DW   DW
  BS    ALLS (SAF) (SF)
  BS    ALLS (SAF) (SF)
  ILR   ALLS DWNH DWNH
  ILR   ALLS DWNH DWNH
  ILR   ALLS DWNH DWNH
  ILR   ALLS DWNH DWNH
  ILR   ALLS DWNH DWNH
  ILR   ALLS DWNH DWNH
  ILR   ALLS DWNH DWNH
  ILR   ALLS DWNH DWNH
  ILR   ALLS DWNH DWNH
  ILR   ALLS DWNH DWNH
  TT1   ALLS US   US   S
  TT2   ALLS US   US   S
  TT3   ALLS US   US   S
  TT4   ALLS US   US   S
  TT5   ALLS US   US   S
  TSL   ALLS RV   RV   RV
  TSL   ALLS RV   RV   RV
  TSL   ALLS RV   RV   RV
  TSL   ALLS UL/R UL/R
  GPM   ALLS R    R    R
  GPM   ALLS R    R    R
  GPM   BIAS
  GPM   BIAS
  GPM   BIAS
```

PROVINCE MANITOBA
FIELD HUDSON BAY
WELL TRILLIUM SOQUIP ONEXCO ET AL BELUGA 0-23
COMPANY CANTERRA ENERGY LTD.

LOCATION
Lsd. Sec. Twp. Rge.
59° 12' 54.4" NORTH LATITUDE
88° 31' 26.6" WEST LONGITUDE

Other Services: BHC-GR, NGT, CST, RFT, WST, CBL-VDL, COMP. CYBER, SHDT

Elev.: K.B. 137.7 m
D.F. 135.7 m
G.L. 133.8 m

Permanent Datum: MSL
Log Measured From: KB 12.7 m Above Perm. Datum

Run	Date	Time	Depth Driller	Depth Logger	Bottom Log Interval	Top Log Interval	Casing Driller	Casing Logger	Bit Size	Type Fluid in Hole	Density	Viscosity	Fluid Loss	Source of Sample	Rm @ Meas. Temp	Rmf @ Meas. Temp	Rmc @ Meas. Temp	Source Rmf/Rmc	Rm @ BHT	Rmf @ BHT	Rmc @ BHT	Max. Rec. Temp	Equip. Location	Recorded By	Witnessed By
ONE	11 SEP 85	Clock	2215.0 m	2215.0 m	2214.0 m	2214.0 m	2214.0 m	2214.0 m	311.2 mm	SEE BELOW	1282 kg/m3	35.0 s	11.0 cc	CIRCULATION	0.060 @ 20.0 C	0.048 @ 22.0 C	0.166 @ 21.0 C	PRESS / PRESS	0.048 @ 30.0 C	0.040 @ 30.0 C	0.137 @ 30.0 C	30.0 C	922	DEBB	L. ZANUSSI
TWO	12 NOV 85	Clock	1477.0 m	1477.0 m	1477.0 m	1477.0 m	339.7mm@178 kg/m																922	DEBB	L. ZANUSSI

12 NOV 85 CAL AK
OTHER SERVICES: DLL-MSFL, BHC-GR, NGT, CST, RFT, WST, CBL-VDL, COMP. CYBER, SHDT
PROGRAM TAPE NO: 28.15
SERVICE ORDER NO: 129404
CASING WEIGHT: 107.147 kg/m

TYPE FLUID IN HOLE: NACL SATURATED GEL POLYMER
DENSITY: 1282. K/M3
VISCOSITY: 35.0 S
PH: 11.0
FLUID LOSS: 29.0 C3
SOURCE OF SAMPLE: CIRC.
RM: .060 OHMM AT 20.0 DEGC
RMF: .048 OHMM AT 22.0 DEGC
RMC: .166 OHMM AT 21.0 DEGC
SOURCE RMF/RMC: PRESS /PRESS
RM AT BHT: .048 OHMM AT 30.0 DEGC
RMF AT BHT: .040 OHMM AT 30.0 DEGC
RMC AT BHT: .137 OHMM AT 30.0 DEGC

TIME CIRC. STOPPED: 00:40 / 12
TIME LOGGER ON BTM.: 14:00 / 12

MAX. REC. TEMP: 30.0 DEGC

LOGGING UNIT NO: 922
LOGGING UNIT LOC: ST. JOHN'S
RECORDED BY: DEBB
WITNESSED BY: L. ZANUSSI

REMARKS:

CNL BOWSPRING RUN
90 DEGREE OFFSET RUN
DRILLING STOPPED @ 23:30 / 11

EQUIPMENT NUMBERS-

TCM-AB 533	TCC-A 553	DRS-C 5786	NSC-E 998
PDM-L 3955	PGD-G 3976	GSR-J 7245	CNC-H 386
CNS-AB 3144	NGC-C 1915	NGD-B 752	AMM-A 813

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 OUR GENERAL TERMS AND CONDITIONS AS SET OUT IN OUR CURRENT PRICE SCHEDULE.

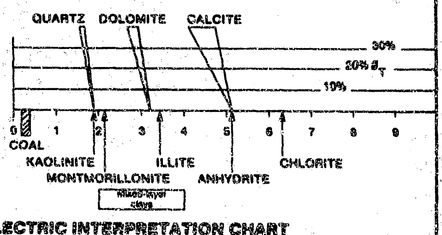
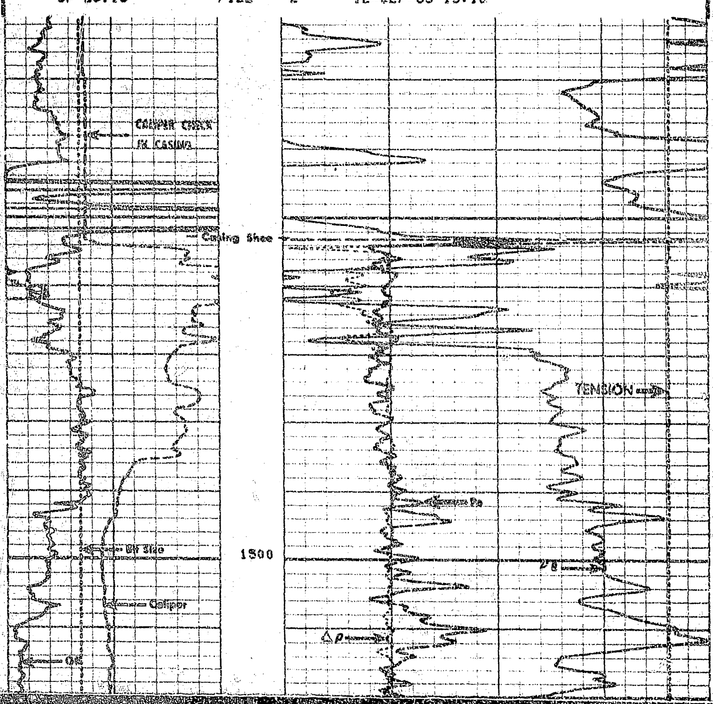
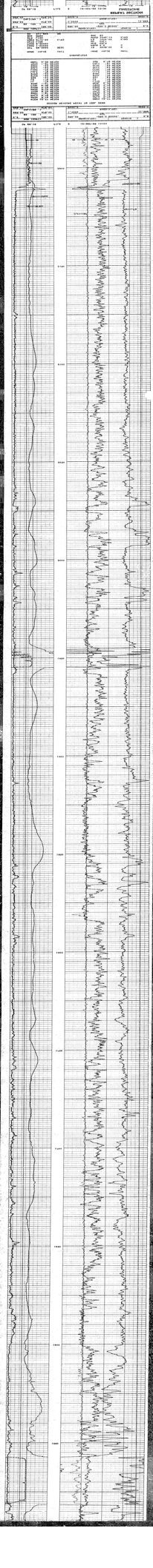


PHOTO ELECTRIC INTERPRETATION CHART

SGR (GAPI)		DRHO(K/M3)		TENS(N)	
0.0	150.00	250.00	-250.0	50000.	0.0
AS (MM)		PEF			
225.00	475.00	1.0000			11.000
CALI(MM)		RHOB(K/M3)			
225.00	475.00	2000.0			3000.0

CP 28.15 FILE 2 12-SEP-85 15:16




FINTSCHE
GEOPHY. INSTRUMENTS
DIVISION OF
GENERAL DYNAMICS CORPORATION
SEISMIC SERIAL LOG CHART SERIES
SEISMIC SERIAL LOG CHART SERIES
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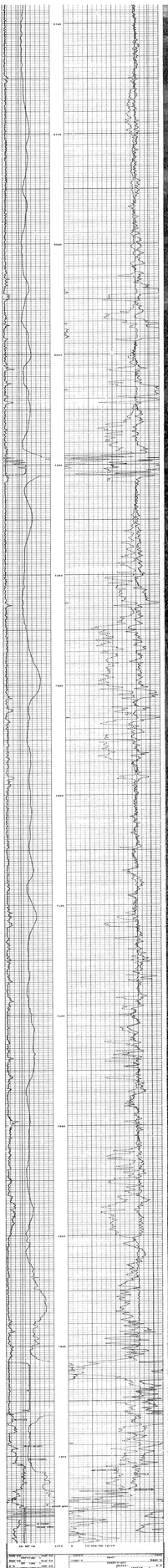
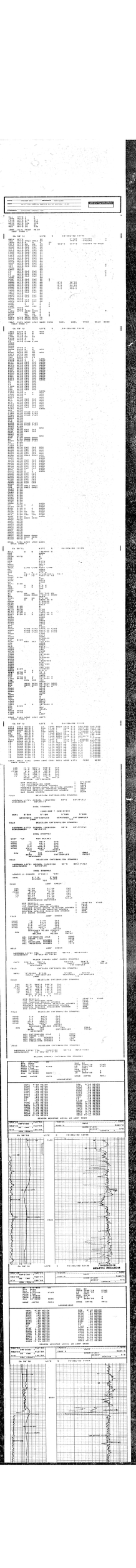
2800
2900
3000


SHELL OIL COMPANY
SHELL-STEELMAN HEADWATERS "A" NO. 1
SHELL-STEELMAN HEADWATERS "A" NO. 1
SHELL-STEELMAN HEADWATERS "A" NO. 1

WELL:	CHEVRON ARCO COMPANY - WELL LONG
FIELD:	CALIFORNIA AMERICA TRACT 6 L.C. AT 0000 - 0.00
COUNTY:	CHEVRONS CHEVRON CO.



WELL	16-AUG-95		
FIELD			
COMPANY			

8910-655-1-1

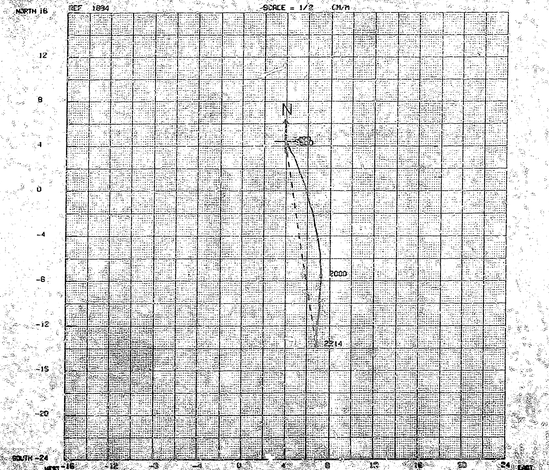
SCHLUMBERGER

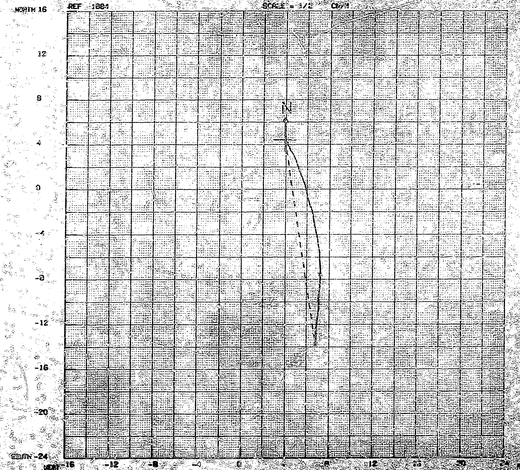
DIRECTIONAL SURVEY

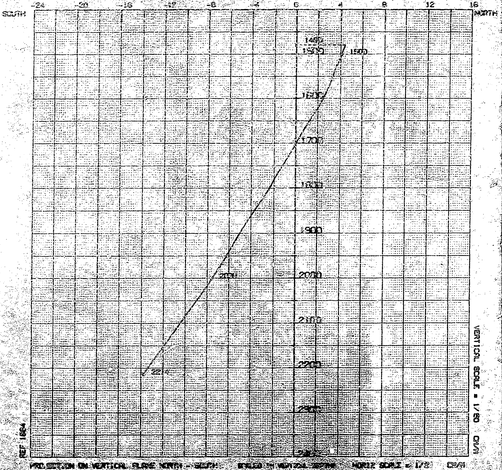
COMPANY	CANTERRA ENERGY LTD.
WELL	TRILLIUM SOQUIP ONEX
FIELD	HUDSON BAY
COUNTRY	BELUGA O-23
RUN	2
DATE LOGGED	12 - SEP - 8[illegible]
REFERENCE	1884

OCT 11 1985

SURVEY IS TIED-IN TO RUN NO.1 AT 1480 METERS







F10-G55-17

SCHLUMBERGER

ARROW PLOT

MAY 25 1995
RECEIVED

COMPANY CANTERRA ENERGY LTD.

WELL TRILLIUM SOUTH
NORTH 6 N, NORTH 5-3

FIELD HUDSON BAY

COUNTRY 59 12' 54.4"N/98 33' 26.6"

RUN 1

DATE LOGGED 15 - AUG - 95

REFERENCE 1594

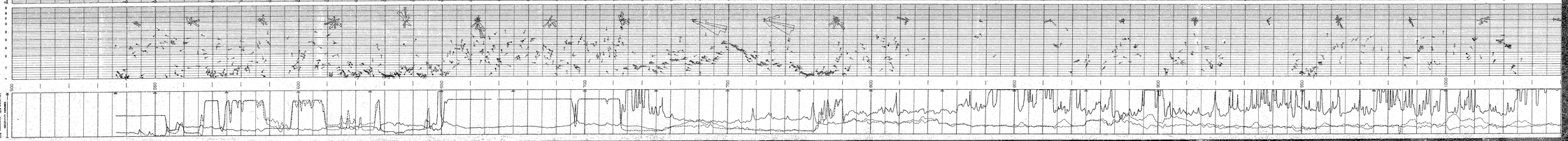
MAGNETIC DECLINATION 0° East

SCALE 1/240

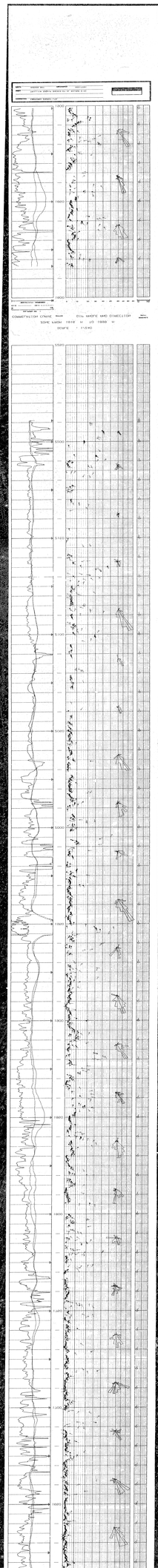
ZONE FROM 500 M TO 1487 M

DIP ANGLE AND DIRECTION

CORRELATION CURVE



SCHLUMBERGER
PROVE PLOT
COMPANY CHEVRON CHOKEN E.P.O.
WELL TRIPLUM DEEPER
BOSSIT & BONITO
FIELD MESSIN BAY
COUNTY MOBA
STATE
RUN 2
DATE LOGGED 12 - NOV - 88
DEPTH UNIT
CONDUCTIVITY CHANGE mmho
DIFF. CONDUCTIVITY CHANGE mmho
TEMP. CHANGE DEG. C
DIFF. TEMP. CHANGE DEG. C
DATE CHANGE
TIME CHANGE
DIFF. DATE CHANGE
DIFF. TIME CHANGE
CHOKE SIZE
DIFF. CHOKE SIZE
CHOKE ADJUST
DIFF. CHOKE ADJUST
DIFF. DATE CHANGE
DIFF. TIME CHANGE
DIFF. CHOKE SIZE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2000
5300
5200
5100
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4900
1700
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1600
1700
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1900
2000

ΔΙΟΙΚΗΣΗ : ΕΓΚΑΤΑΣΤΑΣΗ ΤΗΣ ΓΕΩΓΡΑΦΙΚΗΣ ΥΠΗΡΕΣΙΑΣ ΤΟΥ ΔΗΜΟΥ ΚΑΛΑΜΑΤΑΣ

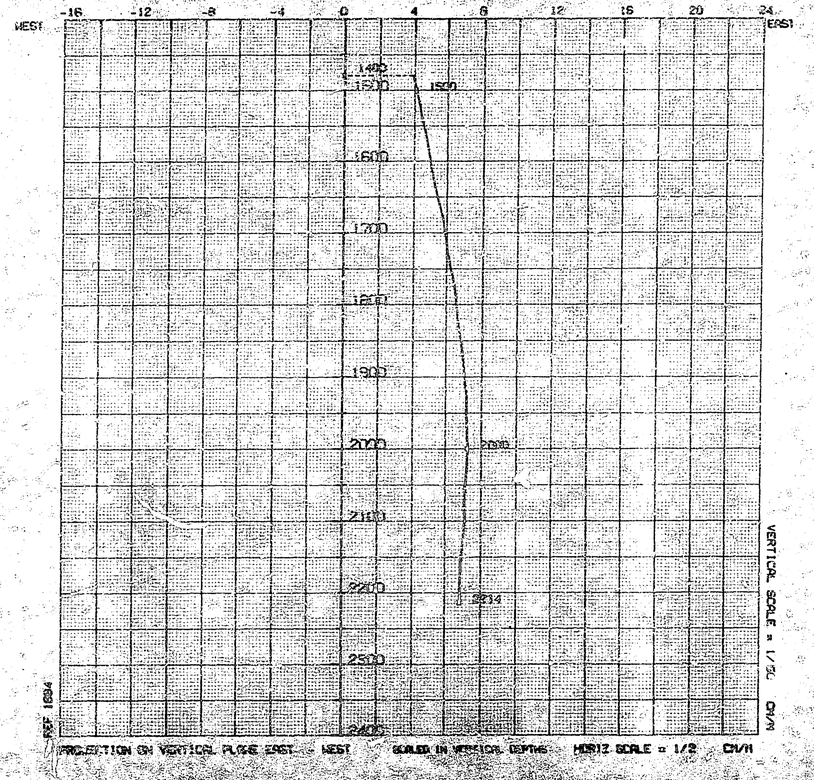
ΔΙΕΥΘΥΝΣΗ : ΤΕΧΝΙΚΗ ΥΠΗΡΕΣΙΑ ΔΗΜΟΥ ΚΑΛΑΜΑΤΑΣ

ΔΙΟΙΚΗΤΗΣ : ΔΗΜΑΡΧΟΣ ΚΑΛΑΜΑΤΑΣ

ΑΔΕΙΑ ΕΚΤΕΛΕΣΗΣ ΕΡΓΩΝ

ΑΔΕΙΑ ΕΚΤΕΛΕΣΗΣ ΕΡΓΩΝ

ΕΠΙΒΛΕΠΩΝ ΜΗΧΑΝΙΚΟΣ : ΚΩΝΣΤΑΝΤΙΝΟΣ ΚΑΡΑΜΠΑΤΖΑΚΗΣ



EXACT RADIUS OF CURVATURE METHOD

TIE-IN LOCATION

MEASURED DEPTH	1480.0	M
TRUE VERTICAL DEPTH	1479.9	M
DISTANCE NORTH	4.4	M
DISTANCE EAST	3.9	M

BOTTOM HOLE LOCATION

COURSE LENGTH	15.4	M
COURSE AZIMUTH	153.6	DEG
MEASURED DEPTH	2214.0	M
TRUE VERTICAL DEPTH	2213.7	M
DISTANCE SOUTH	13.8	M
DISTANCE EAST	6.8	M

REF 1884

NATURAL GAMMA-RAY SPECTROSCOPY LOG

CSU

COMPANY: CANTERRA ENERGY LTD.
WELL: TEILLIUM TOOLIF ONEXED ET AL BELUGA D-23
FIELD: HUDSON BAY
PROV.: MANITOBA
NATION: CANADA
LOCATION:
SEC: TWP: RGE:
LATITUDE: 59 15° 54.47" N
LONGITUDE: 98 39° 04.5" W
PERMANENT DATUM: M.S.L. ELEVATION:
LOG MEASURED FROM: KELLY BUSHING ELEV. 0.0 M
LOG MEASURED FROM: K.B. ABOVE PERM. DATUM
13.7 M ABOVE PERM. DATUM GL: -173.0 M
DRILL MEASURED FROM: KELLY BUSHING

OTHER SERVICES:
BLL-HRFL
BPI
CNL-LST-HGT
DHDT
CIT
HGT

PROGRAM
TAPE NO:
SERVICE ORDER NO:
12945

DATE: 13 SEP 85
RUN NO:: 2

DEPTH-DRILLER: 1692.0 M
DEPTH-LOGGER: 1696.0 M
BOTTOM LOG INTERVAL: 1695.0 M
TOP LOG INTERVAL: 1486.0 M

CASING-DRILLER: 208 M 177.8 M
CASING-LOGGER: 208 M 177.8 M
BIT SIZE: 244.5 MM 311.1 MM
CASING: 244.5 MM 311.1 MM
WEIGHT: 192.5 KG/M 157.1 KG/M
BIT SIZE: 244.7 MM 311.0 MM

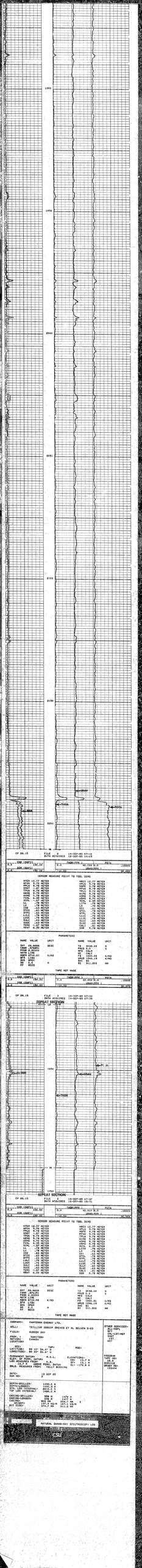
TYPE FLUID IN HOLE: FRESH SATURATED GEL POLYMER
FLUID LEVEL: FULL
PRIORITY: 1
PUMPING: PUMPING
PRESENCE OF SAMPLE: NO
PH: 9.0
FLUID LOSS: 0 CC
PRESSURE: 0 KPA
PRESENCE OF OIL: NO
PRESENCE OF WATER: NO
PRESENCE OF GAS: NO
MAX. REC. TEMP.: 36.0 DEGC
TIME CIRC. STOPPED: 04:40:20
TIME LOGGER ON BOTTOM: 09:40:20
LOGGING UNIT NO.: 3126
LOGGING ENGINEER: D.L.HALL
WITNESS BY: L.DUNDESS

REMARKS:

EQUIPMENT NUMBER: TCC-B 593 NGC-C 1915 HGD-A 730
TCM-AB 938

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 INTERPRETATION, AND WE SHALL NOT 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 OUR TERMS AND CONDITIONS AS SET FORTH IN OUR CURRENT PRICE SCHEDULE.

DATE ACCEPTED: 13 SEP 85
DATE PROCESSED: 13 SEP 85
DATE PRINTED: 13 SEP 85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1950
2007
2052
2100
2150
2200
2250
2300
CP 26.15
FILE 3
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14-SEP-05 16:51
CHP/CNPI1 36.06
TEMPERATURE 1
9.3 46.998 9.4 PDTA
SGR/GRPI1 36.02
GRAVITY 1
-19.68 21.652
SENSOR MEASURE POINT TO TOOL ZERO
HTEN 12.77 METER
HMNO 12.77 METER
HFLA 12.77 METER
SNRT 1.67 METER
SPRT 1.67 METER
HGNR 9.78 METER
HGNR 9.78 METER
CCNL 1.58 METER
HCNL 1.58 METER
HCAL 1.58 METER
LS .78 METER
SS .78 METER
HTNS 1.58 METER
HTNS 1.58 METER
LSUC .78 METER
SSUC .78 METER
HSUC 1.58 METER
HSUC 1.58 METER
SGNC .67 METER
HGNC .67 METER
SGNR 9.78 METER
HGNR 9.78 METER
PP RCOD
PARAMETERS
NAME VALUE UNIT
SHT 26.6666 DEGC
FBHN 17.9201
FBHT 17.9201
HCOR LINE
HCOR LINE .45 K/MD
BFS LINE
BFS 2.00
PP RCOD
TAPE NOT MADE
CHP/CNPI1 36.06
TEMPERATURE 1
9.3 46.998 9.4 PDTA
SGR/GRPI1 36.02
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FILE 3
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2007
2052
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2300
CP 26.15
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9.3 46.998 9.4 PDTA
SGR/GRPI1 36.02
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SENSOR MEASURE POINT TO TOOL ZERO
HTEN 12.77 METER
HMNO 12.77 METER
HFLA 12.77 METER
SNRT 1.67 METER
SPRT 1.67 METER
HGNR 9.78 METER
HGNR 9.78 METER
CCNL 1.58 METER
HCNL 1.58 METER
HCAL 1.58 METER
LS .78 METER
SS .78 METER
HTNS 1.58 METER
HTNS 1.58 METER
LSUC .78 METER
SSUC .78 METER
HSUC 1.58 METER
HSUC 1.58 METER
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HGNC .67 METER
SGNR 9.78 METER
HGNR 9.78 METER
PP RCOD
PARAMETERS
NAME VALUE UNIT
SHT 26.6666 DEGC
FBHN 17.9201
FBHT 17.9201
HCOR LINE
HCOR LINE .45 K/MD
BFS LINE
BFS 2.00
PP RCOD
TAPE NOT MADE
CHP/CNPI1 36.06
TEMPERATURE 1
9.3 46.998 9.4 PDTA
SGR/GRPI1 36.02
GRAVITY 1
-19.68 21.652
REPEAT SECTION
CP 26.15
FILE 3
DATE MODIFIED 14-SEP-05 07:37
14-SEP-05 16:51
CHP/CNPI1 36.06
TEMPERATURE 1
9.3 46.998 9.4 PDTA
SGR/GRPI1 36.02
GRAVITY 1
-19.68 21.652
SENSOR MEASURE POINT TO TOOL ZERO
HTEN 12.77 METER
HMNO 12.77 METER
HFLA 12.77 METER
SNRT 1.67 METER
SPRT 1.67 METER
HGNR 9.78 METER
HGNR 9.78 METER
CCNL 1.58 METER
HCNL 1.58 METER
HCAL 1.58 METER
LS .78 METER
SS .78 METER
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HTNS 1.58 METER
LSUC .78 METER
SSUC .78 METER
HSUC 1.58 METER
HSUC 1.58 METER
SGNC .67 METER
HGNC .67 METER
SGNR 9.78 METER
HGNR 9.78 METER
PP RCOD
PARAMETERS
NAME VALUE UNIT
SHT 26.6666 DEGC
FBHN 17.9201
FBHT 17.9201
HCOR LINE
HCOR LINE .45 K/MD
BFS LINE
BFS 2.00
PP RCOD
TAPE NOT MADE
COMPANY: CONTINENTAL ENERGY LTD.
WELL: TRILLIUM SURGUY SNOWES ET AL BELOW D-93
FIELD: MUSKEG DAY
PROV.: MANITOBA
LOCATION: SUNDEA
SEC: TWP: RGE:
LATITUDE: 56 15' 24.0" N
LONGITUDE: 101 56' 24.0" W
PERMANENT DATUM: P.L.L. ELEVATION:
ELEV. OF PERM. DATUM: 0.0 M KB: 0.0 M
LOG MEASURED FROM: DF: 0.0 M
DRILL MEASURED FROM: KELLY BUSHING GL: -19.68 M
DATE: 14 SEP 05
RUN NO.:
DEPTH-DRILLER: 1652.0 M
DEPTH-LOGGER: 1652.0 M
BTM. LOG INTERVAL: 1652.0 M
TOP LOG INTERVAL: 1646.2 M
CASING-DRILLER: 508 M @ 1478 M
CASING-LOGGER: 508 M @ 1478 M
BIT SIZE: 216.0 MM @ 508.0 MM
TYPE FLUID: WATER WT: 1.00 KG/M3
FLUID LEVEL: 0.0 M VIS: 0.0 MPA.S
PH: 7.00 FLUID LOSS: 0.0 CC
MAX. REC. TEMP.: 0.0 DEGC
EQUIPMENT NO.: 1474
LOCATION: 0
RECORDED BY: 0
WITNESSED BY: 0
OTHER SERVICES: DLL-MSFL
BHC-GR
CNL-LDT-HNGT
NGT
DST
PROGRAM VERS: 1.0
TAPE NO: 0
DATE: 14-SEP-05
SPEED: 30M-30MPH
NATURAL GAMMA-RAY SPECTROSCOPY LOG
CSI

CHAN - STATION
CONNECTION CHANS
DATE (YOOOO) 15 - 001
RUN 5
COUNTRY BELGIUM-B-03
FIELD HUDSON BAY
REC. BRITISH SEISMIC DECK
COMPANY CANADIAN CHEMICAL LTD.
SEISMIC PLOT
SCHLUMBERGER
DATA SEISMIC
REFERENCE NBN

7710-CSS-1-1

ABANDONMENT RECORD

CSU

COMPANY: CANTERRA ENERGY LTD.

WELL: TRILLIUM SOQUIP ONEXCO ET AL BELUGA D-23

FIELD: HUDSON BAY

PROV. : MANITOBA
NATION: CANADA
LOCATION:

SEC: TWP: RGE:
LATITUDE: 59 12' 54.4" N
LONGITUDE: 88 33' 26.6" W

OTHER SERVICES-
NONE

PROGRAM
TAPE NO: 26.2
SERVICE
ORDER NO: 129404

PERMANENT DATUM: M.S.L. ELEVATIONS-
ELEV. OF PERM. DATUM: KB: 13.7 M
LOG MEASURED FROM: K.B. DF: 13.1 M
13.7 M ABOVE PERM. DATUM GL: -179.8 M
DRLG. MEASURED FROM: KELLY BUSHING

DATE: 14 SEP 85
RUN NO:

DEPTH-DRILLER:	2815.0 M	
DEPTH-LOGGER:	2815.0 M	
BTM. LOG INTERVAL:	1478.0 M	
TOP LOG INTERVAL:	1438.0 M	
CASING-DRILLER:	558 M	1478 M
CASING-LOGGER:	558 M	1477 M
CASING:	508 MM	339.7 MM 0
WEIGHT:	157.5 KG/M	107.1 KG/M
BIT SIZE:	374.7 MM	311.2 MM

JA OIL AND GAS LANDS
ALBERTA-NAPOKA
ADMINISTRATION DU PÉTROLE ET DU
GAZ DES TERRES DU CANADA
19 24 1985
ENERGY AND NATURAL RESOURCES
CANADA
TECHNOLOGY OF OIL CONTROLS

TYPE FLUID IN HOLE: MGCL SATURATED GEL POLYMER
DENSITY: 1.03 G/C3
VISCOSITY: 35.0 S
PH: 11.0
FLUID LOSS: 8.0 C3
SOURCE OF SAMPLE: CIRC.
RM@ : .049 OHMM AT 20.0 DEGC
RMF@ : .040 OHMM AT 22.0 DEGC
RMC@ : .156 OHMM AT 21.0 DEGC
SOURCE RMF/RMC: PRESSURE BOX
RM AT BHT: .040 OHMM AT 30.0 DEGC
RMF AT BHT: .031 OHMM AT 30.0 DEGC
RMC AT BHT: .137 OHMM AT 30.0 DEGC

TIME CIRC. STOPPED: 00140/18
TIME LOGGER ON BTM.: 22:30 / 14
MAX. REC. TEMP: 30.0 DEGC

LOGGING UNIT NO: 982
LOGGING UNIT LOC: ST. JOHN'S
RECORDED BY: R. CARSTAIRS
WITNESSED BY:

REMARKS:
13 3/8" MODEL M-1 BAKER PLUG SET @ 1460M

EQUIPMENT NUMBERS-
GFC-A 370 SHM 1136

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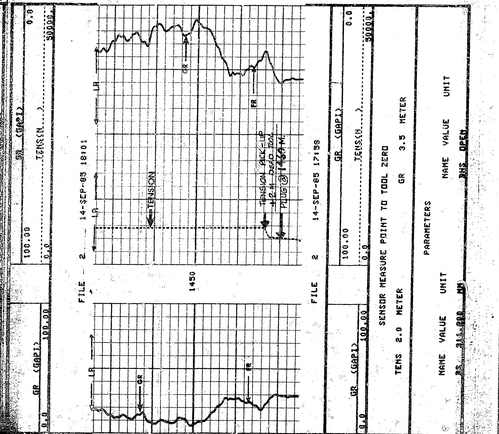

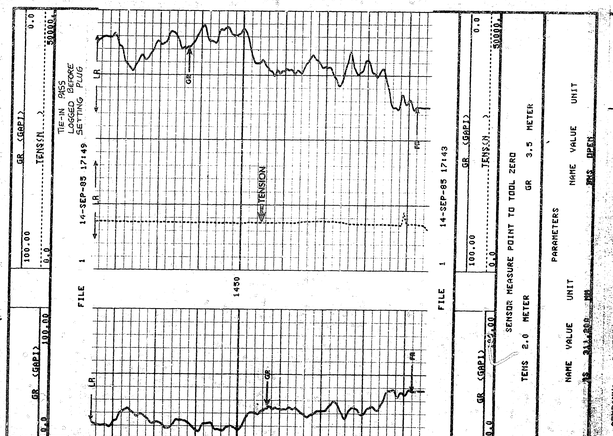

COMPANY: CANTERRA ENERGY LTD.

WELL: TRILLIUM SOQUIP ONEXCO ET AL BELUGA D-23

FIELD: HUDSON BAY

PROV. : MANITOBA
NATION: CANADA
LOCATION:

SEC: TWP: RGE:
LATITUDE: 59 12' 54.4" N
LONGITUDE: 88 33' 26.6" W

OTHER SERVICES-
NONE

PROGRAM
TAPE NO: 26.2
SERVICE
ORDER NO: 129404

PERMANENT DATUM: M.S.L. ELEVATIONS-
ELEV. OF PERM. DATUM: KB: 13.7 M
LOG MEASURED FROM: K.B. DF: 13.1 M
13.7 M ABOVE PERM. DATUM GL: -179.8 M
DRLG. MEASURED FROM: KELLY BUSHING

DATE: 14 SEP 85
RUN NO:

DEPTH-DRILLER:	2815.0 M	
DEPTH-LOGGER:	2815.0 M	
BTM. LOG INTERVAL:	1478.0 M	
TOP LOG INTERVAL:	1438.0 M	
CASING-DRILLER:	558 M	1478 M
CASING-LOGGER:	558 M	1477 M
CASING:	508 MM	339.7 MM 0
WEIGHT:	157.5 KG/M	107.1 KG/M
BIT SIZE:	374.7 MM	311.2 MM

ABANDONMENT RECORD

CSU

STRATIGRAPHIC DIPMETER

CSU

COMPANY: CANTERRA ENERGY LTD.
WELL: TRILLIUM SOUVIP DMEXCO ET AL BELUGA D-22
FIELD: HUDSON BAY
PROV.: MANITOBA
COUNTRY: CANADA
LOCATION:

LATITUDE: 59 18' 54.4" N
LONGITUDE: 98 33' 04.4" W

PERMANENT DATUM: M.S.L.
ELEV. OF PERM. DATUM: 0.0 M
LOG MEASURED FROM: KELLY BUSHING
DRILL. MEASURED FROM: KELLY BUSHING

ELEVATIONS:
KB: 13.7 M
DF: 13.2 M
GL: 0.0 M

DATE: 18 SEP 85
RUN NO.: 1

DEPTH-DRILLER: 2015.0 M
DEPTH-LOGGER: 2014.5 M
BTM. LOG INTERVAL: 2014.5 M
TOP LOG INTERVAL: 1473.0 M

CASING-DRILLER: 558.0 M
CASING-LOGGER: 558.0 M
BIT SIZE: 311.0 MM

OTHER SERVICES:
DIPLOG
SIDPL
JWC-GR
CSS-CST-HST
CST
VSP

PROGRAM
NO. 25
JOB NO.
SERVICE
ORDER NO.
129489

TYPE FLUID IN HOLE: GEL POLYMER
SURFACE TEMP.: 5 C
BOTTOM HOLE TEMP.: 23 C
FLUID LEVEL: FULL
FLUID LOSS: NIL
PRESSURE: NIL
DENSITY: 1.03 G/CC
VISCOSITY: 40 SEC
PH: 9.0
FLUID SAMPLE: NO
RESISTIVITY: 0.20 OHM-M @ 23 C
RESISTANCE: 0.20 OHM-M @ 23 C
SOURCE: MEASURED
TIME CIRC. STOPPED: 0448 / 18
TIME LOGGER ON BTM.: 0548 / 18
MAX. REC. TEMP: 34.5 DEGC
LOGGING UNIT NO.: 2NW
LOGGING ENGINEER: J.MOORE
WITNESSED BY: K.TARVIS

REMARKS:
MAGNETIC DECLINATION IS 3.7 DEGREES

EQUIPMENT NUMBERS
TCC-4 CSU
TCD-4 CSU
SGC-CA 714
SGD-CA 1769
SGH-CA 1767

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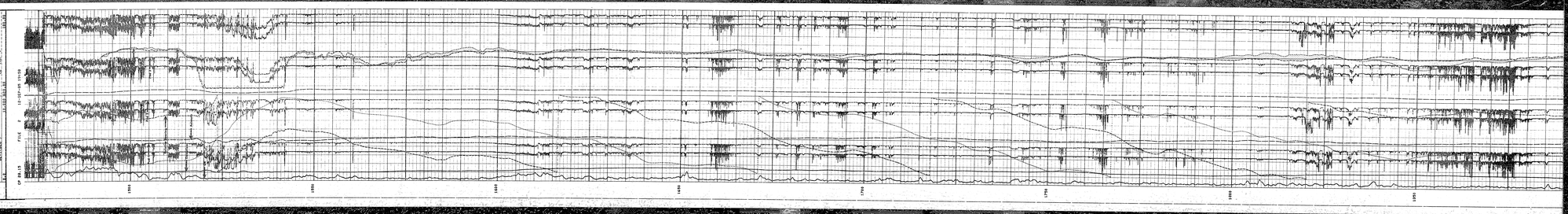
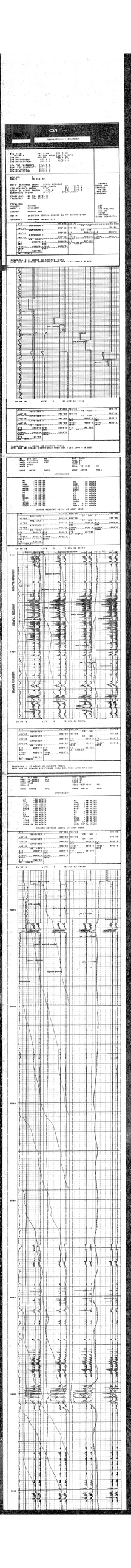
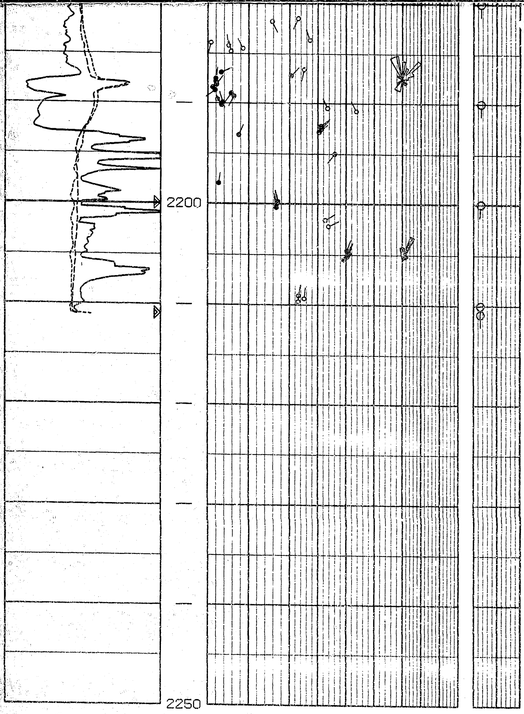


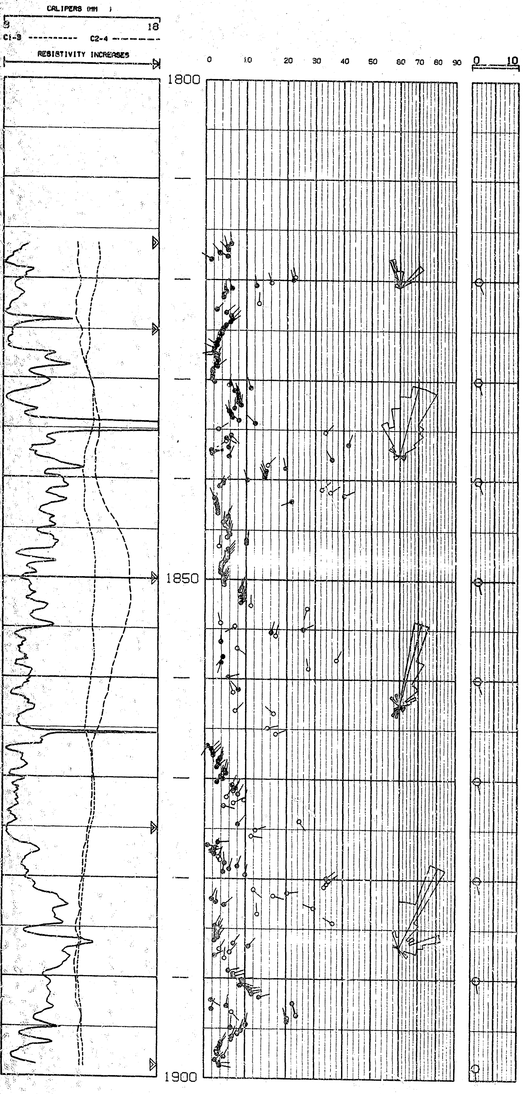

CPI
DIAMOND SHAMROCK
CN 98"78
LITE
DS-HOD-RD 14+38
DEVONIAN ANTOINE ABOVE AN JOBP SEAS
SEISMIC RECORDS

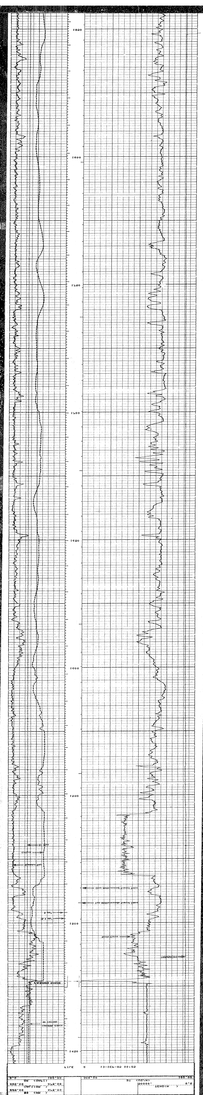


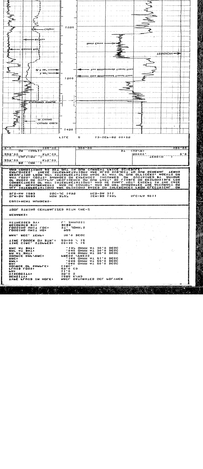
SCALE : 1/240

ZONE FROM 1816 M TO 1899 M

CORRELATION CURVE DEPTHS DIP ANGLE AND DIRECTION BOREHOLE DRIFT







THE INFORMATION THAT THIS WELL WAS DRILLED UNDER OFFSHORE OIL AND GAS OPERATIONS (OFFSHORE) REGULATIONS 1976 WAS SUPPLIED TO THE SECRETARY OF STATE ON 31 JULY 1979 BY BP EXPLORATION (DELTA) LIMITED WHOSE REGISTERED OFFICE IS AT BRITTON HOUSE, 10 ST. JAMES'S STREET, LONDON, SW1A 1EE. THE INFORMATION SHOULD BE TREATED AS CONFIDENTIAL UNTIL 31 JULY 1981 UNLESS THE SECRETARY OF STATE HAS GIVEN PERMISSION TO THE CONTRARY. THE INFORMATION MAY NOT BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS WITHOUT THE PERMISSION OF THE SECRETARY OF STATE.

DATE OF WELL COMPLETION: 1980 JULY 18
DATE OF RELEASE: 1981 JULY 31

VERTICAL SECTION:

ABOVE RIGHT DISPLACEMENT FROM WELL HEAD:

DEPARTURE:

DIRECTION OF WELL:
DIRECTION OF WELL (DEG):
DIRECTION OF WELL (DEG):
DIRECTION OF WELL (DEG):

WHAT WAS WELL DRILLED:
WELL TYPE (EXPLORATORY, DEVELOPMENT, ETC):
WELL TYPE (OIL, GAS, WATER, ETC):

WELL NO. OF WELL:
WELL NAME:
DRILLING RIG NAME:
DRILLING RIG TYPE:
DRILLING RIG OWNER:
DRILLING RIG OWNER ADDRESS:
DRILLING RIG OWNER ADDRESS:
DRILLING RIG OWNER ADDRESS

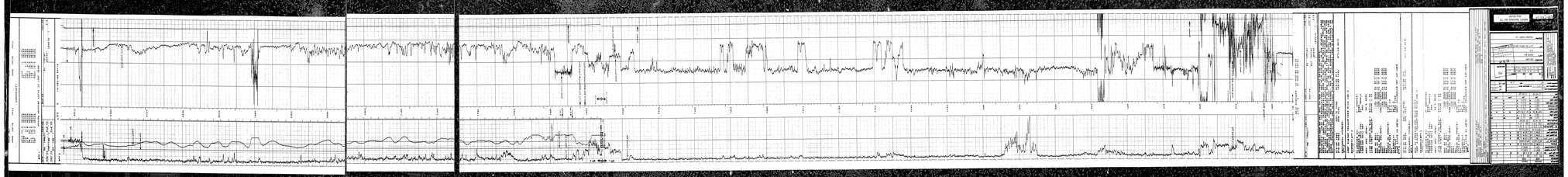
CPI

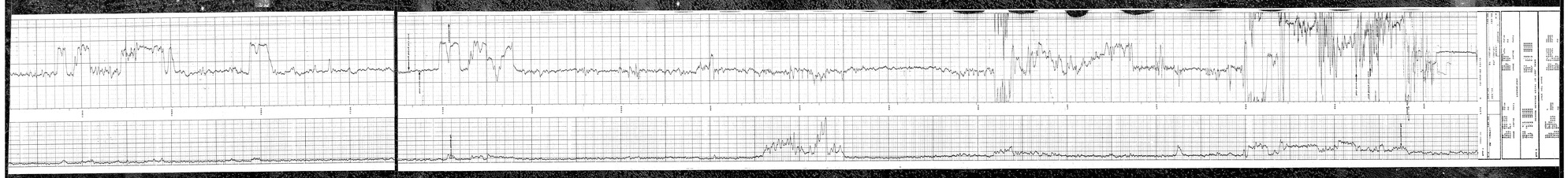
BOREHOLE COMPENSATED SONIC LOG

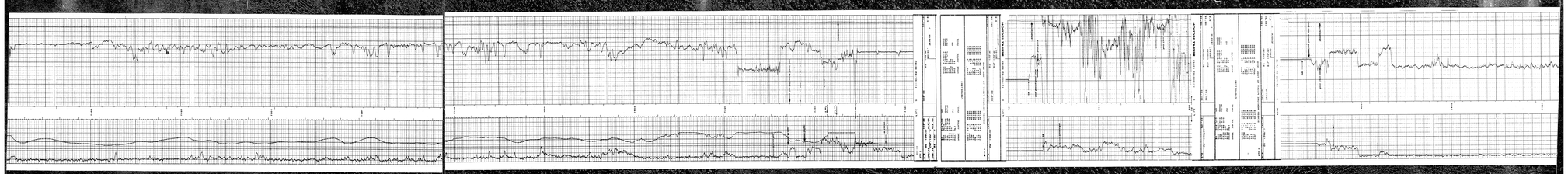
WELL NAME:	[illegible]	
COUNTY:	[illegible]	
FIELD:	[illegible]	
LOCATION:	[illegible]	
SERVICE ORDER:	[illegible]	
API SERIAL NUMBER:	[illegible]	
LATITUDE:	[illegible]	
LONGITUDE:	[illegible]	
DATUM SPECIFICATION BLOCK:	[illegible]	
PERMANENT DATUM:	[illegible]	
LOG MEASURED FROM:	[illegible]	
DRILLING MEASURED FROM:	[illegible]	
ELEVATION:	[illegible]	
DATE:	[illegible]	
RUN NUMBER:	[illegible]	
TD DRILLER:	[illegible]	
TD LOGGER:	[illegible]	
BOTTOM LOG INTERVAL:	[illegible]	
TOP LOG INTERVAL:	[illegible]	
CASING:	[illegible]	
TYPE FLUID IN HOLE:	[illegible]	
DENSITY:	[illegible]	
VISCOSITY:	[illegible]	
PH:	[illegible]	
FLUID LOSS:	[illegible]	
SOURCE OF SAMPLE:	[illegible]	
RM @ MEASURED TEMPERATURE:	[illegible]	
RMF @ MEASURED TEMPERATURE:	[illegible]	
RMC @ MEASURED TEMPERATURE:	[illegible]	
SOURCE: RMF: RMC:	[illegible]	
RM @ BHT:	[illegible]	
TIME SINCE CIRCULATION:	[illegible]	
TIME LOGGER ON BOTTOM:	[illegible]	
MAXIMUM RECORDED TEMPERATURE:	[illegible]	
EQUIPMENT NUMBER:	[illegible]	
LOCATION:	[illegible]	
RECORDED BY:	[illegible]	
WITNESSED BY:	[illegible]	

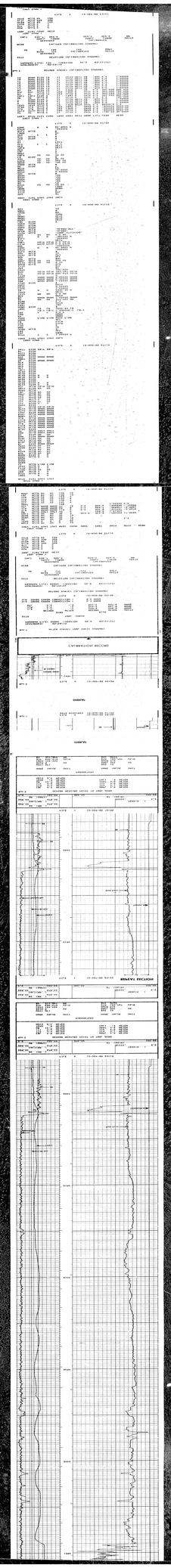
BOREHOLE RECORD	BIT SIZE	
	FROM	TO
CASING RECORD	SIZE	WEIGHT
	FROM	TO

TOOL NUMBER		
TYPE		
SERIAL NUMBER		
MAXIMUM TEMPERATURE RATING OF LOGGING TOOLS		
TRANSMITTER SPACING		
RECEIVER SPACING		
TRANSMITTER FREQUENCY		
RECEIVER FREQUENCY		
TRANSMITTER VOLTAGE		
RECEIVER VOLTAGE		
TRANSMITTER CURRENT		
RECEIVER CURRENT		
TRANSMITTER POWER		
RECEIVER POWER		
TRANSMITTER DAMPING		
RECEIVER DAMPING		
TRANSMITTER GAIN		
RECEIVER GAIN		
TRANSMITTER TRIGGER		
RECEIVER TRIGGER		
TRANSMITTER PULSE WIDTH		
RECEIVER PULSE WIDTH		
TRANSMITTER PULSE RATE		
RECEIVER PULSE RATE		
TRANSMITTER PULSE SHAPE		
RECEIVER PULSE SHAPE		
TRANSMITTER PULSE POLARITY		
RECEIVER PULSE POLARITY		
TRANSMITTER PULSE DELAY		
RECEIVER PULSE DELAY		
TRANSMITTER PULSE DURATION		
RECEIVER PULSE DURATION		
TRANSMITTER PULSE AMPLITUDE		
RECEIVER PULSE AMPLITUDE		
TRANSMITTER PULSE RISE TIME		
RECEIVER PULSE RISE TIME		
TRANSMITTER PULSE FALL TIME		
RECEIVER PULSE FALL TIME		
TRANSMITTER PULSE INTERVAL		
RECEIVER PULSE INTERVAL		
TRANSMITTER PULSE DUTY CYCLE		
RECEIVER PULSE DUTY CYCLE		
TRANSMITTER PULSE ENERGY		
RECEIVER PULSE ENERGY		
TRANSMITTER PULSE TRAIN		
RECEIVER PULSE TRAIN		
TRANSMITTER PULSE TRAIN DURATION		
RECEIVER PULSE TRAIN DURATION		
TRANSMITTER PULSE TRAIN INTERVAL		
RECEIVER PULSE TRAIN INTERVAL		
TRANSMITTER PULSE TRAIN DUTY CYCLE		
RECEIVER PULSE TRAIN DUTY CYCLE		
TRANSMITTER PULSE TRAIN ENERGY		
RECEIVER PULSE TRAIN ENERGY		
TRANSMITTER PULSE TRAIN POLARITY		
RECEIVER PULSE TRAIN POLARITY		
TRANSMITTER PULSE TRAIN DELAY		
RECEIVER PULSE TRAIN DELAY		
TRANSMITTER PULSE TRAIN AMPLITUDE		
RECEIVER PULSE TRAIN AMPLITUDE		
TRANSMITTER PULSE TRAIN RISE TIME		
RECEIVER PULSE TRAIN RISE TIME		
TRANSMITTER PULSE TRAIN FALL TIME		
RECEIVER PULSE TRAIN FALL TIME








CALIBRATION RECORD
SHORTS
SHORTS
BASELINE PASS
SHORTS
SHORTS
BASELINE PASS

BOREHOLE COMPENSATED SONIC LOG

CSU

COMPANY: CANTERRA ENERGY LTD.

WELL: TRILLIUM SOQUIP ONEXCO ET AL BELUGA-O-23

FIELD: HUDSON BAY

PROV. : MANITOBA
NATION: CANADA
LOCATION:

SEC: TWP: RGE:
LATITUDE: 59 12' 54.4" N
LONGITUDE: 88 33' 26.6" W

SEP 19 1985
GENIE

PERMANENT DATUM: M.S.L.
ELEV. OF PERM. DATUM:
LOG MEASURED FROM: K.B.
13.7 M ABOVE PERM. DATUM
DRLG. MEASURED FROM: KELLY BUSHING

ELEVATIONS-
KB: 13.7 M
DF: 13.1 M
GL: -179.8 M

DATE: 12 SEP 85
RUN NO: 2

OTHER SERVICES-
DLL-MSFL
CBL-VDL
CNL-LDT-NGT
SHDT
RFT / CST
VSP

PROGRAM
TAPE NO:
26.2
SERVICE
ORDER NO:
129404

DEPTH-DRILLER:	2215.0 M	
DEPTH-LOGGER:	2215.0 M	
BTM. LOG INTERVAL:	2214.0 M	
TOP LOG INTERVAL:	1477.0 M	
CASING-DRILLER:	558 M	1478 M
CASING-LOGGER:	558 M	1477 M
CASING:	508 MM	339.7 MM
WEIGHT:	197.9 KG/M	107.1 KG/M
BIT SIZE:	374.7 MM	311.2 MM

PROVINCE: BRITISH COLUMBIA
FIELD: WILDCAT
WELL: CANADIAN SUPERIOR ET AL
HOLE: CANADIAN SUPERIOR ET AL
COMPANY: CANADIAN SUPERIOR ET AL

DUAL LATERLOG

Run No.	1		
Date	15-AUG-95		
Depth Driller	2000.0		
Depth Logger	2000.0		
Bottom Log Interval	2000.0		
Top Log Interval	0.0		
Drilling Fluid Type	SALT GEL POLYMER		
Fluid Density	1.09		
Viscosity	65.0		
Fluid Loss	6.0		
Source of Sample	FLOWLINE		
Rm @ Meas. Temp.	0.186 @ 23.0		
Rmf @ Meas. Temp.	0.154 @ 23.0		
Rmc @ Meas. Temp.	0.250 @ 23.0		
Source Rmf/Rmc	MEASURED		
Rm @ BHT	0.186 @ 31.0		
Rmf @ BHT	0.154 @ 31.0		
Rmc @ BHT	0.250 @ 31.0		
Max. Rec. Temp.	31.0		
Equipment Number	1CM-HB 241	1CM-HB 844	TCC-H 553
Location			
Recorded By	D.CHAN		
Witnessed By	Mr. SOMMERVILLE		

REMARKS: Run 1

RMF = .154 @ 23C , RMC = .250 @ 23C , RM = .186 @ 23C.
RMF = .154 @ 23C , RMC = .250 @ 23C.
RMCI = .112 @ 23C.
TOOL STRING CENTRALIZED WITH CMC-2
DRILLING STOPPED @ 1810 HRS
TENSION CURVE DEC/MC MOISY AND NOT PRESENTED

Run 2

EQUIPMENT NUMBERS:

1CM-HB 241	1CM-HB 844	TCC-H 553	SGC-B 767
SRC-F 747	DLC-B 805	DLS-F 695	SGC-1A 716
SPA-H 102	SMA-H 853		

Run 2

Date	15-AUG-95		
Depth Driller	2000.0		
Depth Logger	2000.0		
Bottom Log Interval	2000.0		
Top Log Interval	0.0		
Drilling Fluid Type	SALT GEL POLYMER		
Fluid Density	1.09		
Viscosity	65.0		
Fluid Loss	6.0		
Source of Sample	FLOWLINE		
Rm @ Meas. Temp.	0.186 @ 23.0		
Rmf @ Meas. Temp.	0.154 @ 23.0		
Rmc @ Meas. Temp.	0.250 @ 23.0		
Source Rmf/Rmc	MEASURED		
Rm @ BHT	0.186 @ 29.0		
Rmf @ BHT	0.154 @ 29.0		
Rmc @ BHT	0.250 @ 29.0		
Max. Rec. Temp.	29.0		
Equipment Number	1CM-HB 241	1CM-HB 844	TCC-H 553
Location			
Recorded By	D.CHAN		
Witnessed By	Mr. SOMMERVILLE		

REMARKS: Run 2

TOOL STRING CENTRALIZED WITH CMC-2
DRILLING STOPPED @ 1810 HRS
RMF = .154 @ 23C , RMC = .250 @ 23C , RM = .186 @ 23C
RMF = .154 @ 23C , RMC = .250 @ 23C
RMCI = .112 @ 23C
TENSION CURVE NOT PRESENTED

Run 3

EQUIPMENT NUMBERS:

1CM-HB 241	1CM-HB 844	TCC-H 553	SRC-B 747
SRC-F 747	DLC-B 805	DLS-F 695	SGC-1A 716
SPA-H 102	SMA-H 853		

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 INTERPRETATION, AND WE SHALL NOT, EXCEPT IN THE CASE OF GROSS OR WILLFUL NEGLIGENCE ON OUR ("S. 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 OUR GENERAL TERMS AND CONDITIONS AS SET OUT IN OUR PRICE SCHEDULE.

DT LMN
SGR.LMN
SFLU.LMN
GR (GAPI)
Run 1
CP 89.15
FILE 101
DATE ACQUIRED 15-AUG-95 10:36
Caving Zone
Caliper
Bit Size
Caliper
Bit Size
Caliper
Bit Size

		PUNI	TUNI	MPDI	CNUM	ZREF	PREF	GAIN	OFFS	DCON
TENS	ALLO	N	N	0	20					
CALI	ALLO	MM	MM	36	3	203.1	304.6	.787693	19.0000	
SRAT	ALLO			69				1.00000	0.0	
TT1	ALLO	US	US	87	4					
TT2	ALLO	US	US	99	4					
TT3	ALLO	US	US	54	4					
TT4	ALLO	US	US	42	4					
CBL	ALLO	MV	MV	99	13					
AMPL	ALLO	MV	MV	99	12					
NOIS	ALLO	MV	MV	0	14					
GR	ALLO	GAPI	GAPI	49	0		165.0	1.13089		1

FILE 4 13-SEP-85 03:07

DUTP SUMM :

DUTP	STAT	PUNI	TUNI
TDEP		M	M
DIFF	ALLO	M	M
TOD	ALLO	S	S
TIME	ALLO	MS	MS
ETIM	ALLO	S	S
TENS	ALLO	N	N
CS	ALLO	F/HR	F/HR
ZERO			
DUMM			
DUM2			
MARK	ALLO	M	M
DMAR	DISA	M	M
BS	DISA	MM	MM
RCAL	ALLO	MM	MM
CALI	ALLO	MM	MM
DCAL	DISA	MM	MM
RGR	ALLO	GAPI	GAPI
GR	ALLO	GAPI	GAPI
DT	ALLO	US/M	US/M
SPHI	DISA		
ITT	DISA	S	S
TT1	ALLO	US	US
TT2	ALLO	US	US
TT3	ALLO	US	US
TT4	ALLO	US	US
AMPL	ALLO	MV	MV
CBL	ALLO	MV	MV
SRAT	ALLO		
NOIS	DISA	MV	MV
WF1D	DISA	M	M
WF2D	DISA	M	M
WF1N	DISA		
WF2N	DISA		
VDL1	DISA		
WF1	DISA		
WF2	DISA		
WF3D	DISA	M	M
WF4D	DISA	M	M
WF3N	DISA		
WF4N	DISA		
WF3	DISA		
WF4	DISA		
RO	DISA	OHMM	OHMM
BILI	DISA		
BI	DISA		
SATT	DISA	DB/F	DB/F

FILE 4 13-SEP-85 03:07

SONI SUMM :

SONI	STAT	PUNI	TUNI	VALU
ITTD				BOTH
MODE				BHC
RATE		HZ	HZ	15 HZ
DG				/5
DG1W				/20
DG2W				/20
DG3W				/20
DG4W				/20
AGC	ALLO			*
GAIN				2.00000
MGAI				16.0000
DETE				E2
NC	DISA			*
SGAD	ALLO			*
NMSG		US	US	180 US
FMSG		US	US	260 US
SGW		US	US	80 US
FD	DISA			*
CBLG		US	US	35 US
AMPL				2
CBL				2
WFM				1
VDLD				NEIT
WFD				NEIT
WFS		F	F	10 F
SS				FAST
TC				1
TOD	DISA			*
DTT	ALLO			*
LMOD				DT

FILE 4 13-SEP-85 03:08

CONS SUMM :

CONS	STAT	PUNI	TUNI	VALU
DIFF		F	F	1.00000 F
EDS				PROP
CDS				ALL
UCON	ALLO			*
OMD				UP
LSN				0
CSD				FILM
LD				FILM
PANN				ALL
SPEE		F/HR	F/HR	6000 F/HR
PP				NORM
CGM				NORM
PDS		F	F	0.0 F
E		LB-1	LB-1	7.43000E-7 LB-1
TREF		LB	LB	1000.00 LB
MARK	DISA			*
CMDT				IDW
DIRE				AUTO
PM				SING
SPLI	DISA			*
DD		F	F	0.0 F
DD2		F	F	0.0 F
BS		MM	MM	311.200 MM
RW		OHMM	OHMM	1.00000 OHMM
BHS				OPEN
CSIZ		MM	MM	0.0 MM
IHVD				BOTH
SD		M	M	2496.92 M
FNUM				1.00000
FEXP				2.00000
FPHI				PHIX
SIMU	DISA			*
ITTD				BOTH
DTF		US/M	US/M	620.079 US/M
DTM		US/M	US/M	183.727 US/M
CDTS				100.000
DWCD	ALLO			512
DSIN	ALLO	US	US	5 US
DDEL	ALLO	US	US	200 US
VWF	ALLO			BHC
DWF				ALL
WSV1	ALLO			WF1
DWS	ALLO			16
CSTR		PSIA	PSIA	0.0 PSIA
CHEI		KG/M	KG/M	0.0 KG/M
ZID				NEIT
BILI				.800000
MCI		M	M	.381000 M
MSA		MV	MV	0.0 MV
KPDU				METE
ORDU				METE
MMDU				METE
PF				SHOR
YEAR				85
MONT				9
DAY				12

FILE 4 13-SEP-85 03:08

PRES SUMM :

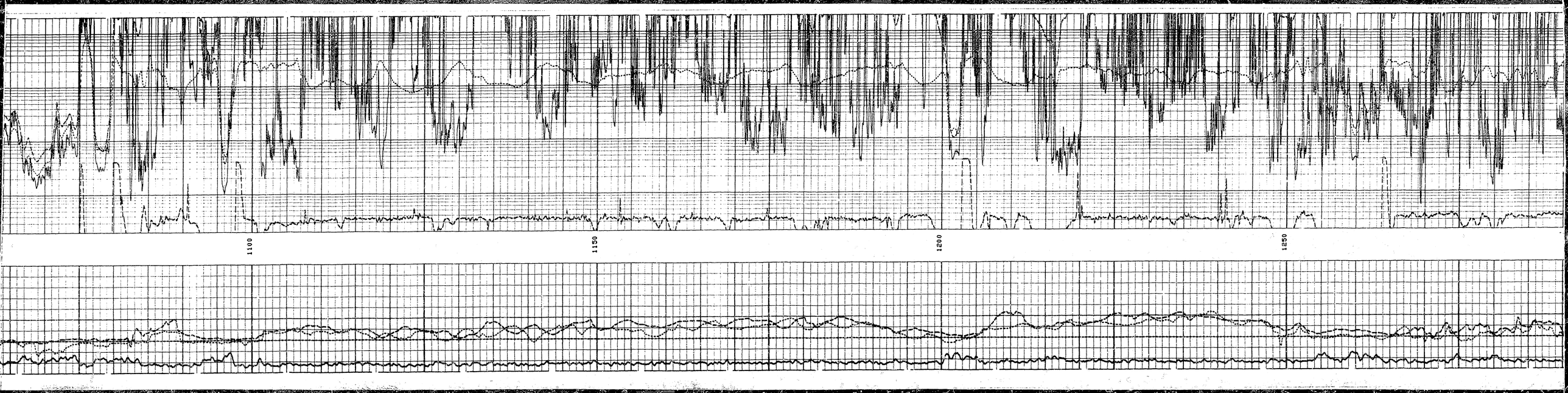
PRES	DUTP	STAT	CHAN	TRAC	CODI	DEST	MODE	FILT	LEDG	REDG
GR	GR	ALLO	0	T1	LLIN	BOTH	SHIF	0.0	0.0	100.000
CALI	CALI	ALLO	1	T1	LDAS	BOTH	SHIF	0.0	225.000	475.000
DT	DT	ALLO	2	T23	LLIN	BOTH	SHIF	0.0	300.000	100.000
BS	BS	ALLO	3	T1	LSPD	BOTH	NB	0.0	225.000	475.000
TENS	TENS	ALLO	4	T3	LSPD	BOTH	SHIF	0.0	50000.0	0.0
5	DUMM	DISA	5	T1	LLIN	NEIT	NB	.500	0.0	1.00000
6	DUMM	DISA	6	T1	LLIN	NEIT	NB	.500	0.0	1.00000
7	DUMM	DISA	7	T1	LLIN	NEIT	NB	.500	0.0	1.00000
8	DUMM	DISA	8	T1	LLIN	NEIT	NB	.500	0.0	1.00000
9	DUMM	DISA	9	T1	LLIN	NEIT	NB	.500	0.0	1.00000
10	DUMM	DISA	10	T1	LLIN	NEIT	NB	.500	0.0	1.00000
11	DUMM	DISA	11	T1	LLIN	NEIT	NB	.500	0.0	1.00000
12	DUMM	DISA	12	T1	LLIN	NEIT	NB	.500	0.0	1.00000
13	DUMM	DISA	13	T1	LLIN	NEIT	NB	.500	0.0	1.00000
14	DUMM	DISA	14	T1	LLIN	NEIT	NB	.500	0.0	1.00000
15	DUMM	DISA	15	T1	LLIN	NEIT	NB	.500	0.0	1.00000
16	DUMM	DISA	15	T1	LLIN	NEIT	NB	.500	0.0	1.00000
17	DUMM	DISA	15	T1	LLIN	NEIT	NB	.500	0.0	1.00000
18	DUMM	DISA	15	T1	LLIN	NEIT	NB	.500	0.0	1.00000
19	DUMM	DISA	15	T1	LLIN	NEIT	NB	.500	0.0	1.00000

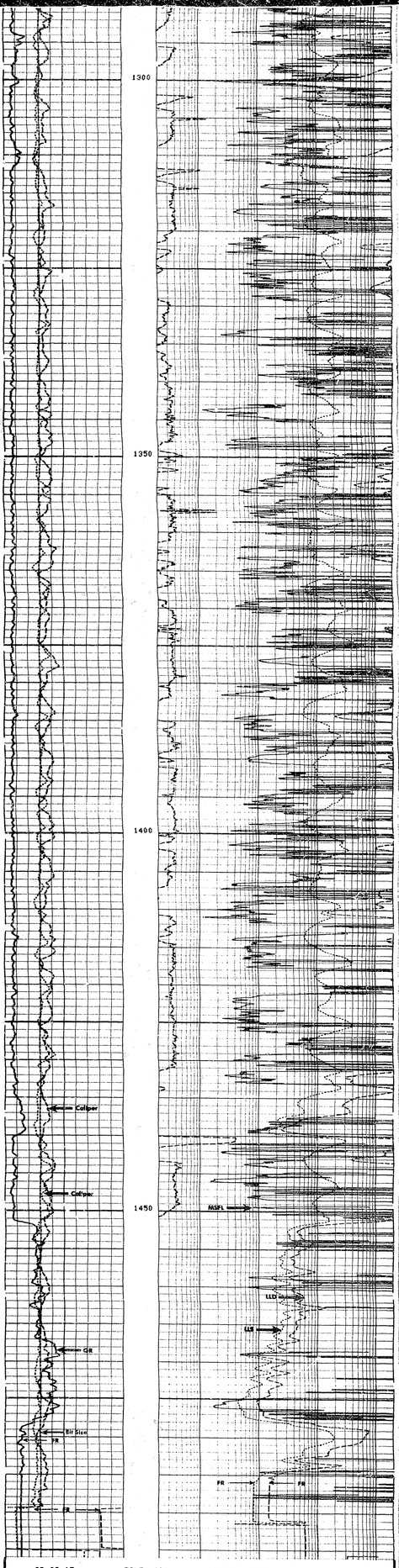
COMPANY CANTERRA ENERGY LTD.

WELL TRILLIUM SOQUIP ONEXCO ET AL BELUGA O-23

FIELD HUDSON BAY PROVINCE MANITOBA

Schlumberger


1100
1150
1200
1250



CP 28.15 FILE 101 15-AUG-85 03:19
DATA ACQUIRED 15-AUG-85 00:42

BS (MM)	300.00 550.00
CALS(MM)	300.00 550.00
CAL1(MM)	300.00 550.00
GR (GAPI)	0.0 150.00

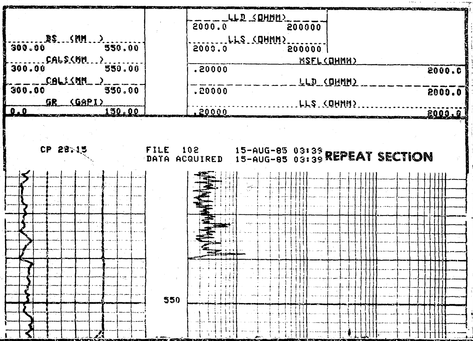
LLD (OHMM)	2000.0 200000
LLS (OHMM)	2000.0 200000
MSFL(OHMM)	.20000 2000.0
LLD (OHMM)	.20000 2000.0
LLS (OHMM)	.20000 2000.0

Run 1 SENSOR MEASURE POINT TO TOOL ZERO

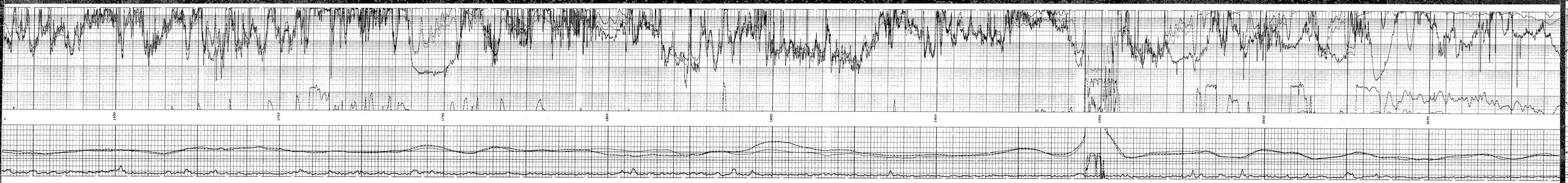
SPAR	12.57 METER	SP	12.57 METER
MTEM	14.96 METER	MRES	14.96 METER
DV1	4.54 METER	CAL1	.86 METER
SV0	4.54 METER	SI0	4.54 METER
DV0	4.54 METER	DI0	4.54 METER
CALS	.94 METER	DLCS	.28 METER
STSG	.28 METER	GR	10.77 METER
I1	.40 METER	TENS	.28 METER
CMSF	.33 METER		

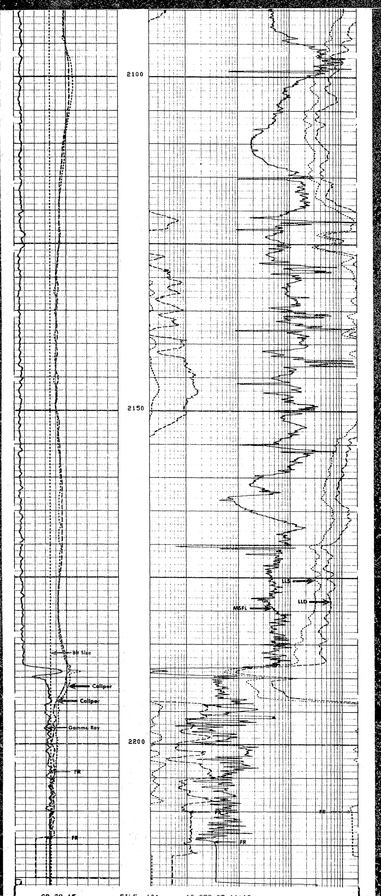
PARAMETERS

NAME	VALUE	UNIT	NAME	VALUE	UNIT
SPRF	550.000	MW	DPRF	550.000	MW
DTIK	2		STIK	2	
CREF	AUTO		OMR	CONS	
RMUD	1.00000	OHMM	SPT	STAN	
SHT	26.6666	DEGC	TD	3048.00	M
BS	374.700	MM	BHS	OPEN	
PP	RECO		DO	.500000	M



CP 28.15 FILE 102 15-AUG-85 03:39
DATA ACQUIRED 15-AUG-85 03:39 **REPEAT SECTION**


1650
1700
1750
1800
1850
1900
1950
2000
2050
2100



CP 28.15 FILE 101 12-SEP-85 11:12
DATA ACQUIRED 12-SEP-85 09:13

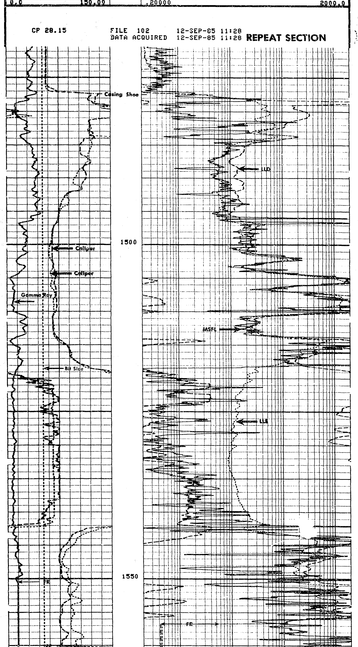
BS (MM)		LLD (OHMM)	
225.00	475.00	2000.0	200000
CALS(MM)		LLS (OHMM)	
225.00	475.00	2000.0	200000
CALI(MM)		MSFL(OHMM)	
225.00	475.00	.20000	2000.0
GR (GAPI)		LLD (OHMM)	
0.0	150.00	.20000	2000.0
		LLS (OHMM)	
		.20000	2000.0

Run 2 SENSOR MEASURE POINT TO TOOL ZERO

SPAR	12.57 METER	SP	12.57 METER
MTEM	14.96 METER	MRES	14.96 METER
DV1	4.54 METER	CALI	.86 METER
SV0	4.54 METER	SI0	4.54 METER
DV0	4.54 METER	DI0	4.54 METER
CALS	.94 METER	DLCS	.28 METER
STSG	.28 METER	GR	10.77 METER
I1	.40 METER	TENS	.28 METER
CMSF	.33 METER		

PARAMETERS

NAME	VALUE	UNIT	NAME	VALUE	UNIT
SPRF	550.000	NW	DPRF	550.000	NW
DTIK	2		STIK	2	
CREF	AUTO		OMR	CONS	
RMUD	1.00000	OHMM	SPT	STAN	
SHT	26.6666	DEGC	TD	3040.00	M
BS	311.150	MM	BHS	OPEN	
PP	RECO		DQ	1.00000	M



CP 28.15 FILE 102 12-SEP-85 11:20
DATA ACQUIRED 12-SEP-85 11:20 **REPEAT SECTION**

CP 28.15 FILE 102 12-SEP-85 11:27
DATA ACQUIRED 12-SEP-85 10:36

BS (MM)		LLD (OHMM)	
225.00	475.00	2000.0	200000
CALS(MM)		LLS (OHMM)	
225.00	475.00	2000.0	200000
CALI(MM)		MSFL(OHMM)	
225.00	475.00	.20000	2000.0
GR (GAPI)		LLD (OHMM)	
0.0	150.00	.20000	2000.0
		LLS (OHMM)	
		.20000	2000.0

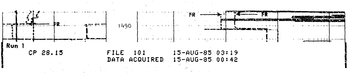
Run 2 SENSOR MEASURE POINT TO TOOL ZERO

SPAR	12.57 METER	SP	12.57 METER
MTEM	14.96 METER	MRES	14.96 METER
DV1	4.54 METER	CALI	.86 METER
SV0	4.54 METER	SI0	4.54 METER
DV0	4.54 METER	DI0	4.54 METER
CALS	.94 METER	DLCS	.28 METER
STSG	.28 METER	GR	10.77 METER
I1	.40 METER	TENS	.28 METER
CMSF	.33 METER		

PARAMETERS

NAME	VALUE	UNIT	NAME	VALUE	UNIT
SPRF	550.000	NW	DPRF	550.000	NW
DTIK	2		STIK	2	
CREF	AUTO		OMR	CONS	
RMUD	1.00000	OHMM	SPT	STAN	
SHT	26.6666	DEGC	TD	3040.00	M
BS	311.150	MM	BHS	OPEN	
PP	RECO		DQ	1.00000	M

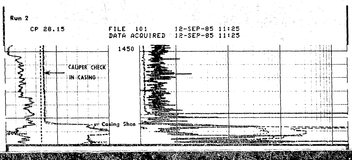
OVERLAP



Run 1
CP 28.15 FILE 101 15-AUG-85 03:19
DATA ACQUIRED 15-AUG-85 00:42

OVERLAP

Run 2
CP 28.15 FILE 101 12-SEP-85 11:25
DATA ACQUIRED 12-SEP-85 11:25



CALIBRATION RECORD

BEFORE SURVEY CALIBRATION SUMMARY

Run 1

PERFORMED: 15-AUG-85 00:00
PROGRAM FILE: RMU (VERSION 20.15 05/01/83)

DSTE ELECTRONICS CALIBRATION SUMMARY

	ZERO	PLUS	ZERO	PLUS	UNITS
SIG	-.0	341.2	0.0	342.5	UW
DVO	-.6	16.0	0.0	16.0	MV
DIG	-.8	341.2	0.0	342.5	UW
DVO	-.6	16.0	0.0	16.0	MV
CMUT	1.6	497.7	1.0	504.0	MSIE
II	-.3	96.9	.1	100.0	MSIE
DVI	-.0	16.0	0.0	16.0	MV
LLD	32.46		31.61		OHMM
LLS	31.91		31.63		OHMM

DSTE ELECTRONICS CALIBRATION SUMMARY

CALIPER COEFF. MEAS REF
.01732 0.0

DSTE CALIPER CALIBRATION SUMMARY

	MEASURED SMALL	MEASURED LARGE	CALIBRATED SMALL	CALIBRATED LARGE	UNITS
CAL1	238.1	315.1	202.67	303.7	MM
CAL2	236.7	315.9	202.44	304.9	MM

DGTL DETECTOR CALIBRATION SUMMARY

	MEASURED BKGD	JIG	CALIBRATED	UNITS
GR	9	179	165	GAPI

AFTER SURVEY TOOL CHECK SUMMARY

PERFORMED: 15-AUG-85 02:59
PROGRAM FILE: RMU (VERSION 20.15 05/01/83)

DSTE TOOL CHECK

	BEFORE ZERO	BEFORE	AFTER ZERO	AFTER	BEFORE PLUS	BEFORE	AFTER PLUS	AFTER	UNITS
SIG	0.0	-.0	-.0	-.0	0.0	340.5	0.0	340.5	UW
DVO	0.0	-.0	-.0	-.0	0.0	16.0	0.0	16.0	MV
DIG	0.0	-.0	-.0	-.0	0.0	340.7	0.0	340.7	UW
DVO	0.0	-.0	-.0	-.0	0.0	16.0	0.0	16.0	MV
CMUT	1.0	-.9	1.0	1.0	500.0	498.9	500.0	99.6	MSIE
DVI	0.0	-.0	-.1	-.1	0.0	16.0	0.0	16.0	MV
LLD	31.61		31.63		OHMM				
LLS	31.61		31.63		OHMM				

PRES SUMM 1

PRES	DUTP	STAT	CHAN	TRAC	CUBI	DEST	MODE	FILT	LEDG	REDG
19	DUMM	DISA	15	T1		LLIN	MEIT	N9	.500 0.0	1.00000
18	DUMM	DISA	15	T1		LLIN	MEIT	N8	.500 0.0	1.00000
17	DUMM	DISA	15	T1		LLIN	MEIT	N7	.500 0.0	1.00000
16	DUMM	DISA	15	T1		LLIN	MEIT	N6	.500 0.0	1.00000
15	DUMM	DISA	15	T1		LLIN	MEIT	N5	.500 0.0	1.00000
14	DUMM	DISA	15	T1		LLIN	MEIT	N4	.500 0.0	1.00000
13	DUMM	DISA	13	T1		LLIN	MEIT	N3	.500 0.0	1.00000
12	DUMM	DISA	12	T1		LLIN	MEIT	N2	.500 0.0	1.00000
11	DUMM	DISA	11	T1		LLIN	MEIT	N1	.500 0.0	1.00000
8	RT	ALLO	1	T8		LB45	BTM	GRAD	0.0 .000000	200.000
TENS	TENS	DISA	9	T3		LSPD	BTM	SHIF	0.0 .000000	0
MSIZ	MSIZ	ALLO	8	T29		LSPD	BTM	GRAD	0.0 .200000	2000.00
LLSB	LLD	ALLO	7	T8		NDAS	BTM	GRAD	5.0 2000.00	200000.
LLD	LLD	ALLO	6	T8		LB45	BTM	GRAD	0.0 .200000	2000.00
LLSB	LLS	ALLO	5	T8		MSPD	BTM	GRAD	0.0 2000.00	200000.
LLS	LLS	ALLO	4	T8		LB45	BTM	GRAD	0.0 .200000	2000.00
CAL5	CAL5	ALLO	3	T8		LSPD	BTM	SHIF	0.0 100.000	550.000
CAL1	CAL1	ALLO	2	T1		LDAS	BTM	SHIF	0.0 300.000	550.000
GR	GR	ALLO	1	T1		LLIN	MEIT	SHIF	0.0 0.0	150.000
SP	SP	DISA	0	T1		LGAP	BTM	WRAP	5.0 -80.000	20.0000

CP 20.15 FILE 7 15-AUG-85 03:05
DATA ACQUIRED MA

CONS SUMM 1

CONS	STAT	PUNI	TUNI	VALU
TSEL				FIEL
PIMO	ALLO			FIEL
AUMS	ALLO			*
EML				32767
ALC				ALL
HDF	DISA			5
DTSP		S	S	1.0000 S
TDPE				ATTE
TGRO				BOTH
TENV				CHEC
DRV				15
MONT				0
YEAR				85
MSI				MSIR
MMSU				METE
OPSU				METE
KPSU				METE
LOC	DISA			*
XMIS				
XMOS				
ADM				.ALARM.OFF.
ALAR				.ALARM.
WTIM				.TOOL.STICKING.
LC24				
LC23				
LC22				
LC21				
LC20				
LC19				
LC18				
LC17				
LC16				
LC15				
LC14				
LC13				
LC12				
LC11				
LC10				
LC09				
LC08				
LC07				
LC06				
LC05				
LC04				
LC03				
LC02				
LC01				
TCMC				MOHM
TBR		KHZ	KHZ	1.00000 OHMM
TINT	ALLO	S	S	10.0000 S
TG	ALLO	MS	MS	40.0000 MS
LCL				7440.00 M
TFR	ALLO			AUTO
TFRI	ALLO	S	S	10 S
RMF				.2000000
RSL				ON
KFAC				30MD
LCMS				0.0
LCMS2				ON
SPRF		MW	MW	550.000 MW
SPWF		MW	MW	550.000 MW
STIK				2
PTIK				2
PLMM				400M
PLMN				0.001
CMRF				AUTO
SPT				STAN
RMUS		OHMM	OHMM	1.00000 OHMM
TG		M		3048.00 M
SNT		DEGC	DEGC	80.0000 DEGC
SNT		DEGC	DEGC	PR:56666 DEGC
FPHI				0.0000
FEXP				2.00000
FNUM				1.00000
SS		M	M	2496.92 M
SSIZ		MM	MM	0.0 MM
RW				.25000
RWS		OHMM	OHMM	1.00000 OHMM
BS		MM	MM	2.7432 MM
MSB	ALLO			*
MCOP				0
MSI1				300
BGZ		M	M	0.0 M
BGL		M	M	0.0 M
PSI	DISA			
PM				SIMG
SPSR				0.0
RIRE				AUTO
CMST				IBM
MANX	DISA			
PREF		LB	LB	1000.00 LB
F		LB/L	LB/L	4.43600E-7 LB-1
PGS		M	M	0.0 M
CQH				HOHM
PP				HOHM
SPEE		F/HR	F/HR	5.00 F/HR
MSL				MSL
DBCS				SELT
LSR				FILM
CSB				FILM
LSH				0
OMS				UP
CSGF	ALLO			0
CSF				ALL
EDS				PSP
DIFF		M	M	.304800 M

CP 20.15 FILE 7 15-AUG-85 03:04
DATA ACQUIRED MA

OUTP SUMM 1

OUTP	STAT	PUNI	TUNI	PROT
LC24	DISA			PROP
LC23	DISA			PROP
LC22	DISA			PROP
LC21	DISA			PROP
LC20	DISA			PROP
LC19	DISA			PROP
LC18	DISA			PROP
LC17	DISA			PROP
LC16	DISA			PROP
LC15	DISA			PROP
LC14	DISA			PROP
LC13	DISA			PROP
LC12	DISA			PROP
LC11	DISA			PROP
LC10	DISA			PROP
LC09	DISA			PROP
LC08	DISA			PROP
LC07	DISA			PROP
LC06	DISA			PROP
LC05	DISA			PROP
LC04	DISA			PROP
LC03	DISA			PROP
LC02	DISA			PROP
LC01	DISA			PROP
SPWV	ALLO	MV	MV	AUX
SPWR	DISA	MV	MV	
SP	ALLO	MV	MV	
RSPA	ALLO	MV	MV	AUX
SPAR	DISA	MV	MV	AUX
AVDL	DISA	V	V	PROP
EPV	DISA	VSC	VSC	PROP
ACUR	DISA	MA	MA	PROP
MCUR	DISA	MA	MA	PROP
MVDL	DISA	V	V	PROP
EVDL	DISA	V	V	PROP
MVDR	ALLO	V		
VV	ALLO	V	V	PROP
HTEM	ALLO	N		
MTEM	ALLO	DEGC	DEGC	
MRES	ALLO	OHMM	OHMM	
AMC9	ALLO			
AMC8	ALLO			
AMC7	ALLO			
AMC6	ALLO			
AMC5	ALLO			
AMC4	ALLO			
AMC3	ALLO			
AMC2	ALLO			
AMC1	ALLO			
AMC0	ALLO			
HOMT	DISA			
RX2	DISA	OHMM	OHMM	
RWAM	DISA			
RT	DISA	OHMM	OHMM	
P3	ALLO	MV	MV	PROP
P2	ALLO	MV	MV	PROP
P1	ALLO	MV	MV	AUX
LLSS	ALLO	OHMM	OHMM	
LLLS	ALLO	OHMM	OHMM	
CLLS	ALLO	OHMM	OHMM	
MSFC	ALLO			
MSFC	ALLO	OHMM	OHMM	PROP
MSFL	ALLO	OHMM	OHMM	
II	DISA	MSIE	MSIE	
CMSF	DISA	MSIE	MSIE	
CAL2	ALLO	MM	MM	
CAL1	ALLO	MM	MM	
SW8	ALLO	MV	MV	AUX
SW4	ALLO	DB	DB	PROP
SW3	ALLO	DB	DB	PROP
SW2A	ALLO	DB	DB	PROP
SW0	ALLO	MV	MV	AUX
SW1	ALLO	MV	MV	AUX
SW2	ALLO	MV	MV	PROP
SW3	ALLO	MV	MV	PROP
MINV	ALLO	OHMM	OHMM	
MNOR	ALLO	OHMM	OHMM	
R11	ALLO	MSIE	MSIE	AUX
R10	ALLO	MSIE	MSIE	AUX
MCAL	ALLO	MM	MM	
STSG	ALLO			
RGA	ALLO	GAPI	GAPI	AUX
RGB	ALLO	GAPI	GAPI	AUX
INV	DISA	M3	M3	
R3	DISA	MM	MM	
TEMP	DISA	DEGC	DEGC	
BNAS	DISA	M	M	AUX
BOR2	ALLO	M	M	
SUMM				
ZERO				
CS	ALLO	F/HR	F/HR	
TENS	ALLO	M	M	
TIME	ALLO	S	S	
TIME	ALLO	MS	MS	
TDD	ALLO	S	S	
DIFF	ALLO	M	M	AUX
TBEP	DISA	M	M	AUX

CP 20.15 FILE 7 15-AUG-85 03:03
DATA ACQUIRED MA

INPU SUMM 1

INPU	STAT	PUNI	TUNI	MPDI	CNUM	ZREF	PREF	GAIN	OFFS	SCON
SP	ALLO	MV	MV	24	16				0.0	
SPAR	ALLO	MV	MV	24	17					
SPWV	ALLO	MV	MV	24	12					
EPV		VSC	VSC	0	4					
ACUR		MA	MA	0	4					
MCUR		MA	MA	0	2					
ETM	ALLO	DEGC	DEGC	0	0					0
II		M	M							
CCSU	ALLO									
VDL		VSC	VSC	0	5					
AVDL		V	V	0	2					
MVDL		V	V	0	3					
MRES	ALLO	OHMM	OHMM	70						
CMUT	ALLO	DEGC	DEGC	70						
DVI	ALLO	MV	MV	24	34	202.7	303.8	1.31282	-92.000	
DVI	ALLO	MV	MV	129	0.0	10.82	.993593	.002277		
SIG	ALLO	UA	UA	129	0.0	340.5	1.0337	.097826		
DVO	ALLO	MV	MV	129	0.0	10.82	.993193	.011630		
DIG	ALLO	UA	UA	129	0.0	342.5	1.02349	.057320		
DVO	ALLO	MV	MV	129	0.0	10.82	.976401	.011442		
SLCS	ALLO	MV	MV	129						
CALS	ALLO	MM	MM	57	202.7	303.8	1.27363	-107.08		
GAP	ALLO	GAPI	GAPI	55	0	165.0	1.02679			
STSG	ALLO			0	0					
TEMI	ALLO	M		0	20					
R11	ALLO	MSIE	MSIE	16		.1997	100.0	1.03142	-.11254	
CMSF	ALLO	MSIE	MSIE	13		1.000	500.0	1.00456	-.02410	

CP 20.15 FILE 7 15-AUG-85 03:02
DATA ACQUIRED MA

TOOL SUMM 1

TOOL	STAT	LTNG	WEIG
AMS	ALLO	92	130
SP&A	ALLO	48	0
TCCA	ALLO	24	57
SGTL	ALLO	66	135
DGTL	ALLO	169	300
BLK	ALLO	8	0
TEMP	ALLO	0	0
DTT	ALLO	0	0

BEFORE SURVEY CALIBRATION SUMMARY

Run 2

PERFORMED: 12-SEP-85 00:43
PROGRAM FILE: RMU (VERSION 20.15 05/01/83)

DSTE ELECTRONICS CALIBRATION SUMMARY

	ZERO	PLUS	ZERO	PLUS	UNITS
SIG	-.1	341.5	0.0	342.5	UW
DVO	-.0	16.0	0.0	16.0	MV
DIG	-.0	341.2	0.0	342.5	UW
DVO	-.0	16.0	0.0	16.0	MV
CMUT	1.0	497.2	1.0	500.0	MSIE
II	-.3	96.9	.1	100.0	MSIE
DVI	-.0	16.0	0.0	16.0	MV
LLD	32.46		31.61		OHMM
LLS	31.93		31.61		OHMM

DSTE ELECTRONICS CALIBRATION SUMMARY

CALIPER COEFF. MEAS REF
.01732 0.0

DSTE CALIPER CALIBRATION SUMMARY

	MEASURED SMALL	MEASURED LARGE	CALIBRATED SMALL	CALIBRATED LARGE	UNITS
CAL1	238.1	315.7	202.68	304.1	MM
CAL5	239.3	314.1	202.60	303.0	MM

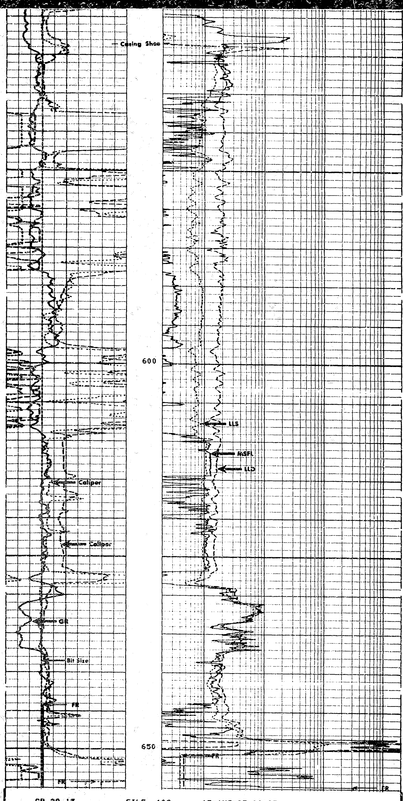
DGTL DETECTOR CALIBRATION SUMMARY

	MEASURED BKGD	JIG	CALIBRATED	UNITS
GR	8	164	165	GAPI

AFTER SURVEY TOOL CHECK SUMMARY

PERFORMED: 12-SEP-85 10:53
PROGRAM FILE: RMU (VERSION 20.15 05/01/83)

DSTE TOOL CHECK



CP 28.15 FILE 102 15-AUG-85 03:37
DATA ACQUIRED 15-AUG-85 02:15

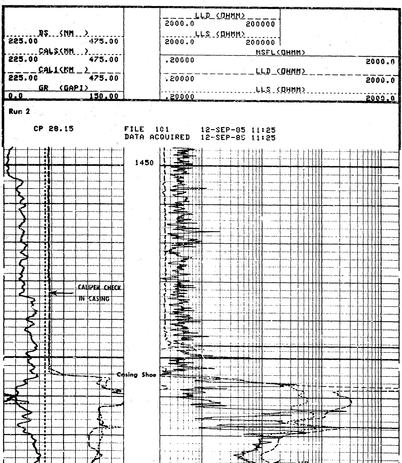
BS (MM) 300.00 550.00	LLD (OHMM) 2000.0 200000
CALS(MM) 300.00 550.00	LLS (OHMM) 2000.0 200000
CALI(MM) 300.00 550.00	MSFL(OHMM) .20000 2000.0
GR (GAPI) 0.0 150.00	LLD (OHMM) .20000 2000.0
	LLS (OHMM) .20000 2000.0

Run 1 SENSOR MEASURE POINT TO TOOL ZERO

SPAR	12.57 METER	SP	12.57 METER
MTEM	14.96 METER	MRES	14.96 METER
DVI	4.54 METER	CALI	.86 METER
SVI	4.54 METER	DIO	4.54 METER
DVO	4.54 METER	DIO	4.54 METER
CALS	.94 METER	DLCS	.28 METER
STSG	.28 METER	GR	10.77 METER
II	.40 METER	TENS	.28 METER
CMSF	.33 METER		

PARAMETERS

NAME	VALUE	UNIT	NAME	VALUE	UNIT
SPRF	550.000	MW	DPRF	550.000	MW
BTIK	2		STIK	2	
CREF	AUTO		OMR	CONS	
RMUD	1.00000	OHMM	SPT	STAN	
SMT	28.6666	DEGC	TD	3048.00	M
BS	374.700	MM	BHS	OPEN	
PP	RECO		PD	.500000	H



BS (MM) 225.00 475.00	LLD (OHMM) 2000.0 200000
CALS(MM) 225.00 475.00	LLS (OHMM) 2000.0 200000
CALI(MM) 225.00 475.00	MSFL(OHMM) .20000 2000.0
GR (GAPI) 0.0 150.00	LLD (OHMM) .20000 2000.0
	LLS (OHMM) .20000 2000.0

Run 2

CP 28.15 FILE 101 12-SEP-85 11:25
DATA ACQUIRED 12-SEP-85 11:25

```
                    ZERO                                  PLUS
                BEFORE      AFTER                  BEFORE      AFTER     UNITS
 SI0            0.0         0.0                    342.5       342.2     UA
 SV0            0.0         0.0                    10.8        10.8      MV
 DI0            0.0         -.0                    342.5       342.5     UA
 DV0            0.0         0.0                    10.8        10.8      MV
 CMSF           1.0         1.0                    500.0       499.7     MSIE
 II             .1          .1                     100.0       99.8      MSIE
 DV1            0.0         0.0                    10.8        10.8      MV

                BEFORE      AFTER      UNITS
 LLD            31.61       31.61      DHMM
 LLS            31.61       31.61      DHMM

  CP 28.15                  FILE   6      12-SEP-85 10:53


 PRES SUMM :
 PRES  OUTP STAT  CHAN TRAC CODI DEST MODE FILT    LEDG    REDG
 19    DUMM DISA 15   T1   LLIN NEIT HB   .500 0.0    1.00000
 16    DUMM DISA 15   T1   LLIN NEIT HB   .500 0.0    1.00000
 17    DUMM DISA 15   T1   LLIN NEIT HB   .500 0.0    1.00000
 18    DUMM DISA 15   T1   LLIN NEIT HB   .500 0.0    1.00000
 15    DUMM DISA 15   T1   LLIN NEIT HB   .500 0.0    1.00000
 14    DUMM DISA 14   T1   LLIN NEIT HB   .500 0.0    1.00000
 13    DUMM DISA 13   T1   LLIN NEIT HB   .500 0.0    1.00000
 12    DUMM DISA 12   T1   LLIN NEIT HB   .500 0.0    1.00000
 11    DUMM DISA 11   T1   LLIN NEIT HB   .500 0.0    1.00000
 BS    BS   ALLO 10   T1   LSPD BOTH HB   0.0   225.000 475.000
 TEMS  TEMS DISA 9    T3   LSPD BOTH SHIF 0.0 50000.0 0.0
 MSFL  MSFL ALLO 8    T2   LLIN BOTH GRAD 0.0 .200000 2000.00
 LLBB  LLD  ALLO 7    T2   HBAS BOTH GRAD 0.0 2000.00 200000.
 LLD   LLD  ALLO 6    T2   LBAS BOTH GRAD 0.0 .200000 2000.00
 LLSB  LLS  ALLO 5    T2   HSPD BOTH GRAD 0.0 2000.00 200000.
 LLS   LLS  ALLO 4    T2   LSPD BOTH GRAD 0.0 .200000 2000.00
 CALS  CALS ALLO 3    T1   LSPD BOTH SHIF 0.0 225.000 475.000
 CALI  CALI ALLO 2    T1   LBAS BOTH SHIF 0.0 225.000 475.000
 GR    GR   ALLO 1    T1   LLIN BOTH SHIF 0.0   0.0   150.000
 SP    SP   ALLO 0    T1   LGAP BOTH SHIF 0.0 -120.00 30.0000

   CP 28.15                 FILE   2      07-SEP-85 10:05


 CDMS SUMM :
 CDMS  STAT PUNI TUNI VALU

 TSEL                     FIEL
 PING  ALLO               *
 AUMS  ALLO               *
 EML                      32767
 EMC                      ALL
 ADF   DISA               1
 TDDI     S    S          15.0000 S
 TDPE                     ATTE
 TGRD                     BOTH
 TDHV                     CHEC
 DAY                      7
 MONT                     9
 YEAR                     85
 PF                       SHOR
 MMDU                     METE
 DRDU                     METE
 XPDU                     METE
 LOC   DISA               *
 XMO2
 XMO1
 XMO0
 ADM                      .ALARM.DEF.
 ALAR                     .ALARM.
 WTSM                     .TOOL.STICKING.
 LCD4
 LCD3
 LCD2
 LCD1
 LCD0
 LCI9
 LCI8
 LCI7
 LCI6
 LCI5
 LCI4
 LCI3
 LCI2
 LCI1
 LCI0
 LCO9
 LCO8
 LCO7
 LCO6
 LCO5
 LCO4
 LCO3
 LCO2
 LCO1
 LCO0
 TCMC                     NORM
 TBRC        KHZ   KHZ    100
 TINT  ALLO S     S        10.0000 S
 LCL   ALLO M     M        7315.20 M
 LCT                      74GP
 TFR   ALLO               AUTO
 TER1  ALLO S     S        10 S
 RMF                      .0200000
 RSL                      DN
 KFAC                     SOND
 LLGD                     OFF
 LCMS                     ON
 BPRF        MW   MW       550.000 MW
 SPRF        MW   MW       550.000 MW
 STIX                     S
 BTIX                     2
 PLRM                     GRDN
 DMR                      CONS
 CREF                     AUTO
 SPT                      STAN
 RMUD        OHMM OHMM    1.00000 OHMM
 TD          M    M       3048.00 M
 BHT         DEGC DEGC    62.8221 DEGC
 SHT         DEGC DEGC    26.6666 DEGC
 FPHI                     PHIU
 FEXP                     2.00000
 FMUN                     1.00000
 SB          M    M       2496.92 M
 CSIZ        MM   MM       12.7 MM
 BHS                      OPEN
 RW          OHMM OHMM    1.00000 OHMM
 BS          MM   MM      311.150 MM
 MSD   ALLO               *
 NCOP                     0
 MBSI                     300
 DQE         M    M       0.0 M
 DD          M    M       0.0 M
 SPLI  DISA               0
 PR                       SING
 SPDR                     0.0
 BIRE                     AUTO
 CMBT                     IBH
 MARK  DISA               *
 TREF        LB   LB      1090.00 LB
 LB          LB-1 LB-1    7.43606E-7  LB-1
 PDS         M    M       0.0 M
 CGM                      NORM
 PP                       NORM
 SPEE        F/HR F/HR    5000 F/HR
 PAMM                     ALL
 ODEX                     NEIT
 LD                       FILM
 CSD                      FILM
 LSN                      0
 DMS                      UP
 UCDN  ALLO               *
 CDS                      ALL
 CDS                      PROP
 DIFF        M    M       .304800 M

   CP 28.15                 FILE   2      07-SEP-85 16:04


 OUTP SUMM :
 OUTP  STAT PUNI TUNI PROT

 LCD4  DISA               PROP
 LCD3  DISA               PROP
 LCD2  DISA               PROP
 LCD1  DISA               PROP
 LCD0  DISA               PROP
 LCI9  DISA               PROP
 LCI8  DISA               PROP
 LCI7  DISA               PROP
 LCI6  DISA               PROP
 LCI5  DISA               PROP
 LCI4  DISA               PROP
 LCI3  DISA               PROP
 LCI2  DISA               PROP
 LCI1  DISA               PROP
 LCI0  DISA               PROP
 LCO9  DISA               PROP
 LCO8  DISA               PROP
 LCO7  DISA               PROP
 LCO6  DISA               PROP
 LCO5  DISA               PROP
 LCO4  DISA               PROP
 LCO3  DISA               PROP
 LCO2  DISA               PROP
 LCO1  DISA               PROP
 SPMV  ALLO MV    MV      AUX
 SPAR  DISA MV    MV
 SP    ALLO MV    MV
 RSPA  ALLO MV    MV      AUX
 RSP   ALLO MV    MV      AUX
 AVOL  DISA V     V       PROP
 EPV   DISA VDC   VDC     PROP
 ACUR  DISA MA    MA      PROP
 MCUR  DISA MA    MA      PROP
 MVOL  DISA V     V       PROP
 EVOL  DISA V     V       PROP
 CCSW  ALLO
 MV    ALLO V     V       PROP
 MTEM  ALLO M     M
 MTEM  ALLO DEGC  DEGC
 MRES  ALLO OHMM  OHMM
 AMC9  ALLO
 AMC8  ALLO
 AMC7  ALLO
 AMC6  ALLO
 AMC5  ALLO
 AMC4  ALLO
 AMC3  ALLO
 AMC2  ALLO
 AMC1  ALLO
 AMC0  ALLO
 XORT  DISA               PROP
 RXO   DISA OHMM  OHMM
 RWAR  DISA               PROP
 RT    DISA OHMM  OHMM
 PG    ALLO NW    NW      PROP
 PS    ALLO NW    NW      AUX
 PD    ALLO NW    NW      AUX
 LLG   ALLO OHMM  OHMM
 LLS   ALLO OHMM  OHMM
 CLLS  ALLO MSIE  MSIE
 LLB   ALLO OHMM  OHMM
 DLCC  ALLO               PROP
 MSFL  ALLO OHMM  OHMM
 MSFL  ALLO MSIE  MSIE
 II    DISA MSIE  MSIE
 CMSF  DISA MSIE  MSIE
 CALI  ALLO MM    MM
 CALI  ALLO MM    MM
 RCAL  ALLO MM    MM      AUX
 SBCA  ALLO DB    DB      PROP
 SBKA  ALLO DB    DB      PROP
 SI0   ALLO UA    UA      AUX
 SV0   ALLO MV    MV      AUX
 DI0   ALLO UA    UA      AUX
 DV0   ALLO MV    MV      AUX
 RSI0  ALLO UA    UA      AUX
 RSV0  ALLO MV    MV      AUX
 RDI0  ALLO UA    UA      AUX
 RDV0  ALLO MV    MV      AUX
 DV1   ALLO MV    MV      PROP
 RDV1  ALLO MV    MV      PROP
 MMDX  ALLO OHMM  OHMM
 MMDX  ALLO OHMM  OHMM
 R11   ALLO MSIE  MSIE    AUX
 R10   ALLO MSIE  MSIE    AUX
 RCAL  ALLO MM    MM      AUX
 RCAL  ALLO
 GR    ALLO GAPI  GAPI
 RGR   ALLO GAPI  GAPI    AUX
 IWH   DISA MS    MS
 BS    DISA MM    MM
 TEMP  DISA DEGC  DEGC
 SMAR  DISA M     M       AUX
 MARK  ALLO M     M
 DUM2
 DUM1
 ZERO
 CS    ALLO F/HR  F/HR
 TEMS  ALLO N     N
 ETIM  ALLO S     S
 TIME  ALLO MS    MS
 TOD   ALLO S     S
 DIFF  ALLO M     M       AUX
 TDEP  DISA M     M       AUX

   CP 28.15                 FILE   2      07-SEP-85 16:03


 INPU SUMM :
 INPU  STAT PUNI TUNI MPDI CNUM    ZREF    PREF    GAIN    OFFS  DCON

 SP    ALLO MV    MV    24   16                              0.0
 SPAR  ALLO MV    MV    24   17
 SPMV  ALLO MV    MV    24   13
 EPV         VDC  VDC   0    4
 ACUR        MA   MA    0    4
 MCUR        MA   MA    0    2
 CTEM  ALLO DEGC DEGC   0                                         0
 HV    ALLO V     V     0
 CCSW  ALLO               0
 EVOL        VDC  VDC   0    5
 AVOL        V    V     0    0
 MVOL        V    V     0    3
 MTEM  ALLO OHMM OHMM  70
 MTEM  ALLO DEGC DEGC  70
 CALI  ALLO MM    MM   34        20.1   304.6  1.24756 -87.290
 SV1   ALLO MV    MV   179       0.0    10.82  .992126 .027750
 SI0   ALLO UA    UA   179       0.0    342.5  1.00188 -.13027
 SV0   ALLO MV    MV   179       0.0    10.82  .993861 .012132
 DI0   ALLO UA    UA   179       0.0    342.5  1.00414 -.086293
 DV0   ALLO MV    MV   179       0.0    10.82  .973571 .012359
 BLCS  ALLO               179
 CALS  ALLO MM    MM   37   0    203.1  304.6  1.25367 -89.957
 GR    ALLO GAPI GAPI 55         165.0  165.0  1.00769
 STSG  ALLO               0
 TENS  ALLO N     N     20
 II    ALLO MSIE MSIE 16        .1997  100.0  1.02691 -.06003
 CMSF  ALLO MSIE MSIE 13        1.000  500.0  1.00305 -.02264

   CP 28.15                 FILE   2      07-SEP-85 16:03


 TOOL SUMM :
 TOOL  STAT LENG  WEIG

 AMS   ALLO 92    130
 SPAA  ALLO 48    0
 TCCA  ALLO 34    57
 SGTL  ALLO 66    135
 DSTE  ALLO 69    474
 DLC   ALLO 0     0
 TEMP  ALLO 0     0
 DTT   ALLO 0     0

   CP 28.15                 FILE   2      07-SEP-85 16:03
```

COMPANY CANTERRA ENERGY LTD.

WELL TRILLIUM 5DQ/P DWEXCO ET AL BELUGA 0-23

FIELD HUDSON BAY PROVINCE MANITOBA

Schlumberger

PROGRAM:	4DATA1.EXE
FIELD:	HIBERNIA - HIBERNIA
WELL:	7855-01 - 7855-01
	2000-02-16 @ 09:00:00 - 0.0
COMPANY:	HIBERNIA MANAGEMENT & DEVELOPMENT

Schlumberger

Hibernia

LOCATION	
Latitude	
Longitude	
Section	
Township	
Range	
Permanent Datum	
Log Measured From	
Drilling Measured From	
Elevation	
Elevation	
Elevation	

Permanent Datum:	
Log Measured From:	
Drilling Measured From:	
Elevation:	
Elevation:	
Elevation:	

Date	
Run Number	
Depth Driller	
Depth Logger	
Bottom Logged Interval	
Top Log Interval	
Casing Driller	
Casing Logger	
Bit Size	
Type Fluid in Hole	
Density	
Viscosity	
pH	
Fluid Loss	
Source of Sample	
Rm @ Meas. Temp.	
Rmf @ Meas. Temp.	
Rmc @ Meas. Temp.	
Source Rmf/Rmc	
Rm @ BHT	
Rmf @ BHT	
Rmc @ BHT	
Time Circ. Started	
Time Circ. Stopped	
Time Logger on Bottom	
Max. Recorded Temp.	
Equipment Location	
Recorded By	
Witnessed By	

Run 1

TYPE FLUID IN HOLE:	Non-dispersed KCl/Polymer
DENSITY:	1250 kg/m3
VISCOSITY:	40 s
PH:	10.0
FLUID LOSS:	20.0 cc
SOURCE OF SAMPLE:	
RM:	@ 0.0 DEGC
RMF:	@ 0.0 DEGC
RMC:	@ 0.0 DEGC
SOURCE RMF/RMC:	/
RM @ BHT:	@ 0.0 DEGC
RMF @ BHT:	@ 0.0 DEGC
RMC @ BHT:	@ 0.0 DEGC
TIME CIRC. STOPPED:	
TIME LOGGER ON BTM.:	
MAX. REC. TEMP:	0.0 DEGC
LOGGING UNIT NO:	922
LOGGING UNIT LOC:	ST. JOHN'S
RECORDED BY:	ECII
WITNESSED BY:	

REMARK1:Run 1

MUD Data NOT INCLUDED [SINCE IT IS NOT REQUIRED].
CALIPER [1=NS 2=EW] [1.0 INCH/DIV] [6.0 INCH/DIV].
LENGTH [1=NS 2=EW] [1.0 INCH/DIV] [1.0 INCH/DIV].
THE CALIPER1 DO NOT OPEN FWD ENOUGH INTO THE NS-HOLE.

Run 2

EQUIPMENT NUMBER:-

DnTrm 3828 MS-19 192" HSI-F 716

Run 2

TYPE FLUID IN HOLE:	
DENSITY:	1250 kg/m3
VISCOSITY:	40.0 s
PH:	10.0
FLUID LOSS:	20.0 cc
SOURCE OF SAMPLE:	
RM:	@ 0.0 DHMM AT 0.0 DEGC
RMF:	@ 0.0 DHMM AT 0.0 DEGC
RMC:	@ 0.0 DHMM AT 0.0 DEGC
SOURCE RMF/RMC:	PRESS /PRESS
RM AT BHT:	@ 0.0 DHMM AT 0.0 DEGC
RMF AT BHT:	@ 0.0 DHMM AT 0.0 DEGC
RMC AT BHT:	@ 0.0 DHMM AT 0.0 DEGC
TIME CIRC. STOPPED:	
TIME LOGGER ON BTM.:	
MAX. REC. TEMP:	0.0 DEGC
LOGGING UNIT NO:	922
LOGGING UNIT LOC:	ST. JOHN'S
RECORDED BY:	ECII - ECII
WITNESSED BY:	KEN EICHER

REMARK1:Run 2

CALIPERS C1 AND C2 ARE PERPENDICULAR TO ONE ANOTHER.

Run 3

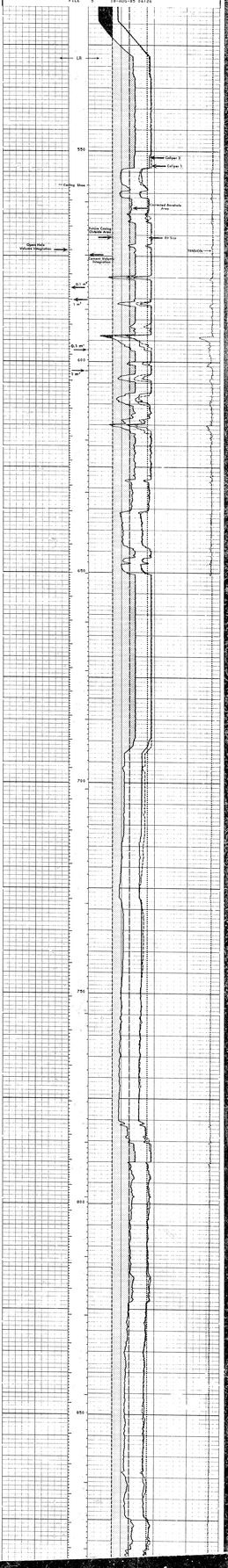
EQUIPMENT NUMBERS:-

SHDI-B 992	SHDI-DB 1721	SGC-SA 718
TCC-B 553	TCM-B 841	

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 OUR GENERAL TERMS AND CONDITIONS AS SET FORTH IN OUR CURRENT PRICE SCHEDULE.

Run 1

CEMENT VOLUME = 30.2092 M3
HOLE VOLUME = 29.5184 M3
FROM: 1992.0 TO 557.9 METE



Schlumberger

COMPLETION RECORD

PROVINCE MANITOBA
FIELD HUDSON BAY
WELL TRILLIUM SOQUIP ONEXCO ET AL BELUGA O-23
COMPANY CANTERRA ENERGY LTD.

LOCATION
LSD 16 SEC 23 TWP 25 RGE 13 W MERIDIAN
FIELD HUDSON BAY
PROVINCE MANITOBA
SEE MAP
Elev KB 0.0 GL 0.0 m Above Perm. Datum

COMPANY CANTERRA ENERGY LTD.
WELL TRILLIUM SOQUIP ONEXCO ET AL BELUGA O-23
FIELD HUDSON BAY
PROVINCE MANITOBA
LOCATION 16-23-25-13-W1M
API NO. 100162502513W100
NUL 25 1985
Canada Oil and Gas Lands Administration

Drilling Measured From KB
Permanent Datum GL
Elevations KB 0.0 GL 0.0
Date 14-SEP-85
Run Number ONE
Depth-Driller 570
Depth-Logger 567
Bottom Log Interval 566
Top Log Interval SURFACE
Casing Driller 13 3/8 @ 0.0
Casing Logger 13 3/8 @ 0.0
Bit Size 12 1/4
Type Fluid in Hole GEL POLYMER
Dens. Visc. 1282 35
PH / Fluid Loss 11.0 29.0 C3
Source of Sample CIRC.
Rm @ Meas. Temp. .048 @ 30.0
Rmf @ Meas. Temp. .048 @ 30.0
Rmc @ Meas. Temp. .166 @ 21.0
Source Rmf / Rmc PRESS /PRESS
Rm @ Bht .048 @ 30.0
Rmf @ Bht .040 @ 30.0
Rmc @ Bht .137 @ 30.0
Maximum Rec. Temp. 30.0 deg. C
Equipment Location SEE BELOW
Recorded By R. CARSTAIRS
Witnessed By

Casing Record	Size (mm)	Wt. (kg/m)	Grade	Top (m)	Bottom (m)
Surface	13 3/8	54.5	J-55	0.0	570.0
Production					
Liner					

Tubing Record	Size (mm)	Wt. (kg/m)	Grade	Top (m)	Bottom (m)
Tubing					

Perforations	Interval (m)	No. of Holes

Stimulation	Interval (m)	Type	Material	Amount

Drill Stem Test	Interval (m)	Formation	Hours	Pressure

Formation Tops	Depth (m)

Logging Record	Run	Interval (m)

Cement Squeeze	Interval (m)	Type	Amount

Perforations	Interval (m)	No. of Holes

Stimulation	Interval (m)	Type	Material	Amount

Drill Stem Test	Interval (m)	Formation	Hours	Pressure

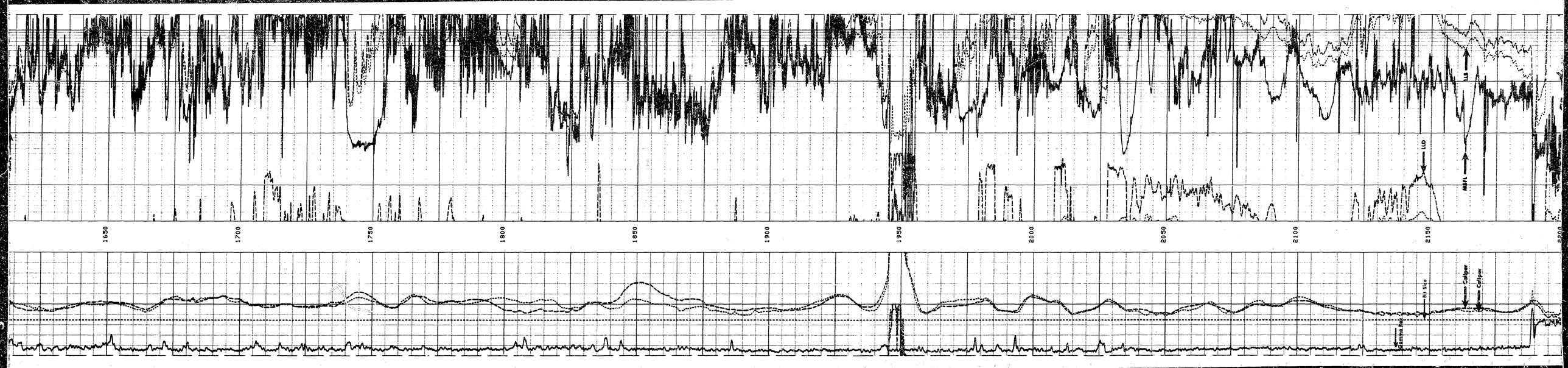
Formation Tops	Depth (m)

Logging Record	Run	Interval (m)

Cement Squeeze	Interval (m)	Type	Amount

Casing Record	Size (mm)	Wt. (kg/m)	Grade	Top (m)	Bottom (m)
Surface	13 3/8	54.5	J-55	0.0	570.0
Production					
Liner					

Tubing Record	Size (mm)	Wt. (kg/m)	Grade	Top (m)	Bottom (m)
Tubing	


LLD
MSFL
LLS
1650
1700
1750
1800
1850
1900
1950
2000
2050
2100
2150
2200
Gamma Ray
Bit Size
Caliper
Caliper

Run 2

CP 28.15

FILE 101 12-SEP-85 11:12
DATA ACQUIRED 12-SEP-85 09:13

BS (MM) 225.00 475.00
CALS(MM) 225.00 475.00
CALI(MM) 225.00 475.00
GR (GAPI) 0.0 150.00

LLD (OHMM) 2000.0 200000
LLS (OHMM) 2000.0 200000
MSFL(OHMM) .20000 2000.0
LLD (OHMM) .20000 2000.0
LLS (OHMM) .20000 2000.0

Run 1

SENSOR MEASURE POINT TO TOOL ZERO

SPAR	12.57	METER	SP	12.57	METER
MTEM	14.96	METER	MRES	14.96	METER
DV1	4.54	METER	CAL1	.86	METER
SV0	4.54	METER	SI0	4.54	METER
DV0	4.54	METER	DI0	4.54	METER
CALS	.94	METER	DLCS	.28	METER
STSG	.28	METER	GR	10.77	METER
II	.40	METER	TENS	.28	METER
CMSF	.33	METER			

PARAMETERS

NAME	VALUE	UNIT	NAME	VALUE	UNIT
SPRF	550.000	NW	DPRF	550.000	NW
BTIK	2		STIK	2	
CREF	AUTO		DMR	CONS	
RMUD	1.00000	OHMM	SPT	STAN	
SHT	26.6666	DEGC	TD	3048.00	M
BS	374.700	MM	BHS	OPEN	
PP	RECO		DD	.500000	M

Run 2

SENSOR MEASURE POINT TO TOOL ZERO

SPAR	12.57	METER	SP	12.57	METER
MTEM	14.96	METER	MRES	14.96	METER
DV1	4.54	METER	CAL1	.86	METER
SV0	4.54	METER	SI0	4.54	METER
DV0	4.54	METER	DI0	4.54	METER
CALS	.94	METER	DLCS	.28	METER
STSG	.28	METER	GR	10.77	METER
II	.40	METER	TENS	.28	METER
CMSF	.33	METER			

PARAMETERS

NAME	VALUE	UNIT	NAME	VALUE	UNIT
SPRF	550.000	NW	DPRF	550.000	NW
BTIK	2		STIK	2	
CREF	AUTO		DMR	CONS	
RMUD	1.00000	OHMM	SPT	STAN	
SHT	26.6666	DEGC	TD	3048.00	M
BS	311.150	MM	BHS	OPEN	
PP	RECO		DD	1.00000	M

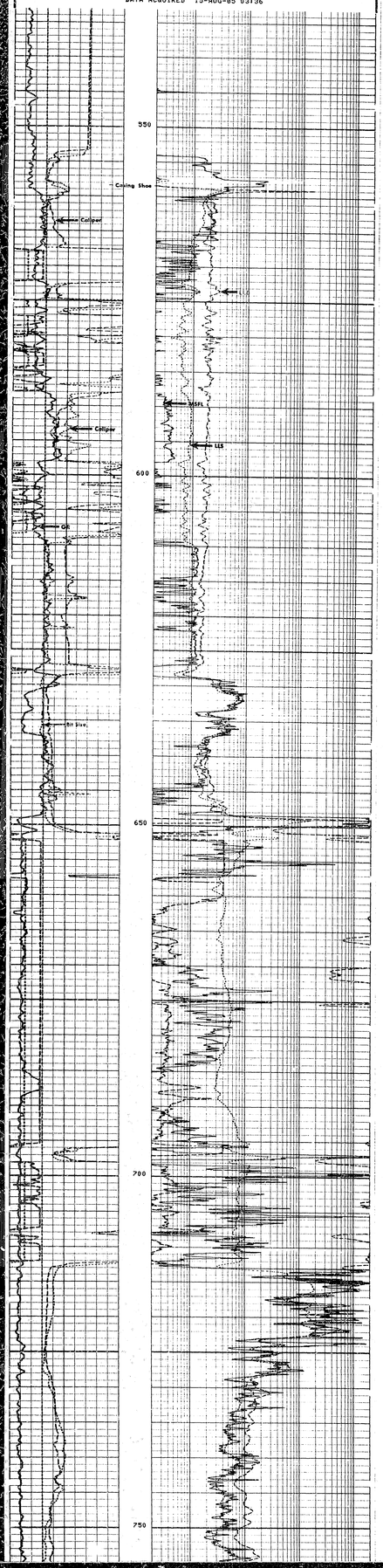
BS (MM) 300.00 550.00
CALS(MM) 300.00 550.00
CALI(MM) 300.00 550.00
GR (GAPI) 0.0 150.00

LLD (OHMM) 2000.0 200000
LLS (OHMM) 2000.0 200000
MSFL(OHMM) .20000 2000.0
LLD (OHMM) .20000 2000.0
LLS (OHMM) .20000 2000.0

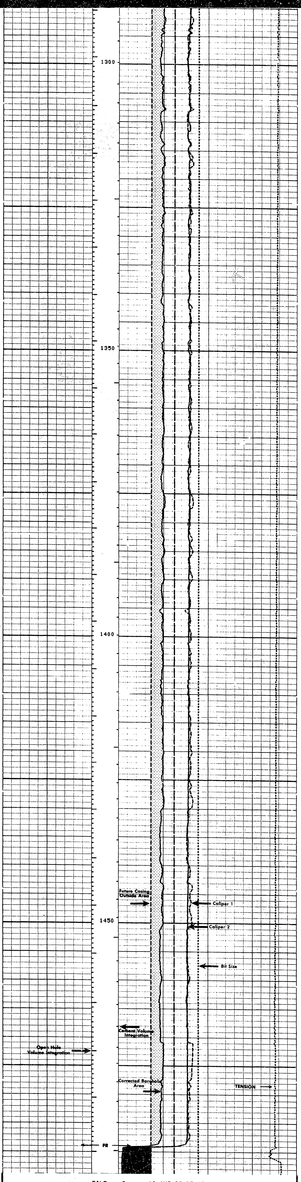
Run 1

CP 28.15

FILE 101 15-AUG-85 03:36
DATA ACQUIRED 15-AUG-85 03:36



TRENCH
Bit Bars
Collar 2
Collar 1
Ground Surface
Bit
Drains Water
Magnetometer
Drains Water
Magnetometer
Bore Hole
Water Magnetometer
950
960
970
980
990
1000
1010
1020
SPLICE
1030
1040
1050
1060
1070



FILE 3 18-AUG-85 05:13

0.0	TENSION ( ) 25993. 0.0
0.0	AREA(M2) .00000
0.0	AREA (M2) .50000
0.0	R2 (MM) .50000
0.0	C2 (MM) 1000.0
0.0	C1 (MM) 1000.0

Run 1 SENSOR MEASURE POINT TO TOOL ZERO

R3	0.0	METER	AZIM	0.0	METER
FEP1	0.0	METER	DEV1	0.0	METER
REFE	0.0	METER	FEP2	0.0	METER
EMEN	0.0	METER	RC	0.0	METER
C2	0.0	METER	C1	0.0	METER
CEN2	0.0	METER	R1	0.0	METER
TEMP	0.0	METER	R2	0.0	METER
FCO	0.0	METER	TEMS	0.0	METER
FC2	0.0	METER	FC3	0.0	METER
FC4	0.0	METER	FC3	0.0	METER
SHIT	0.0	METER			

PARAMETERS

NAME	VALUE	UNIT	NAME	VALUE	UNIT
MDEC	0		PVUM	1.00000	
STYP	NORD		MCT	72	DEG
ZERO	444.000	MM	POS	SPEN	

Run 2

WARI AND R3 CURVES DISALLOWED WHEN DEV LESS THAN 0.5 DEG.
STAND-OFF = -1 MEANS NO KNUCKLE JOINT

EVENT MARK SUMMARY:

OUTPUT	INTERVAL BETWEEN PIPS	DEPTH TRACK EDGE
INV	.100000 M3	LEFT EDGE
ICV	.100000 M3	RIGHT EDGE

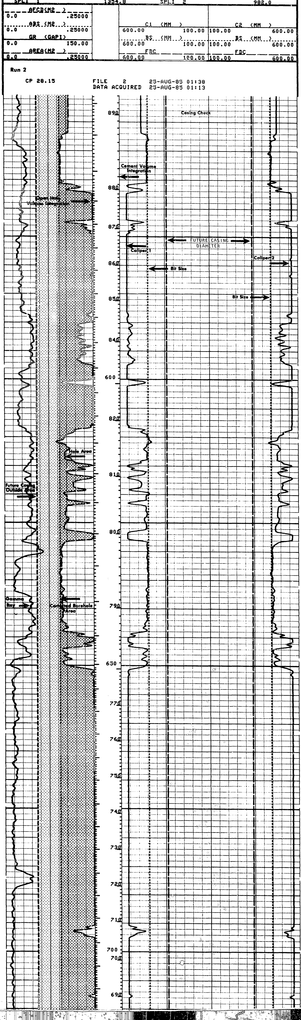
CHANGED PARAMETERS

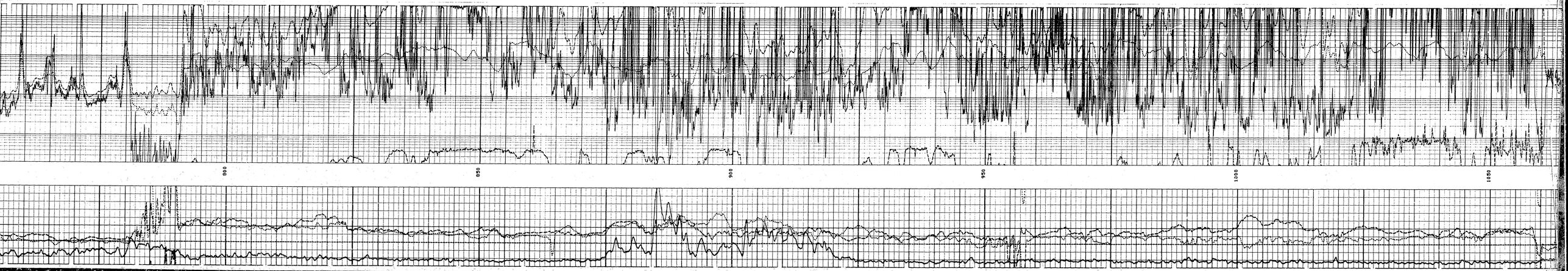
NAME	VALUE	UNIT	DEPTH (M)	NAME	VALUE	UNIT	DEPTH (M)
SPL1			1254.8	SPL1	R		982.8

0.0	AREA(M2)	.25000					
0.0	R3 (MM)	.25000		C1 (MM)	100.00	C2 (MM) 100.00	600.00
0.0	GR (GAPI)			600.00 R2 (MM)	100.00	R1 (MM) 100.00	600.00
0.0	AREA(M2)	150.00		600.00 FBC	100.00	FBC	600.00
0.0		.25000		600.00	100.00	100.00	600.00

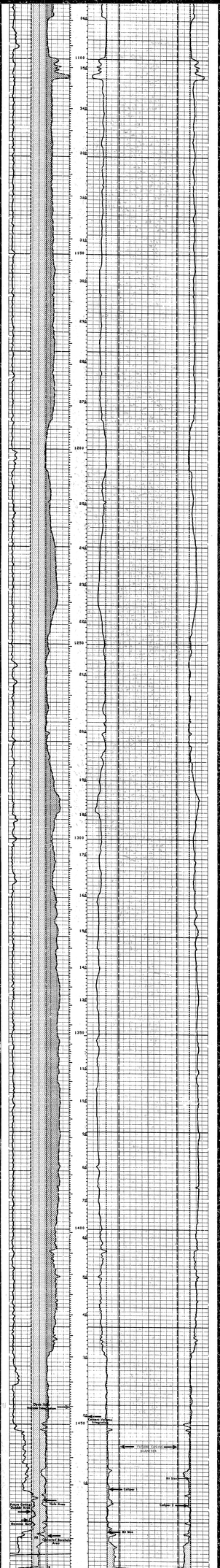
Run 2

CP 28.15 FILE 8 23-AUG-85 01:30
DATA ACQUIRED 23-AUG-85 01:13

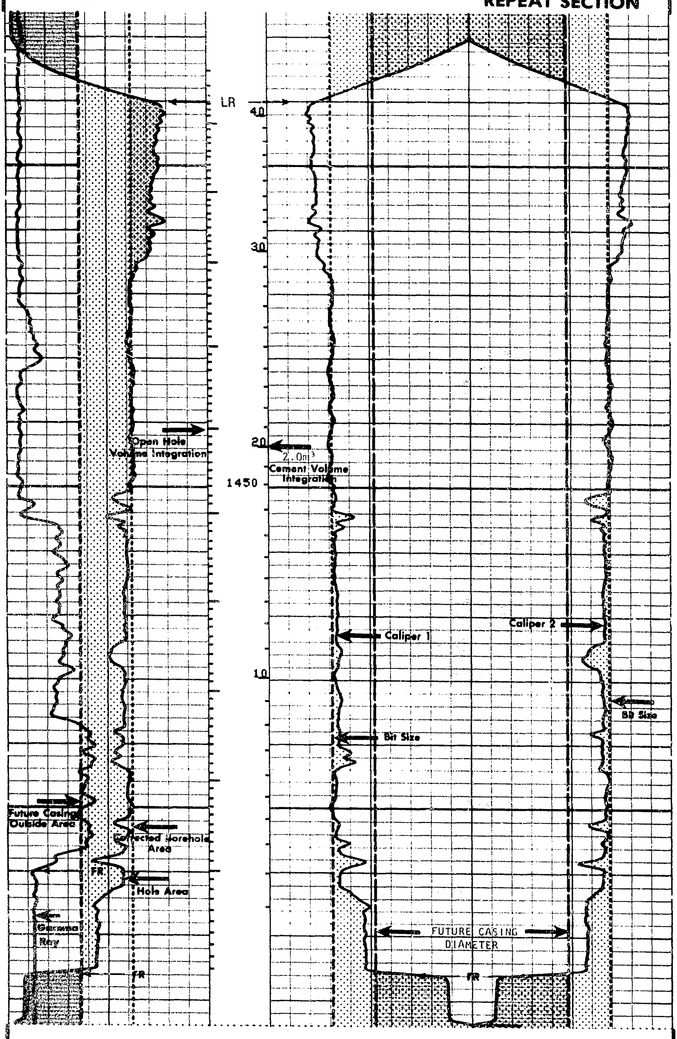



800
850
900
950
1000
1050

Caliper 1
Caliper 1
TOTAL CASING
Casing Shoe
Casing Shoe
Casing Shoe


Pulse Echo Caliper
Caliper 1
Caliper 2
Caliper 3
Caliper 4
Caliper 5
Caliper 6
Caliper 7
Caliper 8
Caliper 9
Caliper 10
Caliper 11
Caliper 12
Caliper 13
Caliper 14
Caliper 15
Caliper 16
Caliper 17
Caliper 18
Caliper 19
Caliper 20
Caliper

CP 20.15 FILE 2 25-AUG-85 13:43 **REPEAT SECTION**



CP 20.15 FILE 2 25-AUG-85 13:33

AFCU(M2)			
0.0 .25000			
ABS (M2)			
0.0 .25000	C1 (MM)	C2 (MM)	
GR (GAPI)	600.00 100.00	100.00 600.00	
0.0 150.00	BS (MM)	BS (MM)	
AREA(M2)	600.00 100.00	100.00 600.00	
0.0 .25000	FCD	FCD	
	600.00 100.00	100.00 600.00	

Run 2

SENSOR MEASURE POINT TO TOOL ZERO

STSG	.38 METER	GR	7.69 METER
TENS	.38 METER	SHDW	.38 METER
C1	.38 METER	ADCR	.38 METER
DCHV	.38 METER	C2	.38 METER
EV	.38 METER	EI	.38 METER
FY	.38 METER	FX	.38 METER
PP	.38 METER	FZ	.38 METER
RAD2	.38 METER	RAD1	.38 METER
RAD4	.38 METER	RAD3	.38 METER
ATEM	.38 METER	ADCZ	.38 METER
VPR	.38 METER	VMR	.38 METER
AY	.38 METER	AX	.38 METER
AZ	.38 METER		

PARAMETERS

NAME	VALUE	UNIT	NAME	VALUE	UNIT
XOFF	0		SOFF	-25.4000	MM
XMOD	MANU		XGAI	0	
VREF	-5.00000	VDC	FCDD	1.	
MDEC	-7.00000	DEG	SHDI	BB	
BS	444.500	MM	BHS	OPEN	

COMPANY CANTERRA ENERGY LTD.

WELL TRILLIUM SOQUIP ONEXCO ET AL BELUGA 0-23

FIELD HUDSON BAY PROVINCE MANITOBA

Schlumberger

8710-C55-1-1

REPEAT FORMATION TESTER

Schlumberger

PROVINCE	MANITOBA
FIELD	HUDSON BAY
WELL	TRILLIUM SOQUIP ONEXCO ET AL BELUGA 0-23
COMPANY	CANTERRA ENERGY LTD.

COMPANY CANTERRA ENERGY LTD.

WELL TRILLIUM SOQUIP ONEXCO ET AL BELUGA 0-23

FIELD HUDSON BAY

PROVINCE MANITOBA

CANADA OIL AND GAS LANDS ADMINISTRATION
ADMINISTRATION DES TERRES ET DU GAZ DES TERRES DU CANADA
NOV 26 1985
Other Services
RMKS
ENGINEERING BRANCH
GÉNIE

LOCATION
59° 12' 54.4" NORTH LATITUDE
88° 33' 26.6" WEST LONGITUDE
LSD | SEC. | TWP | RANGE

Permanent Datum: MSL ; Elev.: 0.0 m
Log Measured From KB 13.7 m Above Perm. Datum
Drilling Measured From KB

Elev.: K.B. 13.7 m
D.F. 13.1 m
G.L. -179.8 m

Date	16 AUG 85		13 SEP 85					
Run No.	One		Two		Three		Four	
Depth—Driller	1492.0 m		2215.0 m		m		m	
Depth—Logger (Schl.)	1490.0 m		2215.0 m		m		m	
Btm. Log Interval	1480.5 m		2193.0 m		m		m	
Top Log Interval	532.0 m		1565.5 m		m		m	
Casing—Driller	508mm @ 558 m		339.7mm@1478 m		@ m		@ m	
Casing—Logger	558.0 m		1477.0 m		m		m	
Bit Size	374.7 mm		311.2 mm		mm		mm	
Type Fluid in Hole	SEE BELOW		SEE BELOW					
Dens kg/m³ / Visc.	1258	40.0	1282	35.0				
pH / Fluid Loss (cm³)	10.6	20.0	11.0	29.0				
Source of Sample	FLOWLINE		CIRCULATION					
Rm @ Meas. Temp.	0.056 @ 23.0 °C		0.060 @ 20.0°C		@ °C		@ °C	
Rmf @ Meas. Temp.	0.046 @ 23.0 °C		0.048 @ 22.0°C		@ °C		@ °C	
Rmc @ Meas Temp	0.112 @ 21.0 °C		0.166 @ 21.0°C		@ °C		@ °C	
Source: Rmf / Rmc	FILTER	PRESS	PRESS	PRESS				
Rm @ BHT	0.051 @ 27.0 °C		0.048 @ 30.0°C		@ °C		@ °C	
TIME Circulation Stopped	1730/14		0040/12					
TIME Tool Last on Bottom	2030/-		1000/13					
Max. Rec. Temp. #1 / #2	27.0 °C	- °C	30.0 °C	- °C	°C	°C	°C	°C
Unit / District	922	ST.J	922	ST.J				
Recorded By	MACNEILL		BEBB					
Witnessed By	GONNASON		ZANUSSI					

REMARKS: 12 NOV 85 CAL MK
OTHER SERVICES: DISFL, DLL-MSFL, DDBHC-GR, NGT, 4-ARM CALIPER, CST, CNL-LDT-GR, SHDT, BHC-GR, WST, CBL-VDL, CORP, CYBER
RUN #1
RUN #2
PROGRAM TAPE NO: 26.2
SERVICE ORDER NO: 129401
CASING WEIGHT: 197.9 kg/m
PROGRAM TAPE NO: 26.2
SERVICE ORDER NO: 129404
CASING WEIGHT: 107.1 kg/m

Run 1
TYPE FLUID IN HOLE: NA-CL SATURATED GEL POLYMER
DENSITY: 1258 K/M3
VISCOSITY: 40.0 S
PH: 10.6
FLUID LOSS: 20.0 C3
SOURCE OF SAMPLE: FLOW LINE
RM: .056 OHMM AT 23.0 DEGC
RMF: .046 OHMM AT 23.0 DEGC
RMC: .112 OHMM AT 21.0 DEGC
SOURCE RMF/RMC: FILTER /PRESS
RM AT BHT: .051 OHMM AT 27.0 DEGC
RMF AT BHT: .042 OHMM AT 27.0 DEGC
RMC AT BHT: .098 OHMM AT 27.0 DEGC

TIME CIRC. STOPPED: 17:30/14
TIME LOGGER ON BTM.: 20:30

MAX. REC. TEMP: 27.0 DEGC

LOGGING UNIT NO: 922
LOGGING UNIT LOC: ST. JOHN'S
RECORDED BY: A. MACNEILL
WITNESSED BY: W. GONNASON

Run 1
REMARKS: ALL PRESSURES ARE kPa ABSOLUTE
PRESSURES ARE CORRECTED FOR TEMPERATURES IN REAL TIME
GAMMA RAY IS NOT CALIBRATED, USED FOR DEPTH CORRELATION ONLY

Run 1
EQUIPMENT NUMBERS-

RFM-AB 547	RFC-AC 458	RFS-A 42	RFS-B 42
RFP-AD 30	RPP-AB 183	RVP-AA 181	

Run 2
TYPE FLUID IN HOLE: NACL SATURATED GEL POLYMER
DENSITY: 1282 K/M3
VISCOSITY: 35.0 S
PH: 11.0
FLUID LOSS: 29.0 C3
SOURCE OF SAMPLE: CIRC.
RM: .060 OHMM AT 20.0 DEGC
RMF: .048 OHMM AT 22.0 DEGC
RMC: .166 OHMM AT 21.0 DEGC
SOURCE RMF/RMC: PRESS /PRESS
RM AT BHT: .048 OHMM AT 30.0 DEGC
RMF AT BHT: .040 OHMM AT 30.0 DEGC
RMC AT BHT: .137 OHMM AT 30.0 DEGC

TIME CIRC. STOPPED: 00:40 / 12
TIME LOGGER ON BTM.: 10:00 / 13

MAX. REC. TEMP: 30.0 DEGC

LOGGING UNIT NO: 922
LOGGING UNIT LOC: ST. JOHN'S
RECORDED BY: BEBB
WITNESSED BY: L. ZANUSSI

REMARKS:Run 2

STANDARD AREA PACKER RUN
STANDARD AREA PROBE USED
PRESSURE GAUGE: 0-5000 PSIA WITH CM-2
PRESSURE CORRECTIONS MADE IN REAL TIME
PRESSURE CORRECTION TABLES ATTACHED
TOOL WAS SET IN 9 5/8" CASING WITH FLOGEL.
TOOL WAS SET IN 9 5/8" NON-PERF BETWEEN TESTS 7 & 8.
AS WELL AS AFTER TESTING WAS COMPLETED

Run 3

EQUIPMENT NUMBERS:

RPM-28	RTC-48 +CO	RPI-4 +8	RTI-8 +0
RPP-48 30	RPP-48 103	RVP-4M 181	SSC-2C 1495

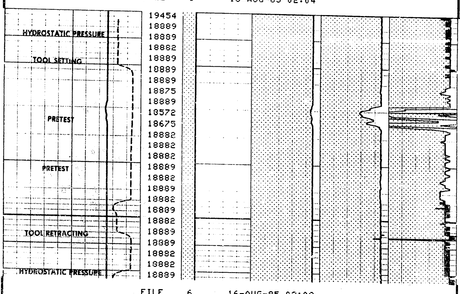
ALL INTERPRETATIONS ARE OPINIONS BASED ON INFERENCES FROM ELECTRICAL OR OTHER MEASUREMENTS MADE WE CANNOT, AND DO NOT GUARANTEE THE ACCURACY OR CORRECTNESS OF ANY INTERPRETATIONS; AND WE SHALL NOT, EXCEPT IN THE CASE OF GROSS OR WILLFUL NEGLIGENCE ON OUR PART, BE LIABLE OR RESPONSIBLE FOR ANY LOSS, COSTS, DAMAGES OR EXPENSES INCURRED OR SUSTAINED BY ANYONE RESULTING FROM ANY INTERPRETATION MADE BY ANY OF OUR OFFICERS, AGENTS OR EMPLOYEES. ALL OTHER PRODUCTS AND SERVICES ARE SUBJECT TO OUR GENERAL TERMS AND CONDITIONS AS SET FORTH IN OUR CURRENT PRICE SCHEDULE.

Run 1

Repeat Formation Test Summary

DEPTH	FILE	TEST #	INITIAL HYDROSTATIC	SHUT IN PRESSURE	FINAL HYDROSTATIC	GOOD SEAL Y/N	PERMEABLE Y/N
4845.5	2.	1.	1944/ 3m.		1944/	YES	TIGHT
4876.5	3.	2.	1945/4		1954/	LOST SEAL	—
4886.5	4.	3.	1946/8		1946/	LOST SEAL	—
4911.5	5.	4.	1946/		1946/	LOST SEAL	—
4938.5	6.	5.	1947/7		1948/2	LOST SEAL	—
4975.5	7.	6.	1950/3		1951/7	LOST SEAL	—
4989.5	8.	7.	1951/		1951/	LOST SEAL	—
5016.5	9.	8.	1955/5		1956/5	LOST SEAL	—
5029.5	10.	9.	1957/		1957/6	YES	TIGHT
5045.5	11.	10.	1959/6		1964/	YES	TIGHT
5062.5	12.	11.	1964/		1965/7	YES	TIGHT
5092.5	13.	12.	1969/5		1969/5	YES	TIGHT
5105.5	14.	13.	1969/5		1969/5	YES	TIGHT
5114.5	15.	14.	1969/5		1969/5	YES	TIGHT
5129.5	16.	15.	1969/5		1969/5	YES	TIGHT
5138.5	17.	16.	1972/2		1972/8	YES	TIGHT
5157.5	18.	17.	1973/8		1973/8	YES	TIGHT
5177.5	19.	18.	1975/5		1975/5	YES	TIGHT
5193.5	20.	19.	1976/5		1976/5	YES	TIGHT
5205.5	21.	20.	1977/5		1977/5	YES	TIGHT
5218.5	22.	21.	1978/5		1978/5	YES	TIGHT
5240.5	23.	22.	1980/5		1980/5	YES	TIGHT
5254.5	24.	23.	1981/5		1981/5	YES	TIGHT
5266.5	25.	24.	1982/5		1982/5	YES	TIGHT
5280.5	26.	25.	1983/5		1983/5	YES	TIGHT
5294.5	27.	26.	1984/5		1984/5	YES	TIGHT
5306.5	28.	27.	1985/5		1985/5	YES	TIGHT
5320.5	29.	28.	1986/5		1986/5	YES	TIGHT
5332.5	30.	29.	1987/5		1987/5	YES	TIGHT
5351.5	31.	30.	1988/5		1988/5	YES	TIGHT
5366.5	32.	31.	1989/5		1989/5	YES	TIGHT
5382.5	33.	32.	1990/5		1990/5	YES	TIGHT
5396.5	34.	33.	1991/5		1991/5	YES	TIGHT
5412.5	35.	34.	1992/5		1992/5	YES	TIGHT
5426.5	36.	35.	1993/5		1993/5	YES	TIGHT
5440.5

FILE 6 16-AUG-85 02:04



FILE 6 16-AUG-85 02:08

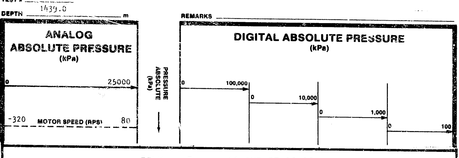
PARAMETERS

NAME	VALUE	UNIT	NAME	VALUE	UNIT
BS	374.700	MM	BHS	OPEN	
FLD	1.00000	G/C3	HPT	8.55057	DEGC
TZRV	453.000	OHMS	TCRV	761.450	OHMS
HPSN	0000A-00		RPU	PSIG	
RFTT	25.0000	DEGC	FDEP	1438.99	M
SGSN	83760				

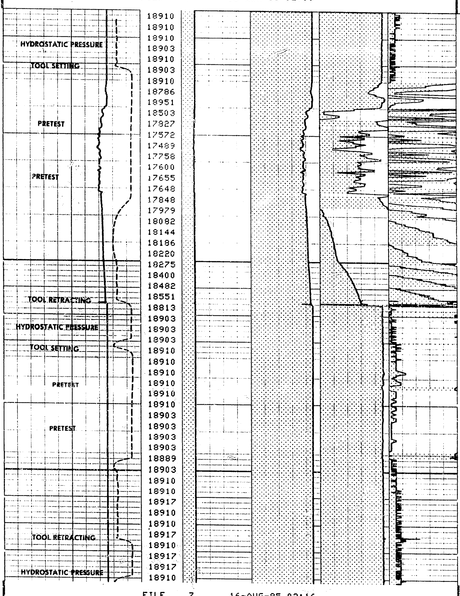
SENSOR MEASURE POINT TO TOOL ZERO

TENS 7.8 METER GR 6.3 METER

TEST # 6
DEPTH 1439.0 m
REMARKS



FILE 7 16-AUG-85 02:09



FILE 7 16-AUG-85 02:16

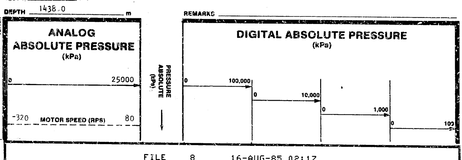
PARAMETERS

NAME	VALUE	UNIT	NAME	VALUE	UNIT
BS	374.700	MM	BHS	OPEN	
FLD	1.00000	G/C3	HPT	8.55057	DEGC
TZRV	453.000	OHMS	TCRV	761.450	OHMS
HPSN	0000A-00		RPU	PSIG	
RFTT	25.0000	DEGC	FDEP	1437.98	M
SGSN	83760				

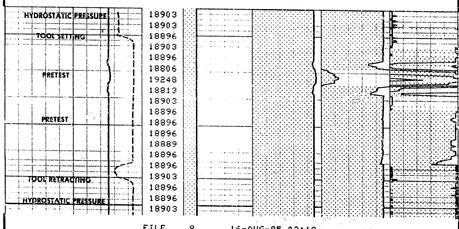
SENSOR MEASURE POINT TO TOOL ZERO

TENS 7.8 METER GR 6.3 METER

TEST # 7
DEPTH 1438.0 m
REMARKS



FILE 8 16-AUG-85 02:17



FILE 8 16-AUG-85 02:19

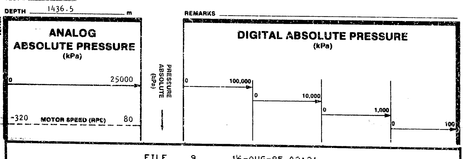
PARAMETERS

NAME	VALUE	UNIT	NAME	VALUE	UNIT
BS	374.700	MM	BHS	OPEN	
FLD	1.00000	G/C3	HPT	8.55057	DEGC
TZRV	453.000	OHMS	TCRV	761.450	OHMS
HPSN	0000A-00		RPU	PSIG	
RFTT	25.0000	DEGC	FDEP	1436.49	M
SGSN	83760				

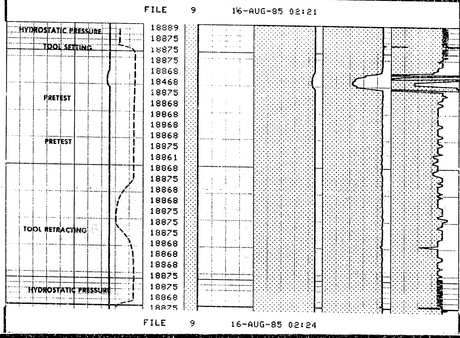
SENSOR MEASURE POINT TO TOOL ZERO

TENS 7.8 METER GR 6.3 METER

TEST # 8
DEPTH 1436.5 m
REMARKS



FILE 9 16-AUG-85 02:21



FILE 9 16-AUG-85 02:24

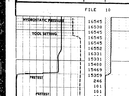
PARAMETERS

NAME	VALUE	UNIT	NAME	VALUE	UNIT
B1	374.750	NM	BHS	OPEN	
FL8	1.00000	G/C3	WPT	8.50657	DEGC
TZMX	453.000	DHMS	TCRV	741.450	DHMS
WPTR	0000H40		RPU	P110	
WPTT	25.0000	DEGC	FBCF	1059.40	M
SSGN	83768				

SENSOR MEASURE POINT TO TOOL ZERO

TENS 7.6 METER GR 4.3 METER

TEST 2 DEPTH 1215.3



FILE 11 14-AUG-95 02:33

FILE 12 14-AUG-95 02:36

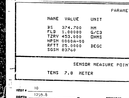
PARAMETERS

NAME	VALUE	UNIT	NAME	VALUE	UNIT
B1	374.750	NM	BHS	OPEN	
FL8	1.00000	G/C3	WPT	8.50657	DEGC
TZMX	453.000	DHMS	TCRV	741.450	DHMS
WPTR	0000H40		RPU	P110	
WPTT	25.0000	DEGC	FBCF	1059.75	M
SSGN	83768				

SENSOR MEASURE POINT TO TOOL ZERO

TENS 7.6 METER GR 4.3 METER

TEST 3 DEPTH 1265.0



FILE 13 14-AUG-95 02:37

FILE 14 14-AUG-95 02:40

PARAMETERS

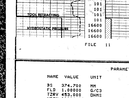
NAME	VALUE	UNIT	NAME	VALUE	UNIT
B1	374.750	NM	BHS	OPEN	
FL8	1.00000	G/C3	WPT	8.50657	DEGC
TZMX	453.000	DHMS	TCRV	741.450	DHMS
WPTR	0000H40		RPU	P110	
WPTT	25.0000	DEGC	FBCF	1059.95	M
SSGN	83768				

SENSOR MEASURE POINT TO TOOL ZERO

TENS 7.6 METER GR 4.3 METER

TEST 4 DEPTH 1300.0

FILE 15 14-AUG-95 02:41



FILE 16 14-AUG-95 02:44

PARAMETERS

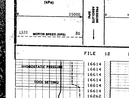
NAME	VALUE	UNIT	NAME	VALUE	UNIT
B1	374.750	NM	BHS	OPEN	
FL8	1.00000	G/C3	WPT	8.50657	DEGC
TZMX	453.000	DHMS	TCRV	741.450	DHMS
WPTR	0000H40		RPU	P110	
WPTT	25.0000	DEGC	FBCF	1061.90	M
SSGN	83768				

SENSOR MEASURE POINT TO TOOL ZERO

TENS 7.6 METER GR 4.3 METER

TEST 5 DEPTH 1335.0

FILE 17 14-AUG-95 02:47



FILE 18 14-AUG-95 02:50

PARAMETERS

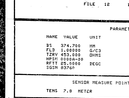
NAME	VALUE	UNIT	NAME	VALUE	UNIT
B1	374.750	NM	BHS	OPEN	
FL8	1.00000	G/C3	WPT	8.50657	DEGC
TZMX	453.000	DHMS	TCRV	741.450	DHMS
WPTR	0000H40		RPU	P110	
WPTT	25.0000	DEGC	FBCF	1061.95	M
SSGN	83768				

SENSOR MEASURE POINT TO TOOL ZERO

TENS 7.6 METER GR 4.3 METER

TEST 6 DEPTH 1370.0

FILE 19 14-AUG-95 02:51



FILE 20 14-AUG-95 02:54

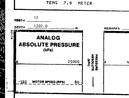
PARAMETERS

NAME	VALUE	UNIT	NAME	VALUE	UNIT
B1	374.750	NM	BHS	OPEN	
FL8	1.00000	G/C3	WPT	8.50657	DEGC
TZMX	453.000	DHMS	TCRV	741.450	DHMS
WPTR	0000H40		RPU	P110	
WPTT	25.0000	DEGC	FBCF	1061.89	M
SSGN	83768				

SENSOR MEASURE POINT TO TOOL ZERO

TENS 7.6 METER GR 4.3 METER

TEST 7 DEPTH 1405.0



FILE 21 14-AUG-95 02:57

FILE 22 14-AUG-95 03:00

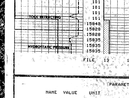
PARAMETERS

NAME	VALUE	UNIT	NAME	VALUE	UNIT
B1	374.750	NM	BHS	OPEN	
FL8	1.00000	G/C3	WPT	8.50657	DEGC
TZMX	453.000	DHMS	TCRV	741.450	DHMS
WPTR	0000H40		RPU	P110	
WPTT	25.0000	DEGC	FBCF	1061.95	M
SSGN	83768				

SENSOR MEASURE POINT TO TOOL ZERO

TENS 7.6 METER GR 4.3 METER

TEST 8 DEPTH 1440.0



FILE 23 14-AUG-95 03:03

FILE 24 14-AUG-95 03:06

PARAMETERS

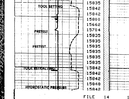
NAME	VALUE	UNIT	NAME	VALUE	UNIT
B1	374.750	NM	BHS	OPEN	
FL8	1.00000	G/C3	WPT	8.50657	DEGC
TZMX	453.000	DHMS	TCRV	741.450	DHMS
WPTR	0000H40		RPU	P110	
WPTT	25.0000	DEGC	FBCF	1061.95	M
SSGN	83768				

SENSOR MEASURE POINT TO TOOL ZERO

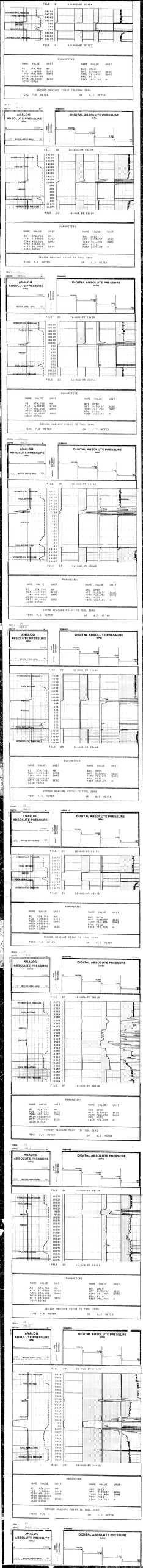
TENS 7.6 METER GR 4.3 METER

TEST 9 DEPTH 1475.0

FILE 25 14-AUG-95 03:09



FILE 26 14-AUG-95 03:12


ANALOG ABSOLUTE PRESSURE (kPa)
DIGITAL ABSOLUTE PRESSURE (kPa)
HYDROSTATIC PRESSURE
TOOL SETTING
PRESSUREDOWN
PRESSUREUP
TOOL RETRACTING
HYDROSTATIC PRESSURE
FILE 21 16-NOV-95 03:24
FILE 22 16-NOV-95 03:35
FILE 23 16-NOV-95 03:39
FILE 24 16-NOV-95 03:42
FILE 25 16-NOV-95 03:46
FILE 26 16-NOV-95 03:53
FILE 27 16-NOV-95 04:18
FILE 28 16-NOV-95 04:21
FILE 29 16-NOV-95 04:23
FILE 30 16-NOV-95 04:26
PARAMETERS
NAME VALUE UNIT
B1 174.750 MM
PLR 1.00000 0/1
TSV1 455.000 DHMS
TSV2 455.000 DHMS
MFP1 25.0000 DEGC
MFT1 25.0000 DEGC
SSEN 82768
NAME VALUE UNIT
BHI OPEN
PCF1 0.00157 DEGC
TCF1 761.450 DHMS
PCF2 0100
TCF2 1572.83 M
SENSOR MEASURE POINT TO TOOL ZERO
TENS 7.6 METER
GR 6.3 METER

PARAMETERS

NAME	VALUE	UNIT	NAME	VALUE	UNIT
BS	374.700	MM	BHS	OPEN	
FLD	1.00000	G/C3	HPT	8.55057	DEGC
TZRV	453.000	OHMS	TCRV	761.450	OHMS
HPSN	0000A-00		RPU	PSIG	
RFTT	25.0000	DEGC	FDEP	1095.36	M
SGSN	83760				

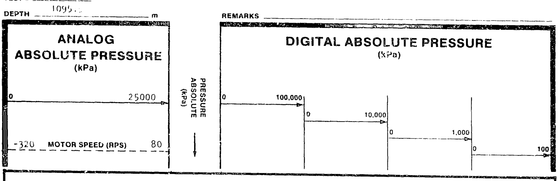
SENSOR MEASURE POINT TO TOOL ZERO

TENS 7.8 METER GR 6.3 METER

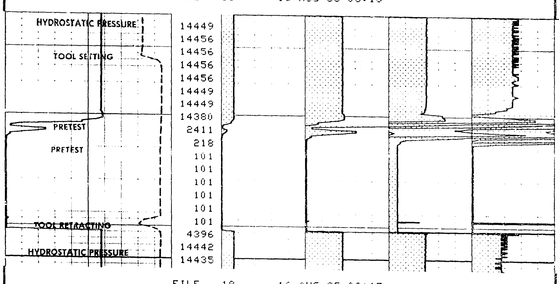
TEST # 17

DEPTH 1095. m

REMARKS



FILE 18 16-AUG-85 03:13



FILE 18 16-AUG-85 03:15

PARAMETERS

NAME	VALUE	UNIT	NAME	VALUE	UNIT
BS	374.700	MM	BHS	OPEN	
FLD	1.00000	G/C3	HPT	8.55057	DEGC
TZRV	453.000	OHMS	TCRV	761.450	OHMS
HPSN	0000A-00		RPU	PSIG	
RFTT	25.0000	DEGC	FDEP	1078.35	M
SGSN	83760				

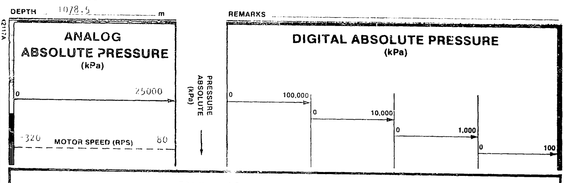
SENSOR MEASURE POINT TO TOOL ZERO

TENS 7.8 METER GR 6.3 METER

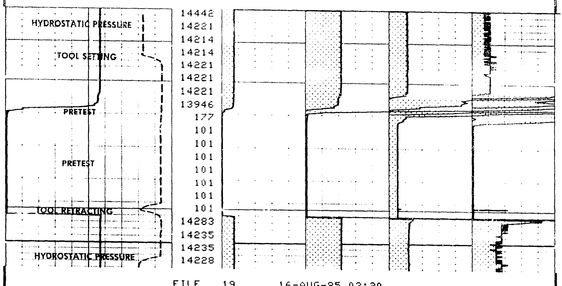
TEST # 18

DEPTH 1078.5 m

REMARKS



FILE 19 16-AUG-85 03:17



FILE 19 16-AUG-85 03:20

PARAMETERS

NAME	VALUE	UNIT	NAME	VALUE	UNIT
BS	374.700	MM	BHS	OPEN	
FLD	1.00000	G/C3	HPT	8.55057	DEGC
TZRV	453.000	OHMS	TCRV	761.450	OHMS
HPSN	0000A-00		RPU	PSIG	
RFTT	25.0000	DEGC	FDEP	1077.85	M
SGSN	83760				

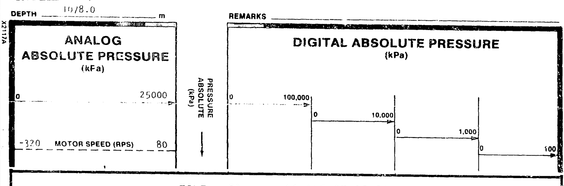
SENSOR MEASURE POINT TO TOOL ZERO

TENS 7.8 METER GR 6.3 METER

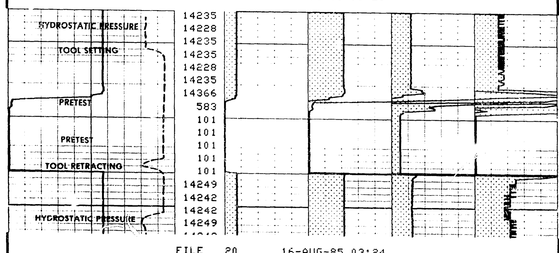
TEST # 19

DEPTH 1078.0 m

REMARKS



FILE 20 16-AUG-85 03:21



FILE 20 16-AUG-85 03:24

PARAMETERS

NAME	VALUE	UNIT	NAME	VALUE	UNIT
BS	374.700	MM	BHS	OPEN	
FLD	1.00000	G/C3	HPT	8.55057	DEGC
TZRV	453.000	OHMS	TCRV	761.450	OHMS
HPSN	0000A-00		RPU	PSIG	
RFTT	25.0000	DEGC	FDEP	1077.34	M
SGSN	83760				

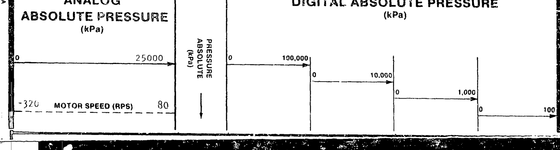
SENSOR MEASURE POINT TO TOOL ZERO

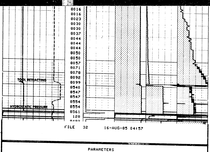
TENS 7.8 METER GR 6.3 METER

TEST # 20

DEPTH 1077.5 m

REMARKS



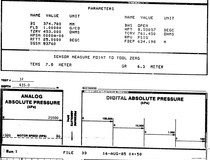


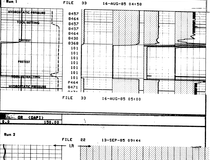
PARAMETERS

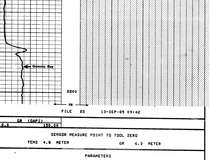
NAME	VALUE	UNIT	NAME	VALUE	UNIT
BS	374.700	MM	BHC	OPEN	
FLR	1.00000	G/C3	WFT	5.70937	DEGC
TEMP	45.0000	DEGC	TEMP	45.0000	DEGC
MFV	0.00000		MFV	0.00000	
SSGN	60760	DEGC	FBPP	4294.190	M

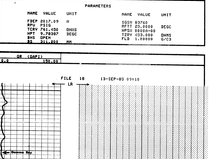
SENSOR MEASURE POINT TO TOOL ZERO

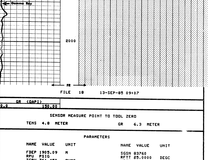
TENS 7.8 METER GR 4.3 METER

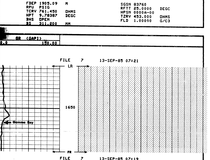


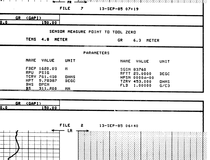


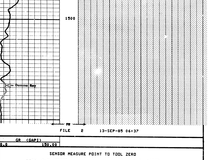


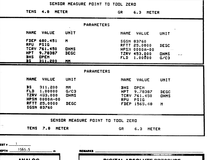


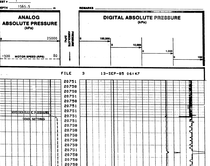




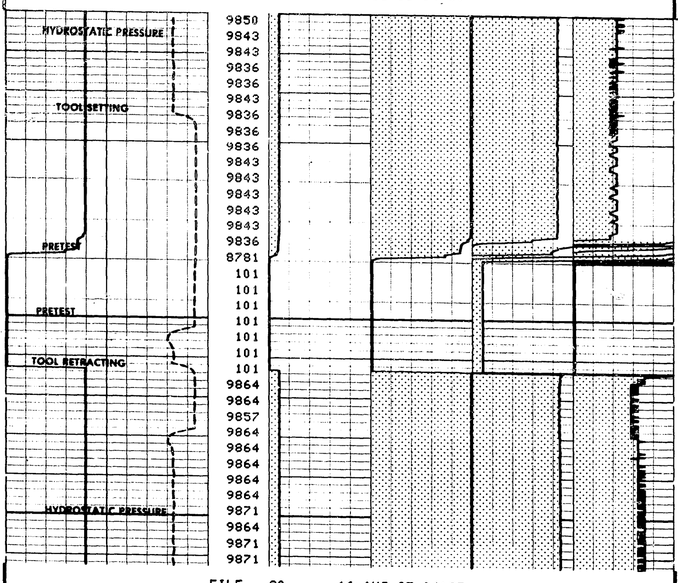








FILE 30 16-AUG-85 04:30



FILE 30 16-AUG-85 04:35

PARAMETERS

NAME	VALUE	UNIT	NAME	VALUE	UNIT
BS	374.700	MM	BHS	OPEN	
FLD	1.00000	G/C3	HPT	8.55057	DEGC
TZRV	453.000	OHMS	TCRV	761.450	OHMS
HPSN	0000A-00		RPU	PSIG	
RFTT	25.0000	DEGC	FDEP	731.703	M
SGSN	83760				

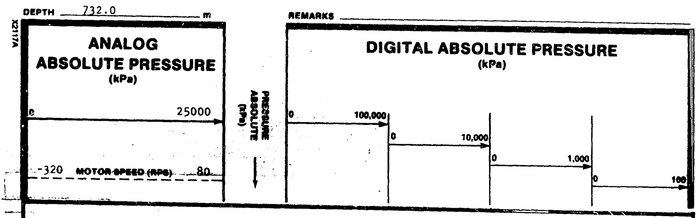
SENSOR MEASURE POINT TO TOOL ZERO

TENS 7.8 METER GR 6.3 METER

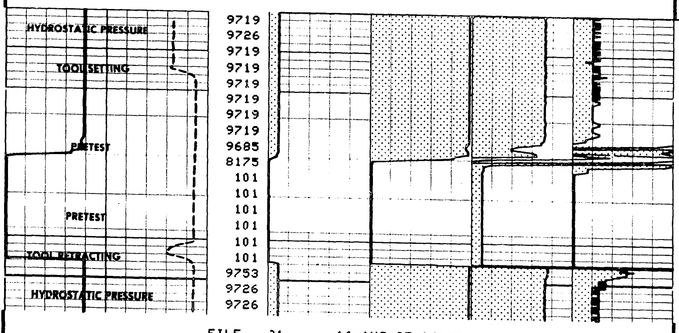
TEST # 30

DEPTH 732.0 m

REMARKS



FILE 31 16-AUG-85 04:37



FILE 31 16-AUG-85 04:40

PARAMETERS

NAME	VALUE	UNIT	NAME	VALUE	UNIT
BS	374.700	MM	BHS	OPEN	
FLD	1.00000	G/C3	HPT	8.55057	DEGC
TZRV	453.000	OHMS	TCRV	761.450	OHMS
HPSN	0000A-00		RPU	PSIG	
RFTT	25.0000	DEGC	FDEP	634.701	M
SGSN	83760				

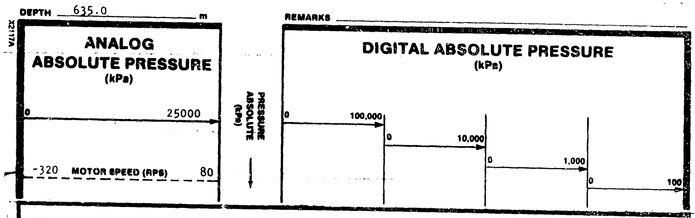
SENSOR MEASURE POINT TO TOOL ZERO

TENS 7.8 METER GR 6.3 METER

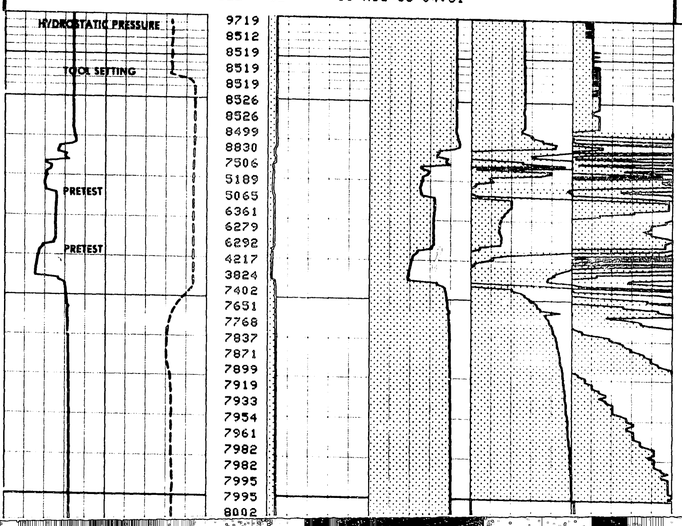
TEST # 31

DEPTH 635.0 m

REMARKS



FILE 32 16-AUG-85 04:51



DIGITAL ABSOLUTE PRESSURE
ANALOG ABSOLUTE PRESSURE
PARAMETERS
NAME VALUE UNIT
SENSOR MOUNTED FEET TO TOOL (TOE)
TEST P.R METER

DIGITAL ABSOLUTE PRESSURE
ANALOG ABSOLUTE PRESSURE
PARAMETERS
NAME VALUE UNIT
SENSOR MOUNTED FEET TO TOOL (TOE)
TEST P.R METER

DIGITAL ABSOLUTE PRESSURE
ANALOG ABSOLUTE PRESSURE
PARAMETERS
NAME VALUE UNIT
SENSOR MOUNTED FEET TO TOOL (TOE)
TEST P.R METER

DIGITAL ABSOLUTE PRESSURE
ANALOG ABSOLUTE PRESSURE
PARAMETERS
NAME VALUE UNIT
SENSOR MOUNTED FEET TO TOOL (TOE)
TEST P.R METER

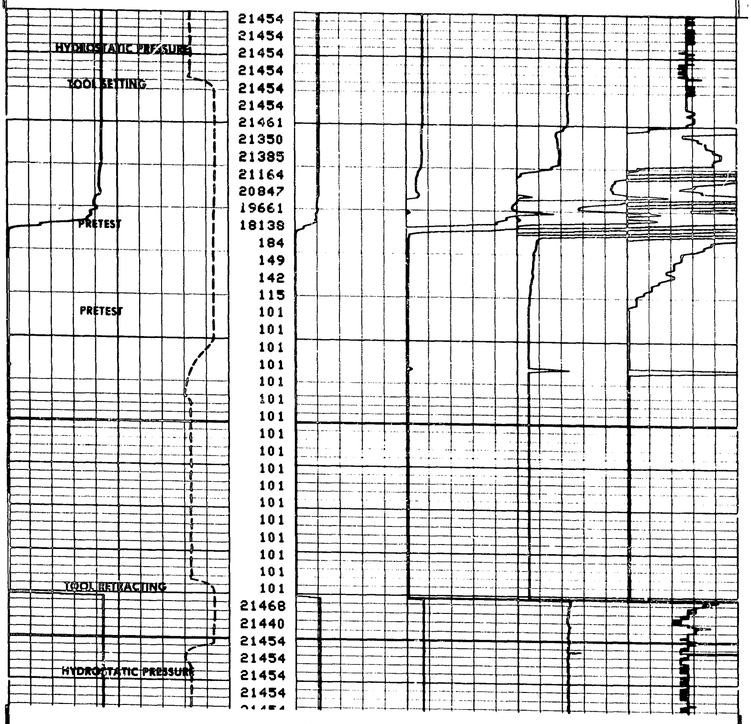
DIGITAL ABSOLUTE PRESSURE
ANALOG ABSOLUTE PRESSURE
PARAMETERS
NAME VALUE UNIT
SENSOR MOUNTED FEET TO TOOL (TOE)
TEST P.R METER

DIGITAL ABSOLUTE PRESSURE
ANALOG ABSOLUTE PRESSURE
PARAMETERS
NAME VALUE UNIT
SENSOR MOUNTED FEET TO TOOL (TOE)
TEST P.R METER

DIGITAL ABSOLUTE PRESSURE
ANALOG ABSOLUTE PRESSURE
PARAMETERS
NAME VALUE UNIT
SENSOR MOUNTED FEET TO TOOL (TOE)
TEST P.R METER

DIGITAL ABSOLUTE PRESSURE
ANALOG ABSOLUTE PRESSURE
PARAMETERS
NAME VALUE UNIT
SENSOR MOUNTED FEET TO TOOL (TOE)
TEST P.R METER

FILE 6 13-SEP-85 07:08



FILE 6 13-SEP-85 07:14

PARAMETERS

NAME	VALUE	UNIT	NAME	VALUE	UNIT
BS	311.200	MM	BHS	OPEN	
FLD	1.00000	G/C3	HPT	9.78387	DEGC
TZRV	453.000	OHMS	TCRV	761.450	OHMS
HPSN	0000A-00		RPU	PSIG	
RFTT	25.0000	DEGC	FDEP	1660.00	M
SGSN	83760				

SENSOR MEASURE POINT TO TOOL ZERO

TENS 7.8 METER GR 6.3 METER

TEST # 5

DEPTH 1660.0 m

REMARKS

X211A

ANALOG ABSOLUTE PRESSURE (kPa)

0 — 50000

-320 MOTOR SPEED (RPS) 80

PRESSURE ABSOLUTE (kPa)

DIGITAL ABSOLUTE PRESSURE (kPa)

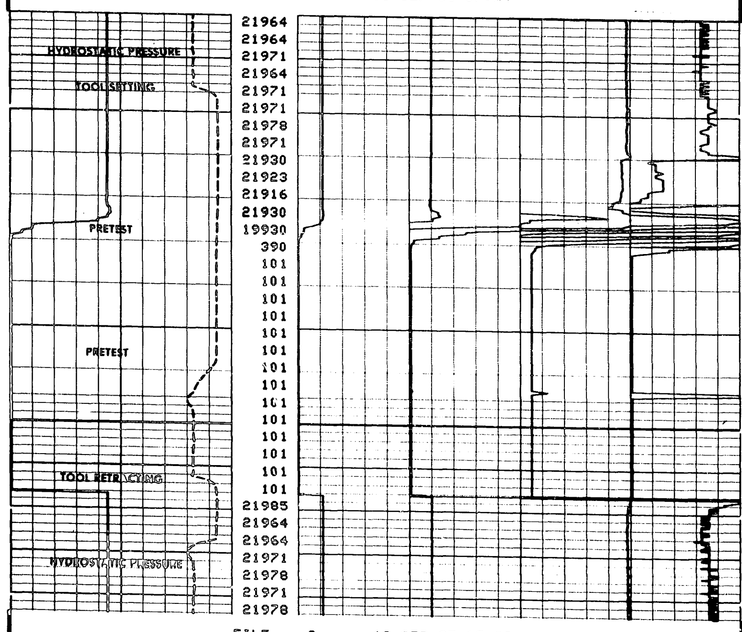
0 — 100,000

0 — 10,000

0 — 1,000

0 — 100

FILE 8 13-SEP-85 07:24



FILE 8 13-SEP-85 07:28

PARAMETERS

NAME	VALUE	UNIT	NAME	VALUE	UNIT
BS	311.200	MM	BHS	OPEN	
FLD	1.00000	G/C3	HPT	9.78387	DEGC
TZRV	453.000	OHMS	TCRV	761.450	OHMS
HPSN	0000A-00		RPU	PSIG	
RFTT	25.0000	DEGC	FDEP	1682.01	M
SGSN	83760				

SENSOR MEASURE POINT TO TOOL ZERO

TENS 7.8 METER GR 6.3 METER

TEST # 6

DEPTH 1682.0 m

REMARKS

X211A

ANALOG ABSOLUTE PRESSURE (kPa)

0 — 50000

-320 MOTOR SPEED (RPS) 80

PRESSURE ABSOLUTE (kPa)

DIGITAL ABSOLUTE PRESSURE (kPa)

0 — 100,000

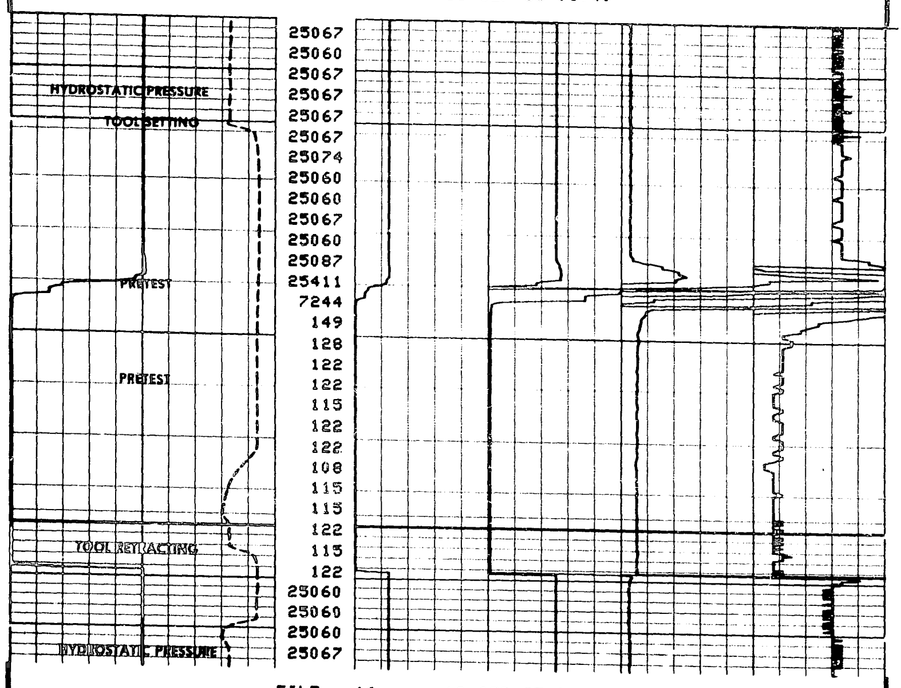
0 — 10,000

0 — 1,000

0 — 100

FIELD CALIBRATION GAUGE # 8350
HYSTERESIS CURVE GAUGE # 8350
DISPLAY VARIABLE ASSESSMENT
DISPLAY VARIABLE ASSESSMENT
DISPLAY VARIABLE ASSESSMENT
DISPLAY VARIABLE ASSESSMENT
DISPLAY VARIABLE ASSESSMENT
DISPLAY VARIABLE ASSESSMENT
DISPLAY VARIABLE ASSESSMENT
DISPLAY VARIABLE ASSESSMENT

FILE 16 13-SEP-85 08:49



FILE 16 13-SEP-85 08:53

PARAMETERS

NAME	VALUE	UNIT	NAME	VALUE	UNIT
BS	311.200	MM	BHS	OPEN	
FLD	1.00000	G/C3	HPT	9.78387	DEGC
TZRV	453.000	OHMS	TCRV	761.450	OHMS
HPSN	0000A-00		RPU	PSIG	
RFTT	25.0000	DEGC	FDEP	1905.09	M
SGSN	83760				

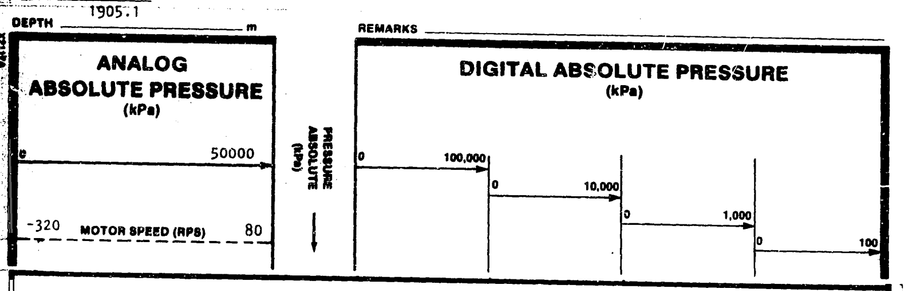
SENSOR MEASURE POINT TO TOOL ZERO

TENS 7.8 METER GR 6.3 METER

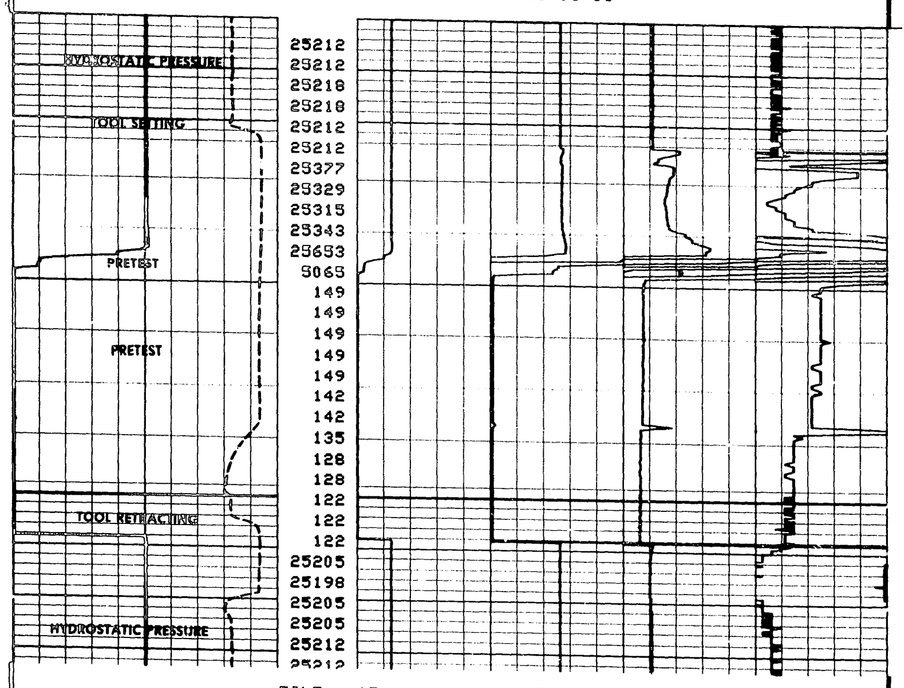
TEST # 14

DEPTH 1905.1 m

REMARKS



FILE 17 13-SEP-85 08:55



FILE 17 13-SEP-85 08:59

PARAMETERS

NAME	VALUE	UNIT	NAME	VALUE	UNIT
PP	NORM		DO	0.0	F
BS	311.200	MM	BHS	OPEN	
FLD	1.00000	G/C3	HPT	9.78387	DEGC
TZRV	453.000	OHMS	TCRV	761.450	OHMS
HPSN	0000A-00		RPU	PSIG	
RFTT	25.0000	DEGC	FDEP	1959.10	M
SGSN	83760				

TAPE NOT MADE

SENSOR MEASURE POINT TO TOOL ZERO

TENS 7.8 METER GR 6.3 METER

FIELD CALIBRATION GAUGE # 83760

CORRECTED PRESSURE = LOG PRESS.+DELTA-P

HYSTERESIS CURVE GAUGE # 83760

CORRECTED PRESSURE = LOG PRESS.+DELTA-P

```
FILE  2                                  04-SEP-95 01:04
PRESS DEVP TEMP CHAN  FNC CES NEXT MODE FILT LEVL  MODE
 1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
```

CONS SUMM :

CONS	STAT	PUNI	TUNI	VALU
DIFF		M	M	.304800 M
EDS				PROP
CDS				ALL
UCON	ALLO			*
OMD				UP
LSN				0
CSD				FILM
LD				FILM
PANN				ALL
SPEE		F/HR	F/HR	6000 F/HR
PP				NORM
CGM				NORM
POS		M	M	0.0 M
E		LB-1	LB-1	7.43000E-7 LB-1
TREF		LB	LB	1000.00 LB
MARK	DISA			*
CMDT				IDW
DIRE				AUTO
BS		MM	MM	374.700 MM
RW		OHMM	OHMM	1.00000 OHMM
BHS				OPEN
CSIZ		MM	MM	0.0 MM
IHVD				1
SD		M	M	2496.92 M
FNUM				1.00000
FEXP				2.00000
FPHI				PHIX
HPSN				0000A-00011
G0HP				-5440.38
G1HP				.282165
G2HP				-.454667E-03
G3HP				-.260034E-05
H0HP				.931999E-02
H1HP				-.525821E-06
H2HP				.170933E-08
H3HP				.336883E-11
I0HP				.169320E-09
I1HP				.298415E-12
I2HP				-.204989E-14
I3HP				.335907E-17
J0HP				.441555E-17
J1HP				.101440E-19
J2HP				-.353323E-23
J3HP				0.
CCTU				DEGF
FLD		G/C3	G/C3	1.00000 G/C3
HPT	ALLO	DEGC	DEGC	8.55057 DEGC
TZRV		OHMS	OHMS	453.000 OHMS
TCRV		OHMS	OHMS	761.450 OHMS
RPU				PSIG
SGSO				10K
RLM				FTES
AOFF				BOTH
RFTT	ALLO	DEGC	DEGC	21.1110 DEGC
FDEP		M	M	0.0 M
APRE		PSIA	PSIA	14.7000 PSIA
ATEM		DEGC	DEGC	25.0000 DEGC
TPRE		KPA	KPA	101.324 KPA
SGSN				83760
PMOD				SING
TOFT		S	S	0.0 S
TPT		S	S	20.0000 S
CVOL				PRET
PLOT				HORN
LC01				
LC02				
LC03				
LC04				
LC05				
LC06				
LC07				
LC08				
LC09				
LC10				
LC11				
LC12				
LC13				
LC14				
LC15				
LC16				
LC17				
LC18				
LC19				
LC20				
LC21				
LC22				
LC23				
LC24				
WTSM	ALLO			.TOOL.STICKING.
ALAR	ALLO			.ALARM.
AOM	ALLO			.ALARM.OFF.
XM00	DISA			
XM01	DISA			
XM02	DISA			
LQC	DISA			*
KPDU				METE
ORDU				METE
MMDU				METE
PF				SHOR
YEAR				85
MONT				8
DAY				13

8710-C55-1-1

Schlumberger

NATURAL GAMMA RAY SPECTROSCOPY LOG

SCHLUMBERGER OF CANADA Calgary, Alberta

COMPANY CANTERRA ENERGY LTD.

WELL TRILLIUM SOQUIP HEXO ET AL HUDSON BAY 0-23

FIELD HUDSON BAY

PROVINCE MANITOBA

CANADA OIL AND GAS LANDS ADMINISTRATION
PROMOTION DU PÉTROLE ET DU GAZ DES TERRES DU CANADA
NOV 26 1985
ENGINEERING GÉNIE

PROVINCE MANITOBA
FIELD HUDSON BAY
WELL TRILLIUM SOQUIP HEXO ET AL HUDSON BAY 0-23
COMPANY CANTERRA ENERGY LTD.

LOCATION 54° 11' 44.4" NORTH LATITUDE
88° 33' 26.6" WEST LONGITUDE
LSD | SEC. | TWP | RANGE

Other Services: CBL-VDL, COMP. CYBER

Permanent Datum: MSL ; Elev.: 0.0 m
Log Measured From KB 13.7 m Above Perm. Datum
Drilling Measured From KB

Elev.: K.B. 13.7 m
D.F. 13.7 m
G.L. -178.3 m

Date	15 AUG 85		13 SEP 85					
Run No.	One		Two		Three		Four	
Depth—Driller	1492.0	m	2215.0	m		m		m
Depth—Logger (Schl.)	1490.0	m	2215.0	m		m		m
Btm. Log Interval	1489.0	m	2210.0	m		m		m
Top Log Interval	558.0	m	1486.0	m		m		m
Casing—Driller	508.0 @558.5	m	339.7 @1475	m	@	m	@	m
Casing—Logger	558.0	m	1477.0	m		m		m
Bit Size	375.7	mm	311.2	mm		mm		mm
Type Fluid in Hole	SEE BELOW		SEE BELOW					
Dens lb/gal (kg/m³) / Visc.	1258	40.0	1282	35.0				
pH / Fluid Loss (cm³)	10.6	20.0	11.0	29.0				
Source of Sample	CIRCULATION		CIRCULATION					
Rm @ Meas. Temp.	0.056 @ 23.0 °C		0.060 @20.0 °C		@ °C		@ °C	
Rmf @ Meas. Temp.	0.046 @ 23.0 °C		0.048 @22.0 °C		@ °C		@ °C	
Rmc @ Meas. Temp.	0.112 @ 21.0 °C		0.166 @21.0 °C		@ °C		@ °C	
Source: Rmf / Rmc	FILTER	PRESS	PRESS	PRESS				
Rm @ BHT	0.049 @ 29.0 °C		0.048 @30.0 °C		@ °C		@ °C	
Circulation Stopped	1730/14		0040/12					
Tool Last on Bottom	0145/15							
Max. Rec. Temp. #1 / #2	29.0 °C	- °C	30.0 °C	- °C	°C	°C	°C	°C
Unit / District	922	ST.J	922	ST.J				
Recorded By	MACNEILL		BEBB/MACNEILL					
Witnessed By	GONNASON		ZANUSSI					

REMARKS: CBL-VDL, COMP. CYBER

RUN 2
PROGRAM TAPE NO: 26.2
SERVICE ORDER NO: 32910
CASING WEIGHT: 101.1 kg/m

Run 1
TYPE FLUID IN HOLE: NA CL SATURATED GEL POLYMER
DENSITY: 1256 KG
VISCOSITY: 40.0 S
PH: 10.6
FLUID LOSS: 20.0 C3
SOURCE OF SAMPLE: CIRCULATION
RM: .056 OHMM AT 23.0 DEGC
RMF: .046 OHMM AT 23.0 DEGC
RMC: .112 OHMM AT 21.0 DEGC
SOURCE RMF/RMC: FILTER/PRESS
RM AT BHT: .049 OHMM AT 29.0 DEGC
RMF AT BHT: .040 OHMM AT 29.0 DEGC
RMC AT BHT: .094 OHMM AT 29.0 DEGC

TIME CIRC. STOPPED: 1730/14
TIME LOGGER ON BTM.: 1145 / 15

MAX. REC. TEMP: 29.0 DEGC

LOGGING UNIT NO: 922
LOGGING UNIT LOC: ST. JOHN'S
RECORDED BY: MACNEILL
WITNESSED BY: W. GONNASON

REMARKS:Run 1

LOGGED AT 900 FT/HR OVER THE WHOLE HOLE.
THERMOMETERS WERE NOT RUN ON THE TOOL.
SO THE TEMPERATURE IS RECORDED AS THE SAME AS LAST TIME.

Run 1
EQUIPMENT NUMBERS-

TCM-AB 538	DRS-C 5786	PDH-L 3955	PGD-G 3976
CNC-HA 386	CNH-A 3424	NGD-B 752	NGC-C 1915
TCC-A 553	AMM-AA 813		

Run 2
TYPE FLUID IN HOLE: NACL SATURATED GEL POLYMER
DENSITY: 1282 K/M3
VISCOSITY: 35.0 S
PH: 11.0
FLUID LOSS: 29.0 C3
SOURCE OF SAMPLE: CIRCULATION
RM: .060 OHMM AT 20.0 DEGC
RMF: .048 OHMM AT 22.0 DEGC
RMC: .166 OHMM AT 21.0 DEGC
SOURCE RMF/RMC: PRESS /PRESS
RM AT BHT: .048 OHMM AT 30.0 DEGC
RMF AT BHT: .040 OHMM AT 30.0 DEGC
RMC AT BHT: .137 OHMM AT 30.0 DEGC

TIME CIRC. STOPPED: 00:40/12
TIME LOGGER ON BTM.: 0145/15

MAX. REC. TEMP: 30.0 DEGC

LOGGING UNIT NO: 922
LOGGING UNIT LOC: ST. JOHN'S
RECORDED BY: BEBB/MACNEILL
WITNESSED BY: L. ZANUSSI

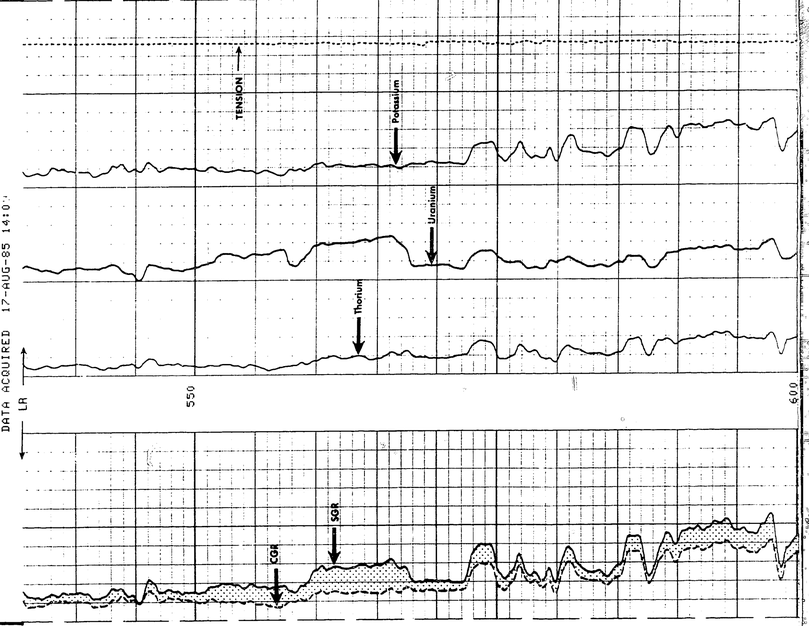
REMARKS:

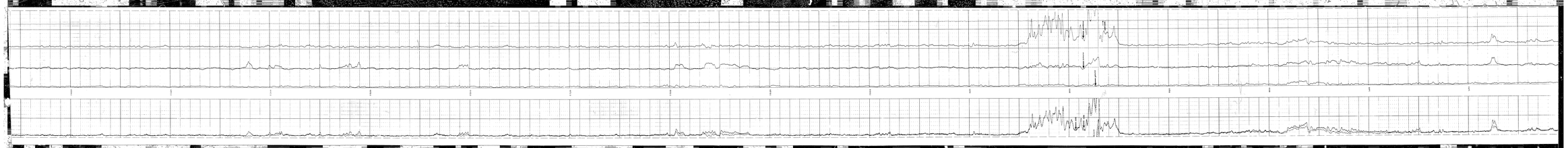
Run 2
EQUIPMENT NUMBERS-

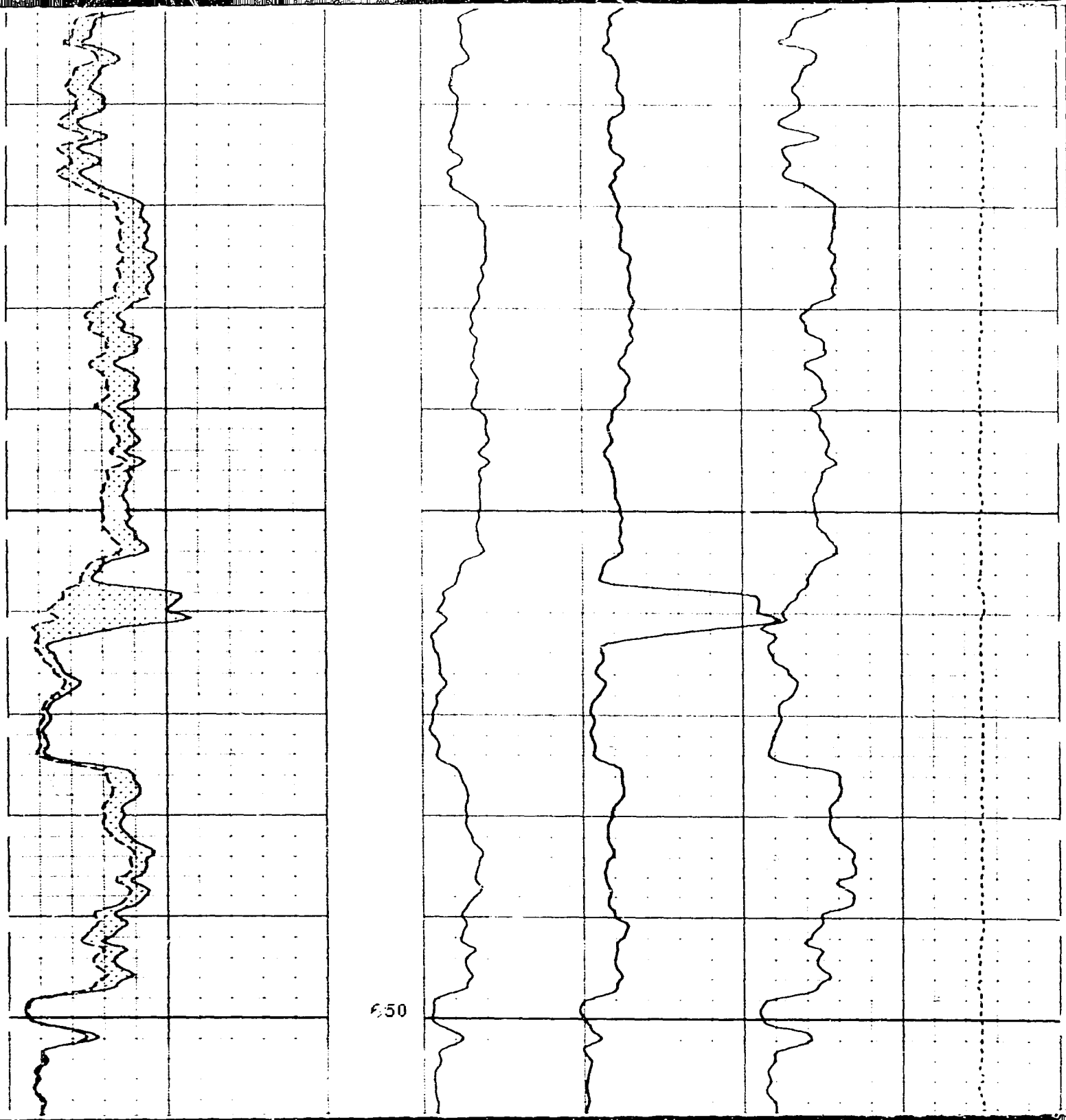
TCM-AB 538	TCC-A 553	NGC-C 1915	NGD-B 752

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 OUR GENERAL TERMS AND CONDITIONS AS SET OUT IN OUR CURRENT PRICE SCHEDULE.

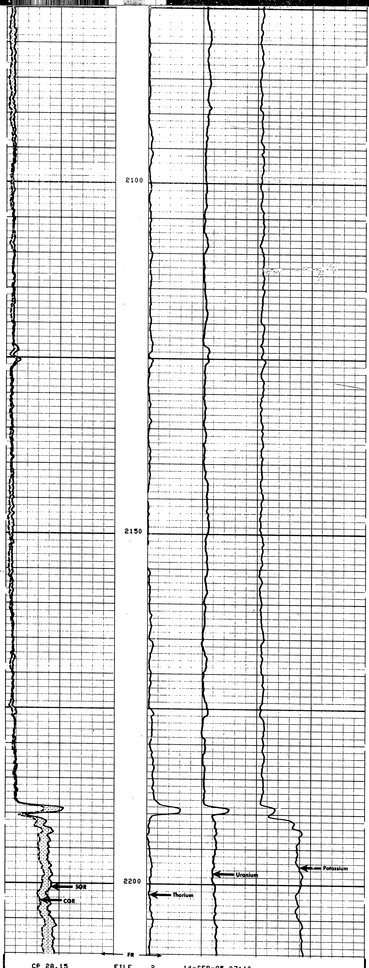
			0.0	POTA	.10000
			0.0	TENSCH >	0.0
			0.0	THOR(PPM > 40.000	25000.
				URAN(PPM >	
			-10.00		30.000
0.0	CGR (GAPI)	150.00			
0.0	SGR (GAPI)	150.00			






650

HEAVY RECORD
HEAVY RECORD



CP 28.15 FILE 2 14-SEP-85 07:10
DATA ACQUIRED 12-SEP-85 14:05

CGR (GAPI)		THOR(PPM)		POTA	
0.0	150.00	0.0	40.000	0.0	.10000
SGR (GAPI)		URAN(PPM)			
0.0	150.00	-10.00			30.000

Run 2

SENSOR MEASURE POINT TO TOOL ZERO

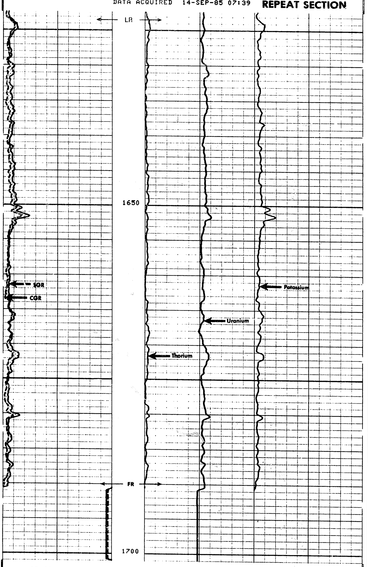
MTEM	12.77	METER	MRES	12.77	METER
APUW	9.78	METER	APLW	9.78	METER
PPLW	9.78	METER	NGPE	9.78	METER
SNGT	-.87	METER	PPUW	9.78	METER
TPUW	9.78	METER	TPLW	9.78	METER
W2NG	9.78	METER	W1NG	9.78	METER
W4NG	9.78	METER	W3NG	9.78	METER
FCNL	6.35	METER	W5NG	9.78	METER
SCNL	-.87	METER	NCNL	6.35	METER
LL	.78	METER	LITH	.78	METER
LU	.78	METER	LS	.78	METER
SSZ	.63	METER	SSI	.63	METER
DTCS	.63	METER	DTCL	.78	METER
DTPS	.63	METER	DTPL	.78	METER
LULC	.78	METER	LLLC	.78	METER
LUUC	.78	METER	LLUC	.78	METER
SULC	.63	METER	SLLC	.63	METER
SUUC	.63	METER	SLUC	.63	METER
TENS	-.87	METER	CALI	.81	METER
MRAT	6.35	METER	SGR	9.78	METER

PARAMETERS

NAME	VALUE	UNIT	NAME	VALUE	UNIT
SHT	26.6666	DEGC	TD	3048.00	M
CBAR	.976851		PMUD	0.0	%
PSNR	2.20000		NFD	KALM	
MATR	LIME		HC	CALI	
MDCH	2710.00	K/M3	FD	1000.00	K/M3
BFM	LIQU		WMUD	1246.19	K/M3
BHS	OPEN		BHC	BS	
DD	0.0	M	BS	311.200	MM
PP	RECO				

TAPE NOT MADE

CGR (GAPI)		THOR(PPM)		POTA	
0.0	150.00	0.0	40.000	0.0	.10000
SGR (GAPI)		URAN(PPM)			
0.0	150.00	-10.00			30.000



CP 28.15 FILE 3 14-SEP-85 07:37 **REPEAT SECTION**
DATA ACQUIRED 12-SEP-85 15:21

CGR (GAPI)		THOR(PPM)		POTA	
0.0	150.00	0.0	40.000	0.0	.10000
SGR (GAPI)		URAN(PPM)			
0.0	150.00	-10.00			30.000

Run 2

SENSOR MEASURE POINT TO TOOL ZERO

MTEM	12.77	METER	MRES	12.77	METER
APUW	9.78	METER	APLW	9.78	METER
PPLW	9.78	METER	NGPE	9.78	METER
SNGT	-.87	METER	PPUW	9.78	METER
TPUW	9.78	METER	TPLW	9.78	METER
W2NG	9.78	METER	W1NG	9.78	METER
W4NG	9.78	METER	W3NG	9.78	METER
FCNL	6.35	METER	W5NG	9.78	METER
SCNL	-.87	METER	NCNL	6.35	METER
LL	.78	METER	LITH	.79	METER
LU	.78	METER	LS	.79	METER
SSZ	.63	METER	SSI	.63	METER
DTCS	.63	METER	DTCL	.78	METER
DTPS	.63	METER	DTPL	.78	METER
LULC	.78	METER	LLLC	.78	METER
LUUC	.78	METER	LLUC	.78	METER
SULC	.63	METER	SLLC	.63	METER
SUUC	.63	METER	SLUC	.63	METER
TENS	-.87	METER	CALI	.81	METER
MRAT	6.35	METER	SGR	9.78	METER

PARAMETERS

NAME	VALUE	UNIT	NAME	VALUE	UNIT
SHT	26.6666	DEGC	TD	3048.00	M
CBAR	.976851		PMUD	0.0	%
PSNR	2.20000		NFD	KALM	
MATR	LIME		HC	CALI	
MDCH	2710.00	K/M3	FD	1000.00	K/M3
BFM	LIQU		WMUD	1246.19	K/M3
BHS	OPEN		BHC	BS	
DD	0.0	M	BS	311.200	MM
PP	RECO				

TAPE NOT MADE

COMPANY CANTERRA ENERGY LTD.

WELL TRILLIUM SOQUIP ONEXCO ET AL BELUGA 0-23

FIELD HUDSON BAY PROVINCE MANITOBA

Schlumberger

Wt: 9.9
Vis: 33
pH: 10.0
WL: 16
Cl⁻: 150,000

850

875

Wt: 10.2
Vis: 33
pH: 10.5
WL: 16
Cl⁻: 174,000
(saturated)

WOB: 30-35
RPM: 125
PP: 2650
SPM: 200

900

925

Tr. C1

Wt: 10.2
Vis: 32
pH: 10.5
WL: 18
Cl⁻: 174,000

950

975

1000

Tr. C1

WOB: 35
RPM: 120
PP: 2700
SPM: 200

gas units: 0 50 100 150

min/m: 0 10 20 30

1025

1050

Wt: 10.2
Vis: 33
pH: 11
WL: 19
Cl⁻: 174,000

Tr. C2 1068-79 m
Tr. C1 @ 1075 m

Ca incr. 800→2000 ppm

TRIP: 0.5% (20 μm) T.G.
0.2% (10 μm) C1
0.016% C2

-25°

Bit no. 7
HW J22

Wt: 10.3
Vis: 35
pH: 10
WL: 25
Cl⁻: 177,000

WOB: 40
RPM: 90
PP:
SPM: 200

1100

-26°
N54E

Torque on bit

TRIP: 0.2% (10 μm) T.G.
0.1% (5 μm) C1
0.016% C2
Tr. C3

Bit no. 8
HW R3

WOB: 30
RPM: 115
PP: 2850
SPM: 200

Wt: 10.3
Vis: 36
pH: 10.5
WL: 34
Cl⁻: 179,000

1125

WOB: 30
RPM: 110-115

1150

Tr. C1

1175

1200

%					
80				TO	MUDST, PRED. RD & SOME LT GY a/a (10%); LMST a/a, SOMEWHAT DOLIC.; TR. GYPSUM
25				TO	MUDST, PRED w/ MIXED LT GY, NON-CALC; LMST a/a, CLEAN-SL. ARG., PRED. OCC. DOLIC., TR. CRINOID
70				30	LMST, WH-BF, CRYPTOXL (MICRITIC), OCC. BLEBS ARG. MAT; SOME DOL'IZATION (F-XTALLINE), TITE
20?				30?	50? SALT, BF & LT BN, C-XTALLINE, CLEAN (HALITE); MUDST & LMST a/a
		T		T	H SALT a/a
		T		T	H SALT a/a
		T		T	H SALT a/a
		T		T	H SALT a/a
		T		T	H SALT a/a
		T		T	H SALT a/a
		T		T	H SALT a/a
		T		T	H SALT a/a
					H SALT a/a
					H SALT a/a, BF & LT BN (OCC CLR.), SL PK IN PT., C-XTALLINE, CLEAN, PRED HALITE; POSS. MNR KCC SALT
					H SALT a/a
					H SALT a/a
					H SALT a/a
					H SALT a/a
					H SALT a/a
					H SALT a/a
					H SALT a/a
					H SALT a/a
					H SALT a/a; TR. OCC KCl
					H SALT a/a
					H SALT a/a, BF & LT BN (IN PT CLR), PKISH IN PT, C-XTALLINE, CLEAN, PRED HALITE BUT POSS. SL. INCR KCl SALT
					H SALT a/a, OCC CLR, SOME PLATY XTALS
					H SALT a/a
					H SALT a/a; SL. INCR CLR; SOME KCl
					H SALT a/a
					H SALT a/a
					H SALT a/a, BF-TRANSLUCENT, TR. CBR., OCC PLATY XTALS
					H SALT a/a
					H SALT a/a, SOMEWHAT DECR XTAL SIZE, IN PT TO M-C XTALLINE
					H SALT a/a, CLR-TRANSLUCENT, INCR. PLATY XTALS
					H SALT a/a
				T	H SALT, BCMING. PRED. XTALLINE, XTALS SOMEWHAT PLATY; TR. KCl
					TR. REDDISH CLAY
				T	H SALT a/a, PRED. CLR, XTALLINE; TR. REDDISH CLAY
				T	H SALT a/a; DECR. CLAY TO TR.
					H SALT a/a, CBR-TRANSLUCENT (TR. WHITE); TR. CLAY
					H SALT a/a
					H SALT a/a
					H SALT a/a
					H SALT a/a
					H SALT a/a, CLR-TRANSLUCENT, NO CLAY, NO KCl
					H SALT a/a
75	25				LMST, WH-BF, MICRITIC-CHALKY, SOFT, SL-V ARG.; IN PT MD BN, CX-MX, HRD, DOLIC IN PT, SL. ARG., TITE; DOL, MD BN, MICROXL, CALC, SOMEWHAT ARG., HRD; GRDG TO LMST IN PT.
75	25				LMST, BF-LT BN, CRYPTOXL (SL. CHALKY)-MICROXL, CLEAN BUT PRED SL-V. DOLIC, TR. CRIN, FORAM TR. PP & "EARTHY" P; DOL (GRDG FROM LMST) PRED. MICROXL, CALC, OCC IC & PP P; POSS. V. FAINT FLUOR.
80	20				LMST, PRED a/a, PRED. SOMEWHAT DOL'IZED, OCC. MD WH STRNG. CUT FL., LT BN OIL RESID. OCC. BITUM. STREAKS (BK); OCC. GRDG. TO CALC DOL; OCC. TR. (DECR.) P a/a
30	10	40	20		LMST a/a, DOL'IZED IN PT.; GRDG TO DOL a/a, LOC. V. ARG., GRDG TO LT-MD GY, SOFT, CALC SHALE; ANHY, MILKY-WH, XTALLINE, CLEAN; NO VIS P IN LMST/DOL; TR. TENTACULITES
5	45	40	10		ANHY, 15% WH, SILKY, CLEAN; 25% BF-LT GY, SL-V. DOLIC.; GRDG TO DOL, LT GY, CRYPTOXL, DENSE, M-V ANHYDR'IC, HRD, TITE; A FEW CALC CRIN.; MUDST, GY & RD (CVGS?); MNR. DOLIC LMST a/a
5	50	40	5		DOL a/a, V. ANHYDR'IC; GRDG TO ANHY a/a (15% WH, NON-DOLIC), TR. PYR, NO VIS. FOS.; MNR. LMST a/a; MNR. MUDST a/a
5	10	85			ANHY, WH-BF a/a, CRYPTOXL, SL. WAXY, IN PT (~10%) DOLIC w/ MNR. GRDG TO DOL a/a, ANHYDR'IC; MNR. LMST a/a, WH, CRYPTO-MICROXL, DOLIC, TITE; TR. CRIN. FRAGS.
40	30	20			LMST, LT BN, CRYPTOXL-SL. SUCROSIC, FRM, BLOCKY, CLEAN, IN PT. ANHYDR'IC; ANHY a/a & DOL a/a, LT GY, ANHYDR'IC IN PT, SL. ARG., NO VIS P
20	25	30	25		POOR SAMPLE (TRIP): LMST a/a; MUDST, GY & RD; ABUND. CLYST, V. STICKY; PROB. ABUND. SALT (?)
5?	10?	10	65?	5	CLYST, V. SOFT, STICKY; DOL, LT GY, CRYPTO-MICROXL, SOFT (LOC WH, HRD), SL. ANHYDR'IC IN PT, TITE; ANHY, WH-BF, WAXY; MUDST a/a; PROB. SALT (?)
5?	10?	10?	70?	5	CLAY, LT-MD GY, V. SOFT, CALC; 5% RDISH MUDST a/a; DOL, ANHY, LMST a/a (% ?); TR. CRINOIDS, SPONGE SPICULES PROB. SALT ?
	5	5	10	80	SALT (HALITE), TRANSLUCENT, PLATY XTALS; CLAY, GY a/a (10% ?); MNR. ANHY, DOL a/a (CVGS ?)
5	5	T	T	90	SALT a/a; MNR. CLYST a/a; TR. RD MUDST, BCMING. SL. HRDER., DOLIC.; DOL, LMST a/a TR. TENTACULITES
					H SALT, CLR-TRANSLUCENT
					H SALT a/a, XTALS. PRED. PLATY
					H SALT a/a
					H SALT a/a
					H SALT a/a
					H SALT a/a, PRED. TRANSLUCENT
					H SALT a/a, CLR-TRANSLUCENT, CLEAN, C-XTALLINE
					H SALT a/a
					H SALT a/a
					H SALT a/a
					H SALT a/a
					H SALT a/a
					H SALT a/a, PRED. CLR-TRANSLUCENT (HALITE), VC-XTALLINE
		5		95	SALT a/a; MNR. WH ANHY INCLUS, CRYPTOXL, HRD.
5		55?	40?	?	ANHY, WH-BF, SL. WAXY, CRYPTOXL, LOC. SOMEWHAT CALC; GRDG TO MNR. BF-LT BN, ANHYD'IC LMST; CLYST, LT-MD GY, SOFT, NON-CALC; 10% RD, SOFT-FRM MUDST; SALT ?
80		20			LMST, BF-LT BN, CRYPTOXL, FAIRLY SOFT, CLEAN, ANHYD'IC IN PT; ANHY, WH, SOFT a/a, CALC a/a

NOTE: THESE DESCR. OBTAINED OVER THIS PRED. SALT, WHICH

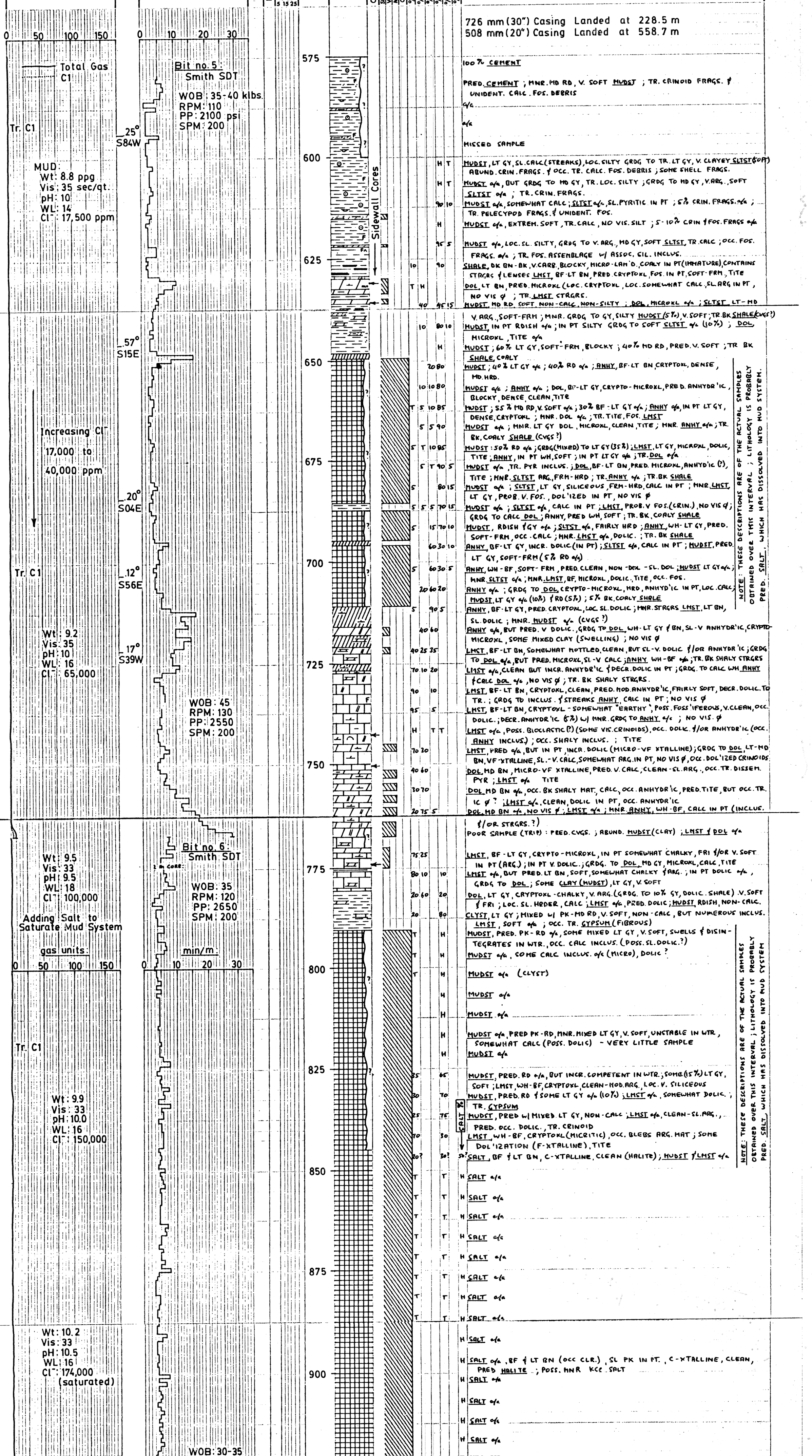
DAWSON – LONG & ASSOCIATES LTD.

RESOURCE CONSULTANTS

WELL NAME: TRILLIUM et al BELUGA 0-23 — T.D. FORMATION: PRECAMBIAN

LOCATION: Lat. 59°12'54.4" N Long. 88°33'26.6" W — GEOLOGIST: J. TUCKER / D. ROBERTS

ELEVATION: K.B. 13.7 m — WATER DEPTH: 179.8 m — SPUD DATE: JULY 28, 1985 2030 Hrs.



GAMMA-RAY LOG

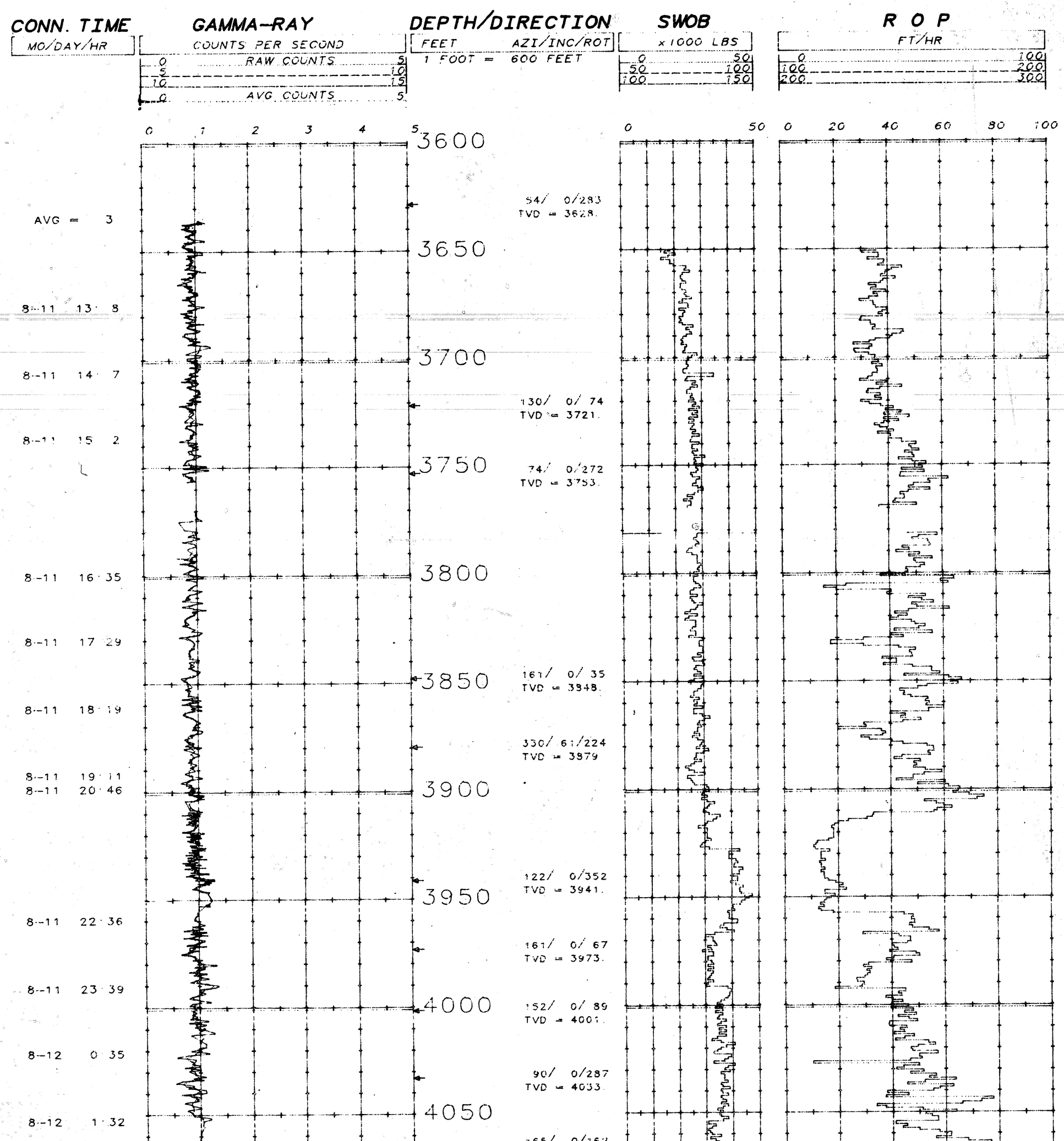
CLIENT: CANTERRA ENERGY LTD.

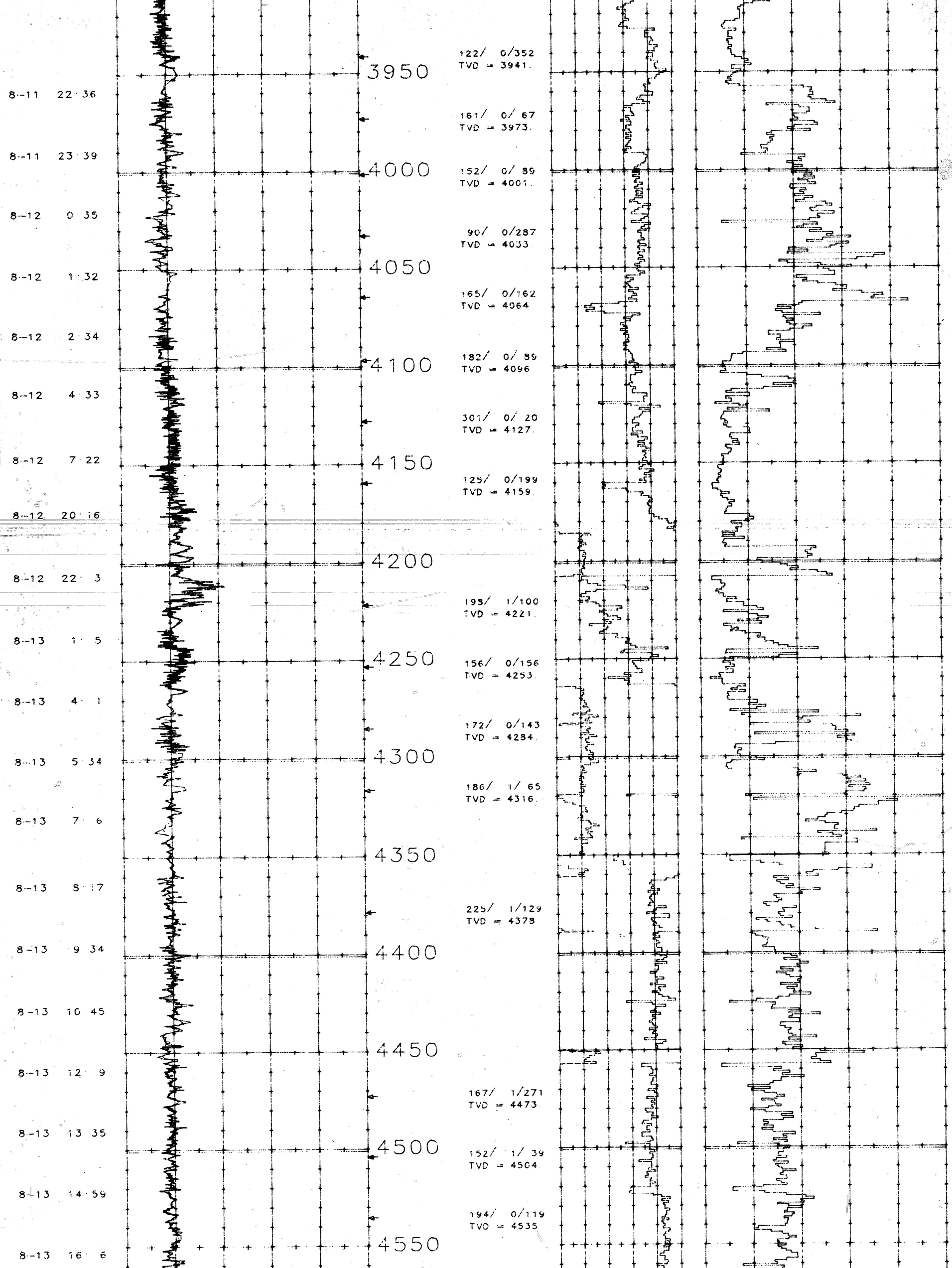
FIELD: BELUGA

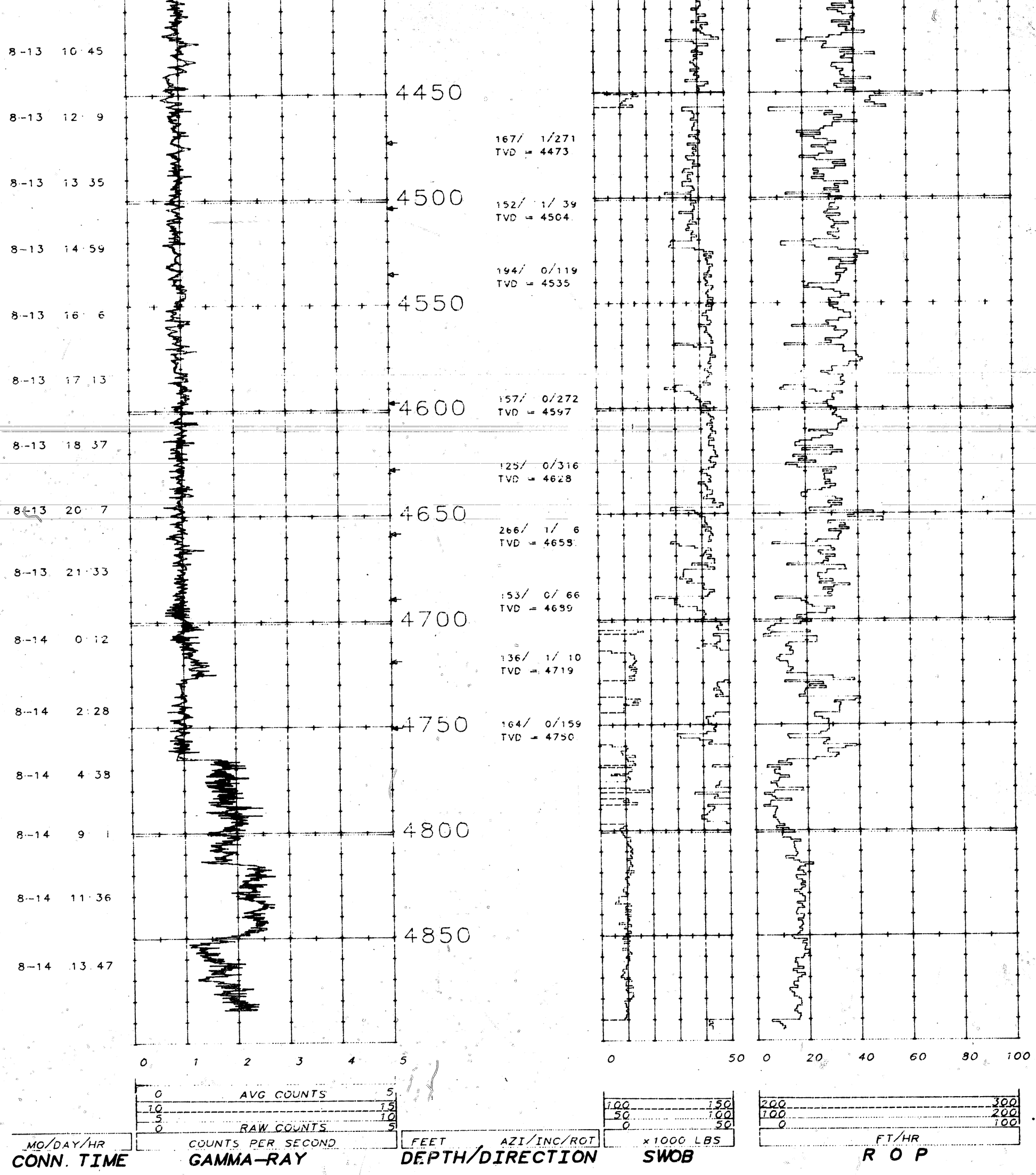
WELL: O-23

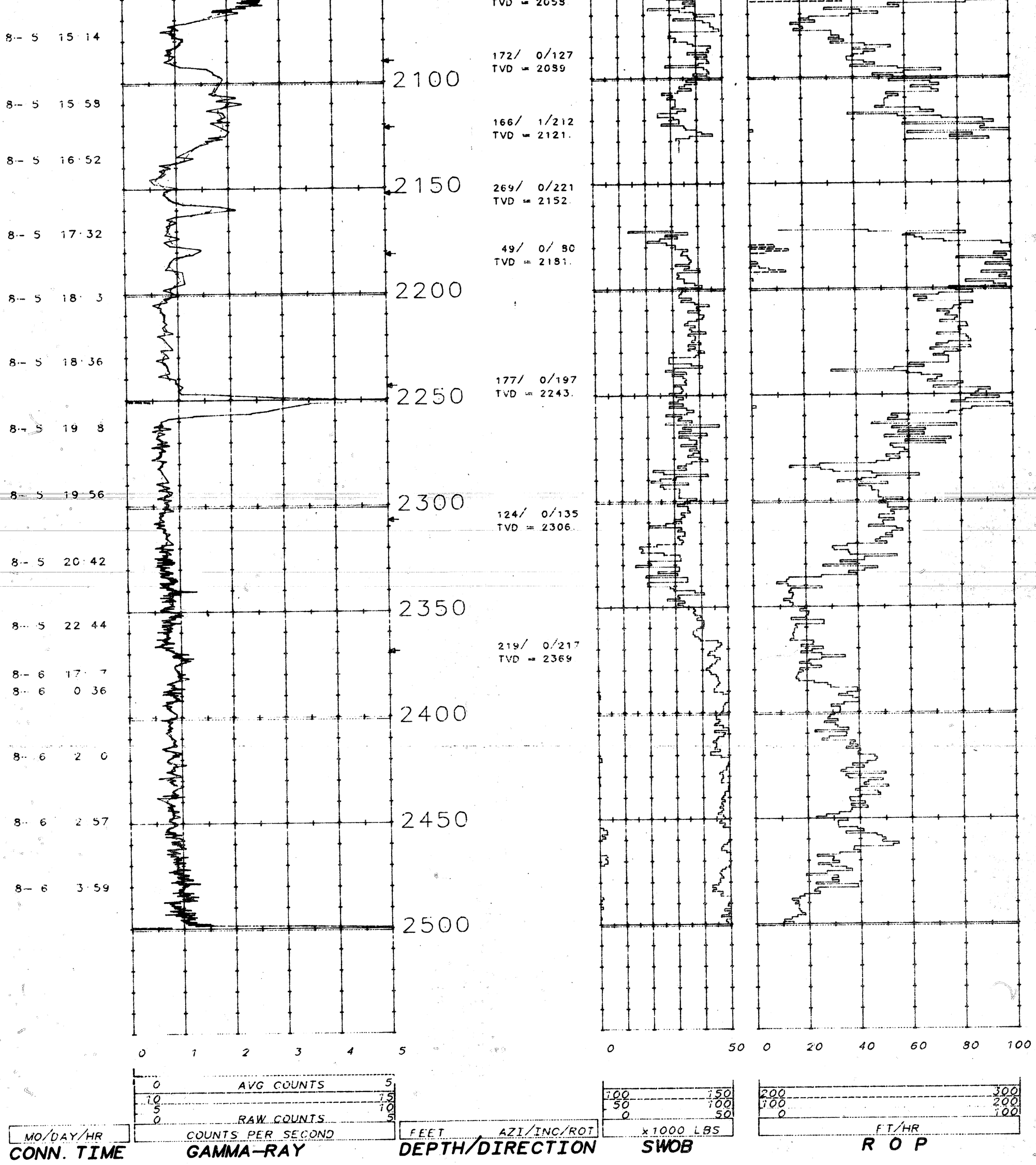
Date: 8-5-85

Tool Number: E-61, M-420, G-13




8-11 22 36
8-11 23 39
8-12 0 35
8-12 1 32
8-12 2 34
8-12 4 33
8-12 7 22
8-12 20 16
8-12 22 3
8-13 1 5
8-13 4 1
8-13 5 34
8-13 7 6
8-13 8 17
8-13 9 34
8-13 10 45
8-13 12 9
8-13 13 35
8-13 14 59
8-13 16 6
3950
4000
4050
4100
4150
4200
4250
4300
4350
4400
4450
4500
4550
122/ 0/352
TVD = 3941.
161/ 0/ 67
TVD = 3973.
152/ 0/ 89
TVD = 4001.
90/ 0/287
TVD = 4033
165/ 0/162
TVD = 4064
182/ 0/ 89
TVD = 4096
301/ 0/ 20
TVD = 4127.
125/ 0/199
TVD = 4159.
193/ 1/100
TVD = 4221.
156/ 0/156
TVD = 4253.
172/ 0/143
TVD = 4284.
186/ 1/ 65
TVD = 4316.
225/ 1/129
TVD = 4378
167/ 1/271
TVD = 4473.
152/ 1/ 39
TVD = 4504
194/ 0/119
TVD = 4535


8-13 10 45
8-13 12 9
8-13 13 35
8-13 14 59
8-13 16 6
8-13 17 13
8-13 18 37
8-13 20 7
8-13 21 33
8-14 0 12
8-14 2 28
8-14 4 38
8-14 9 1
8-14 11 36
8-14 13 47
4450
4500
4550
4600
4650
4700
4750
4800
4850
167/ 1/271
TVD = 4473
152/ 1/ 39
TVD = 4504
194/ 0/119
TVD = 4535
157/ 0/272
TVD = 4597
125/ 0/316
TVD = 4628
266/ 1/ 6
TVD = 4658
153/ 0/ 66
TVD = 4699
136/ 1/ 10
TVD = 4719
164/ 0/159
TVD = 4750
0 1 2 3 4 5
0 50
0 20 40 60 80 100
0 AVG COUNTS 5
10 15
5 10
0 RAW COUNTS 5
MO/DAY/HR
CONN. TIME
COUNTS PER SECOND
GAMMA-RAY
FEET
AZI/INC/ROT
DEPTH/DIRECTION
100 150
50 100
0 50
x1000 LBS
SWOB
200 300
100 200
0 100
FT/HR
R O P


8- 5 15 14
8- 5 15 58
8- 5 16 52
8- 5 17 32
8- 5 18 3
8- 5 18 36
8- 5 19 8
8- 5 19 56
8- 5 20 42
8- 5 22 44
8- 6 17 7
8- 6 0 36
8- 6 2 0
8- 6 2 57
8- 6 3 59
2100
2150
2200
2250
2300
2350
2400
2450
2500
TVD = 2058
172/ 0/127
TVD = 2089
166/ 1/212
TVD = 2121.
269/ 0/221
TVD = 2152.
49/ 0/ 80
TVD = 2181.
177/ 0/197
TVD = 2243.
124/ 0/135
TVD = 2306.
219/ 0/217
TVD = 2369
0 1 2 3 4 5
0 50
0 20 40 60 80 100
0 AVG COUNTS 5
10 7.5
5 10
0 RAW COUNTS 5
MO/DAY/HR
COUNTS PER SECOND
FEET AZI/INC/ROT
100 150
50 100
0 50
x1000 LBS
200 300
100 200
0 100
FT/HR
CONN. TIME
GAMMA-RAY
DEPTH/DIRECTION
SWOB
R O P

COMPUTALOG–GEARHART, LTD.

MWD DIVISION

GAMMA–RAY LOG

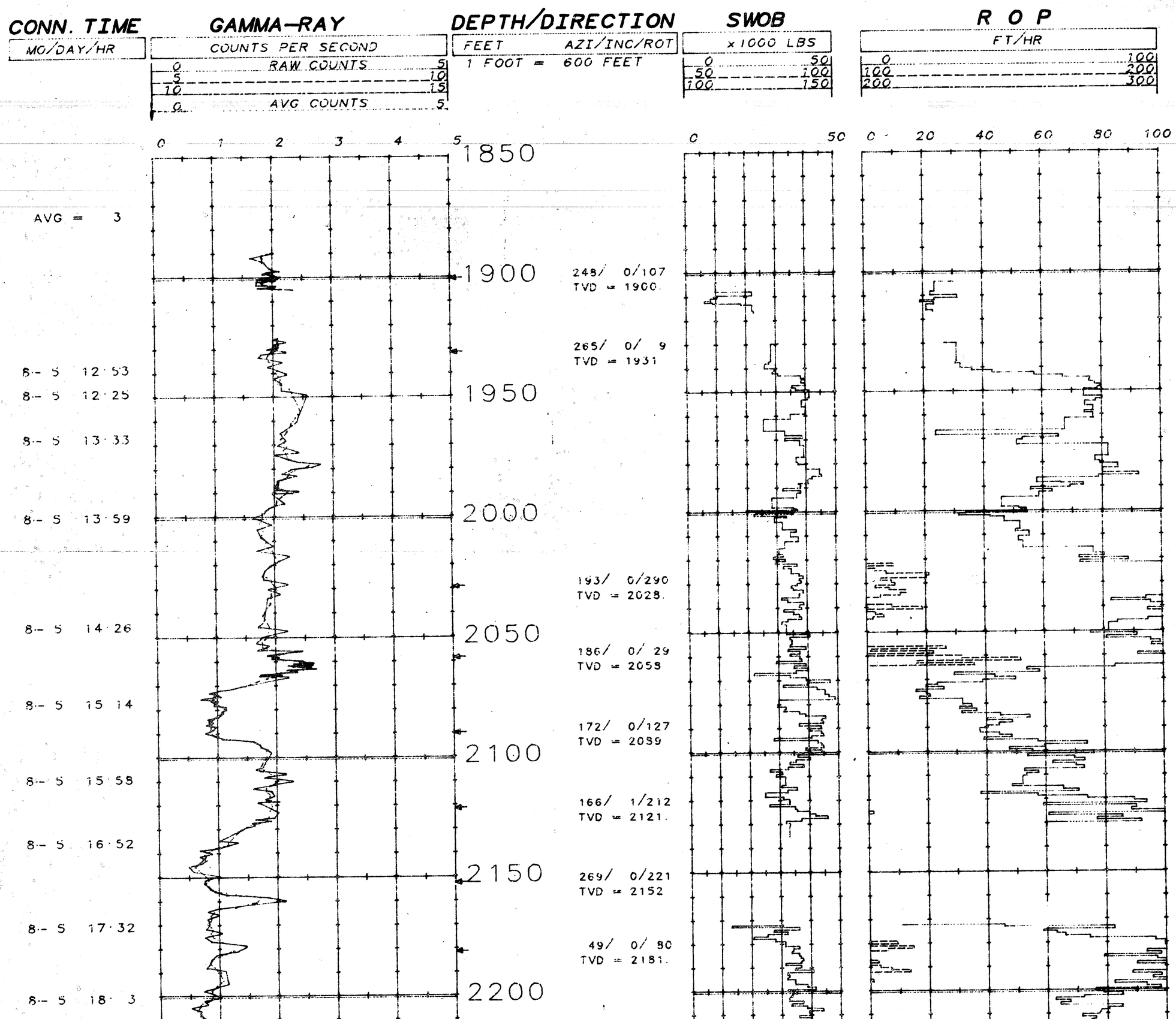
CLIENT: CANTERRA ENERGY LTD.

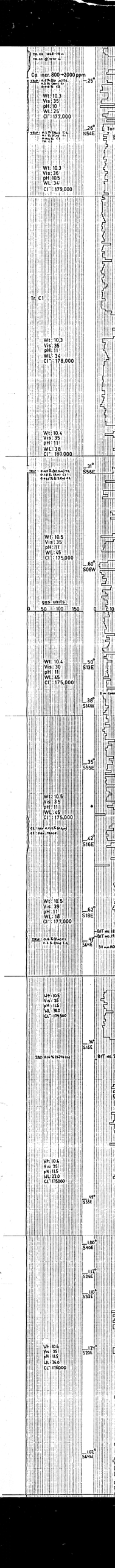
FIELD: BELUGA

WELL: O–23

Date: 8– 5–85

Tool Number: E– 61, M–420, G– 13




Co incr. 800→2000 ppm
Bit no. 7
HW J22
WOB: 40
RPM: 90
PP: 2800
SPM: 200
Torque on bit
Bit no. 8
HW R3
WOB: 30
RPM: 115
PP: 2850
SPM: 200
Wt: 10.3
Vis: 35
pH: 10.5
WL: 34
Cl⁻: 179,000
WOB: 30
RPM: 110-115
Wt: 10.3
Vis: 35
pH: 11
WL: 34
Cl⁻: 178,000
WOB: 30-35
RPM: 110-115
PP: 2800
SPM: 200
Wt: 10.4
Vis: 35
pH: 11
WL: 38
Cl⁻: 180,000
Bit no. 9
Smith F3
Torque
Wt: 10.5
Vis: 35
pH: 11
WL: 45
Cl⁻: 175,000
RPM: 60
Wt: 10.4
Vis: 30
pH: 11
WL: 45
Cl⁻: 175,000
Wt: 10.5
Vis: 39
pH: 11
WL: 45
Cl⁻: 175,000
WOB: 60
RPM: 90
PP: 2880
SPM: 190
Wt: 10.5
Vis: 35
pH: 11
WL: 18
Cl⁻: 177,000
Bit no. 18 HW XDV
Bit no. 19 HW ⅞XDV
31" HOLE
Wt: 10.5
Vis: 35
pH: 11.5
WL: 34.0
Cl⁻: 179,500
WOB: 30-40
RPM: 100
PP: 2850
SPM:
Bit no. 20 Smith F3
Wt: 10.6
Vis: 35
pH: 11.5
WL: 22.0
Cl⁻: 175000
WOB: 60
RPM: 60
PP: 2800
SPM:
Wt: 10.6
Vis: 35
pH: 11.5
WL: 36.0
Cl⁻: 175000
WOB: 60
RPM: 60
PP: 2925
SPM: 105
gas units
0 50 100 150
min/m
0 2.10 20 30
1075
1100
1125
1150
1175
1200
1225
1250
1275
1300
1325
1350
1375
1400
1425
1450
1475
1500
1525
1550
1575
1600
1625
1650
1675
1700
1725
1750
-25°
-26°
N54E
-31°
S56E
-50°
S13E
-38°
S14W
-35°
S55E
-42°
S16E
-18°
S18E
-36°
S15E
-49°
S35E
-100°
S40E
-117°
S24E
-110°
S33E
-137°
S20E
-101°
S64W
Kangarilla
(1452)
340mm
Csg.
Tc. C1

Depth	Drill Rate	Lithology	Description
	30 40 30		LMST =/- , V DOL IN PT , ANHY IN PT , DENSE . DOL UH - LT GY , V SLTY - SDY . ANHY UH - CLR , CRYPTO - V FINE XL , DOL IN PT .
	60 90 T		LMST BUFF - LT BRN , CRYPTO - MICRO XL , DENSE . ALSO F-M GRAINED BIOCL W/ 10-15 % + 16 ø TRACE ONLY . DOL =/- , V SLTY . SH GY , SL CALC . SLTY .
	85 15		LMST WH , OFF UH , LT BRN , CRYPTO - MICRO XL , NON FOS , DENSE , ANHY HINT , DOL IN PT .
	90 10 T		LMST
1575	95 5 T		LMST =/- RARE FOS , TR F-M GRAINED BIOCL DENSE . SH GY , SL CALC , SLTY .
	95 5 T		LMST =/- DOL UH - LT GY , MICRO - V FINE XL , SUC , V SLTY , DENSE
	90 10		LMST =/- TR BIOCL W/ ø ALSO =/- , TR MGGY ø , SL - V DOLOMITIC , GRDG TO LIMEY DOL IN PT . DOL =/- PRED V FINE XL , DENSE , V CALC IN PT .
	90 10		LMST
	60 90		LMST PRED =/- , ALSO LT BRN - BRN , MICRO XL , MICROSACROSIC , RR FOS , V SL ARG , NO VIS ø , NO FLOR . DOL =/- .
1600	20 80	10	SLTST LT GY - LT GY/BRN , PRED CALC , SL DOL IN PT , NON ARG , LMST =/- DOL =/- .
	10	T 90	SLTST =/- , CALC VHS , SL ARG IN PT . LMST WH , CRYPTO XL , DENSE SH . GY , NON CALC , NON DOL , BLK SPECS , SLTY .
	60 30	10	LMST WH , OFF WH , CRYPTO XL , RR FOS , SL - V BIOLOMITIC , GRDG TO DOL IN PT , DENSE . DOL WH , V FINE TO FINE XL , V CALC , DENSE .
	30 45	5 20	DOL =/- , ALSO MUR LT BRN MIC XL , TR FOS , W OCC . BRN/BLK ORGANIC FRAGS (50 %+ mm) , NO VIS ø .
	10 85	T 5	DOL LT BRN - BRN , MICRO XL , MICROSAC TEXTURE , V SLTY IN PT , V CALC IN PT . TR ORG FRAGS , NO VIS ø , VUN CHT FLOR , NO VIS ø , RR FOS , GRDG TO LS IN PT .
1625	10 10	T	DOL OFF WH , LT GY , LT BRN , SL ARG IN PT . CRYPTO - MICRO XL , V CALC IN PT , GRDG TO LMST , SLTY IN PT . LMST OFF WH - BRN , CRYPTO - MICRO XL , SLTY .
	30 70		DOL =/- , GEN V SLTY , CALC PATCHES . LMST V DOL IN PT GRDG TO LIMEY DOL .
	60 90		DOL =/- . LMST =/- TR BIOCL , MUDST , DENSE .
	H T		LMST WH , OFF WH - LT BRN , CRYPTO - MICRO XL , TR FOS , CRIN , TR BIOCL - F-M GRAINED , LOC 5-10 % 16 ø , NO SHOWS .
1650	H T		LMST =/- , CRIN MUDST , RR BLK ORG SPECS .
	80 20		LMST =/- TR CRIN , V DOL IN PT GRADING TO DOLOMITE IN PART . DOL LT GY , VF - F XL , V CALC .
	90 10		LMST =/- SL INCR IN BIOCL DEB , MUDST - WACKESTONE , DENSE , TR GY SL ARG - SLTY . DOL =/- .
	95 5		LMST =/- MUDST , DENSE , TR DOL .
	90 30		LMST =/- V DOL IN PT . DOL LT GY - WH , VF XL , V CALC , TR FOS , DENSE , FROM LMST .
	90 30		LMST =/- DOL =/- .
1675	80 20		LMST OFF WH - LT BRN , CRYPTO - MICRO XL , TR CRIN , PRED MUDST , MNR BIOCL PACKSTONE , DENSE . DOL =/- , TR QTZ + CALC VN/FRAC FILL .
	90 20		LMST =/- , DOL =/- .
	80 20		LMST =/- , NON DOLOMITIC , DENSE . DOL =/- , V CALC .
	90 10		LMST =/- , CRIN , SL BIOCL . DOL =/-
	90 5		LMST =/- , NON DOL , TR FOS . DOL =/-
1700	95 5		LMST =/- SL DOL IN PT . DOL LT GY , MICRO - V FINE XL , CALC , DENSE .
	H T		LMST OFF WH - LT BRN , CRYPTO - MICRO XL , BRITTLE , DENSE , RR FOS , MUDST .
	90 10		LMST =/- , NON DOL , TR FOS , DENSE . DOL =/- .
	95 5	T	LMST =/- , DOL IN PT . DOL WH - LT GY , =/- , V CALC , FOS IN PT , FROM LMST .
	95 5		LMST =/- , TR FOS .
	H T		LMST =/- , SL DOL IN PT , CRIN , MUDSTONE
	H T		LMST =/- , MNR PACKSTONE , BIOCL
	95 15		LMST =/- DOL =/- . V CALC , TR FOS , FROM LMST .
	90 10		LMST =/- DOL =/- , SLTY IN PT .
	95 5		LMST OFF WH - LT BRN - BRN , BIOCL IN PT , CRYPTO - MICRO XL , V FINE XL
1750	H T		LMST =/- , TR FOS .
	H T		LMST =/- .
	H T		LMST =/- , SL DOL IN PT .
	H T		LMST OFF WH - LT BRN , CRYPTO - MICRO XL , TR FOS , NON DOL - SL DOL .
	H T		LMST =/- CRIN , SL DOL IN PT . DOL =/- , CALC IN PT .
1775	H T		LMST =/- , V SL DOL IN PT , CRIN MUDST - WACKESTONE IN PT , DENSE .
	H T		LMST =/- , DOL LT GY , VF - F XL , GEN CALC , TR FOS , FROM LMST .
	H T		LMST =/- , TR DOL , TR FOS , MNR BIOCL STREAKS , DENSE .
	H		LMST =/- , TR FOS .
	H T		LMST GEN NON DOL , TR CRIN , TR BIOCL . DOL =/- .
1800	H		LMST =/- ALSO TRACE GY/BRN , MICRO XL , SL ARG , DENSE .
	95	5	SLTST LT GY , DOLOMITIC , V SL ARG IN PT , TIGHT . LMST =/- , TR DOL IN PT , FOS , DENSE .
	90 5	5	SLTST OFF WH - BUFF , DOL , GEN NON ARG . DOL LT GY , VF - F XL , CALC IN PT , DENSE . LMST =/- .
	10	60	SLTST =/- . LMST =/- .
	5	95	SLTST =/- DOLOMITIC , TIGHT , TR CALC PATCHES .
1825	5	95	SLTST =/-
	95 T	5	LMST =/- OFF WH - LT BRN , CRYPTO - MICRO XL , RR FOS , SL - V DOL IN PT , POSSIBLE PELLETS , DENSE . ANHY VN/CLR , MASSIVE .
	90 T	60	SLTST =/- , MNR LT GY - SL ARG , TIGHT . LMST =/- TR FOS , MUDST - WACKESTONE , DENSE .
	50	50	LMST =/- SLTST =/- .
	10	70 20	SLTST PRED BUFF , MNR OFF WH , DOLOMITIC , COMMONLY SANDY - VF - F GR , GRADING TO SLTY SS IN PT , TIGHT .
1850	T	T H T	SLTST =/- , SDY IN PT . ANHY UH , CLR , CRYPTO - MICRO XL , SOFT - FIRM .
	T	T H	SLTST =/- , GRDG TO SLTY DOLOMITE IN PT .
		T H	SLTST =/- .
		60 20	SLTST =/- , ALSO RARE RED/GRAY + RED/PURP , SDY + ARG . SS - BUFF , VF - F , ANG , F SRT , MOD CMT , W/ DOL CMT , GRDG FROM SLTST . TRACE ø T .
		80 20	SLTST =/- , V SDY IN PT . SS =/- . GRDG TO SDY DOLOMITE IN PT , TIGHT .
1875		80 10	SLTST =/- , FOS ? , DOLOMITIC , TIGHT .
	30	70	SLTST =/- , V SDY IN PT , NO VIS ø . LMST PROBABLE CAVINGS AS ABOVE .
	T	H T	SLTST =/- , GRDG TO SLTY DOL IN PT , SL CALC IN PT , V SDY IN PT .
	5	95	SLTST =/- . INCR CALC .
	10 T T	90	SLTST =/- SL CALC IN PT . LMST LT BRN , CRYPTO XL , V DOL IN PT . DOL OFF WH , VF XL , BIOCL TEXTURE , V CALC IN PT , DENSE .
1900	10 T	90	SLTST =/- , GRDG TO SLTY DOLOMITE . LMST SL DOL , BIOCL IN PT , =/- DENSE . DOL =/- , BIOCL .
	80	20	LMST OFF WH - LT BRN , CRYPTO - MICRO XL , SOFT IN PT , TR FOS , V DOL IN PT , DENSE . SLTST =/- .
	70 20	10	LMST =/- V DOL IN PT , SLTST =/- . DOL LT GY , VF - F XL , V CALC , TIGHT , V SLTY .
	80 10	10	LMST =/- V DOL IN PT . DOL =/- V CALC .
	70 20	10	LMST TR FOS , BRAC , V DOL IN PT . DOL V CALC .
1925	90 T	10	LMST OFF WH - LT BRN , CRYPTO - MICRO XL , SOFT IN PT , FOS IN PT , V DOL IN PT , LOC GRDG TO LIMEY DOL , DENSE . SLTST CAVINGS .
	95 T	5	LMST =/- V DOL IN PT , CRIN , BIOCL IN PT .
	H T		LMST =/- , TR BIOCL , BRAC , DENSE , SL DOL .
	90 T	10	LMST =/- TR BIOCL PACKSTONE . SLTST =/- .
	50 10 T	40	SLTST LT BRN - LT GY - LT GY/BRN , ARG IN PT , V DOLOMITIC , GRDG TO SLTY DOL , TR SDY . LMST =/- TR FOS , MUDST . DOL FROM LMST . ANHY , LT GY , CRYPTOXL .
1950	10 T	90	SLTST =/- BRN (OBST) SPECS IN PT , SL ARG IN PT , SOFT IN PT . LMST ABNT BIOCL , PACKSTONE , DENSE . POSSIBLE SALT BED 1946-1956m
	T	H	SLTST BUFF - LT BRN , DOLOMITIC , GRADING TO SILTY DOLOMITE IN PT , SL CALC IN PT , TIGHT .
	5 T	95	SLTST =/- , SL CALC IN PT . LMST DOLOMITIC IN PT , MUDSTONE , DENSE .
	5	95	SLTST =/- .
	10	60	LMST OFF WH - LT BRN , CRYPTO XL , BIOCL IN PT , GEN V DOL , DENSE . SLTST =/- .
1975	55 10	10	LMST FOS , MUDSTONE . DOL LT GY , VF - F XL , V CALC , FROM LMST , DENSE .
	10 10 T	20	LMST =/- , FOS , V DOL . DOL =/- , FOS . SLTST =/- ALSO MNR LT GY , SL ARG , DOL .
	50 10 T	40	LMST =/- SLTST =/- .
	10 T T	60	LMST =/- , V DOL IN PT . SLTST BUFF - LT BRN , MNR LT GY , V DOL , SL ARG IN PT , SL CALC IN PT .
	70	30	LMST OFF WH - LT BRN , CRYPTO - MICRO XL , V DOL IN PT , TR FOS , SOFT IN PT , DENSE . SLTST =/- TR LT GY , SL ARG , SL CALC IN PT .
2000	95	5	LMST =/- GEN NON DOL , RR FOS , DENSE .
	30	70	30 ANHY UH , CLR TRNSL , MASSIVE , SOFT TO FIRM . LMST =/- SL DOL . SLTST =/- ALSO TRACE , LT GY - GY , SL ARG .
	30	60	30 ANHY =/- LMST =/- V DOL IN PT . SLTST =/- TR GY , SL ARG .
	10 20 5	65	SLTST BUFF - LT BRN , V DOL , GRDG TO SILTY DOL IN PT , TIGHT . DOL LT BRN , CRYPTO - MICRO XL , SL SLTY , SL CALC . LMST BUFF - LT BRN , DENSE .
2025	10 30 T	30	DOL OFF WH - LT BRN , MICRO XL , SL SLTY , SL CALC , V CALC - VF XL IN PT , FOS . LMST OF WH - LT BRN , CRYPTO XL , DOL IN PT , RR FOS . SLTST =/- .
	10 H T	20	LMST =/- SLTST LT GY - GY , MNR LT BRN , V DOL , SL CALC , SL ARG , CLR IN PT , TIGHT .
	5 10 5	10	LMST =/- DOL FROM LMST .
	10 10		LMST OFF WH - LT BRN , CRYPTO - MICRO XL , MNR VF XL , RR FOS , SL - V DOL , GRDG TO LIMEY DOL , DENSE . DOL OFF WH - LT BRN , LT GY , CALC , TR NONCALC .
	10 10		LMST =/- . DOL =/- , FROM LMST .
2050	80 20		LMST =/- .
	30 30		LMST =/- , RR FOS , DOL =/- .
	50 10		LMST =/- .
	10 10		LMST =/- .
	10 10		LMST GRDG TO DOL IN PT .
	80 20		LMST =/- .
2075	10 10		LMST =/- DOL =/- FROM LIMESTONE .
	H T		LMST OFF WH - LT BRN , CRYPTO XL , MNR MICRO XL , TR - RR FOS , BRAC , TR SL DOL , SOFT IN PT , DENSE .
	H T		LMST =/- .
	H		LMST =/- .
	H		LMST =/- , SOFT IN PT .
2100	H T		LMST =/- , DOL GY/BRN , VF XL , SL SLTY , SL ARG , SL CALC .
	H T		LMST =/- , RR FOS , SL DOL IN PT .
	H		LMST =/- , LT GY/BRN , TR FOS .
	H		LMST =/-
	H		LMST =/- , V RR PYR , TR BRN/BLK ORGANIC FRAGMENTS , NO VIS ø , NO DOL , RR FOS .
2125	H		LMST =/- , RR TR DOL .
	H		LMST =/- , CRIN , BRAC , MUDSTONE - WACKESTONE .
	H		LMST =/- .
	H		LMST =/- , TR FOS .
	H	T	LMST OFF WH - LT BRN , CRYPTO - MICRO XL , FOS IN PT , TR DOL IN PT , DENSE . SLTST GY/BRN , DOLOMITIC , SANDY , TIGHT .
2150	H		LMST =/- .
	H T		LMST =/- . DOL OFF WH - LT GY , VF - F XL , CALC , DENSE .
	H		LMST =/- , PRED MUDST , MINOR WACKESTONE , DENSE .
	H		LMST =/- , TR FOS , CRIN , BRAC .
	H		LMST =/- , OFF WH - LT BRN , CRYPTO - MICRO XL , RR TR DOL , TR FOS , DENSE .
2175	H		LMST =/- , RR PYR , MUDST - RR PACKST , BIOCL IN PT , DENSE .
	H		LMST =/- , RR PYR .
	H	T	LMST =/- , TRACE ANHYDRITIC ? . SH LT GY , SOFT / FRI , SL DOL , TR PYR .
	30	55	CLR QTZ , FI - VC GRAINED + , P SRT , ANG - SRAND , P CONS W/ SIL , NO VIS POR , NO SHOWS . GNEISS FI - VC XL + , QTZ , TR FK + WHITE , BIOT MICA , BLK MAFIC MINERALS , GNEISSIC TEXTURE , ORIENTED MAFIC MINS . SS =/- TR MSGR .
	50 50	T	
	10 65	S	
2200	S 95		GNEISS =/- , CHLORITIC IN PT .
	S 95		GNEISS .
	T H		GNEISS .

Depth scale: 1575, 1600, 1625, 1650, 1675, 1700, 1725, 1750, 1775, 1800, 1825, 1850, 1875, 1900, 1925, 1950, 1975, 2000, 2025, 2050, 2075, 2100, 2125, 2150, 2175, 2200

Drill Rate scale: 10, 20, 30, 40, 50, 60, 70, 80, 90

Lithology: ANTRIM SHALE (1561); LOWER ELBURN; UPPER ANDERSON (1695); MID HURON MARKER (1880); CARGILL CROP; PRE-CARBONIFEROUS (1989); PALEOZOIC CROSS

Carboniferous 2185

Pre-Carboniferous 2189

TD 2215m

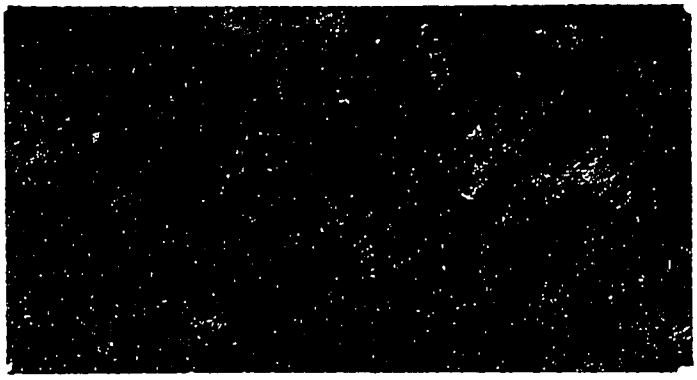
2235

Depth	Bit	Mud	Survey
1575	WOB: 60 RPM: 60 PP: 2800 SPM:		
1650	99° S35E		
1675	100° S40E		
1700	112° S26E		
1725	110° S33E		
1750	124° S20E	WOB: 60 RPM: 60 PP: 2925 SPM: 105	
1775	103° S44W		
1800	175° S49E		
1850	75° S72E	BIT no. 21	SS 1/8 F-S
1875	126° S35E	WOB: 60 RPM: 60-70 PP: 2900 SPM: 105	
1900	150° S06E		
1925	200° S05E	WOB: 60 RPM: 80 PP: 2900 SPM: 105	
1950	210° S52E	BIT no. 22	HW J-33
1975	200° S60W	BIT no. 23	RR no. 22
2000	230° S06E	WOB: 60 RPM: 80 PP: 2880 SPM: 105	
2025	135° S56E		
2050	125° S35E		
2075	110° N48W		
2100		BIT no. 24	SMITH F-19
2125		NO SURVEYS THIS BIT RUN	
2150		WOB: 60-65 RPM: 85 PP: 2800 SPM: 100	
2175		BIT no. 25	SMITH F-4
2200	104° S58W	WOB: 65 RPM: 80 PP: 2880 SPM: 105	

Depth	Mud
1575	VF: 10.6 Vis: 35 pH: 11.5 WL: 12.0 CL: 175000
1775	VF: 10.6 Vis: 35 pH: 11.5 WL: 12.0 CL: 175000
1850	TRIP 0.36% TG 0.33% C1 0.01% C2 TR C3
1875	VF: 10.6 Vis: 38 pH: 11.5 WL: 31.0 CL: 175000
1925	TRIP 0.30% TG 0.20% C1 0.02% C2 TR C3
1950	VF: 10.6 Vis: 37 pH: 11.0 WL: 33.0 CL: 175000
2025	TRIP 0.33% TG 0.28% C1 0.01% C2 TR C3
2050	VF: 10.6 Vis: 35 pH: 11.0 WL: 35.0 CL: 178000
2150	VF: 10.6 Vis: 35 pH: 10.5 WL: 35.0 CL: 178000
2175	TRIP 0.10% TG 0.04% C1
2200	VF: 10.7 Vis: 35 pH: 11.0 WL: 29.0 CL: 171000

TRILLIUM BELUGA O-23

8710-C55-1-1



Geoservices North America Ltd.

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Calgary, Alberta, T2A 5K8
(403) 235-1660
TLX 038 22865

8710-C55-1-1

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CANTERRA ENERGY Ltd.

BELUGA O-23

GEOSERVICES WELL REPORT

CANADA OIL AND GAS LANDS ADMINISTRATION
ADMINISTRATION DU PÉTROLE ET DU GAZ DES TERRES DU CANADA
NOV 12 1985
ENGINEERING AND CONTROL BRANCH
TECHNIQUE ET DU CONTROLE

GEOSERVICES
NORTH AMERICA Ltd.
13.3300-14 AVENUE N.E.
CALGARY,
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GEOSERVICES Inc.
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HOUSTON,
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Tel: 713-8205908

SUMMARY

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I . "GENERALITIES" CHAPTER CONTENTS

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I-2 . Location map

I-3 . Technical section

I-4 . Deviation

I-5 . Geological section

I-6 . Daily progress

I-7 . Rig data

I-8 . Geoservices survey & equipment

I-1. WELL DATA

Operator : CANTERRA ENERGY Ltd.
Well name : BELUGA O-23
Country : CANADA
Area : HUDSON BAY

Location
long :88 33' 26.6" W
lat :59 12' 54.4" N

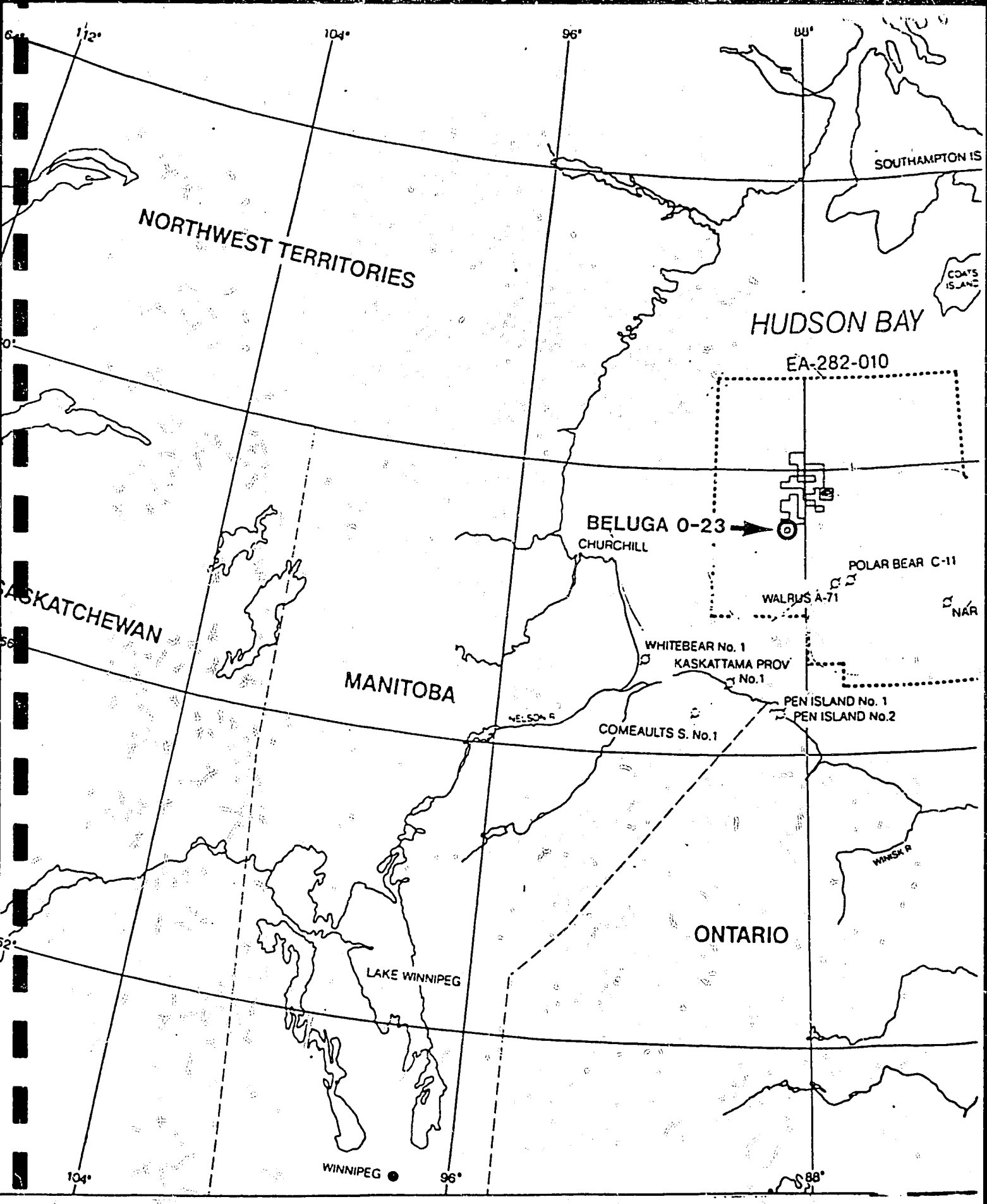
Seismic line : CO-15
Shot point : 2780
KB elevation : 13.7 m
Water depth : 179.8 m
Total depth : 2215 m

Spudded on : 28-07-1985
Total depth reached on: 11-09-1985
Abandonned on : 15-09-1985
Total days : 49

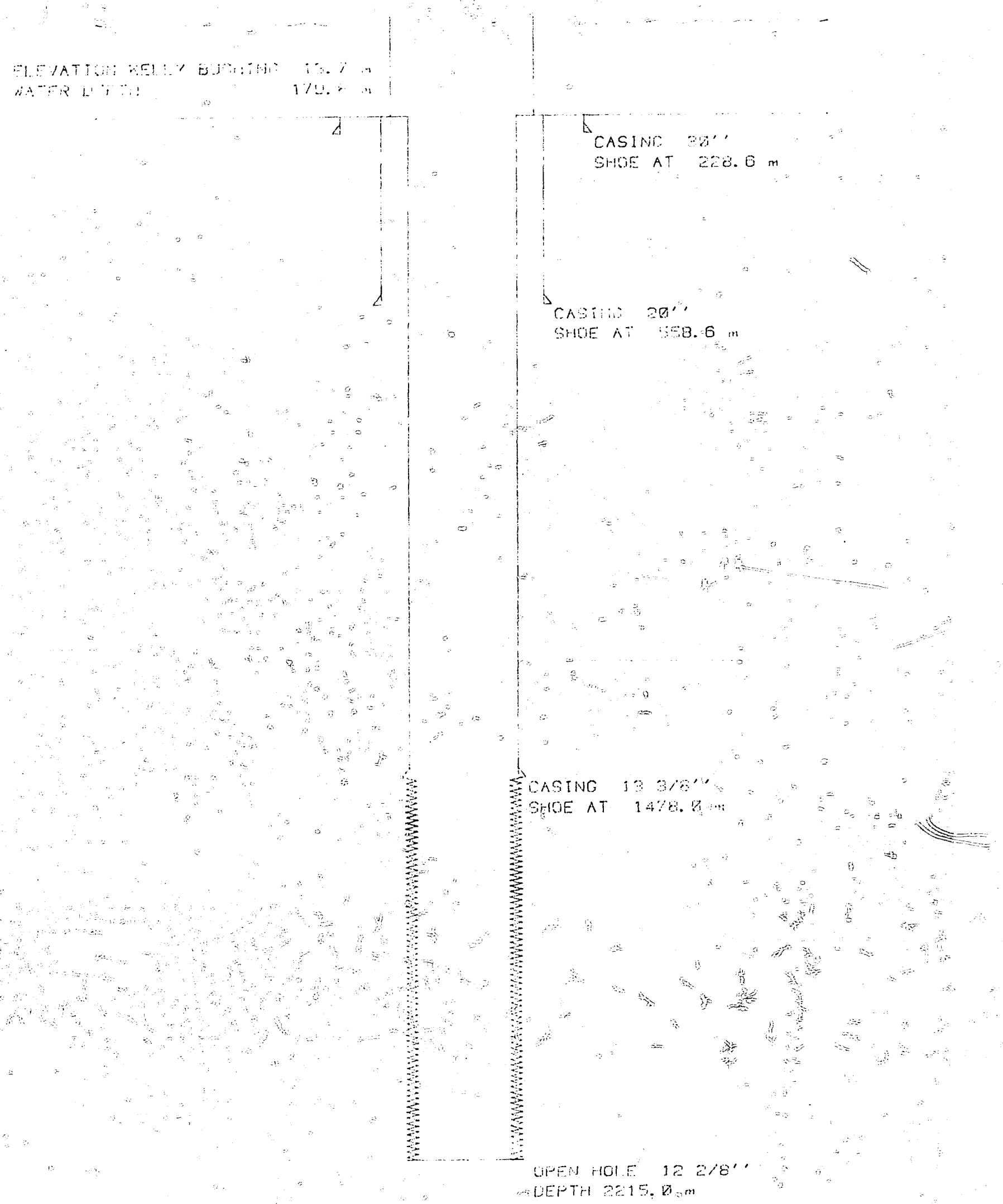
Contractors:

Drilling vessel	: Drillship Neddrill 2
Mud logging	: Geoservices
Mud engineering	: Technifluids
Electrical logging	: Schlumberger
Cementing company	: Dowell Schlumberger
Multishot survey	: Computalog MWD
Diving service	: Hydrospace
Helicopter	: Okanogan Helicopters

Rig name : Neddrill 2
Rig type : DP Drillship


112°
104°
96°
88°
SOUTHAMPTON IS
NORTHWEST TERRITORIES
COATS ISLAND
HUDSON BAY
EA-282-010
BELUGA 0-23
CHURCHILL
POLAR BEAR C-11
WALRUS A-71
NAR
SASKATCHEWAN
WHITEBEAR No. 1
KASKATTAMA PROV No.1
MANITOBA
PEN ISLAND No. 1
PEN ISLAND No.2
NELSON R
COMEAULTS S. No.1
WINISK R
ONTARIO
LAKE WINNIPEG
WINNIPEG
104°
96°
88°

WELL: BELUGA Ø-23



GEOSERVICES

BELUGA 0-23 COMPUTALOG MWD

DEPTH Stand metr	DRIFT	BEARING	Depth Vertical metr	BOTTOM HOLE COORDINATES NORTH	SOUTH	WEST	EAST	L
193.5	0.00	0.0	193.55	0.00		0.00		1
210.0	0.50	0.0	210.01	0.07		0.00		2
229.5	0.75	0.0	229.51	0.28		0.00		3
232.3	0.43	326.5	232.26	0.31		0.01		4
251.8	0.22	108.9	251.76	0.40			0.06	5
299.9	0.10	245.0	299.92	0.26			0.07	6
328.3	0.22	281.1	328.27	0.26		0.01		7
414.5	0.40	331.9	414.52	0.53		0.39		8
500.8	0.22	38.4	500.78	1.00		0.35		9
566.0	0.05	88.9	566.01	1.07		0.21		10
579.2	0.13	247.9	579.17	1.05		0.20		11
588.6	0.25	264.8	588.56	1.04		0.23		12
618.3	0.17	193.4	618.28	0.97		0.32		13
627.3	0.28	186.1	627.27	0.93		0.32		14
636.9	0.23	171.9	636.88	0.89		0.32		15
646.5	0.57	165.6	646.48	0.82		0.31		16
656.0	0.32	268.8	656.02	0.76		0.35		17
664.7	0.03	49.1	664.73	0.79		0.36		18
683.7	0.20	176.6	683.73	0.77		0.33		19
703.0	0.12	123.9	703.00	0.73		0.30		20
722.0	0.17	219.1	722.03	0.68		0.29		21
1096.0	0.05	111.2	1095.97		0.01	0.11		22
1105.9	0.25	54.1	1105.87		0.01	0.08		23
1134.2	0.20	129.6	1134.21		0.01		0.03	24
1143.9	0.30	73.9	1143.88		0.02		0.07	25
1172.7	0.43	160.6	1172.74		0.11		0.23	26
1182.4	0.58	104.8	1182.37		0.16		0.29	27
1201.2	0.35	122.3	1201.21		0.23		0.44	28
1210.9	0.27	161.5	1210.91		0.27		0.47	29
1219.5	0.28	152.1	1219.54		0.30		0.48	30
1229.2	0.37	90.4	1229.15		0.33		0.53	31
1238.8	0.30	165.3	1238.78		0.37		0.57	32
1248.6	0.38	182.2	1248.57		0.42		0.58	33
1258.0	0.43	301.0	1258.03		0.46		0.52	34
1267.7	0.30	124.9	1267.74		0.51		0.49	35
1286.7	0.55	198.1	1286.67		0.64		0.53	36
1296.3	0.48	155.7	1296.25		0.73		0.54	37
1305.9	0.48	171.9	1305.87		0.81		0.56	38
1315.5	0.60	185.9	1315.50		0.90		0.56	39
1334.5	0.70	225.2	1334.54		1.09		0.47	40
1363.3	0.50	167.2	1363.27		1.38		0.39	41
1372.7	0.72	151.9	1372.73		1.47		0.42	42
1382.3	0.38	194.0	1382.31		1.57		0.43	43
1401.0	0.35	157.4	1401.01		1.68		0.44	44
1410.6	0.35	125.0	1410.62		1.73		0.48	45
1419.8	0.43	137.4	1419.82		1.77		0.53	46
1429.2	0.38	152.8	1429.21		1.83		0.56	47
1438.3	0.57	136.3	1438.29		1.89		0.61	48
1447.8	0.42	164.2	1447.81		1.96		0.65	49
1457.4	0.43	136.6	1457.42		2.02		0.68	50
1481.6	0.62	162.5	1481.63		2.21		0.80	51
1496.0	0.72	115.1	1495.94		2.34		0.91	52
1545.7	0.60	164.6	1545.66		2.78		1.27	53
1594.7	0.48	125.0	1594.69		3.15		1.54	54
1642.7	1.02	220.6	1642.63		3.78		1.62	55

GEOSERVICES

BELUGA 0-23 COMPUTALOG MWD

DEPTH Stand metr	DRIFT	BEARING	Depth Vertical metr	BOTTOM HOLE COORDINATES NORTH	SOUTH	WEST	EAST	L
1656.3	1.12	153.8	1656.25		4.03		1.59	56
1666.0	1.10	146.7	1666.00		4.19		1.68	57
1684.9	0.97	160.0	1684.90		4.50		1.83	58
1693.7	1.23	200.5	1693.68		4.67		1.83	59
1703.4	0.87	191.2	1703.34		4.84		1.79	60
1732.2	1.75	164.5	1732.15		5.49		1.81	61
1742.8	1.00	243.7	1742.80		5.69		1.77	62
1752.9	0.35	314.2	1752.85		5.67		1.65	63
1762.4	0.82	167.3	1762.30		5.72		1.57	64
1768.4	1.73	135.6	1768.40		5.84		1.63	65
1778.2	1.47	64.7	1778.12		5.89		1.85	66
1788.0	0.45	252.1	1787.90		5.85		1.93	67
1807.1	1.25	144.7	1807.06		6.12		1.84	68
1816.7	1.43	163.9	1816.65		6.32		1.93	69
1836.0	1.38	179.7	1835.93		6.79		2.00	70
1855.0	2.00	171.9	1854.92		7.35		2.04	71
1863.1	2.10	231.9	1863.04		7.58		1.95	72
1891.3	2.32	173.7	1891.19		8.47		1.60	73
1900.7	2.03	318.3	1900.63		8.53		1.51	74
1910.5	1.80	259.8	1910.38		8.43		1.25	75
1929.7	2.15	240.1	1929.54		8.66		0.63	76
1948.8	1.88	120.4	1948.68		8.99		0.59	77
1968.1	1.33	145.0	1967.93		9.36		0.98	78
1987.1	1.17	312.5	1987.01		9.41		0.97	79
2121.7	0.73	323.2	2121.56		7.76	0.53		80
2150.1	1.55	214.1	2149.91		7.93	0.86		81
2204.3	1.07	238.2	2204.15		8.79	1.75		82

CANTERRA ENERGY BELUGA O-23

SCALE: 1/10000

CASING	Depth below RTKB (m)	FORMATION	LITHOLOGY	LITHOLOGICAL DESCRIPTION
				13.7 Sea Level
	200			193.5 Sea Floor
30" Shoe at 228.5m	400			NO RETURNS
20" Shoe at 558.8m	600	MIDBAY		580 Mudstone, light grey, soft, occ silty, abundant fossil debris. 630 Dolomite, light brown, cryptoxl, slighty argillaceous. 640 Mudstone, red and grey, fossi. Anhydrite interbeds. 695 Anhydrite, with minor Mudstones and carbonates. 727
	800	WALRUS LST.		Limestone, buff, grading to Dolomite, light grey. Occ Anhydrite. 781 Mudstone, pink-red, occ grey, very soft, swelling. Firming to base. 835 Limestone, white to buff, cryptoxl, occ argillaceous, dolomitic. 845
	1000	WALRUS SHALE (equivalent)		Halite. Possible minor KCl salt. Rare Limestone and Mudstone interbeds.
		DEVONIAN		1060 Limestone and Dolomite, buff to brown. Anhydrite interbeds below. 1109 Claystone, light to medium grey, very soft. 1115
	1200	POLAR BEAR		Halite, clean. Occ Mudstone and Anhydrite. 1195 Anhydrite and buff Limestone interbeds. Minor Mudstone. 1206 Halite, clean. Occ interbeds of Anhydrite, Mudstone and Dolomite. 1248
	1400	PEN		Anhydrite, white, microxl, with Limestone an Dolomite interbeds. 1295 Limestone, white to light grey, fossi, with Anhydrite interbeds. 1327 Halite, buff to clean. Minor Anhydrite and Mudstone interbeds. 1433 Anhydrite and buff, soft, cryptoxl Limestone. 1440 Halite. 1451 Dolomite, with Anhydrite. Grading down to Shale, then Siltstone. 1498
		KENOGAMI		Anhydrite with minor Dolomite, becoming Dolomite with Anhy beds.
		NARWHAL		1560
		ATTAWAP.		Limestone, white to buff, occ anhydritic, with minor Dolomite. 1600
	1600	EKWAN RIVER		Siltstone, light grey-brown, calcareous, occ dolomitic. 1615 Dolomite, light grey, buff, cryptoxl, with minor Limestone. 1638
13 3/8" Shoe at 1478m		SILURIAN		
		SEVERN RIVER		Limestone, buff to light brown, crypto-microxl, fossi, occ bioclastic. Minor Dolomite at top.
	1800			1813
		RED HEAD RAPIDS		Siltstone and Limestone interbeds. Sandy in parts. 1830 Siltstone, buff, occ multicoloured, dolomitic, grading to Sandstone 1888 Siltstone, with Limestone interbeds. 1905 Limestone, light brown, soft, fossi occ grading to Dolomite. 1980
	2000	ORDOVICIAN		Siltstone, buff, grading to Dolomite. Incr Limestone interbeds towards base. Occ Anhydrite. 2030
		CHURCHILL		Limestone, light brown to off white, cryptoxl, occ fossi, occ dolomitic.
	2200	CAMBRIAN		2189 Sandstone, dominantly quartz, with light grey Shale at top. 2194
		PRECAMB.	TD =	Gneiss, granitic, quartz, altered feldspars, misc, mafic mins. 2216

WELL DIARY FOR BELUGA 0-23

Day 1: 29th July 1985.
Tag mud line at 193.6m.Drill ahead with Bit #1 (26") and 42" hole-opener, to 229.5m using seawater and Hi-Vis pills.Make wiper trip to sea bed.Pump 100 bbls Hi-Vis,and 200 bbls of 10.7ppg mud.POOH.Rig up to run 30" casing.

Day 2: 30th July 1985.
Run 30" casing,using underwater TV camera to guide into hole.Wash casing through 10m of fill to 228.6m.Circulate hole volume and cement casing with 16.7ppg slurry.Back out running tool and POOH.Make up Bit #2 (26") and BHA.RIH and tag cement at 226.2m.Drill cement,shoe and new formation to 231.6m.POOH.Make up Bit #3 (14.75") and RIH.Drill pilot hole to 264m.

Day 3: 31st July 1985.
Drill 14.75" pilot hole to 531m,spotting every connection with Hi-Vis mud.

Day 4: 1st August 1985.
Drill 14.75" pilot hole to 571.5m.Pump 100bbl Hi-Vis mud and circulate around.Spot 250 bbl Hi-Vis mud.POOH.Make up Bit #4 (26") and RIH.Open hole to 26" from 231.6m to 372m.

Day 5: 2nd August 1985.
Open hole to 26" from 372m to 571.5m.Pump 400bbl Hi-Vis mud and circulate around.POOH to 30" shoe.RIH and wash 3m of fill to 571.5m.Spot 1000bbl Hi-Vis mud.

Day 6: 3rd August 1985.
POOH.Rig up and run 20" casing,using underwater TV camera to stab into 30" housing.Continue running 20" casing.Make up stinger and wellhead.Land casing into 30" housing.Rig up cement lines and test.Circulate casing with 1000bbl seawater.Cement as per program.Back out running tool and POOH.Run BOP and marine riser,pressure-testing each joint.

Day 7: 4th August 1985.
Land BOP and install diverter.Make up test tool and RIH.Function and pressure-test BOP.POOH with test tool.Run wear bushing.Make up Bit #5 (14.75") and BHA.Check and change MWD tool.

Day 8: 5th August 1985.
RIH and tag cement at 552.6m.Take SCR's and friction losses in kill line. Drill cement,shoe and new formation to 574.5m,whilst displacing hole to mud.Drill new formation to 579.1m.Perform LOT (25.3ppg MWEQ).Drill 14.75" hole to 923.8m.

Day 9: 6th August 1985.
Drill 14.75" hole to 766m.Repair control line to BOP.Drill 14.75" hole to 767m.Circulate B/U and POOH for bit change.Make up Bit #6 (14.75") and RIH.Drill 14.75" hole from 767m to 829m.

Day 10: 7th August 1985.
Drill 14.75" hole from 829m to 1071m.

Day 11: 8th August 1985.
Drill 14.75" hole from 1071m to 1082m.Observe weather and attempt to turn rig.Interchange choke and kill line positions to enable rig to turn into current.Drop survey and POOH.Change MWD tool.Attempt to repair blue pod leakage.Displace riser to seawater.Unlatch BOP and pull riser.Repair blue pod leakage.

Day 12: 9th August 1985.
Repair leaks on BOP.Run BOP and riser.

Day 13: 10th August 1985.
Land BOP and install diverter.Make up test tool and RIH.Displace riser to mud.Function and pressure-test BOP.POOH with test tool.Run wear bushing. Make up Bit #7 (14.75") and BHA.Check MWD tool and RIH.Ream tight spot 617m to 634m.Continue RIH.Ream 1061m to 1082m.Work junk sub.Circulate B/U.Drop and retrieve Totco survey.Drill 14.75" hole from 1082m to 1106m.

Day 14: 11th August 1985.
Circulate and work junk sub.POOH.Make up Bit #8 (14.75") and RIH.Ream from 1099m to 1106m (7m of fill) and work junk sub.Drill 14.75" hole from 1106m to 1220m.

Day 15: 12th August 1985.
Drill 14.75" hole from 1220m to 1267m.POOH.Make up Bit #9 (14.75"),pick up new drilling jars and RIH.Wash 4m of fill to bottom.Drill 14.75" hole from 1267m to 1287m.

Day 16: 13th August 1985.
Drill 14.75" hole from 1287m to 1435m.

Day 17: 14th August 1985.
Drill 14.75" hole from 1435m to 1491.9m.Circulate B/U and POOH.Lay down MWD tool.Rig up Schlumberger.Run DLL/MSFL.

Day 18: 15th August 1985.
Schlumberger logging: DLL/MSFL;AMS/NGT/CNL/LDT;SEDT;RFT/GR.

Day 19: 16th August 1985.
Schlumberger logging: RFT/GR.Rig down Schlumberger.Slip & cut drilling line.Make up 13.375" casing shoe and float joint.Change of plan:Rig up Schlumberger.Run CST (44 shots,44 recovered,2 empty).Rig down Schlumberger. Make up Under-reamer #1 (17.5") and BHA.RIH.Ream 14.75" hole to 17.5" from 564m to 651m.

Day 20: 17th August 1985.
Ream 14.75" hole to 17.5" from 651m to 1488m.Circulate B/U.POOH to 550m. Ream from 558.3m to 559m (through casing shoe).POOH.

Day 21: 18th August 1985.
POOH.Under-reamer #1 was 2 5/8" under-gauged,and probably failed very early.Rig up Schlumberger and run caliper log from 558.7m to 1488m to confirm.Rig down Schlumberger.Make up Under-reamer #2 (17.5") and RIH. Tag cement at 555m.Ream 14.75" hole to 17.5" from 555m to 725m.

Day 22: 19th August 1985.
Ream 14.75" hole to 17.5" from 725m to 910m.POOH-washout in under-reamer. Make up Under-reamer #3 (17.5") and RIH.Ream 14.75" hole to 17.5" from 910m to 1028m.

Day 23: 20th August 1985.
Ream 14.75" hole to 17.5" from 1028m to 1073m.POOH.Make up Under-reamer #4 (17.5") and RIH.Ream 14.75" hole to 17.5" from 1073m to 1099.3m.POOH. Make up Under-reamer #5 (17.5").

Day 24: 21st August 1985.
RIH.Ream 14.75" hole to 17.5" from 1099.3m to 1201m.POOH.Make up Under-reamer #6 (17.5") and RIH.Ream 14.75" hole to 17.5" from 1201m to 1262.5m.

Day 25: 22nd August 1985.
POOH.Make up Under-reamer #7 (17.5") and RIH.Attempt to ream from 1262.5m but it would not take any weight.POOH.Make up Under-reamer #8 (17.5") and RIH.Ream 14.75" hole to 17.5" from 1262.5m to 1296.2m.POOH.Make up Under-reamer #9 (17.5").

Day 26: 23rd August 1985.
RIH.Ream 14.75" hole to 17.5" from 1296.2m to 1310.4m.POOH.Make up Under-reamer #10 (17.5") and RIH.Ream 14.75" hole to 17.5" from 1310.4m to 1388.6m.

Day 27: 24th August 1985.
Ream 14.75" hole to 17.5" from 1388.6m to 1433.2m.POOH.Make up Under-reamer #11 (17.5") and RIH.Ream 14.75" hole to 17.5" from 1433.2m to 1461.7m.POOH.Make up Under-reamer #12 (17.5").

Day 28: 25th August 1985.
RIH.Ream 14.75" hole to 17.5" from 1461.7m to 1491.2m.Circulate B/U.Rig up Schlumberger and run caliper log.Rig down Schlumberger.Make up running tool and retrieve wear bushing.Rig up to run 13 3/8" casing.Make up shoe, shoe joint and float joint;and test.Run 57 joints of 13 3/8" casing.

Day 29: 26th August 1985.
Run and land 111 joints of 13 3/8" casing.Circulate casing with 600bbls of mud.Test cement lines and pump 50 bbls saturated salt water.Cement casing as per program.Unlatch running tool.Displace riser to seawater,and wash wellhead and BOP cavities.POOH with running tool.Pull diverter and slip joint.Unlatch BOP and lay out riser.

Day 30: 27th August 1985.
Pull riser and BOP.Locate and recover acoustic beacon from seabed using crowsfoot on DP.Work on BOP.Wait on weather.

Day 31: 28th August 1985.
Wait on weather.Run BOP and riser.

Day 32: 29th August 1985.
Run and land BOP.Make up and run test tool.Function and pressure-test BOP. Run wear bushing.

Day 33: 30th August 1985.
Make up MWD tool and test.Make up Bit #10 (12 1/4") and BHA and RIH.Drill cement,float collar,shoe and rat-hole to 1490.5m.Circulate B/U.Perform LOT (20.5ppg MWEQ).Drill rat-hole to 1494m and POOH.Make up Bit #11 (12 1/4") and RIH.Work junk baskets before drilling 12 1/4" hole from 1494m to 1498m.

Day 34: 31st August 1985.
Drill 12 1/4" hole from 1498m to 1553m.POOH and retrieve 131bs junk from baskets.Make up Bit #12 (12 1/4") and RIH.

Day 35: 1st September 1985.
Drill 12 1/4" hole from 1553m to 1619m.

Day 36: 2nd September 1985.
Drill 12 1/4" hole from 1619m to 1696m.

Day 37: 3rd September 1985.
Drill 12 1/4" hole from 1696m to 1790.3m.

Day 38: 4th September 1985.
POOH.Make up Bit # 13 (12 1/4"),pick up shock sub and lay out a stabilizer. RIH and drill 12 1/4" hole from 1790.3m to 1851.3m.

Day 39: 5th September 1985.
Drill 12 1/4" hole from 1851.3m to 1868.8m.POOH for suspected washout-found in XO between DC and HWDP.Make up Bit #14 (12 1/4") and new XO,RIH. Drill 12 1/4" hole from 1868.8m to 1883.3m,until loss of SPP.POOH to check for washout-found on box of a DC.Change DC and pick up 2 extra DC's. Check bit and all BHA connections,RIH.

Day 40: 6th September 1985.
Drill 12 1/4" hole from 1883.3m to 1959.8m.

Day 41: 7th September 1985.
Drill 12 1/4" hole from 1959.8m to 2018.8m.POOH for suspected washout-found in DC.Make up Bit #15 (12 1/4").

Day 42: 8th September 1985.
Wait on weather.RIH with BHA and 15 stands DP.Pressure-test to 2800psi-leaked 400psi.POOH.Found washout in HWDP.Lay out faulty joints and pick up 2 new joints.RIH.Drill 12 1/4" hole from 2018.8m to 2046m.

Day 43: 9th September 1985.
Drill 12 1/4" hole from 2046m to 2138m.

Day 44: 10th September 1985.
Drill 12 1/4" hole from 2138m to 2171.7m.POOH for suspected washout-found in DP.POOH BHA and Magnaflux all connections.Lay down damaged and cracked collars.Make up Bit #16 (12 1/4") and Magnaflux the bit sub.

Day 45: 11th September 1985.
Make up BHA.Change out MWD tool.RIH to 2171m.Drill 12 1/4" hole from 2171.7m to 2195.8m.Loss of SPP,POOH for suspected washout-found in DP.RIH to 2195.8m,and drill 12 1/4" hole to 2215m.TD of well declared from lithology.Circulate B/U.

Day 46: 12th September 1985.
Circulate B/U and POOH.Lay down BHA.Rig up Schlumberger.Run the following logs:LDT/MSFL;CNL/LDT/GR;HDT/GR;SONIC/GR/BHC (CBL/VDL inside casing).

Day 47: 13th September 1985.
Schlumberger logging:SONIC/GR/BHC;RFT;WST;CST.

Day 48: 14th September 1985.

Schlumberger logging:CST (66 shots,36 recovered).Rig down Schlumberger. PIH open-ended to TD.Set 35 bbl cement plug.POOH 7 stands and reverse-circulate.POOH.Rig up Schlumberger and set bridge plug at 1460m.RIH open-ended to tag plug.Set cement plug from 1410m to 1460m.POOH to 250m.Set cement plug.POOH.

Day 49: 15th September 1985.

Prepare to pull BOP and riser.....

I-7 . RIG DATA

Riser length: 179.8 m internal diameter: 17 5/8"

Drawwork:

Manufacturer	: Ideco
Model	: 3000
Cable diameter	: 1 1/2"

Reeving:

Number of lines: 12

Stand pipe	length: 21.5 m	internal diameter:	5 1/2"
Hose	length: 26.0 m	internal diameter:	4"
Swivel	length: 1.0 m	internal diameter:	3 1/2"
Kelly	length: 16.8 m	internal diameter:	3"

Pumps:

Manufacturer	: Emsco
Model	: FB 1600
Number	: 2
Liners	: 7"
Stroke	: 12"
Displacement	: 6.0 gal
Efficiency	: 96 %

I-8 . GEOSERVICES SURVEY AND EQUIPMENT

GEOSERVICES crew was on site from the 28-07-1985 until the 15-09-1985.This corresponded to drilling from spud to 2215 m and abandonment operations.

2 dry samples were taken every 5 metres from 590 m to TD.

2 wet samples were taken every 5 metres from 590 m to TD.

4 Geochemichal samples were taken every 10 m from 590 m to TD.

H2S sensors were tested every week,they were situated:

- on the rig floor
- on the active pit
- on the shale shakers
- on the Geoservices gas line
- continuous monitoring of flow line returns for sulphide content by the Mud Duck

GEOSERVICES equipment:

Unit: standard TDC	No
Pressurization	1
GZ degasser	3
GD 12	1
DHS 103	1
H2S sensors	4
Mud Duck	1
Chromatograph	1
Mud still VMS	1
Chromatograph	

Parafor RV	1
CP (Hall/Hyd)	1
Pump stroke counter	2
Z unit	1
MFR 101	2
MFR Sensor HP4"	1
Spacer	1
MFR Sensor LP6"	1
Output install. eqipt	1
DFR 101	1
Leak of test recorder	1

Densimud: in	1
out	1
Restor 104	2
Resistivimud 102	1
Calorimud 103	1
Recorders:	
C 301	9
C 321	1
IF 5200	1

TDC equipment:

DATA PROCESS "OFF"		
	Calculator HP 9825	1
	Printer	1
	Plotter	1
DATA PROCESS "ON"		
	Computer 21 MX	1
	Printer	1
	Graphic plotter	1
	Video repeater	4
	Stabil. power supply	1
VIGIGRAPHIC SYSTEM (On site)	Vigigraphic monitor	0
	Video repeater	0
	Hard copy printer	0
GEOTRANS		
	Geotrans	0
	Viggraphic monitor	0
	Video repeater	0
	Hard copy printer	0

GEOSERVICES software:

```
+ OFF LINE system:                                                          +
+                                                                           +
+                                                                           +
+   Drill pack cartridge: Hydraulic report                                  +
+                         Surge and swab                                    +
+                         Prekick                                           +
+                         Kick                                              +
+                         Deviation: vertical and horizontal sections       +
+                         Deviation: three-dimensional plot                 +
+                         Side track                                        +
+                                                                           +
+   Geo pack cartridge  : Data transfer ON LINE/OFFLINE                     +
+                         D-exponent                                        +
+                         Agip sigma log (2 different plots available)+
+                         Lithology report                                  +
+                         Composite log                                     +
+                         Drilling report                                   +
+                         Gas efficiency                                    +
+                         Gas composition diagram                           +
+                         Chromatolog                                       +
+                         Chromato composite                                +
+                         Gas ratio                                         +
+                         Gas evolution diagram                             +
+                         Gas chart                                         +
+                         Hydrocarbon evaluation                            +
+                                                                           +
+   Annexe cartridge    : Casing run                                        +
+                         Cement                                            +
+                         Tests interpretation                              +
+                         Curve fitting,leak off test                       +
+                         Shale density                                     +
+                         Minicost                                          +
+                         Optimisation WOB-ROP                              +
+                         Bit record                                        +
```

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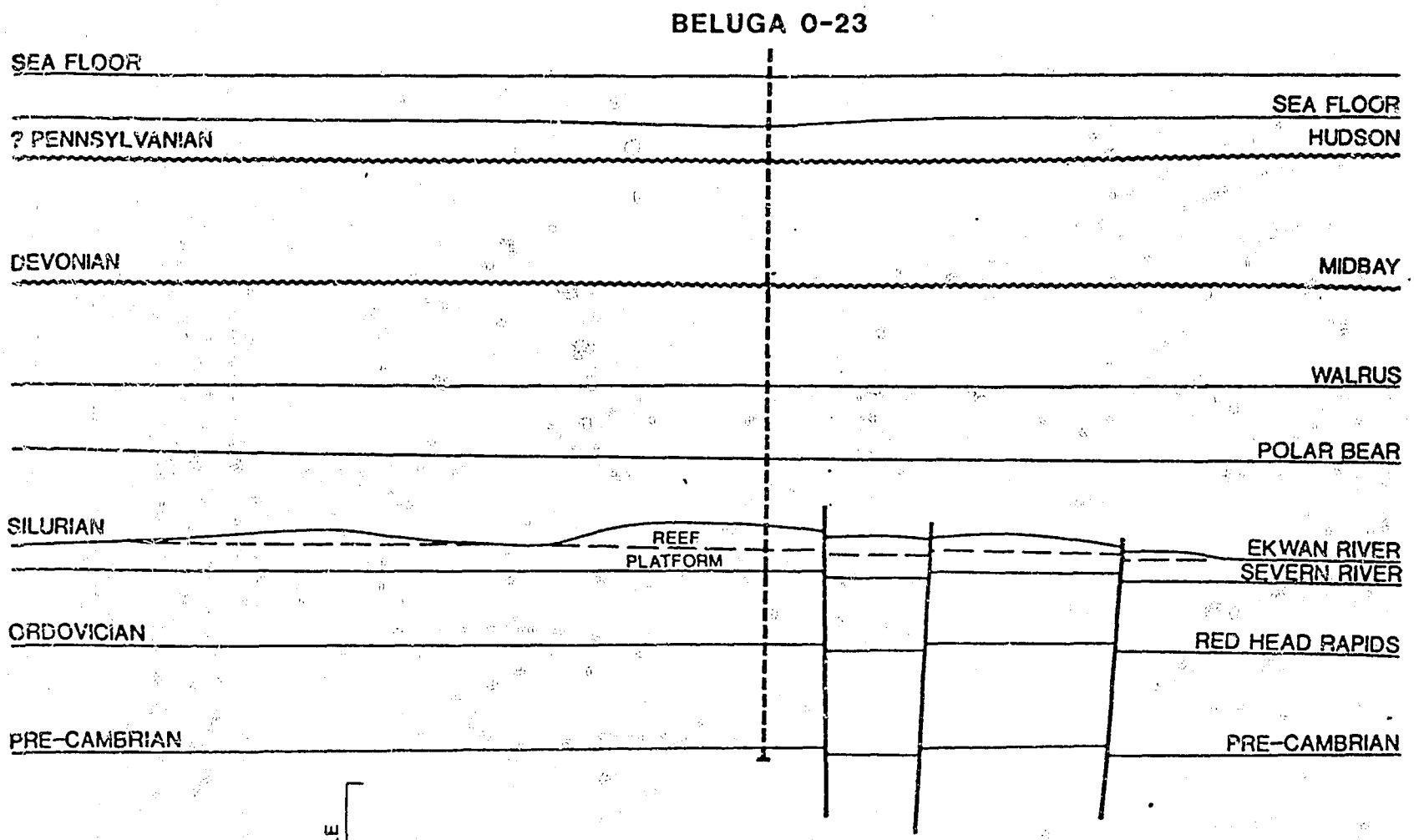
+ ON LINE system                                                            +
+                                                                           +
+                                                                           +
+   Bit cartridge  : Birep      Overpressure cartridge: DXpri               +
+                    Bicos                              DXplo               +
+                    Biped                              SIpri               +
+                    Bipet                              SIplo               +
+                                                                           +
+   Gas cartridge  : Gasef      Hydraulic cartridge   : Hyrep               +
+                    Gasco                              Mudwt               +
+                    Gason                              Opthy               +
+                    Gasrt                              Surge and swab+
+                    Gsapl                               in real time       +
+                                                                           +
+   Kick cartridge : Kikdo      Others: Volci (cement)                      +
+                    Kikup              Deviation                           +
+                                       Temperature rerun                   +
```

II GEOLOGY

CONTENTS

		page
II-1	.Objectives	xx
II-2	.Isobath map	
II-3	.Seismic data	
II-4	.General well information	
II-5	.Overpressures survey	



HORIZONTAL SCALE 1 km

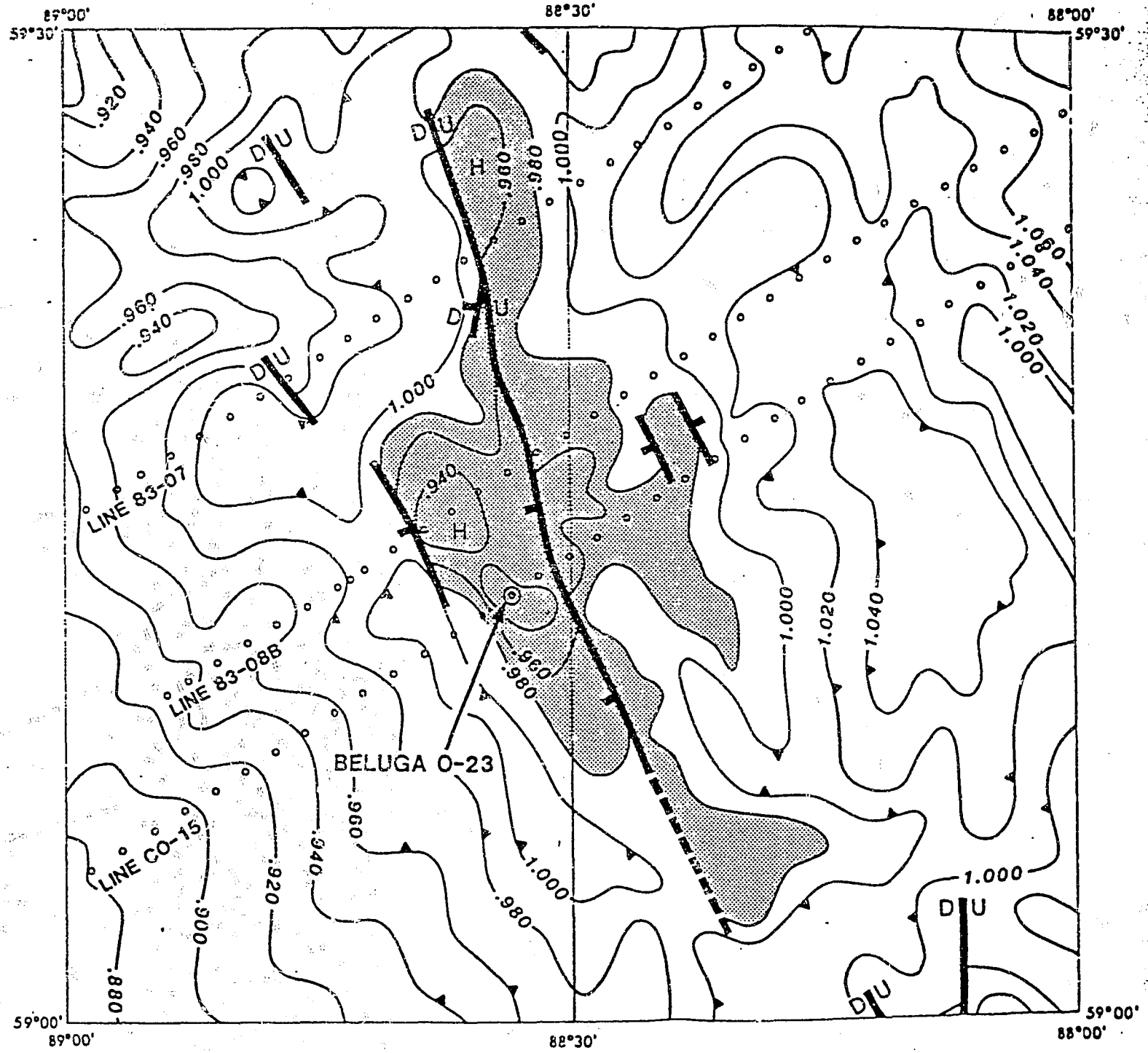
1 km
VERTICAL SCALE

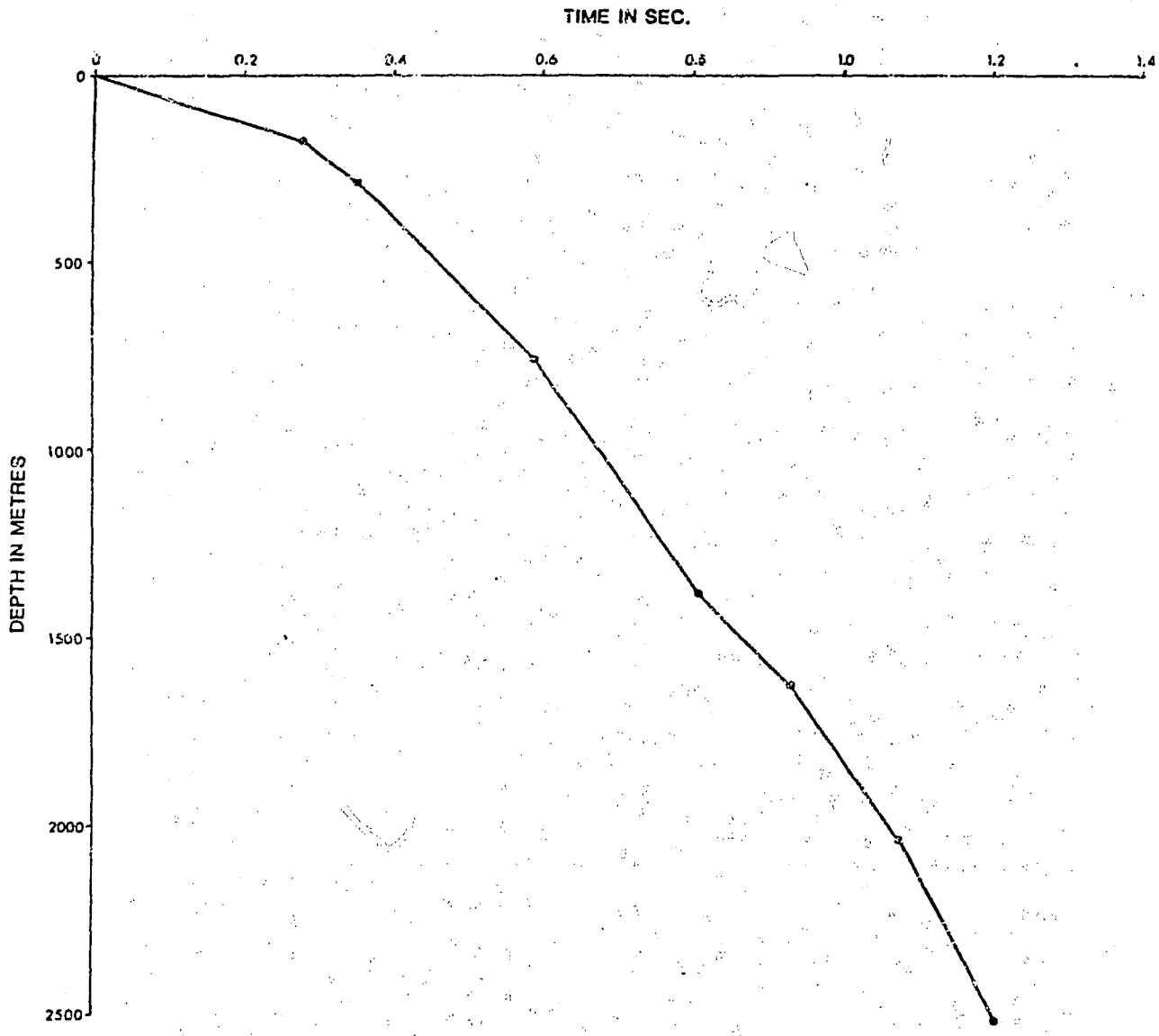
Canterra Energy Ltd.

HUDSON BAY

SCHEMATIC SECTION ALONG LINE CO-15

SCALE:	CONTOUR INTERVAL:
PREPARED BY: J. E. THORPE	DATE: APRIL, 1985
DRAWN BY: C. AULL	FILE: 13-19


89°00'
88°30'
88°00'
59°30'
59°00'
.920
.940
.960
.980
1.000
1.020
1.040
1.060
D U
H
LINE 83-07
LINE 83-08B
LINE CO-15
BELUGA 0-23



Canterra Energy Ltd.

HUDSON BAY

TRILLIUM SOQUIP ONEXCO
ET AL BELUGA O-23

TIME DEPTH CURVE

SCALE:	CONTOUR INTERVAL:
PREPARED BY: J. E. THORPE	DATE: APRIL, 1985
DRAWN BY: A. J. & C. A.	FILE: 13-19

OVERPRESSURE SUMMARY

DCS THEORY

The basic d'exponent was developed by Jordan and Shirley to detect overpressures in shale formations.This is done by normalising the drilling rate curve by compensating for changes in the drilling parameters,RPM,WOB and bit size.The basic formula has been further developed by Geoservices to account for differential pressure between the wellbore and the formation and to allow for the bit wear with different types of bits,giving the equation:

$$dcs = \frac{\log \dfrac{W * ROP}{60 * RPM}}{\log \dfrac{12 * WOB}{10^{6} * B}} * \frac{H}{ECD}$$

dcs = Corrected d-exponent
W = Function giving estimate of bit wear
ROP = Rate of penetration in min/ft
WOB = Weight on bit in lbs
B = Bit diameter in inches
H = Normal hydrostatic gradient in ppg
ECD = Equivalent circulating density in ppg

In normally-compacted shales,a plot of the dcs on semi-log paper against depth will give a straight line with a positive gradient.Any deviations to the left of this trend will be indicative of undercompaction,the distance between the trend line and the dcs value being proportional to the increase in formation pressure.

The main limitation to the use of the d-exponent is that it is developed for use in shale formations;when used in different formations the interpretation should make allowances for the lithology.

SIGMALOG THEORY

The Sigmalog was developed by AGIP for the drilling of carbonate rocks in the Pau Valley of Italy,where the results produced by the d-exponent proved too inaccurate.

The use of the Sigmalog is similar to the d-exponent but the method of calculation is different.A plot of the Sigmalog produces a series of normal trends with a positive gradient,the sudden shifts in these trends being caused by changes in lithology or drilling parameters.

Any deviation to the left of these normal trends or any negative gradients are indicative of under-compaction,with the corresponding increase in pore pressure being proportional to the distance of the Sigmalog from the normal trend.To aid in the interpretation of the Sigmalog,the envelopes of the normal trends are shifted to produce a straight line (Normalized Sigmalog).This makes it easier to identify any abnormal deviations.

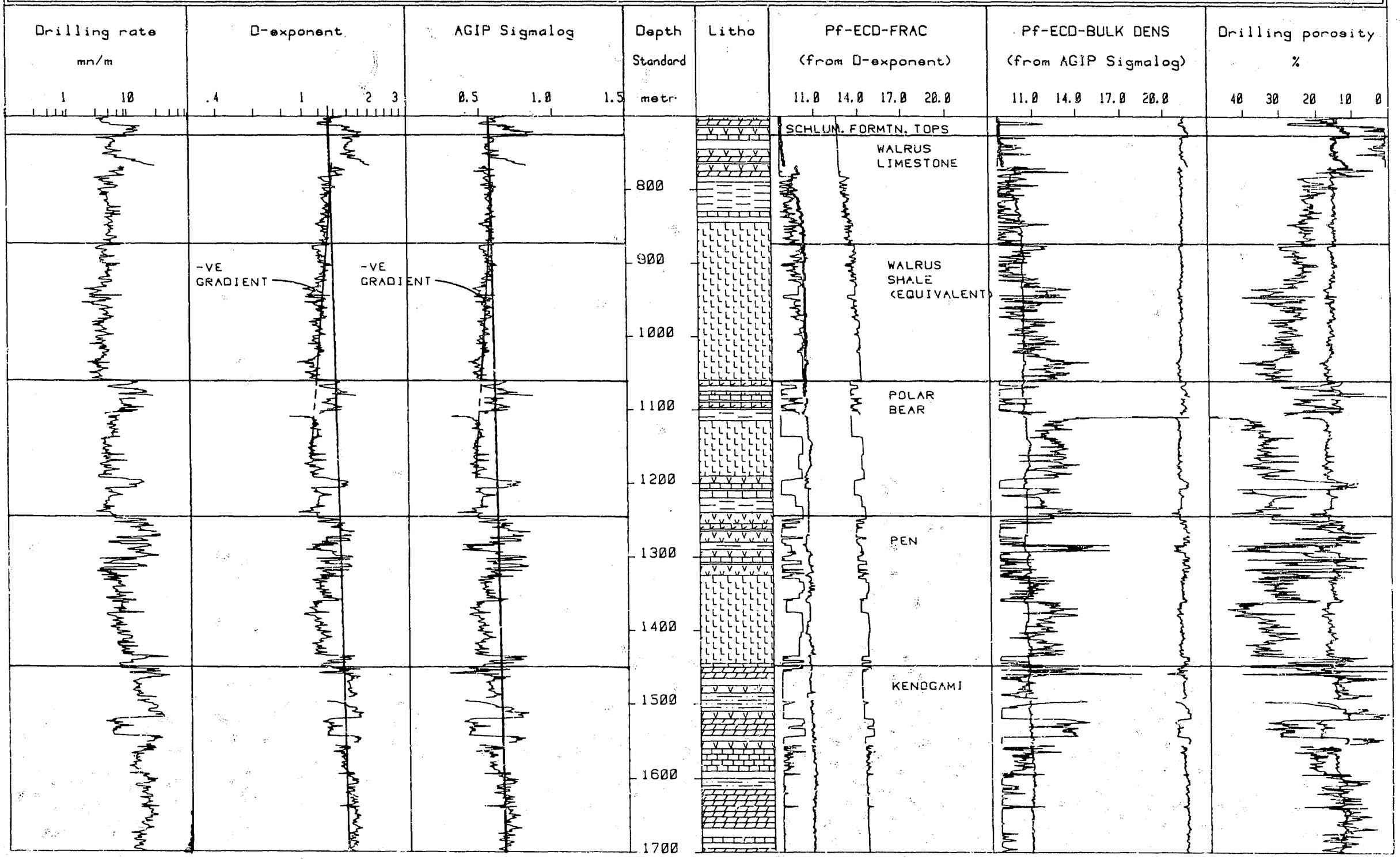
In order to see clearly the development of the trends,it is usual to plot both the d-exponent and the Sigmalog on a small scale of 1/10000 or 1/5000.

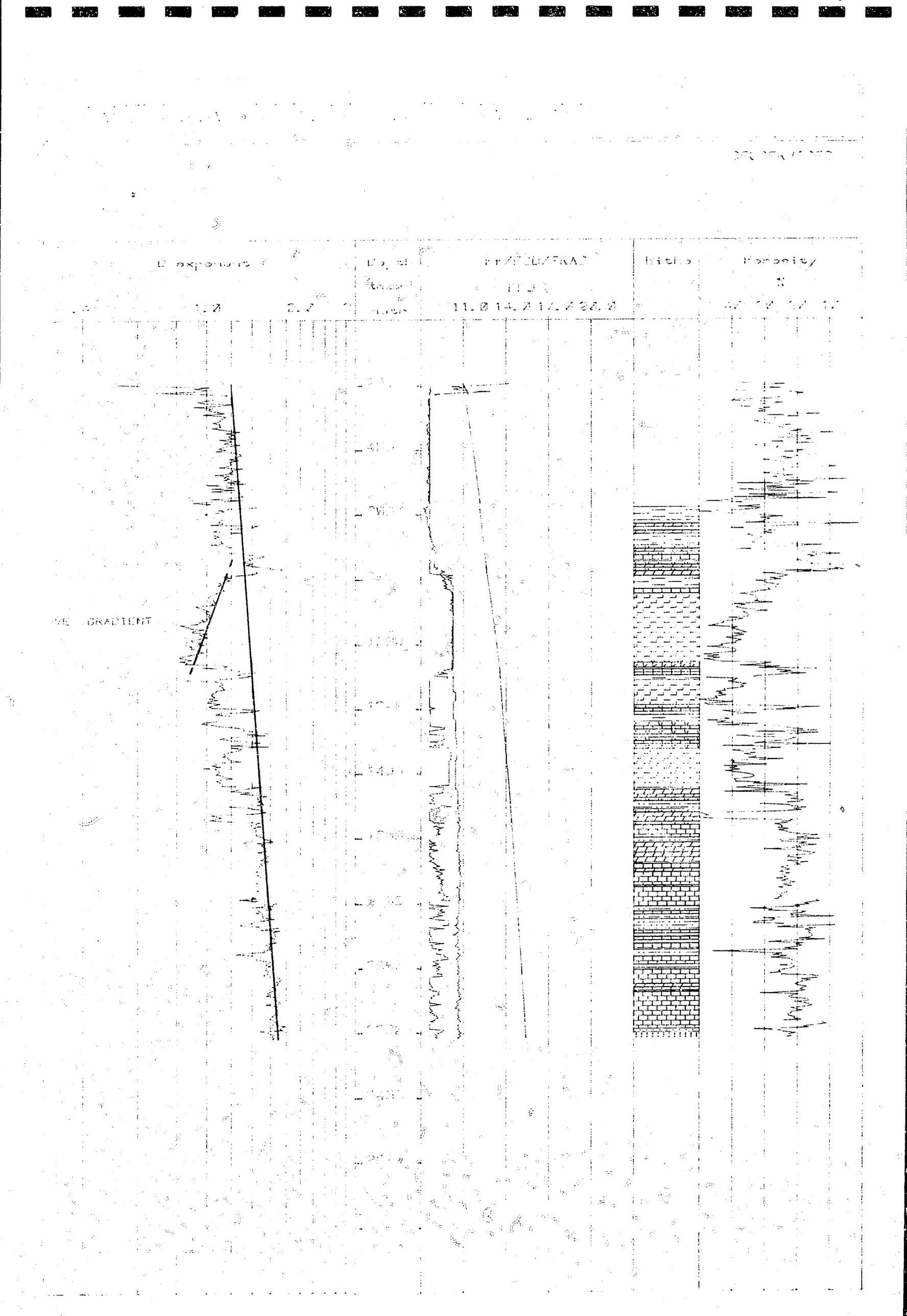
GEOSERVICES

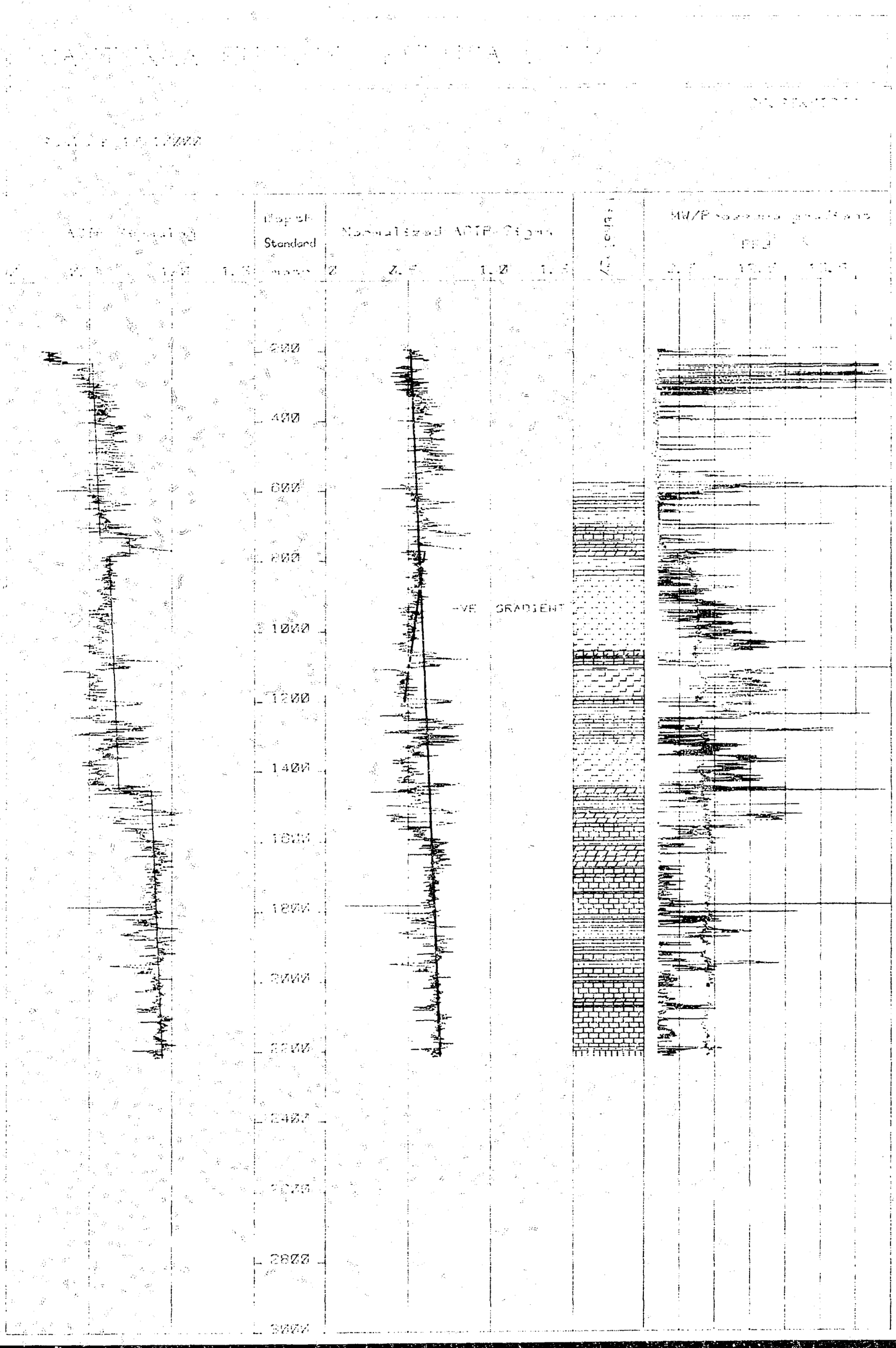
CANTERRA ENERGY BELUGA O-23

COMPOSITE LOG

Scale : 1/ 5000

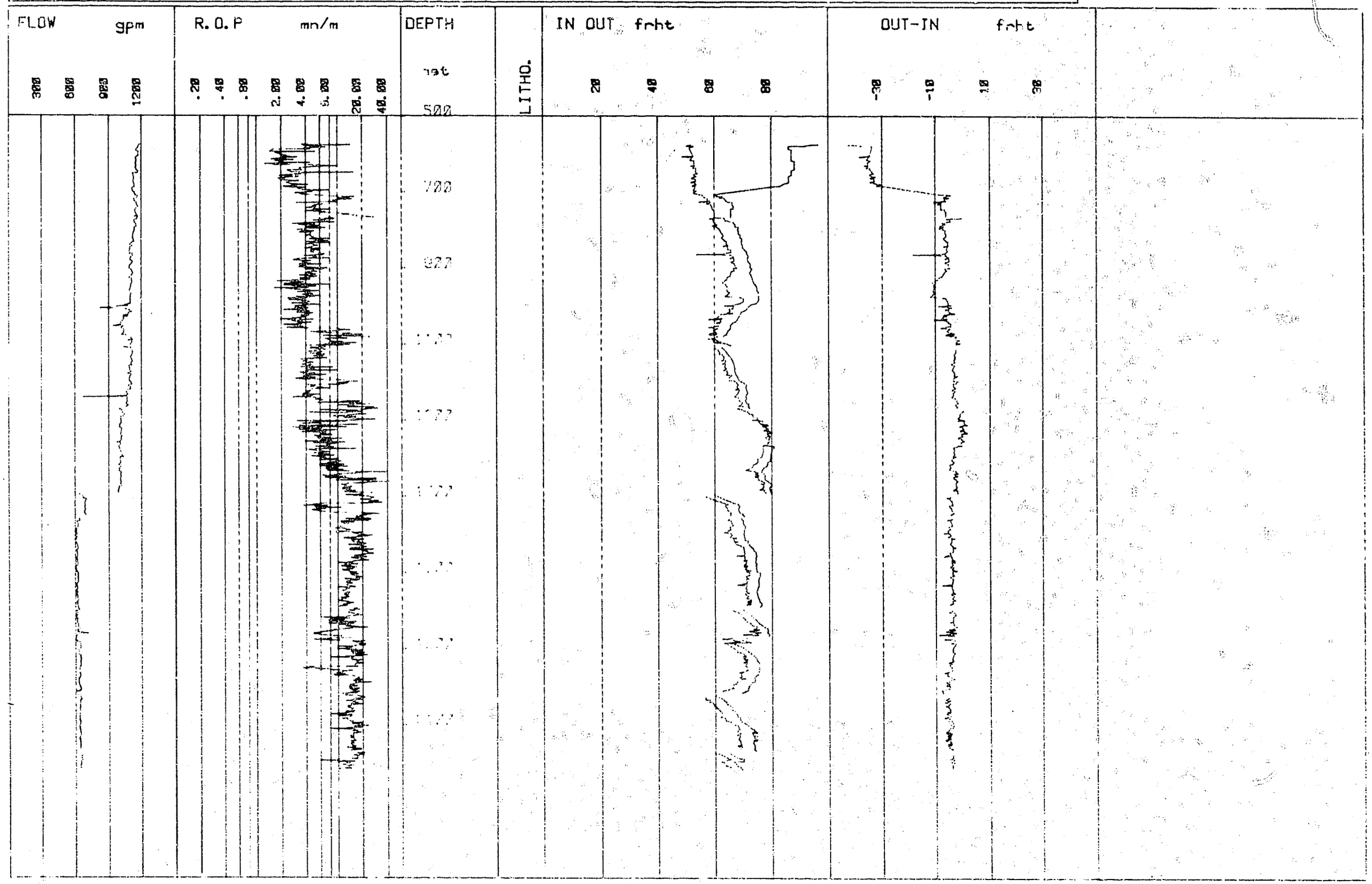



11.0 14.0 17.0 20.0
GRADIENT


Depth
Standard
Normalized ACIP Sigma
MW/Pressure gradient
200
400
600
800
1000
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
-VE GRADIENT

GEOSERVICES ON-LINE TDC TEMPERATURE PLOT

14/ 9/ 85 BELUGA 0-23 SCALE 1/10000



OVERPRESSURE IN BELUGA O-23

DISCUSSION

Due to the nature of this well,most of the usual overpressure indicators were not usable.For example:

As there were only traces of hydrocarbons and no connection gases,no conclusions could be drawn from the traces of trip gas.

No major shale beds were encountered to allow the plotting of shale density.

The use of salt-saturated mud whilst drilling prohibited the use of mud resistivity data.

With the predominant lithologies being salt,limestone and anhydrite,no indication of overpressures could be drawn from the shape,size and texture of the cuttings.

The cooling effect of the sea around the marine riser effectively damps out any subtle changes in the flowline mud temperatures.

This leaves us with the information derived from D-exponent and Sigmalog as the only real-time indicators of abnormal formation pressures.

From the 1:10000 of d-exponent and Sigmalog,we can clearly see a gradual departure from the normal compaction trend,starting at 830m and continuing through to the base of the salt at 1061m.As the d-exponent is only good in shales,the pore pressure and fracture gradient calculations are inaccurate, but the plot may still be used as an indicator.This is because any homogeneous formation such as this massive salt should still show a positive compaction trend,not the negative trend as shown on the plot.

Similarly,for the Sigmalog sudden shifts in the plot are caused by changes in lithology or drilling parameters,but the negative compaction gradient is an indication of increasing pore pressure.

To aid the interpretation of this section of the well,a composite log at scale 1/5000 is provided,with the formation topss derived from electric logs.

CONCLUSIONS:

Transition zone: 830m - 1061m.

This zone is a massive salt,starting in the Walrus Limestone member and continuing through the Walrus Shale (Equivalent),to the top of the Polar Bear formation.It is unusual to find such a large transition zone,but this could be explained by the plastic nature of salt and its readiness to transmit pressure.

Caprock: 1061m - 1115m.

This section in the Polar Bear formation (possibly the limestone member) of interbedded limestone,dolomite,anhydrite and mudstone would provide an ideal cap for underlying pressures.

Overpressured zone: 1115m onwards.

Accurate pore pressure predictions through such formations with the above methods are highly inaccurate.From the Sigmalog,the pressure prediction is from 9.5 to 12.5 ppg (MWEQ).This section was drilled with a 10.3 to 10.6 ppg mud,and the well successfully completed with a 10.7 ppg mud,suggesting a formation pressure below 10.3 ppg.However,with such tight impermeable formations,the possibility of having completed the well underbalanced cannot be ignored.

III DRILLING

Drilling chapter contents:

page

III-1 . Drilling parameters plot
III-2 . Bit record
III-3 . Mud record
III-4 . Deviation
III-5 . Phase summaries

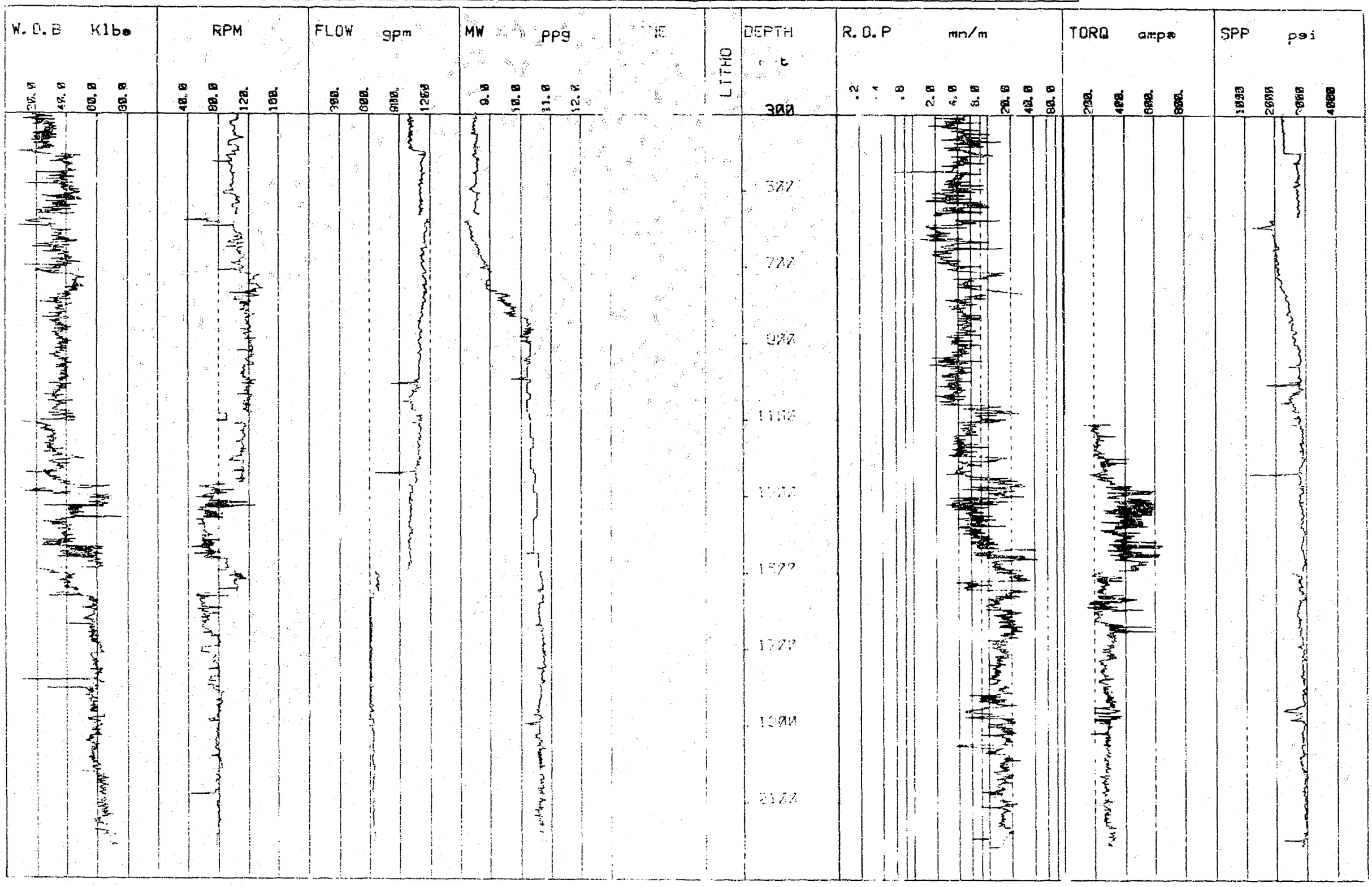
CEDSERVICES ON-LINE TDC

BIT PERFORMANCE VERSUS DEPTH

13/ 9/ 85

BELUGA Ø-23

SCALE 1/10000



OFFLINE TDC
GEOSERVICES

WELL: BELUGA 0-23

BIT RECORD
SHEET NO. 1.00

NO.	SQ	TYPE	SIZE	NOZZLES /32''	IN m	OUT m	MTG m	TIME hr:mn	DEV deg	WOB klbs	RPM	FLOW gpm	SPP psi	REV *1000	T	B	G	COST $	$/M STD	MW ppg	REMARKS
1	1	HTC OSC3AJ	26"	3*24	193.5	229.5	36.00	20:25		7.2	75	1150	1965		2	4	In		3713.	8.5	PILOT HOLE + 42" HOLE OPENER.
2	2	HTC OSC3AJ	26"	OPEN	229.5	231.5	2.00	1:00							1	1	In		-	8.5	DRILL CEMENT + SHOE ONLY.
3	3	SMT SDT	14.75"	3*18	231.5	571.5	340.0	24:00		27	95	1050	2500		3	3	In	4000	414.5	8.5	PILOT HOLE.
4	4	SMT DSJ	26"	3*22	231.6	571.5	339.9	24:30		27	105	1135	1960		3	6	In	17870	421.5	8.7	HOLE OPENING.
5	5	HTC OSC3AJ	14.75"	3*22	571.5	767	195.5	16:52		34	110	1100	2050		3	5	In	4000	602.9	9.2	
6	6	SMT SDT	14.75"	3*22	767	1082	315.0	25:00		35	115	1080	2620		6	4	In	4000	505.3	10.2	
7	7	HTC J22	14.75"	3*24	1082	1106	24.00	3:47		39	90	1100	2770		1	1	In	32000	2262.	10.3	PULLED ON HIGH TORQUE + LOW ROP.
8	8	HTC R3	14.75"	3*24	1106	1267	161.0	18:00		32	110	1080	2820		3	6	In	4000	683.5	10.3	PULLED ON LOW ROP.
9	9	SMT F3	14.75"	3*24	1267	1491.9	224.9	39:33		45	71	1000	2870		2	3	In	17000	932.3	10.4	TO CASING/LOGGING POINT.
UR 1	10	D. BOART	17.5	20-20-22	558.6	1491.9	933.3	11:10		1.4	93	914	2640		-	-	84	14000	124.8	10.6	ABORTIVE HOLE OPENING. BADLY UNDERGAUGE.
UR 2	11	TRI-STATE	17.5"	25-25-26	555	910	355.0	13:21		4.5	80	1010	2815		4	8	In		278.9	10.6	POOH FOR WASHOUT.
UR 3	12	TRI-STATE	17.5"	25-25-26	910	1073	163.0	6:57		10.5	60	950	2950		-	-	-		380.5	10.6	HIGH TORQUE. POOH TO CHECK.
UR 4	13	TRI-STATE	17.5"	25-25-26	1073	1099.3	26.30	7:07		11.3	64	918	2786		-	-	-		1565	10.6	SLOW ROP. MODERATE TORQUE.
UR 5	14	TRI-STATE	17.5"	25-25-26	1099.3	1201	101.7	7:36		6.7	75	900	2720		-	-	-		585.4	10.6	
UR 6	15	BULLNOSE	17.5"	1*32	1201	1262.5	61.50	5:42		8.6	103	940	2430		-	-	-		803.5	10.6	
UR 7	16	D. BOART	17.5"	3*20	1262.5	1262.5	0.00	-		-	-	-	-		-	-	-		-	-	WOULD NOT START REAMING. NO WOB/TORQUE.
UR 8	17	BULLNOSE	17.5"	1*32	1262.5	1296.2	33.70	4:43		11	100	975	2620		4	8	In		1398.	10.5	
UR 9	18	TRI-STATE	17.5"	20-20-22	1296.2	1310.4	14.20	4:33		8.3	70	855	2800		6	7	In		3191	10.5	
UR10	19	TRI-STATE	17.5"	3*22	1310.4	1433.2	122.8	11:15		10.5	100	880	2955		5	7	In		606.2	10.5	
UR11	20	BULLNOSE	17.5"	1*32	1433.2	1461.7	28.50	5:17		12.2	90	873	2367		6	8	0		1410.	10.5	POOH for TORQUE.UNDERGAUGE.
UR12	21	BULLNOSE	17.5"	1*32	1461.7	1491.2	29.50	4:15		6.6	77	870	2450		6	6	In		1331.	10.6	POOH for CASING.
10	22	HUGHES XDV	12.25	3*13	1491.2	1494	2.80	2:30		18	100	565	2710		6	8	In	6000	2142	10.6	DRILL CEMENT+SHOE+RAT HOLE
11	23	SMITH SDG	12.25	3*15	1494	1553	59.00	15:30		38.7	101	678	2774		5	2	In	6000	1763	10.6	WORK JUNK SUB.DRILL AHEAD
12	24	SMITH F3	12.25	3*14	1553	1790.3	237.3	59:36		57.5	69	615	2828		4	3	In	15000	1242	10.7	CHANGE OUT BIT.
13	25	SMITH F3	12.25	3*14	1790.3	1868.8	78.50	15:24		58.7	81	611	2881		2	2	In	15000	1368	10.6	WASHOUT IN HWDP CROSSOVER.
14	26	HTC J33	12.25	3*14	1868.8	2018.8	150.0	37:12		51.5	71	571	2561		3	3	In	15000	1579	10.7	WASHOUT IN DRILL COLLAR.

OFFLINE TDC
GEOSERVICES

WELL: BELUGA 0-23

BIT RECORD
SHEET NO. 2.00

NO.	SQ	TYPE	SIZE	NOZZLES /32''	IN m	OUT m	MTG m	TIME hr:mn	DEV deg	WOB klbs	RPM	FLOW gpm	SPP psi	REV *1000	T	B	G	COST $	$/M STD	MW ppg	REMARKS
15	27	SMITH F4	12.25	3*14	2018.8	2171.7	152.9	37:30		63	79	636	2946		2	2	In	15000	1261	10.7	WASHOUT IN HWDP & DP
16	28	SMITH F4	12.25	14-14-15	2171.7	2215	43.3	9:13		67.5	78	648	2900		3	2	In	15000	2322	10.7	TD of WELL @ 2215m

GEOSERVICES T.D.C CANTERRA ENERGY

MUD RECAP WATER BASE

DEPTH FEET	TEMP degF	M.W ppg	VIS sec	PV cp	YP	GELS 10 sec	GELS 10 min	FILTRATE API	FILTRATE HPHT	CAKE 32 mm	CAKE HPHT mm	Ca ppm	Cl ppm	SAND %	RETORT % OIL	RETORT % WATER	RETORT % SOLS	pH	pF	Mf	MBT
1738	0	8.5	165	14	72	0	3	0.0		0.0		0	17500	0	0	0	0	9.0	0.0	0.0	0.0
1775	0	8.5	130	14	65	0	3	0.0		0.0		0	17500	0	0	0	0	9.0	0.0	0.0	0.0
1875	0	8.7	125	11	66	2	4	0.0		0.0		0	19200	0	0	0	0	9.5	0.0	0.0	0.0
1875	0	8.5	37	5	10	1	2	0.0		0.0		0	19000	0	0	0	0	9.5	0.0	0.0	0.0
1832	46	8.6	32	4	10	1	3	0.0		0.0		380	17000	0	0	0	0	10.0	0.3	0.3	7.0
2378	58	9.2	35	5	12	2	5	16.0		0.0		800	65000	0	3	98	3	10.0	0.1	0.2	7.0
2720	68	9.9	33	5	10	1	3	16.0		0.0		900	150000	0	3	98	3	10.0	0.1	0.2	6.0
3517	67	10.2	33	6	9	2	4	19.0		0.0		900	174000	0	0	98	3	11.0	0.2	0.5	6.0
3555	64	10.2	32	6	8	1	3	20.0		0.0		1950	174000	0	0	98	3	11.0	0.3	0.4	7.5
3628	65	10.3	35	6	8	2	4	25.0		0.0		2400	177000	0	0	97	3	10.0	0.2	0.3	5.0
4000	71	10.3	35	6	9	3	6	34.0		0.0		2800	178000	0	0	96	4	11.0	0.3	0.4	5.0
4220	68	10.4	35	8	9	4	7	39.0		0.0		2900	174000	0	0	96	5	11.0	0.3	0.4	5.0
4704	77	10.5	35	8	9	2	5	27.0		0.0		2500	177000	0	0	96	4	11.0	0.3	0.5	5.0
4891	80	10.5	39	12	12	4	8	20.0		0.0		2600	175000	0	0	95	6	12.0	0.2	0.2	7.5
4894	70	10.6	38	12	8	1	4	26.0		2.0		2600	175000	0	0	95	5	10.5	0.2	0.1	7.5
2136	72	10.6	40	13	10	3	7	29.0		2.0		2750	173000	0	0	96	5	9.5	0.2	0.3	7.5
4891	78	10.5	40	14	10	2	6	28.0		2.0		2800	177000	0	0	97	4	9.0	0.1	0.2	7.5
2360	77	10.5	39	12	10	2	6	31.0		2.0		3200	175000	0	0	97	4	8.5	0.1	0.2	7.5
3609	82	10.6	37	10	8	2	5	36.0		2.0		2800	173000	0	0	96	4	11.0	0.4	0.5	7.5
4128	77	10.5	38	11	9	2	6	30.0		2.0		3500	171000	0	0	97	4	10.5	0.3	0.4	7.0
4201	72	10.5	39	12	9	3	6	31.0		2.0		3400	172000	0	0	97	4	10.5	0.4	0.5	7.5
4792	75	10.6	39	11	9	3	6	39.0		2.0		3200	180000	0	0	96	5	11.0	0.4	0.5	7.5
4892	76	10.6	40	12	10	3	8	$$$$		2.0		3700	179000	0	0	95	5	11.0	0.4	0.5	7.5
4849	61	10.6	38	10	9	2	5	39.0		2.0		3800	174000	0	0	95	5	10.0	0.2	0.3	7.5
5090	61	10.5	35	9	8	2	5	38.0		2.0		3600	174000	0	0	95	5	11.5	0.6	0.7	5.0
5313	71	10.6	35	6	8	3	5	22.0		2.0		2400	174000	0	0	95	5	11.5	0.4	0.6	5.0
5560	72	10.6	35	7	8	3	5	26.0		2.0		2650	175000	0	0	95	5	11.5	0.3	0.5	5.0
5576	73	10.6	36	7	9	4	6	29.0		2.0		2900	177000	0	0	95	5	11.5	0.4	0.5	5.0
6074	73	10.5	38	8	9	5	7	31.0		2.0		3000	175000	0	0	95	5	11.5	0.4	0.5	5.0
6180	74	10.5	38	9	10	5	9	35.0		2.0		3900	178000	0	0	95	6	11.5	0.4	0.5	5.0
6430	72	10.5	37	9	11	4	8	33.0		2.0		4100	175000	0	0	95	5	11.0	0.2	0.5	5.0
6624	69	10.7	36	10	8	4	9	30.0		2.0		5000	178000	0	0	95	5	11.0	0.2	0.3	5.0

GEOSERVICES T.D.C CANTERRA ENERGY

MUD RECAP WATER BASE

DEPTH FEET	TEMP degF	M.W ppg	VIS sec	PV cp	YP	GELS 10 sec	GELS 10 mn	FILTRATE API mm	FILTRATE HPHT TEMP	FILTRATE HPHT mm	CAKE API 32	CAKE HPHT	FILTRATE ANALYSIS Ca ppm	FILTRATE ANALYSIS Cl ppm	SAND %	OIL %	WATER %	SOLS %	pH	pF	Mf	Mf
6720	60	10.7	35	9	7	4	7	35.0		2.0		5900	178000		0	0	94	7	11.0	0.2	0.2	5.
7015	68	10.7	35	7	8	4	6	35.0		2.0		6750	174000		0	0	94	7	10.5	0.2	0.2	5.
7122	69	10.7	35	8	8	3	5	39.0		2.0		7150	176000		0	0	94	7	10.5	0.2	0.2	5.
7264	66	10.7	35	8	7	3	5	29.0		2.0		7600	171000		0	0	94	7	11.0	0.3	0.5	5.
7267	68	10.7	35	8	7	3	5	31.0		2.0		8000	168000		0	0	94	7	11.0	0.3	0.5	5.

42" PHASE SUMMARY

28th July - 30th July 1985
193.6m - 229.5m
Bit #1
Drilling Hours: 20.41
Average ROP: 1.76 m/hr

BELUGA 0-23 was spudded on 28th July 1985,when Bit #1 (26") and a 42" hole-opener was RIH to tag the mud line at 193.6m.Drilling commenced using seawater and high viscosity mud sweeps to clean the hole,to a depth of 229.5m.A wiper trip was made to the seabed,and 100 bbls Hi-Vis mud followed by 200bbls of 10.7 ppg mud were pumped before POOH.

Three joints of 30",310 lbs/ft S16 casing were then run in on drillpipe, using the underwater TV camera to guide the shoe into the hole.The casing had to be washed to bottom through 10m of fill,until the shoe was at 228.6m.

The casing volume was then circulated before pumping a 20 bbl spacer of seawater.This was followed by 45 tons of Class G cement + 2% CaCl, mixed with 112 bbls seawater,yielding 200 bbls slurry at 16.5 ppg.This was displaced with 30 bbls seawater,and the running string was then backed out and POOH.

26" PHASE SUMMARY

30th July - 3rd August 1985
229.5m - 571.5m
Bits # 2,3,4.
Drilling Hours: 25.0
Average ROP: 13.68 m/hr
Hole opening Hours: 24.5
Average ROP: 13.87 m/hr

Bit #2 (26") was RIH to tag cement at 226.2m.This bit drilled the cement,shoe and new formation to 231.6m before POOH.

Bit #3 (14 3/4") was then RIH to drill a pilot hole to 571.5m,spotting every connection with Hi-Vis mud.100 bbls Hi-Vis mud were then circulated around,followed by spotting 250 bbls Hi-Vis mud.Bit #3 was then POOH.

Bit #4 (26") was then run in to open the hole to 571.5m.400 bbls Hi-Vis mud were then circulated around,and the bit pulled back into the 30" shoe, Upon RIH,3m of fill were washed away back down to 571.5m,and 1000 bbls Hi-Vis mud was spotted before POOH to run casing.

Thirty joints of 20",133 lbs/ft X52 casing were then run on drillpipe, using the underwater TV camera to guide it into the 30" housing.It was landed in the 30" housing,and tested with 25000 lbs overpull,with the shoe at 558.6m.100 bbls of seawater were then circulated,before cementing as follows:

Lead slurry: 42 tons Class G + 2.5% Gel + 0.5% D-65 + seawater,yielding 350 bbls slurry at 13.0 ppg.

Tail slurry: 36 tons Class G + 2" CaCl + seawater,yielding 175 bbls slurry at 16.5 ppg.

This was displaced with 48.5 bbls seawater,of which 1.5 bbls bled off after stopping circulating.The running string was then backed out and POOH.

14 3/4" (17 1/2") PHASE

4th August - 27th August 1985
571.5m - 1491.9m
Bits # 5,6,7,8,9
Under-reamers # 1-12
Drilling Hours: 103.2
Average ROP: 8.91 m/hr
Under-reaming Hours: 70.76
Average ROP: 13.0 m/hr

The BOP was run in on the marine riser,with each joint being pressure-tested to 6000 psi;followed by testing of the choke and kill lines to 6000 psi.The BOP was landed with 30000 lbs,and took overpull of 50000 lbs. The diverter was then installed,and the test tool made up and RIH.A full function and pressure-test of the BOP was then made,before POOH with the test tool.

After running a wear bushing,Bit #5 (14 3/4") was made up on the BHA, and the MWD tool tested before RIH.Cement was tagged at 552.6m,and the float,shoe and new formation was drilled to 574.5m,whilst displacing the hole to mud.

Drilling continued to 579.1m,where the mud was conditioned and a formation intake test was performed.This yielded a MW equivalent of 25.3ppg, although no leak-off was apparent.

Drilling continued with this bit until 767m,when it was pulled for low ROP.

Bit #6 was then made up on the same BHA,and drilled ahead to 1082m.At this point,the rig was having difficulty staying on location due to the currents,so drilling was stopped and the rig turned into the prevailing current.This required interchanging the positions of the choke and kill lines,and subsequently a leak was found in the blue operating pod,which would require the BOP to be pulled for repairs.

So,Bit # 6 was POOH,the riser was displaced to seawater,and the BOP pulled.On surface,several repairs were necessary,which required about 16 hours.The BOP was eventually re-run and latched,and both pods function tested.A full BOP pressure test was also performed,using the test tool run on drillpipe.

Because of the low ROP's at the end of the last bit run,it was decided to try a slightly harder (insert) bit,a J-22;which was made up on the same BHA and RIH (Bit #7).Unfortunately,this proved to be a bad choice,as it did not perform very well and gave low ROP's and high torque.It drilled only 24m to 1106m.

Bit #8,an HTC R3,drilled 161m further to 1267m,before it was pulled for low ROP.

Bit # 9,an F3,then drilled ahead to 1491.9m,again being pulled for low ROP.

At the end of this section,it was virtually impossible to derive any correlation between the drilled lithologies and the well prognosis,so it was decided to run an intermediate logging suite,before making a decision on the suitability of this depth as a casing point.

Schlumberger made four logging runs,namely:
DLL/MSFL; AMS/CNL/LDT; SEDT; RFT/GR.

From these logs,it was decided that this was a suitable place for the 13 3/8" casing shoe,so the shoe joint and float joint were made up and stood back in the derrick.

A change of plan then required some sidewall cores to be taken before hole opening to 17 1/2";so Schlumberger ran the CST,taking 44 shots, recovering 44,with 2 empty.

Under-reamer #1,a Diamant-Boart diamond type was then made up and RIH, and began opening the hole to 17.5" from 564m.This under-reamer was run all the way to TD at 1491.9m in only 11 hours,although there was some concern about the apparent lack of weight and torque during this fast run.Upon POOH, it was found to be 2 5/8" under-gauged,and had thus failed very early.

It was then decided to run a Schlumberger caliper log to determine the depth at which it had failed.

Under-reamer # 2,a conventional Tri-State reamer was RIH,and tagged cement at 555m inside the casing.This was reamed out to 17.5",and the hole was reamed to 910m before a washout was detected.Upon POOH,a washout was duly found in the under-reamer itself.

Under-reamer #3 continued to 1073m before being pulled for high torque; and Under-reamer #4 made only 26.3m to 1099.3m before being pulled for high torque and low ROP.

Under-reamer #5 made 101.7m to 1201m in 7.5 hours,which was considered to be the safe upper limit for drilling hours (to prevent the loss of arms/ cones),and so it was POOH.

Under-reamer #6 was a bullnose-type (ie: requiring no pilot bit),and it made 61.5m to 1262.5m in 5.75 hours,before being pulled on low ROP and drilling hours.

Under-reamer #7 was another Diamant-Boart diamond type,but when RIH would not take any weight or start reaming.

The bullnose was run again as Under-reamer #8,and this made 33.7m to 1296.2m in 4.75 hours,before being pulled for erratic torque.

Under-reamer #9 was the Tri-State type with pilot bit,which made only 14.2m to 1310.4m in 4.5 hours.This was re-dressed and run as Under-reamer #10 (with different jets),and it made 122.8m to 1433.2m before torque problems occurred.

Under-reamer #11 was the bullnose type,which made only 28.5m to 1461.7m, as the formation being reamed now was quite hard.Upon POOH,it was found to be under-gauged.

The hole was finally reamed to TD of 1491.2m by Under-reamer #12,and the hole was circulated well before POOH.A Schlumberger caliper log was then run to ensure there was adequate clearance for the 13 3/8" casing.

One hundred and eleven joints of 13 3/8",72 lbs/ft,C-95/K-95 casing was then run on drillpipe,with the shoe at 1478m when the hanger was landed in the 20" housing.The casing was circulated with 600 bbls mud before cementing as follows:

Spacer: 50 bbls saturated salt water at 8.5 ppg.

Lead Slurry: 50 tons Class G + 3.5% Gel + 10% NaCl + 360 bbls mixwater yielding 480 bbls slurry at 12.6 ppg.

Tail Slurry: 16.8 tons Class G + 34% NaCl + 50 bbls mixwater yielding 92 bbls slurry at 12.8 ppg.

This was displaced with 619 bbls mud using the rig pumps,and the plug was bumped with 3000 psi.When the pressure was bled off,there was no back flow.

The Vetco pack-off was then torqued to 20,000 ft/lbs,and tested against the annulus to 3000 psi.The riser was then displaced to seawater,and the wellhead and BOP cavities were washed with the running tool upon POOH.The diverter and slip joint were then laid out,and the BOP unlatched and pulled to surface.

12 1/4" PHASE SUMMARY

28th August - 14th September 1985
1491.9m - 2215m
Bits # 10,1,12,13,14,15,16.
Drilling Hours: 176.9
Average ROP: 4.08 m/hr

A period of 28 hours waiting on weather was spent on repairs to the BOP, recovering the acoustic beacon from the seabed and recovering the taut-wire beacon on a corrosion hook.

The BOP and riser were finally run and latched,and a full function and pressure-test performed using the test tool.

The MWD tool was tested before running in with BIT # 10,to tag cement at 1452.6m.Cement,float collar,shoe and rat-hole were drilled to 1490.5m, and the mud conditioned before performing a formation intake test.This yielded a MW equivalent of 20.5 ppg.Drilling then continued with this bit until 1494m.

Bit # 11 made 59m of hole to 1553m in 15.5 hours and when POOH the junk subs contained 13 lbs of junk.

The junk subs were then laid out,and an F3 insert Bit (#12) drilled a total of 237.3m to 1790.3m in almost 60 hours,through fairly uniform dolomite and limestone.

Bit #13,another F3,was run in with a shock sub (to allow more WOB without drill string bounce),and drilled to 1868.8m in 15 hours,before being pulled for a suspected washout.This was found upon POOH in the crossover between the HWDP and the DC's.

This bit was not badly worn,but it was decided to run Bit #14,an HTC J-33 next.This drilled to 1883.3m before another washout occurred.This was found on the box of one of the DC's,so this was changed and all BHA connections were checked before running the same bit again.Bit #14 finally drilled to 2018.8m in 37 hours before being pulled for another washout. Again,it was found in one of the collars.

The formation was now a hard limestone,so the next bit to be run (#15) was an F4.Whilst waiting on weather for 10 hours,the MWD tool was serviced, and the BHA + 15 stands DP were RIH and pressure-tested.Another washout was found,this time in the HWDP.

Bit # 15 then drilled ahead to 2171.7m in 37.5 hours through hard limestone,before being POOH for yet another washout.This time a crack was found in a joint of DP.

Because of this recurring washout problem,it was decided to Magnaflux all the connections on the BHA,and to change out all suspect items.

Bit # 16,another F4,was then RIH;and this drilled only 24.1m to 2195.8m before another washout occurred.This time it was found in the DP,so after changing the joint the bit was run back to bottom to resume drilling.

A change of lithology to gneiss at 2194m indicated basement,so this was drilled to 2215m before TD of the well was declared.

The hole was circulated clean before POOH for a full logging suite.This consisted of:

DLT/MSFL; CNL/LDT/GR; HDT/GR; SONIC/GR/BHC; RFT; WST; CST (66 shots, 36 recovered).

ABANDONMENT PROCEDURE

After the final logging run,open-ended drillpipe was run in to TD (2215m) and circulated for 15 minutes.

Cement plug #1 was then pumped,comprising:
12.4 tons Clas G,yielding 35 bbls slurry at 15.5 ppg.
This was displaced with 122 bbls mud.Seven stands of DP were then POOH,and the pipe reverse-circulated with no cement returns.The pipe was then POOH, and the wear bushings retrieved.
Schlumberger then ran in and set a bridge plug at 1460m,which was tested to 2000 psi.Open-ended DP was then run in to tag the plug.

Cement plug # 2 was then pumped,comprising:
Class G slurry at 15.8 ppg,from 1410m to 1460m.
The pipe was then POOH 3 stands,and the cement displaced with 20.5 bbls.

Cement plug #3 was then set at 250m,comprising:
Class G slurry at 15.8 ppg.
This was displaced with 12 bbls,and the pipe POOH.

The riser was then displaced to seawater,the diverter and slip joint laid out,and the BOP and riser were then pulled.Neddrill 2 was then released from the well.

GEOSERVICES

LITHOLOGICAL SUMMARY

CANTERRA ENERGY BELUGA O-23

SCALE: 1/10000

CASING	Depth below RTKB (m)	FORMATION		LITHOLOGY	LITHOLOGICAL DESCRIPTION
					18.7 Sea Level
	200				193.5 Sea Floor
	400				NO RETURNS
20" Shoe at 248.0m	600	DEVONIAN	MIDDAY		82 Mudstone, light grey, soft, occ silty, abundant fossil debris. Dolomite, light brown, cryptoxl, slightly argillaceous. Mudstone, red and grey, fossil. Anhydrite interbeds. Anhydrite, with minor Mudstone and Dolomite.
	800		NAIRUP ST.		Limestone, buff, grading to Dolomite, light grey. Occ Anhydrite. Mudstone, pink-red, occ grey, very soft, swelling. Dolomite to barren. Limestone, white to buff, cryptoxl, occ argillaceous, dolomitic.
	1000		NAIRUP SHALE (equivalent)		Halite. Possible minor KCl salt. Rare limestone and Mudstone interbeds.
	1200		POLAR BEAR		Limestone and Dolomite, buff to brown. Anhydrite interbeds below. Claystone, light to medium grey, very soft. Halite, clean. Occ Mudstone and Anhydrite. Anhydrite and buff limestone interbeds. Minor Mudstone. Halite, clear. Occ interbeds of Anhydrite, Mudstone and Dolomite.
	1400		HELEN		Anhydrite and buff, soft, cryptoxl. Halite. Dolomite, with Anhydrite. Anhydrite with minor Dolomite, becoming Dolomite with Anhy beds.
			MENDOGAYA		
	1600	SILURIAN	NARWHAL		
			ATTAWAPISKAT		Limestone, white to buff, occ anhydritic, with minor Dolomite. Siltstone, light grey brown, calcareous, occ dolomitic. Dolomite, light grey, buff, cryptoxl, with minor Limestone.
			EKWAN RIVER		
			SELERN RIVER		Limestone, buff to light brown, crypto-microxl, fossil, occ dolomitic. Minor Dolomite at top.
	1800	ORDOVICIAN	RED HEAD RAPIDS		Siltstone and Limestone interbeds, sandy in parts. Siltstone, buff, occ multi coloured, dolomitic, grading to Sandstone. Siltstone, with Limestone interbeds. Limestone, light brown, soft, fossil, occ grading to Dolomite. Siltstone, buff, grading to Dolomite. Thin Limestone interbeds toward base. Occ Anhydrite.
	2000		CHURCHILL		Limestone, light brown to off white, cryptoxl, occ fossil, occ dolomitic.
	2200		CAMBRIAN		Sandstone, dominantly quartz, with light grey Shale at top.
			PRECAMB.		Gneiss, granitic, quartz, altered feldspars, mica, mafic min.

HYDROCARBON MUD LOG

Geoservices

WELL: CANTERRA ENERGY Trillium Soquip Onexco et al Beluga O-23

STATE or PROV.	Northwest Territories
LOCATION	Lsd — Sec — Twp — Rge — W —
	Lat
	Long
ELEVATION K.B.	13.7m
DATE SPUDDED	28/07/85
SCALE	1:600
TECHNICIANS	

LEGEND

Each horizontal division equal 1 Meter

MUD DATA

- W — Weight in lb/Gal
- V — Viscosity
- WL — Filtrate in cc
- FC — Filter Cake
- CL — Chloride Cont. in ppm
- Rm. — Mud Resistivity in Ω m/m²
- Rmf. — Mud Filtrate Resistiv. in Ω m/m²

DRILLING LEGEND

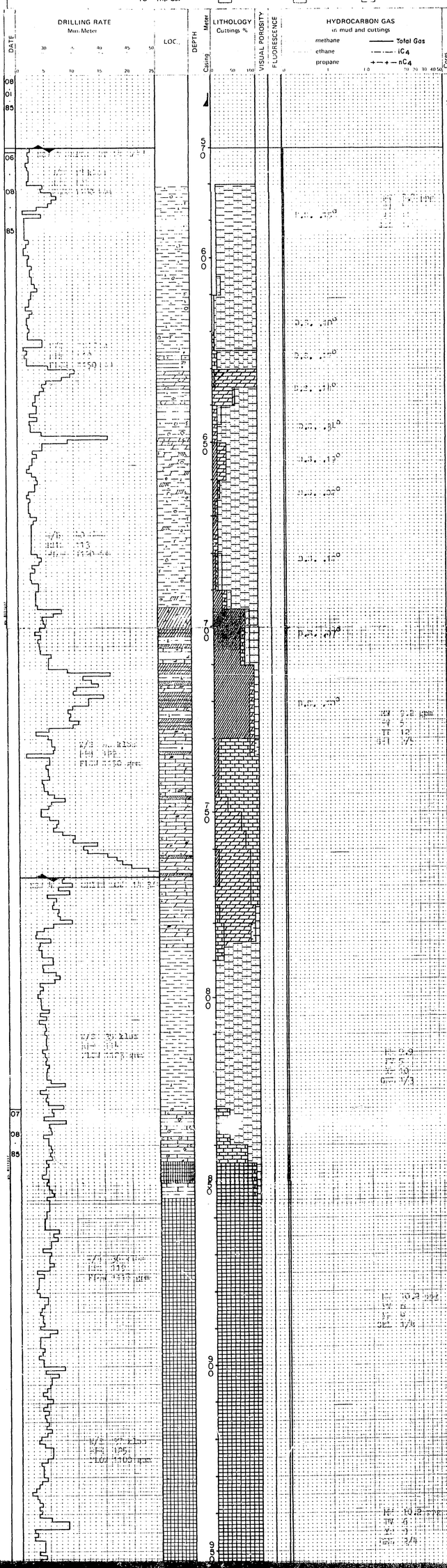
- NB — New Bit
- RRB — Rerun Bit
- DB — Diamond Bit
- TB — Turbo Drill
- CB — Core Bit
- DCB — Diamond Core Bit
- DS — Deviation Survey
- W/B — Weight on bit
- RPM — Rotation (Rev/min)
- LC — Lost Circulation
- NR — No Returns
- TG — Trip Gas

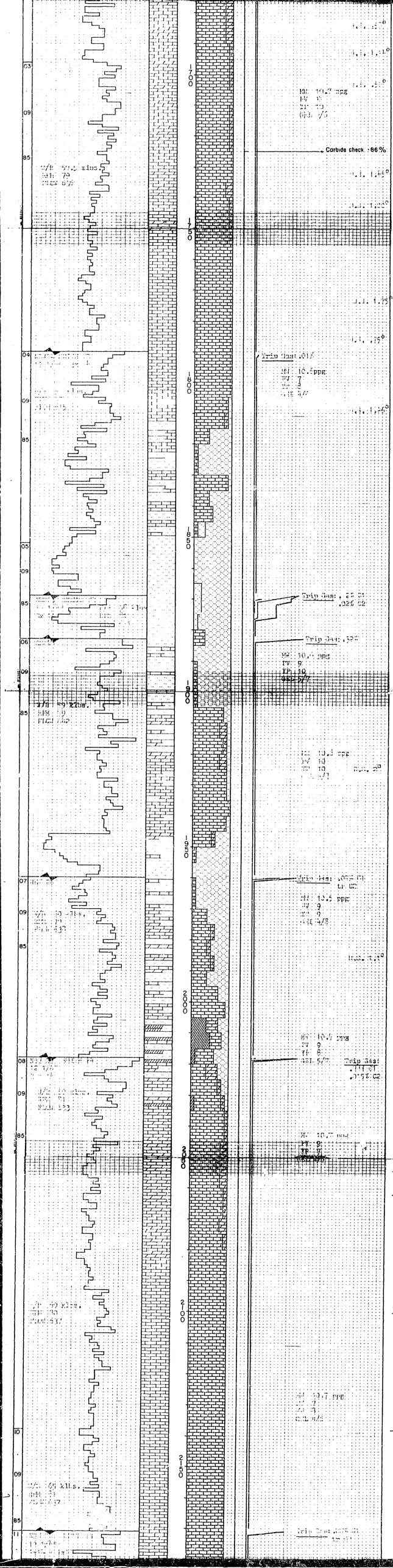
LITHOLOGY LEGEND

- Sand, Sandstone
- Silt
- Quarzite
- Conglomerate
- Shale, Clay
- Silty shale
- Limestone
- Ool Limestone
- Dolomite
- Salt
- Gypsum
- Anhydrite
- Coal, Lignite
- Chert
- Metamorphic rock (Gneiss....)
- Extrusive rock (Basalt....)
- Intrusive rock (Granite....)

ENGINEERING LEGEND

- C 1 rec. 95% — Core Nº 1 recovery 95%
- DST 1 — Drill Steam Test Nº 1
- Dry
- Water
- Oil
- Gas





n dolstone, lns. ~~LMST~~ tr ltt, vm-fine fill.

LMST off wh-lt brn, crypto-microxl, tr ltt, dns, rr foss, tr mint.

DOL lt gy, micro-vf xln, v calc, foss in pt,

LMST off wh-wh, crypto-microxl frit, dns, sl dol in pt, rr foss, crin, mnr packstone biocl.

DOL wh-lt gy, micro-vf xln, v calc, tr foss, slty in pt.
LMST off wh-lt brn-brn, biocl in pt, crypto-microxl, vf **xln in pt, crin, gen non dol.**

LMST off wh-lt brn, crypto-microxl, tr foss, non-sl dol.

LMST off wh-lt brn, crypto-microxl, tr foss, gen non dol, tr crin, tr biocl.

LMST lt gy, dol, v sl arg, tt.
Dol lt gy, vf-f xln, calc in pt, dns.

SHLE off wh-bff, dol, gen non dol.

LMST off wh-lt brn, crypto-microxl, rr foss, sl-v dol in pt, possible pellets, dns.
SHLE off wh-bff, mnr lt gy, sl arg, tt.
LMST prod bff, mnr off wh, dol, com sndy-vf-f gr, grdg to slty DOL in pt.

SS off, vf-f gy, sbg, f srt, mod cons, dol cmt, grdg from LMST.
SHLE prod bff, mnr off wh, com sndy-vf-f gr, also rr pl /orng & pl/purp, sndy, arg, grdg to slty DOL in pt.

LMST off wh-lt brn, probable cv gs.
SHLE prod bff, mnr off wh, **dol, grdg to slty DOL in pt, sl calc in pt, v sndy in pt.**

LMST off wh-lt brn, crypto-microxl, sft in pt, tr foss, v dol in pt, dns.
DOL off wh, v f xln, biocl foss, v calc in pt, dns.

LMST off wh-lt brn, crypto-microxl, v dol in pt, tr foss, v dol in pt, dns.

lt brn-lt gy-lt gy/brn, rpc in pt, v dol, grdg to slty dol, tr sndy.

bff-lt brn, dol, grdg to sndy DOL, sl calc in pt, tr orng-orng spec in pt.

LMST off wh-lt brn, crypto-microxl, biocl in pt, gen v dol, dns.

DOL lt gy, vf-f xln, v calc, dns.

LMST off wh-lt brn, crypto-microxl, v dol in pt, tr foss in pt, sft in pt, dns.
SHLE bff-lt brn, dol, grdg to slty DOL, sl calc in pt, tr lt gy-gy, sl arg.

SALT wh, clr-trnscl, massive, sft-frm.

LMST off wh-lt brn, crypto-microxl, v dol in pt, tr foss sft in pt, dns.
DOL off wh-lt brn, microxl, sl slty, sl calc, v calc-vf xln, dns.
SHLE off-lt brn, grdg to slty dol in pt, tt.

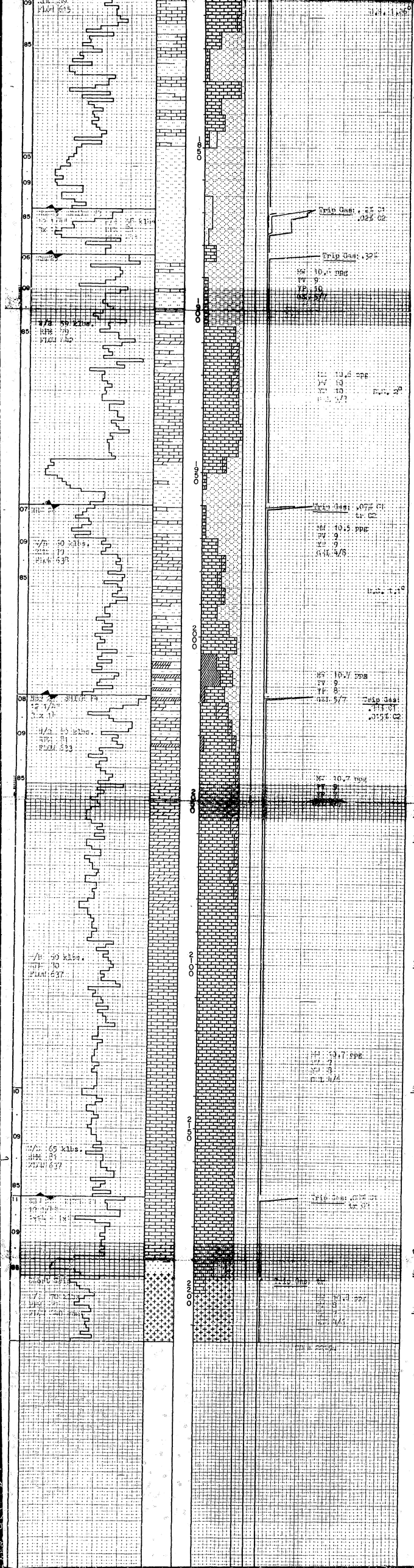
LMST off wh-lt brn, crypto-microxl, mnr vf xln, rr foss **sl-v dol, grdg to limy DOL, dns.**

DOL off wh-lt brn, lt gy, calc, tr mnr calc, tt.

LMST off wh-lt brn, crypto-microxl, tr-mr foss, tr-v dol, sft in pt, dns.

LMST off wh-lt brn, crypto-microxl, mnr microxl, tr-mr foss, tr-v dol, tr sl dol, sft in pt, crin, dns.

LMST off wh-lt brn, crypto-microxl, mnr microxl, tr-mr foss, tr-v dol, tr sl dol, sft in pt, dns.



DOL lt gy, vf-f xln, calc in pt, dns.

SLTST off wh-bff, dol, gen non dol.

LMST off wh-lt brn, crypto-microxl, rr foss, sl-v dol in pt, possible pellets, dns.

SLTST off wh-bff, mnr lt gy, sl arg, tt.

SLTST pred bff, mnr off wh, dol, com sndy-vf-f gr, grdg to slty SS in pt.

SS bff, vf-f gr, ang, f srt, mod cons, dol cmt, grdg from SLTST.

SLTST pred bff, mnr off wh, dol com sndy-vf-f gr, also rr rd /orng & rd/purp, sndy, arg, grdg to slty SS in pt.

LMST off wh-lt brn, probable cvgs.

SLTST pred bff, mnr off wh, dol, grdg to slty DOL in pt, sl calc in pt, v sndy in pt.

LMST off wh-lt brn, crypto-microxl, sft in pt, tr foss, v dol in pt, dns.

DOL off wh, v f xln, biocl foss, v calc in pt, dns.

LMST off wh-lt brn, crypto-microxl, sft in pt, foss in pt, v dol in pt, loc grdg to limey DOL, dns.

LMST lt brn-lt gy-lt gy/brn, arg in pt, v dol, grdg to slty dol, tr sndy.

SLTST bff-lt brn, dol, grdg to slty DOL, sl calc in pt, brn -orng specs in pt.

LMST off wh-lt brn, cryptoxl, biocl in pt, gen v dol, dns.

DOL lt gy, vf-f xln, v calc, dns.

LMST off wh-lt brn, crypto-microxl, v dol in pt, tr foss in pt, sft in pt, dns.

SLTST bff-lt brn, dol, grdg to slty DOL, sl calc in pt, tr lt gy-gy, sl arg.

ANHY wh, clr-transl, massive, sft-frm.

LMST off wh-lt brn, crypto-microxl, v dol in pt, tr foss sft in pt, dns.

DOL off wh-lt brn, microxl, sl slty, sl calc, v calc-vf xln, dns.

SLTST bff-lt brn, grdg to slty dol in pt, tt.

LMST off wh-lt brn, crypto-microxl, mnr vf xln, rr foss, sl-v dol, grdg to limey DOL, dns.

DOL off wh-lt brn, lt gy, calc, tr non calc, tt.

LMST off wh-lt brn, cryptoxl, mnr microxl, tr-rr foss, brac, tr sl dol, sft in pt, dns.

LMST off wh-lt brn, cryptoxl, mnr microxl, tr-rr foss, brac, tr sl dol, sft in pt, tr crin, dns.

LMST off wh-lt brn, cryptoxl, mnr microxl, tr-rr foss, brac, tr sl dol, sft in pt, dns.

tr SH lt gy, sft, fri, sl dol occ pyr.

SS clr qtz, m-vc, poor sort, sub ang, poor sil cem, no vis por.

GNEISS granitic, m-vc xls, qtz, tr pk & wh felds, biot mica, blk mafic mins, occ chloritic.

OTTAWA COPY

SF

5 m VERY POOR SAMPLE PREDOMINANTLY CEMENT. 14

150 m SILTSTONE (65%), BUFF TO LIGHT GREY, CLEAN TO SLIGHTLY ARGILLACEOUS, NON DOLOMITIC, LOCALLY SANDY, FINE TO MEDIUM GRAINED, SUB-ROUNDED QUARTZ AND CHERT, OCCASSIONAL BITUMINOUS AND CALCAREOUS STREAKS, ALSO IN PART REDISH, DOLOMITIC SLIGHTLY ARGILLACEOUS. (5% SAND GRAINS)
ANHYDRITE (15%), WHITE, MICROCRYSTALLINE, SLIGHTLY CALCAREOUS IN PART, MINOR CLEAR GYPSUM.
SHALE (10%) RED, SILTY.
CEMENT (15%)

1 m ANHYDRITE (85-95%) WHITE, BUFF, LIGHT BROWN, CRYPTO-CRYSTALLINE TO MICROCRYSTALLINE TO FINELY CRYSTALLINE. SLIGHTLY CALCAREOUS, SLIGHTLY TO VERY DOLOMITIC IN PART, RED STREAKS IN PART, 150C
SILTSTONE (0-5%), PINK, SLIGHTLY CALCAREOUS AND ANHYDRITIC.
DOLOMITE (0-15%) BUFF TO LIGHT GREY, MICROCRYSTALLINE, ARGILLACEOUS, DENSE.

3 m SALT: INTERPRETED FROM RATE OF PENETRATION SAMPLES CONSIST OF CAVINGS ONLY. 152

10 DOLOMITE (70-95%) LIGHT GREY TO GREY, CRYPTOCRYSTALLINE TO MICROCRYSTALLINE, ANHYDRITIC VERY SILTY TO VERY FINE SANDY. 1547
LIMESTONE (5-30%) BUFF TO LIGHT BROWN MICROCRYSTALLINE TO VERY FINE CRYSTALLINE TRACE FOSSILIFEROUS, POSSIBLE GASTROPOD, ANHYDRITIC.
ANHYDRITE (TRACE) WHITE TO LIGHT GREY, CRYPTOCRYSTALLINE, MASSIVE.

CANADA OIL AND GAS LANDS ADMINISTRATION
ADMINISTRATION DU PÉTROLE ET DU GAZ DES TERRES DU CANADA
SEP 19 1985
ENGINEERING BRANCH

SAMPLE DESCRIPTIONS:

1550 - 1560 LIMESTONE (30%) LIGHT BROWN, CRYPTOCRYSTALLINE TO VERY FINELY CRYSTALLINE, ANHYDRITIC IN PART, DOLOMITIC IN PART, TRACE POROSITY IN PART.
DOLOMITE (TRACE TO 40%), WHITE TO LIGHT GREY, CRYPTOCRYSTALLINE, VERY SILTY TO SANDY.
ANHYDRITE (30 - 70%) WHITE - CLEAR, CRYPTOCRYSTALLINE TO VERY FINE CRYSTALLINE, DOLOMITIC IN PART.

1560 - 1595 LIMESTONE (60 - 95%) BUFF TO LIGHT BROWN, OLIVE WHITE TO OFF WHITE, CRYPTOCRYSTALLINE TO VERY FINE CRYSTALLINE, RARE FOSSILS, TRACE VERY BIOCLASTIC WITH 10 - 15% INTERGRANULAR POROSITY, NO SHOWS DOLOMITIC IN PART.
DOLOMITE (5 - 40%) AS DESCRIBED PREVIOUSLY, VERY SILTY, OCCASSIONALLY VERY SANDY, GRADING TO SANDSTONE / SILTSTONE IN PART, DENSE.
SHALE (TRACE ONLY), GREY, LIMEY, SILTY.

1595 - 1600 DOLOMITE (40%), WHITE TO LIGHT GREY, CRYPTO-CRYSTALLINE TO VERY FINELY CRYSTALLINE, MASSIVE, DENSE.
LIMESTONE (20%) AS DESCRIBED ABOVE, (40%) LIGHT BROWN TO BROWN, CRYPTOCRYSTALLINE TO MICROCRYSTALLINE, MICRO SUCROSIC, RARE FOSSIL FRAGMENTS, NO VISABLE POROSITY, SLIGHTLY ARGILLACEOUS.

1600 - 1610 SILTSTONE (40 - 90%) LIGHT GREY TO LIGHT GREY/BROWN, CALCAREOUS TO SLIGHTLY DOLOMITIC, SLIGHTLY ARGILLACEOUS IN PART, CALCITE VEINS.
LIMESTONE (10 - 40%) AS DESCRIBED ABOVE.
DOLOMITE (0 - 20%) AS DESCRIBED ABOVE.
SHALE (TRACE ONLY) GREY, NON CALCAREOUS OR DOLOMITIC, ~~BLACK~~ (CARBONACEOUS?) FRAGS, SILTY.

SAMPLE DESCRIPTIONS:

1610 – 1615

SILTSTONE (20%) AS DESCRIBED ABOVE.
LIMESTONE (50%) WHITE TO OFF WHITE, CRYPTO-CRYSTALLINE, RARE FOSSIL FRAGMENTS, SLIGHT TO VERY DOLOMITIC, GRADING TO DOLOMITE IN PART, ~~DENSE~~.
DOLOMITE (30%) WHITE, VERY FINE TO FINE CRYSTALLINE VERY CALCAREOUS, DENSE.

1615 – 1635

DOLOMITE (40 – 70%) LIGHT GREY, LIGHT BROWN CRYPTOCRYSTALLINE TO MICROCRYSTALLINE, FOSSILIFER IN PART, COMMONLY VERY CALCAREOUS, NO VISABLE POROSITY, SILTY IN PART, ~~from 1615 - 1625~~ TRACE BROWN/BLACK ORGANIC FRAGMENTS, NO FLUORESCENCE AND A VERY WEAK CUT FLUORESCENCE.
LIMESTONE (10 – 50%) OFF WHITE TO LIGHT BROWN CRYPTOCRYSTALLINE, SLIGHTLY TO VERY DOLOMITIC RARE (UNKNOWN) FOSSILS. SHALE (0 – 5%) AS ABOVE.
SILTSTONE 0 – 20% AS DESCRIBED ABOVE.

1635 – 1680

LIMESTONE 70 – 100% OFF WHITE TO LIGHT BROWN TO BROWN, CRYPTOCRYSTALLINE TO MICROCRYSTALLINE TRACE FOSSILIFEROUS, CRINOIDS, MINOR BIOCLASTIC STREAKS, NON TO VERY DOLOMITIC, GRADING TO LIMEY DOLOMITE IN PART, DENSE.
DOLOMITE 0 – 30% WHITE TO LIGHT GREY, VERY FINE TO FINE CRYSTALLINE, COMMONLY VERY CALCAREOUS (MATRIX), DENSE, LOCALLY FOSSILIFEROUS (QUARTZ AND CALCITE FILLED VIENS/FRACTURES FROM 1675 – 1680 m)

SAMPLE DESCRIPTIONS:

85-09-13

1780 - 1805 — LIMESTONE: (100%) OFF-WHITE TO LIGHT BROWN, CRYPTOCRYSTALLINE TO MICROCRYSTALLINE, TRACE FOSSILIFEROUS, TRACE CRINOIDS, OCCASIONAL BIOCLASTIC STREAKS, NON TO SLIGHTLY DOLOMITIC, DENSE, MUDSTONE TO MINOR PACKSTONE, TRACE GREY/BROWN, SLIGHTLY ARGILLACEOUS.
DOLOMITE: (TRACE) LIGHT GREY, VERY FINE TO FINE CRYSTALLINE, GENERALLY CALCAREOUS, FOSSILIFEROUS IN PART.

1805 - 1815 — SILTSTONE: (5%) LIGHT GREY, DOLOMITIC, SLIGHTLY ARGILLACEOUS IN PART.
LIMESTONE (95%) AS DESCRIBED ABOVE.
DOLOMITE (TRACE TO 5%) AS DESCRIBED ABOVE, CALCAREOUS IN PART.

1815 - 1845 — SILTSTONE (50-100%) OFF WHITE TO BUFF DOLOMITIC, CALCAREOUS PATCHES IN PART, SLIGHTLY ARGILLACEOUS IN PART, TIGHT, GRADING TO SILTY DOLOMITE IN PART.
LIMESTONE (5-50%) OFF WHITE TO LIGHT BUFF, AS DESCRIBED ABOVE.
ANHYDRITE (TRACE, IN SOME SAMPLES) WHITE/CLEAR TRANSLUCENT, MASSIVE.

1845 - 1855 — SILTSTONE 70-100% AS ABOVE, SANDY IN PART GRADING TO SANDSTONE IN PART.
SANDSTONE (TRACE-20%), FROM SILTSTONE VERY FINE TO FINE GRAINED, FAIR SORTING, ANGULAR, SILTY, DOLOMITIC, TIGHT

SAMPLE DESCRIPTIONS

1845 - 1855 cont... LIMESTONE : (TRACE TO 10%) AS DESCRIBED ABOVE.

ANHYDRITE : (TRACE) AS DESCRIBED ABOVE.

NOTE : HIGH RATES OF PENETRATION FROM 1850 TO 1880 m. MAY INDICATE SALT (HALITE) WHICH WAS NOT SEEN IN SAMPLES.

1855 — 1865 SILTSTONE : (100%) BUFF, DOLOMITIC, GRADING TO SILTY DOLOMITE IN PART.

1865 - 1880 SILTSTONE (80-90%) AS ABOVE, SANDY IN PART.

SANDSTONE (10-20%) BUFF, VERY FINE TO FINE GRAINED, SILTY, FAIR SORTING, ANGULAR TIGHT, DOLOMITIC, GRADING TO SANDY DOLOMITE IN PART.

1880 - 1910 SILTSTONE : (90-100%) AS DESCRIBED ABOVE, SLIGHTLY CALCAREOUS IN PART, TRACE SANDY IN PART.

LIMESTONE (TRACE-10%) OFF WHITE to LIGHT BROWN, CRYPTOCRYSTALLINE TO MICROCRYSTALLINE, SOFT TO FIRM, TRACE FOSSILIFEROUS, VERY DOLOMITIC IN PART, DENSE.

DOLOMITE (TRACE) OFF WHITE, VERY FINE TO FINE CRYSTALLINE, VERY CALCAREOUS IN PART (AFTER LIMESTONE) BIOCLASTIC IN PART.

ELUGA 0-23

1910 - 1945 LIMESTONE: 70-100% OFF WHITE TO LIGHT BROWN, CRYPTOCRYSTALLINE TO MICRO CRYSTALLINE, SOFT TO FIRM, TRACE FOSSILIFERO SLIGHTLY TO VERY DOLOMITIC, RARE CRINOIDS, RARE BRACHIOPODS, DENSE, GRADING TO CALCAREOUS DOLOMITE, LOCALLY ABUNDANT BIOCLASTIC DEBRIS.

DOLOMITE (TRACE TO 10%) LIGHT GREY TO LIGHT BROWN VERY FINE TO FINE CRYSTALLINE, VERY CALCAREOUS (AFTER LIMESTONE), SLIGHTLY SILTY IN PART.

SILTSTONE: (TRACE TO 10%) AS DESCRIBED ABOVE.

1945 - 1970 SILTSTONE: (90 TO 100%) BUFF TO LIGHT BROWN MINOR LIGHT GREY TO LIGHT GREY/BROWN, TRACE SANDY, ARGILLACEOUS IN PART, TIGHT, DOLOMITIC (BROWN SPECS SEEN IN 1955 SAMPLE - ORGANIC REMAINS?) SLIGHTLY CALCAREOUS IN PART. GRADING TO SILTY DOLOMITE IN PART.

LIMESTONE: (TRACE TO 10%), AS DESCRIBED ABOVE, ABUNDANT BIOCLASTIC DEBRIS IN PART PACKESTONE.

ANHYDRITE: (TRACE) WHITE TO CLEAR, CRYPTOCRYSTALLINE, MASSIVE.

1970 - 2000 LIMESTONE: (40-70%) OFF WHITE TO LIGHT BROWN, CRYPTOCRYSTALLINE TO MICROCRYSTALLINE, COMMONLY VERY DOLOMITIC, TRACE BIOCLASTIC DEBRIS, PREDOMINANTLY MUDSTONE, TRACE FOSSILIFEROUS, DENSE.

DOLOMITE (TRACE TO 10%) FROM LIMESTONE, AS DESCRIBED ABOVE, VERY CALCAREOUS, FOSSILIFEROUS IN PART.

1910 - 2000 continued SILTSTONE (30 - 50%) BUFF TO LIGHT BROWN, MINOR LIGHT GREY - SLIGHTLY ARGILLACEOUS, DOLOMITIC, MINOR SLIGHTLY CALCAREOUS, TIGHT.

2000 - 2005 LIMESTONE: (95%) OFF WHITE TO LIGHT BROWN, CRYPTOCRYSTALLINE TO MICROCRYSTALLINE, SOFT IN PART, GENERALLY NON DOLOMITIC, RARE FOSSILS, DENSE.
SILTSTONE (5%) AS DESCRIBED ABOVE.

2005 - 2015 ANHYDRITE (40 - 50%) WHITE TO CLEAR, TRANSLUCENT IN PART, CRYPTO-CRYSTALLINE, MASSIVE, SOFT IN PART.
LIMESTONE (30%) AS ABOVE, SLIGHTLY TO VERY DOLOMITIC, DENSE.
SILTSTONE (20 - 30%) AS ABOVE

2020 - 2035 LIMESTONE (10 - 75%) OFF WHITE TO LIGHT BROWN, CRYPTOCRYSTALLINE, DOLOMITIC IN PART, RARE FOSSILS, DENSE
SILTSTONE (10 - 65%) OFF WHITE TO LIGHT BROWN DOLOMITIC, SLIGHTLY CALCAREOUS, ALSO MINOR LIGHT GREY TO GREY, DOLOMITIC, SLIGHTLY ARGILLACEOUS. (INTERLAMINATED WITH CLEAN SILTSTONE.
DOLOMITE (10 - 30%) OFF WHITE TO LIGHT BROWN LIGHT GREY, MICROCRYSTALLINE TO VERY FINE CRYSTALLINE

BRUGA 0-23

-24-

2020 - 2035 CONTINUED. DOL CALCAREOUS, DENSE, AFTER LIMESTONE GRADING TO DOLOMITIC LIMESTONE IN PART.

2035 - 2080 LIMESTONE 70-90% OFF WHITE TO LIGHT BROWN, CRYPTOCRYSTALLINE TO MICROCRYSTALLINE, VERY FINE CRYSTALLINE IN PART, TRACE-RARE FOSSILS, VERY DOLOMITIC IN PART, DENSE

DOLOMITE (10-30%) OFF WHITE TO LIGHT BROWN, MINOR LIGHT GREY, VERY FINE TO FINE CRYSTALLINE, VERY CALCAREOUS, MINOR NON CALCAREOUS, DENSE, AFTER LIMESTONE.

2080 - 2185 LIMESTONE (100%) OFF WHITE TO LIGHT BROWN, CRYPTOCRYSTALLINE TO MICROCRYSTALLINE, FOSSILIFEROUS IN PART, SLIGHTLY TO VERY DOLOMITIC IN PART, DENSE, MUDSTONE TO TRACE WACKESTONE AND RARE BIOCLASTIC PACKSTONE (RARE TRACE PYRITE SEEN TO 2175-2185 m.)

DOLOMITE (0-TRACE) OFF WHITE TO LIGHT BROWN, VERY FINE TO FINE CRYSTALLINE CALCAREOUS, RARE FOSSILS, AFTER LIMESTONE.

2185 - 2190 LIMESTONE (100%) AS DESCRIBED ABOVE

SHALE (TRACE) GREY, SOFT/FRIABLE, SLIGHTLY DOLOMITIC

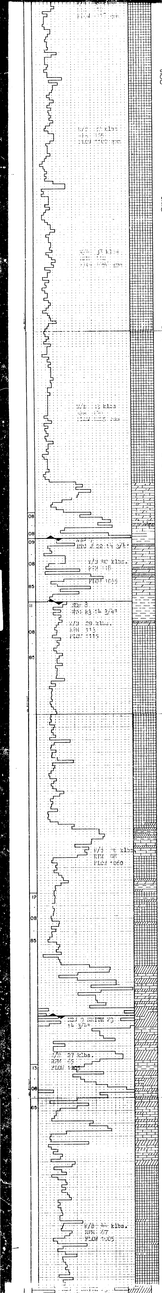
BELUGA 0-23 — 21 —

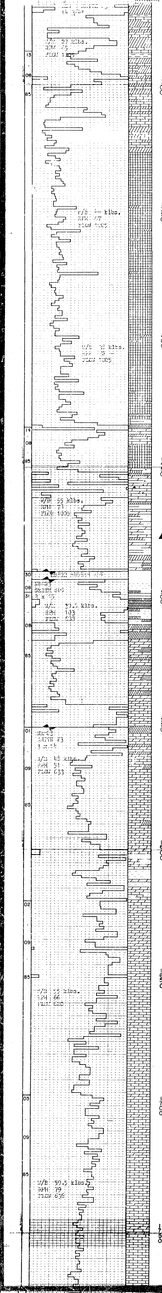
2190 - 2193 SANDSTONE (30%) CLEAR QUARTZ, TRACE FELDSPAR, RARE LITHIC FRAGMENTS, MEDIUM TO VERY COARSE GRAINED, (PLUS?) POOR SORTING, ANGULAR TO SUBANGULAR, POOR (?) CONSOLIDATION WITH SILICA CEMENT, NO VISABLE POROSITY, NO SHOWS, NO FLUORESCENCE, NO CUT FLUORESCENCE.

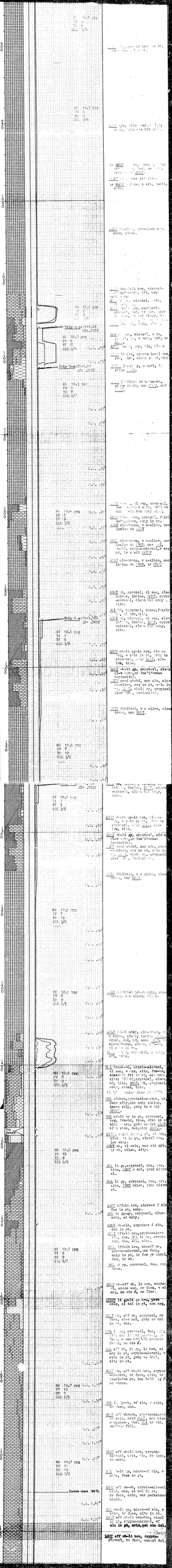
2193 - 2194 SHALE (TRACE) GREY, SOFT / FRIABLE, DOLOMITIC, SANDY IN PART, MEDIUM GRAINED, ANGULAR QUARTZ.

2194 - 2215 LIMESTONE AND SANDSTONE CAVINGS (100%) GRANITIC GNEISS. MEDIUM TO VERY COARSE CRYSTALLINE, QUARTZ, MINOR PINK AND WHITE FELDSPAR, TRACE BIOTITE MICA - CHLORITIZED IN PART, AND ABUNDANT MAFIC MINERAL SHOWING A STRONG ORIENTATION / SHEARING IN ASSOCIATION WITH QUARTZ.

F.T.D 2215m.







8710-C55-H
Schlumberger

COMPENSATED NEUTRON LITHOLOGY DENSITY

CSU Field Log

COMPANY:	CANTERRA ENERGY LTD.
WELL:	TRILLIUM SOUIP ONEXCO ET AL BELUGA D-23
FIELD:	HUDSON BAY
PROV. :	MANITOBA
NATION:	CANADA
LOCATION:	
LATITUDE:	59 12' 54.4" N
LONGITUDE:	88 33' 26.6" W
PERMANENT DATUM:	M.S.L.
ELEV. OF PERM. DATUM:	0.0 M
LOG MEASURED FROM:	K.B. 13.7 M
	13.7 M ABOVE PERM. DATUM
BRLG. MEASURED FROM:	KELLY BUSHING
DATE:	15 AUG 85
RUN NO:	1
DEPTH-DRILLER:	1493.0 M
DEPTH-LOGGER:	1490.0 M
BTM. LOG INTERVAL:	1489.0 M
TOP LOG INTERVAL:	558.0 M
CASING-DRILLER:	558.0 M 0.0 M 0.0 M
CASING-LOGGER:	558.0 M 0.0 M 0.0 M
CASING:	508 MM 0
WEIGHT:	197.925 KG/M 0.0 KG/M 0.0 KG/M
BIT SIZE:	374.7 MM

OTHER SERVICES-
DLL-MSFL
DDBHC
DIL
RFT

JAN 20 1986

OTTAWA COPY

PROGRAM
TAPE NO:
20.15
SERVICE
ORDER NO:
129401

TYPE FLUID IN HOLE: PA CL DISPERSED GEL POLYMER
DENSITY: 1.09 G/C3
VISCOSITY: 38.0 S
PH: 10.0
FLUID LOSS: 4.0 C3
SOURCE OF SAMPLE: FILTER PRES
RM@ MEAS TEMP: .0646 OHMM AT 22.0 DEGC
RMF@ MEAS TEMP: .0646 OHMM AT 22.0 DEGC
SOURCE RMF/RMC: FILTER PRESS AT 22.0 DEGC
RMC@ MEAS TEMP: .0646 OHMM AT 22.0 DEGC
RM@ BHT: .0394 OHMM AT 22.0 DEGC

TIME CIRCL STOPPED: 1730/15
TIME LOGGER AT BTM: 2130/15
MAX. REC. TEMP: 29.0 DEGC

LOGGING UNIT NO: 922
LOGGING UNIT LOC: ST. JOHN'S
WITNESSED BY: M. JOHNSON

REMARKS:
LOGGED AT 490 FT/HR OVER THE WHOLE HOLE.
THE CALIPER WAS ON THE SAME AS LAST TIME.
ID THE TEMPERATURE IS RECORDED AS THE SAME AS LAST TIME.

EQUIPMENT NUMBERS-
DPH-AA-C 3706 FDH-1 3955 PGD-A 3976
CNC-HA 386 HGD-B 752 NGC-C 1915
DIS-HA 3484

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 INTERPRETATION, AND WE SHALL NOT BE LIABLE FOR ANY LOSS OF GROSS OR SLIGHT NEGLIGENCE ON OUR PARTS. WE ARE ALSO RESPONSIBLE FOR LOSSES OR DAMAGES ARISING FROM ANY INTERPRETATION MADE BY ANY OF OUR OFFICERS, AGENTS OR EMPLOYEES. THIS INTERPRETATION IS ALSO SUBJECT TO OUR GENERAL TERMS AND CONDITIONS AS SET OUT IN OUR CURRENT PRICE SCHEDULE.

CP 28.15 FILE 5 15-AUG-85 18:07

EVENT MARK SUMMARY
OUTPUT DEPTHS BETWEEN PIPS
1MV .100000 M

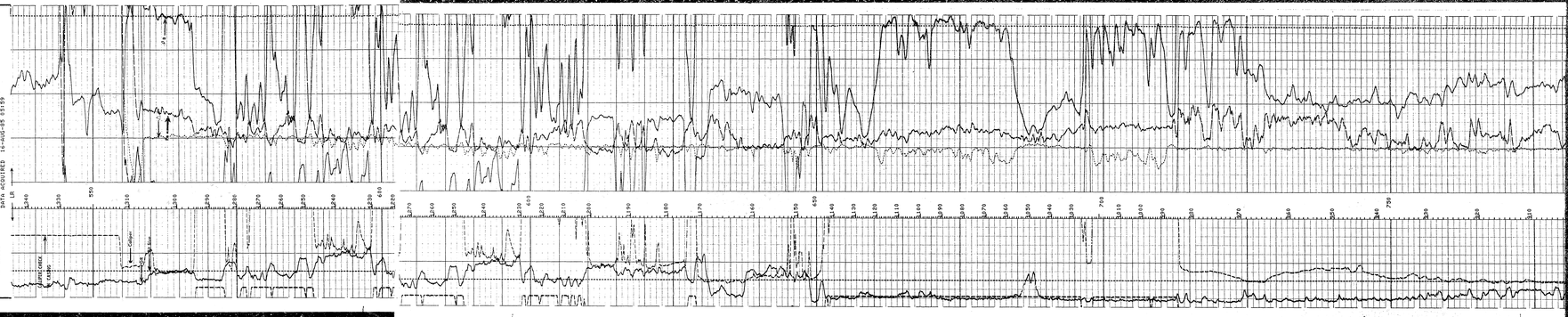
DEPTH TRACK
EDGE
LEFT EDGE

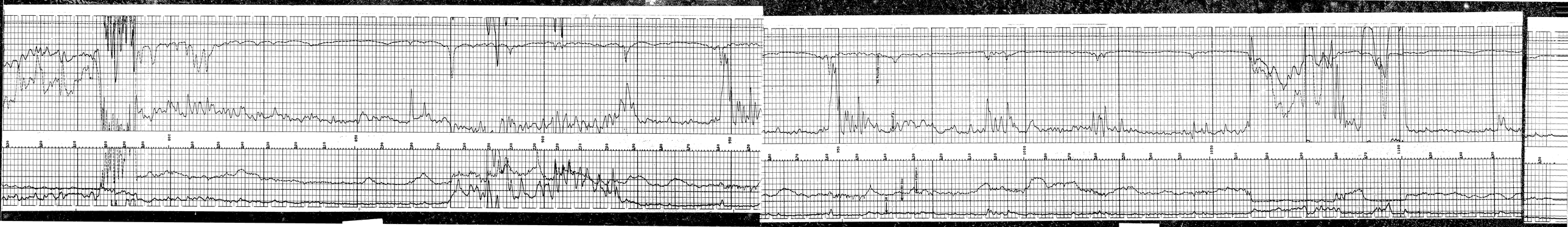
0.0	SUM LENGTH	150.00	
300.00	MA. DPM	556.00	
300.00	COLUMN	556.00	

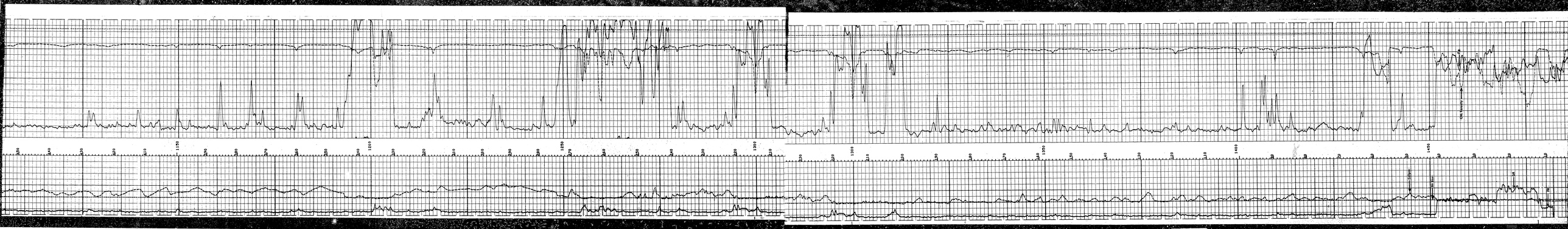
265.00	MAX(X/MT)	TENSION	0.0
1.0000	Range	265.00	0.0
	MAX		11.000
		RMS(X/MT)	2.0000

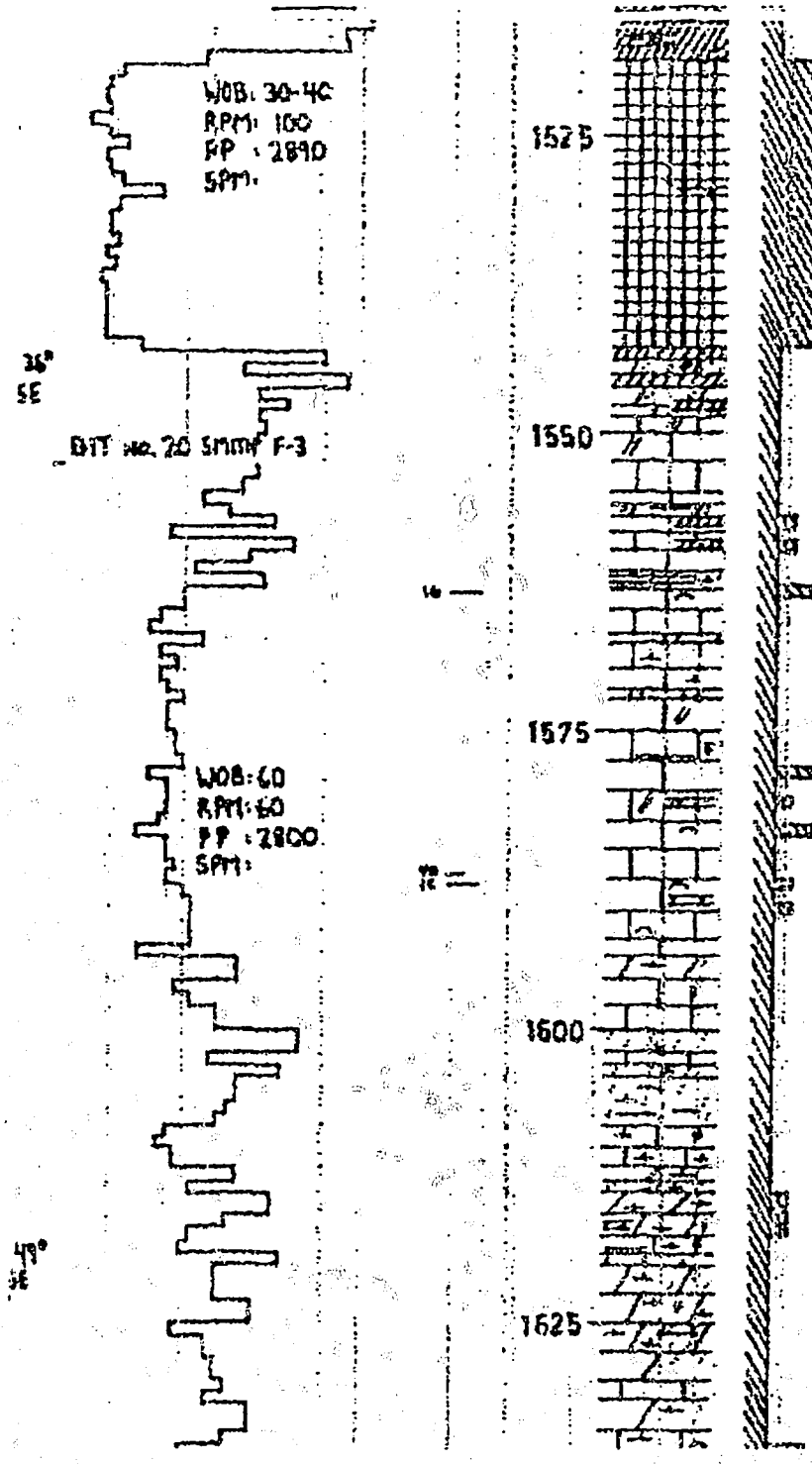
CP 28.15

FILE 3 16-AUG-85 05:59
16-AUG-85 05:59

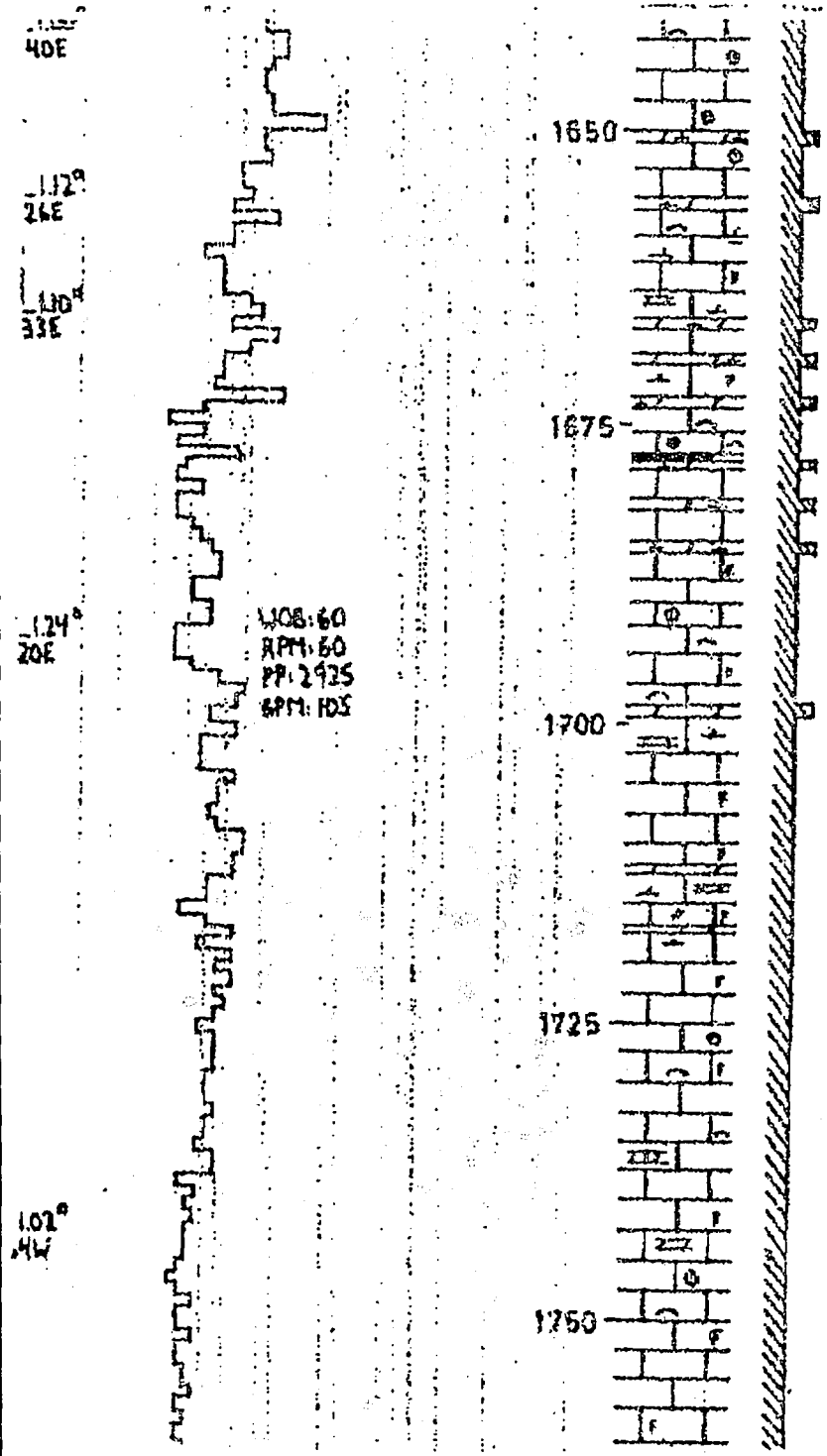








15	85	T	ANHY a/a, DECR. CALC TO MNR., INCR. DOLIC IN PT, OCC. REDDISH STRINGS; DOL, LT VUGGY, CRYPTOXL, DENSE, V. ARG, TITE; TR SLTST a/a
30	80		ANHY a/a, DOLIC GRDG TO DOL, IF LT GY, MICROXL, V. ANHY'IC, CLEAN, SL. ARG.; MNR. CRYPTOXL a/a
70?	70?		ANHY / DOL a/a
50	50		DOL. LT GY, CRYPTOXL, DENSE, ALG, TT, ANHY a/a, V DOL IN PT PRED MICRO XL.
75?	35?		DOL a/a IN PT LT GN/GY GRDG TO MICRO XL, ANHYDRITIC. ANHY a/a.
30	70	T	LMST BF - LT BRN, MICRO - V FINE XL, FOS IN PT, GAST ?, ANHYDRITIC. DOL LTGY-GY, CRYPTO XL, SLTY-SANDY, SL ANHYDRITIC. ANHY WH-LT GY, CRYPTO XL, MAS.
5	95	T	DOL a/a, V SLTY, OCC RED STREAK.
30	T	70?	LMST LT BRN, CRYPTO - V FINE XL, DENSE, ANHYDRITIC.
30	40	30?	LMST a/a, V DOL IN PT, ANHY IN PT, DENSE. DOL WH-LT GY, V SLTY-SDY. ANHY WH-CLR, CRYPTO - V FINE XL, DOL IN PT.
60	40	T	LMST BUFF-LT BRN, CRYPTO-MICRO XL, DENSE, ALSO F-M GRAINED BIOCL W/ 10-15 % + 16 ø TRACE ONLY. DOL a/a, V SLTY. SH GY, SL CALC, SLTY.
85	15		LMST WH, OFF WH, LT BRN, CRYPTO - MICRO XL, NON FOS, DENSE, ANHY INPT, DOL IN PT.
90	10	T	LMST
95	5	T	LMST a/a RARE FOS, TR F-M GRAINED BIOCL DENSE. SH GY, SL CALC, SLTY.
95	5	T	LMST a/a DOL WH-LT GY, MICRO - V FINE XL, SUC, V SLTY, DENSE
90	10		LMST a/a TR BIOCL W/ ø ALSO a/a, TR VUGGY ø, SL-V DOLOMITIC, GRDG TO LIMEY DOL IN PT. DOL a/a PRED V FINE XL, DENSE, V CALC IN PT.
90	10		LMST
60	40		LMST PRED a/a, ALSO LT BRN-BRN, MICRO XL, MICRO SUCROSIC, RR FOS, V SL ARG, NO VIS ø, NO FLOR. DOL a/a.
40	20	40	SLTST LT GY - LT GY/BRN, PRED CALC, SL DOL IN PT, NON ARG, LMST a/a DOL a/a
10		T 90	SLTST a/a, CALC VNS, SL ARG IN PT. LMST WH, CRYPTO XL, DENSE SH GY, NON CALC, NON DOL, BLK SPECS, SLTY.
60	30	20	LMST WH, OFF WH, CRYPTO XL, RR FOS, SL-V DOLOMITIC, GRDG TO DOL IN PT, DENSE. DOL WH, V FINE TO FINE XL, V CALC, DENSE.
30	45	5 20	DOL a/a, ALSO MNR LT BRN MIC XL, TR FOS, W/ OCC BRN/BLK ORGANIC FRAGS (TO ½ mm), NO VIS ø.
10	85	T 5	DOL LT BRN-BRN, MICRO XL, MICRO SUC TEXTURE, V SLTY IN PT, V CALC IN PT TR ORG FRAGS, NO FLOR, V VK CUT FLOR, NO VIS ø, RR FOS, GRDG TO LS IN PT.
10	90	T	DOL OFF WH, LT GY, LT BRN, SL ARG IN PT, CRYPTO-MICRO XL, V CALC IN PT, GRDG TO LMST, SLTY IN PT. LMST OFF WH-BRN, CRYPTO-MICRO XL, SLTY.
30	70		DOL a/a, GEN V SLTY, CALC PATCHES. LMST V DOL IN PT GRDG TO LIMEY DOL.



H T		LMST WH, OFF WH-LT BRN, CRYPTO-MICRO XL, TR FOS, CRIN, TR BIOCL, M GRAINED, LOC 5-10% IG Ø, NO SHOWS.
H T		LMST a/a, CRIN MUDST, RR BLK ORG SPECS.
80 20		LMST a/a TR CRIN, V DOL IN PT GRADING TO DOLOMITE IN PART. DOL LT GY, VF-F XL V CALC.
90 10		LMST a/a SL INCR IN BIOCL DEB, MUDST-WARKEST, DENSE, TR GY SL ARG + SLTY. DOL a/a
95 5		LMST a/a MUDST, DENSE, TR DOL.
70 30		LMST a/a V DOL IN PT. DOL LT GY-WH, VF XL, V CALC, TR FOS, DENSE, FROM LMST.
70 30		LMST a/a DOL a/a
80 20		LMST OFF WH-LT BRN, CRYPTO-MICRO XL, TR CRIN, PRED MUDST, MNR BIOCL PACKSTONE, DENSE. DOL a/a. TR QTZ + CALC VN/FRAC FILL.
80 20		LMST a/a. DOL a/a
80 20		LMST a/a, NON DOLOMITIC, DENSE. DOL a/a V CALC.
90 10		LMST a/a, CRIN, SL BIOCL. DOL a/a
95 5		LMST. a/a NON DOL, TR FOS. DOL a/a
95 5		LMST a/a SL DOL IN PT. DOL LT GY, MICRO-V FINE XL, CALC, DENSE.
H T		LMST OFF WH-LT BRN, CRYPTO-MICRO XL, BRITTLE, DENSE, RR FOS, MUDST.
90 10		LMST a/a, NON DOL, TR FOS, DENSE. DOL a/a.
95 5	T	LMST a/a, DOL IN PT. DOL WH-LT GY, a/a, V CALC, FOS IN PT, FROM LMST.
95 5		LMST a/a, TR FOS.
H T		LMST a/a, SL DOL IN PT, CRIN, MUDSTONE
H T		LMST a/a, MNR PACKSTONE, BIOCL
85 15		LMST a/a DOL a/a V CALC, TR FOS, FROM LMST.
90 10		LMST a/a DOL a/a, SLTY IN PT.
95 5		LMST OFF WH-LT BRN-BRN, BIOCL IN PT, CRYPTO-MICRO XL, V FINE XL IN PT, CRIN, GEN. NON DOL. TRACE CEMENT
H T		LMST a/a, TR FOS.
H T		LMST a/a.

87-P-056-1-1

Schlumberger

STRATIGRAPHIC DIPMETER

CSU Field Log

COMPANY: CANTERRA ENERGY LTD.

WELL: TRILLIUM SDGUIP ONEXCO ET AL BELUGA O-23

FIELD: HUDSON BAY

PROV. : MANITOBA
NATION: CANADA
LOCATION:

ATT 27 1985

OTTAWA COPY

LATITUDE: 59 12' 54.4" N
LONGITUDE: 88 33' 26.6" W

PERMANENT DATUM: M.S.L.
ELEV. OF PERM. DATUM: 0.0 M
LOG MEASURED FROM: K.B. 13.7 M ABOVE PERM. DATUM
DRLG. MEASURED FROM: KELLY BUSHING

ELEVATIONS-
KB: 13.7 M
DF: 13.1 M
GL: -179.8 M

DATE: 15 AUG 85
RUN NO: 1

DEPTH-DRILLER: 1492.0 M
DEPTH-LOGGER: 1490.0 M
BTM. LOG INTERVAL: 1489.0 M
TOP LOG INTERVAL: 550.0 M

CASING-DRILLER: 550.0 M 0.0 M 0.0 M
CASING-LOGGER: 550.0 M 0.0 M 0.0 M
CASING: 508 MM 0
WEIGHT: 197.925 KG/M 0.0 KG/M 0.0 KG/M
BIT SIZE: 374.7 MM

OTHER SERVICES-
DLL-MSFL
BDSMC
CNL-LDT-NGT
DIL-SFL
BFT

PROGRAM
TAPE NO: DB-15
SERVICE ORDER NO: 129401

TYPE FLUID IN HOLE: WATER GELSTARCH GEL POLYMER
DENSITY: 1250. K/M3
PH: 10.0
FLUID LOSS: 16.0 C3
RM @ MEAS TEMP: .140 OHMM AT 23.0 DEGC
RMF @ MEAS TEMP: .140 OHMM AT 23.0 DEGC
RMC @ MEAS TEMP: .140 OHMM AT 23.0 DEGC
SOURCE OF SAMPLE: FLOW LINE
RM @ BHT: .140 OHMM AT 57.0 DEGC
RMF @ BHT: .140 OHMM AT 57.0 DEGC
RMC @ BHT: .140 OHMM AT 57.0 DEGC
TIME CIRC. STOPPED: 17:30/14
TIME LOGGER ON BTM.: 20:15/14
MAX. REC. TEMP: 27.0 DEGC
LOGGING UNIT NO: 922
LOGGING UNIT LOC: STRATHMORE
WITNESSED BY: M. GOMMASH

REMARKS:

MAGNETIC DECLINATION IS -7 DEGREES

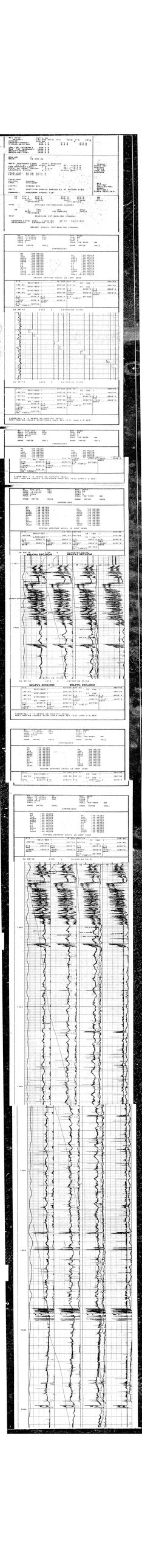
EQUIPMENT NUMBERS-
MSFL 1007-29 1721 SNDC-H 1709 SGC-SA 718
DIL-SFL 1004-28 841
TDM-AB 841

ALL INTERPRETATIONS ARE OPINIONS BASED ON INFERENCES FROM ELECTRICAL OR OTHER MEASUREMENTS AND WE CANNOT, AND WILL 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 OUR GENERAL TERMS AND CONDITIONS AS SET OUT IN OUR PRICE SCHEDULE.

CP 28-15 FILE 9 15-AUG-85 22:42

MAXIS AND R CURVES ESTABLISHED WITHIN 20% LESS THAN 0.5 DEG.
MAXIS AND R CURVES ESTABLISHED WITHIN 20% LESS THAN 0.5 DEG.

3816.	4095.0	3816.	4095.0		
3816.		3816.			
281	4095.0	282	5000.0	P/F (CDL1)	90.000
281		282			
-46.00	5000.0	58 (DEG.)	3630.00	P3326.	4095.0
				P3326.	4095.0
				3630.00	4095.0
				P3326.	4095.0
				3630.00	4095.0
		P1A2(DEG.)	3630.00	P3326.	4095.0
				P3326.	4095.0
				3630.00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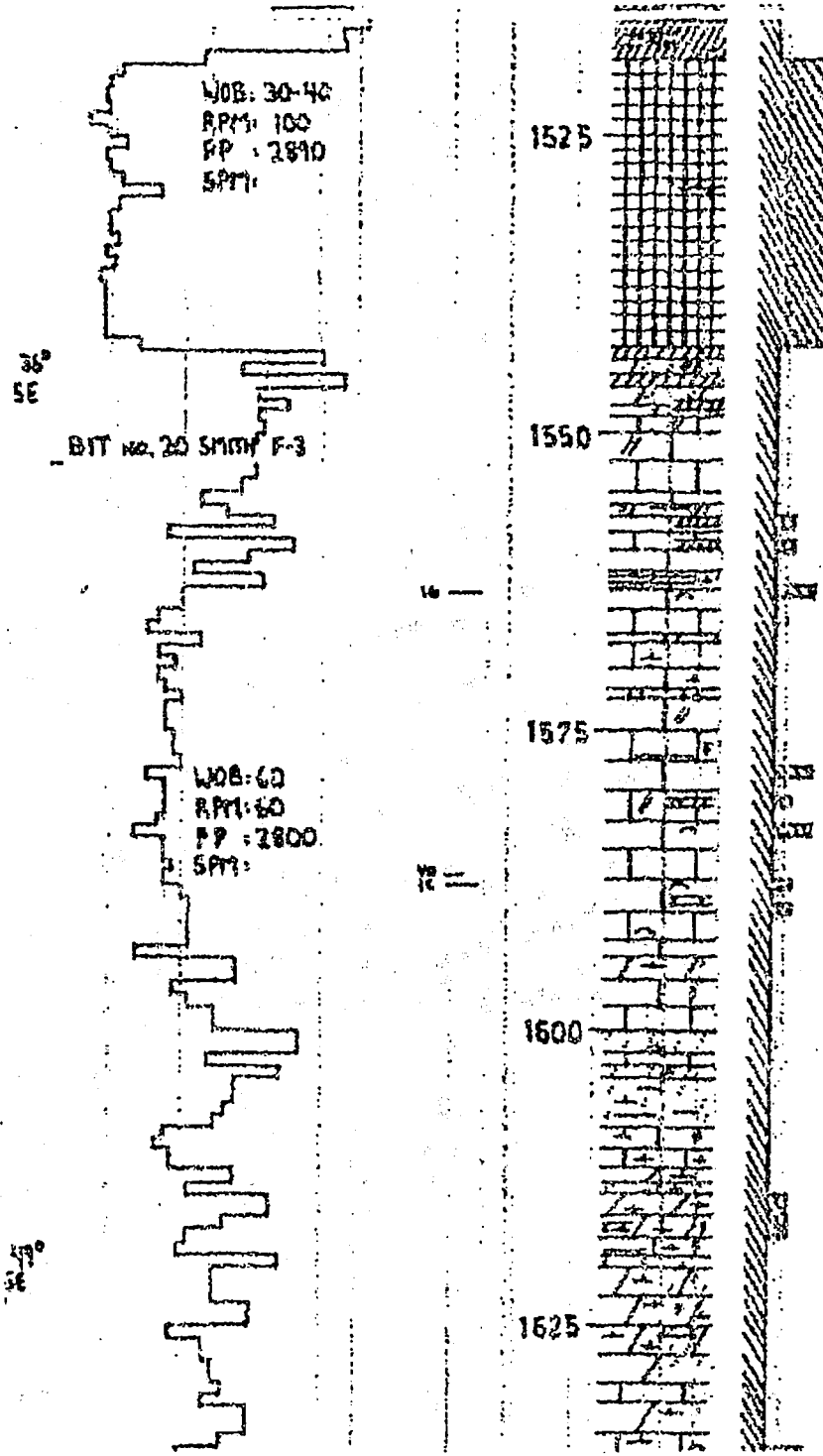
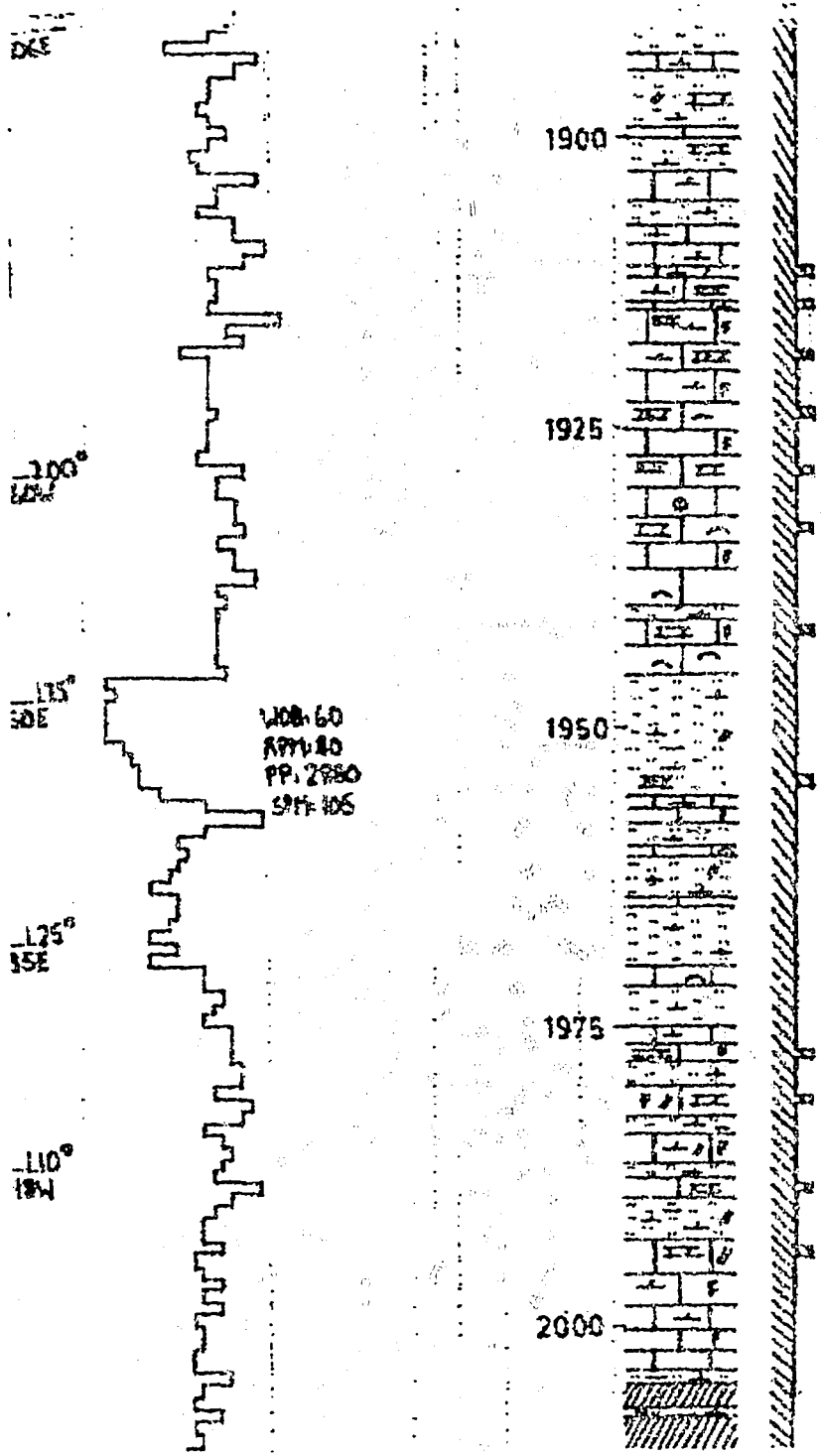


15	85	T	ANHY a/a, DECR. CALC TO MNR., INCR. DOLIC IN PT, OCC. REDDISH STRAINS; DOL LT VUGGY, CRYPTOXL, DENSE, V. ARG, TITE; TR SLTST a/a
20	80		ANHY a/a, DOLIC GRDG TO DOL, LT-LT GY, MICROXL, V. ANHY'IC, CLEAN, SL. ARG.; MNR. CRYPTOXL a/a
70?	70?		ANHY / DOL a/a
50	50		DOL. LT GY, CRYPTOXL, DENSE, ALG, TT, ANHY a/a, V DOL IN PT, PRED MICRO XL.
75	35?		DOL a/a IN PT LT GN/GY GRDG TO MICRO XL, ANHYDRITIC. ANHY a/a.
30	70	T	LMST BF-LT BRN, MICRO-V FINE XL, FOS IN PT, GAST ?, ANHYDRITIC. DOL LTGY-GY, CRYPTO XL, SILTY-SANDY, SL ANHYDRITIC. ANHY WH-LT GY, CRYPTO XL, MAS.
5	95	T	DOL a/a, V SLTY, OCC RED STREAK.
30	7	70?	LMST LT BRN, CRYPTO-V FINE XL, DENSE, ANHYDRITIC.
30	40	30?	LMST a/a, V DOL IN PT, ANHY IN PT, DENSE. DOL WH-LT GY, V SLTY-SDY. ANHY WH-CLR, CRYPTO-V FINE XL, DOL IN PT.
60	90	T	LMST BUFF-LT BRN, CRYPTO-MICRO XL, DENSE, ALSO F-M GRAINED BIOCL W/ 10-15% + 16 Ø TRACE CHRY. DOL a/a, V SLTY. SH GY, SL CALC, SLTY.
85	15		LMST WH, OFF WH, LT BRN, CRYPTO-MICRO XL, NON FOS, DENSE, ANHY INPT, DOL IN PT.
90	10	T	LMST
95	5	T	LMST a/a RARE FOS, TR F-M GRAINED BIOCL DENSE. SH GY, SL CALC, SLTY.
95	5	T	LMST a/a DOL WH-LT GY, MICRO-V FINE XL, SUC, V SLTY, DENSE
90	10		LMST a/a TR BIOCL W/Ø ALSO a/a, TR VUGGY Ø, SL-V DOLOMITIC, GRDG TO LIMEY DOL IN PT. DOL a/a PRED V FINE XL, DENSE, V CALC IN PT.
90	10		LMST
60	40		LMST PRED a/a, ALSO LT BRN-BRN, MICRO XL, MICRO SUCROSIC, RR FOS, V SL ARG, NO VIS Ø, NO FLOR. DOL a/a.
40	20	40	SLTST LT GY-LT GY/BRN, PRED CALC, SL DOL IN PT, NON ARG, LMST a/a DOL a/a
10		T 90	SLTST a/a, CALC VNS, SL ARG IN PT. LMST WH, CRYPTO XL, DENSE SH GY, NON CALC, NON DOL, BLK SPECS, SLTY.
50	30	20	LMST WH, OFF WH, CRYPTO XL, RR FOS, SL-V DOLOMITIC, GRDG TO DOL IN PT, DENSE. DOL WH, V FINE TO FINE XL, V CALC, DENSE.
30	45	5 20	DOL a/a, ALSO MNR LT BRN MIC XL, TR FOS, W/ OCC BRN/BLK ORGANIC FRAGS (TO ½ mm), NO VIS Ø.
70	85	T 5	DOL LT BRN-BRN, MICRO XL, MICROSUC TEXTURE, V SLTY IN PT, V CALC IN PT TR ORG FRAGS, NO FLOR, V WK CUT FLOR, NO VIS Ø, RR FOS, GRDG TO LS IN PT.
10	90	T	DOL OFF WH, LT GY, LT BRN, SL ARG IN PT, CRYPTO-MICRO XL, V CALC IN PT, GRDG TO LMST, SLTY IN PT. LMST OFF WH-BRN, CRYPTO-MICRO XL, SLTY.
50	70		DOL a/a, GEN V SLTY, CALC PATCHES. LMST V DOL IN PT GRDG TO LIMEY DOL.

| | | |



5			95	SLTST a/a, INCR CALC.
10	T	T	90	SLTST a/a SL CALC IN PT. LMST LT BRN, CRYPTO XL, V DOL IN PT. DOL OFF WH VF XL, BIOCL TEXTURE, V CALC IN PT, DENSE.
10		T	90	SLTST a/a, GRDG TO SLTY DOLOMITE. LMST SL DOL, BIOCL IN PT, a/a, DENSE. DOL a/a, BIOCL.
80			20	LMST OFF WH - LT BRN, CRYPTO - MICRO XL, SOFT IN PT, TR FOS, V DOL IN PT, DENSE. SLTST a/a
70	20		10	LMST a/a V DOL IN PT. SLTST a/a. DOL LT GY, VF-F XL, V CALC, TIGHT, V SL. SLTY.
80	10		10	LMST a/a V DOL IN PT. DOL a/a V CALC.
70	20		10	LMST TR FOS, BRAC, V DOL IN PT. DOL V CALC.
90	T		10	LMST OFF WH - LT BRN, CRYPTO - MICRO XL, SOFT IN PT, FOS IN PT, V DOL IN PT, LOC GRDG TO LIMY DOL, DENSE. SLTST CAVINGS.
95	T		5	LMST a/a V DOL IN PT, GRIN, BIOCL IN PT.
100	T			LMST a/a TR BIOCL, BRAC, DENSE, SL DOL.
90	T		10	LMST a/a TR BIOCL PACKSTONE. SLTST a/a.
50	10	T	40	SLTST LT BRN - LT GY - LT GY/BRN, ARG IN PT V DOLOMITIC, GRDG TO SLTY DOL, TR BRY. LMST a/a TR FOS, MUDST. DOL FROM LMST. ANHY LT GY, CRYPTO XL
10	T		90	SLTST a/a BRN (DRGT) SPECS IN PT, SL ARG IN PT, SOFT IN PT. LMST ABNT BIOCL PACKSTONE, DENSE. POSSIBLE SALT BED 1946-1956m
T			10	SLTST BUFF - LT BRN, DOLOMITIC, GRADING TO SILTY DOLOMITE IN PT, SL CALC IN PT, TIGHT.
5	T		95	SLTST a/a, SL CALC IN PT. LMST DOLOMITIC IN PT, MUDSTONE, DENSE.
5			95	SLTST a/a.
90			10	LMST OFF WH - LT BRN, CRYPTO XL, BIOCL IN PT, GEN V DOL, DENSE. SLTST a/a
80	10		10	LMST FOS, MUDSTONE. DOL LT GY, VF-F XL, V CALC, FROM LMST, DENSE.
40	10	T	50	LMST a/a, FOS, V DOL DOL a/a, FOS. SLTST a/a ALSO MNR LT GY, SL ARG, DOL.
50	10	T	40	LMST a/a SLTST a/a
40	T	T	60	LMST a/a, V DOL IN PT. SLTST BUFF - LT BRN, MNR LT GY, V DOL, SL ARG IN PT, SL CALC IN PT.
70			30	LMST OFF WH - LT BRN, CRYPTO - MICRO XL, V DOL IN PT, TR FOS, SOFT IN PT, DENSE. SLTST a/a TR LT GY, SL ARG, SL CALC IN PT.
95			5	LMST a/a GEN NON DOL, RR FOS, DENSE.
30	40		30	ANHY WH, CLR TRNSL, MASSIVE, SOFT TO FIRM. LMST a/a SL DOL. SLTST a/a ALSO TRACE, LT GY - GY, SL ARG.

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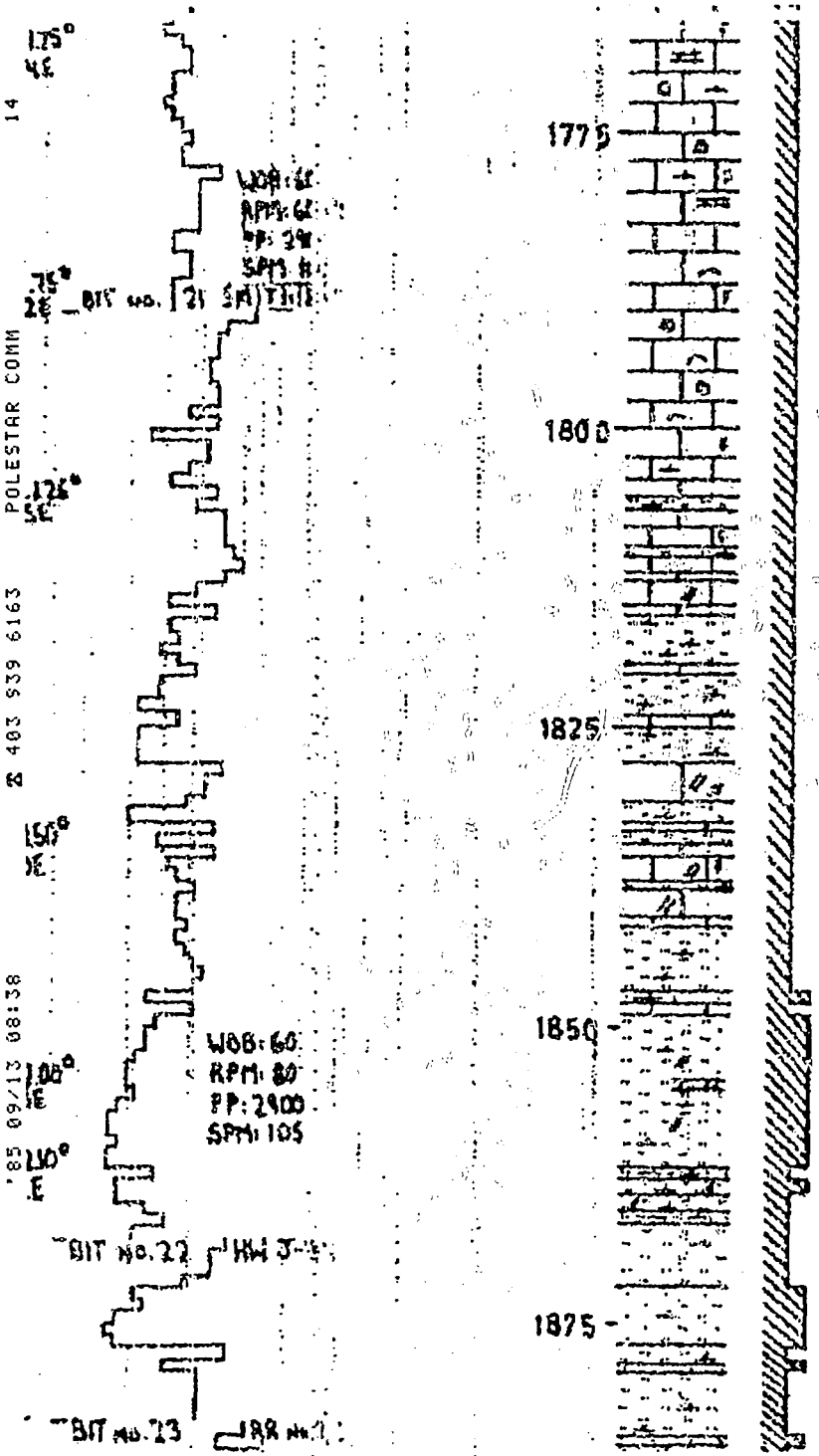
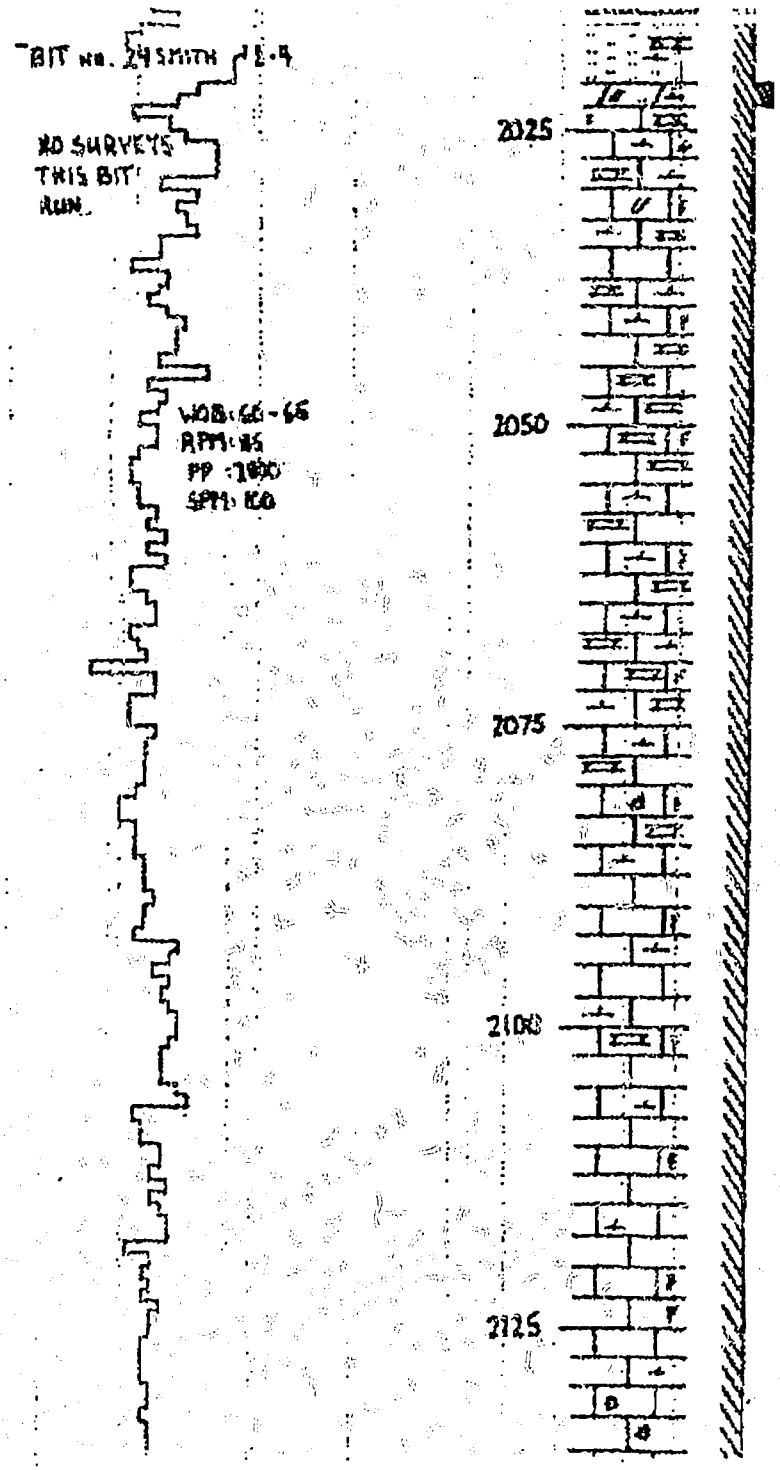
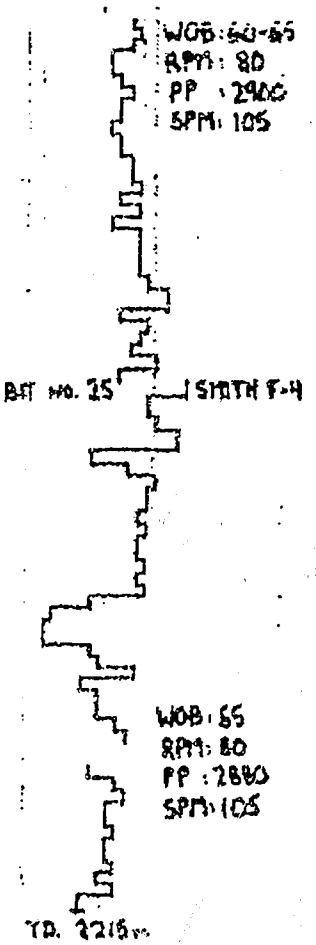
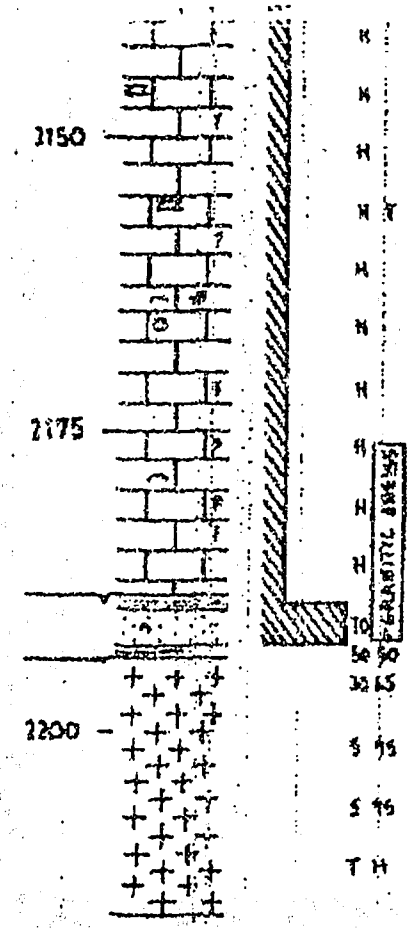


H T				LMST OFF WH - LT BRN, CRYPTO - MICRO XL, TR FOS, THIN DOL - SL DOL.
H T				LMST a/a CRIN, SL DOL IN PT. DOL a/a, CALC IN PT.
H T				LMST a/a, V SL DOL IN PT, CRIN MUDST - WACKESTONE IN PT, DENSE.
H T				LMST a/a. DOL LT GY, VF-F XL, GEN CALC, TR FOS, FROM LMST.
H T				LMST a/a. TR DOL, TR FOS, MNR BIOCL STRINGS, DENSE.
H				LMST a/a, TR FOS.
H T				LMST GEN NON DOL, TR CRIN, TR BIOCL. DOL a/a
H				LMST a/a ALSO TRACE GY/BRN, MICRO XL, SL ARG, DENSE.
95		5		SLTST LT GY, DOLOMITIC, V SL ARG IN PT, TIGHT. LMST a/a, TR DOL IN PT, FOS, DENSE.
90 5		5		SLTST OFF WH - BUFF, DOL, GEN NON ARG. DOL LT GY, VF-F XL, CALC IN PT, DENSE. LMST a/a.
40		60		SLTST a/a. LMST a/a.
5		95		SLTST a/a DOLOMITIC, TIGHT, TR CALC PATCHES.
5		95		SLTST a/a
95	T	5		LMST a/a OFF WH - LT BRN, CRYPTO - MICRO XL, RR FOS, SL-V DOL IN PT, POSSIBLE PELLETS, DENSE. ANHY WH/CLR, MASSIVE.
40	T	60		SLTST a/a, MNR LT GY - SL ARG, TIGHT. LMST a/a TR FOS, MUDST - WACKEST, DENSE.
50		50		LMST a/a SLTST a/a
80		20	20	SLTST PRED BUFF, MNR OFF WH, DOLOMITIC, COMMONLY SANDY - VF-F GR, GRADING TO SLTY SS IN PT, TIGHT.
T	T	H T		SLTST a/a, SDY IN PT. ANHY WH, CLR, CRYPTO - MICRO XL, SOFT - FIRM.
T	T	H		SLTST a/a, GRDG TO SLTY DOLOMITE IN PT.
	T	H		SLTST a/a.
		80	20	SLTST a/a ALSO RARE RED/ORNG + RED/PURP, SDY + ARG. SS - BUFF, VF F, ANG, F SRT, MOD CONS W/ DOL CMT, GRDG FROM SLTST TRACE Ø T.
		80	20	SLTST a/a V SDY IN PT. SS a/a GRDG TO SDY DOLOMITE IN PT, TIGHT.
		90	10	SLTST a/a, FOS ?, DOLOMITIC, TIGHT.
30		70		SLTST a/a, V SDY IN PT, NO VIS Ø. LMST PROBABLE CAVINGS AS ABOVE.



[illegible]	[illegible]	[illegible]	[illegible] CRYPTO-MICRO XL, SL SLTY, SL CALC IN PT. LMST BUFF-LT BRN, DENSE.
40 30 T	30	DOL	OFF WH-LT BRN, MICRO XL, SL SLTY, SL CALC, V CALC-VF XL IN PT, DNS. LMST OFF WH-LT BRN, CRYPTO XL, DOL IN PT, RR FOS. SLTST a/a.
90 10 T	20	LMST	a/a. SLTST LT GY-GY, MNR LT BRN, V DOL, SL CALC, SL ARG, CLA IN PT, TIGHT.
75 10 5	10	LMST	a/a DOL FROM LMST.
90 10		LMST	OFF WH-LT BRN, CRYPTO-MICRO XL, MNR VF XL, RR FOS, SL-V DOL, GRDG TO LIMEY DOL, DENSE. DOL OFF WH-LT BRN, LT GY, CALC, TR NONCALC.
90 10		LMST	a/a. DOL a/a, FROM LMST.
80 20		LMST	a/a.
70 30		LMST	a/a, RR FOS. DOL a/a.
90 10		LMST	a/a.
90 10		LMST	a/a.
90 10		LMST	a/a GRDG TO DOL IN PT.
80 20		LMST	a/a.
90 10		LMST	a/a. DOL a/a FROM LIMESTONE.
H T		LMST	OFF WH-LT BRN, CRYPTO XL, MNR MICRO XL, TR-RR FOS, BRAC, TR SL DOL, SOFT IN PT, DENSE.
H T		LMST	a/a.
H		LMST	a/a.
H		LMST	a/a. SOFT IN PT.
H T		LMST	a/a. DOL GY/BRN, VF XL, SL SLTY, SL ARG, SL CALC.
H T		LMST	a/a, RR FOS, SL DOL IN PT.
H		LMST	a/a. LT GY/BRN, TR FOS.
H		LMST	a/a
H		LMST	a/a, V RR PYR, TR BRN/BLK ORGANIC FRAGMENTS, NO VIS Ø, NONDOL, RR FOS.
H		LMST	a/a, RR TR DOL.
H		LMST	a/a, CRIN, BRAC, MUDSTONE-WACKESTONE.





	H			LMST a/a, TR FOS.
	H		T	LMST OFF WH-LT BRN, CRYPTO-MICRO XL, FOS IN PT, TR DOL IN PT, DENSE. SLTST GY/GRN, DOLOMITIC, SANDY, TIGHT.
2150	H			LMST a/a
	H	T		LMST a/a. DOL OFF WH-LT GY, VF-F XL, CALC., DENSE.
	H			LMST a/a, FELD MUDST, MINOR WACKESTONE, DENSE.
	H			LMST a/a, TR FOS, CRN, BRAC.
	H			LMST a/a, OFF WH-LT BRN, CRYPTO-MICRO XL, RR TR DOL, TR FOS, DENSE.
2175	H			LMST a/a, RR PYR, MUDST - RR PACKST, BIOCL IN PT, DENSE.
	H			LMST a/a, RR PYR.
	H		T	LMST a/a, TRACE ANHYDRITIC?, SH LT GY, SOFT/FRI, SL DOL, TR PYR.
	10			30 SS CLR QTZ, M-VC GRAINED +, P SRT, ANG-SANG, P CONS W/SAL, NO VIS POR.
	50 50		T	NO SHOWS. GNEISS M-VC XL +, QTZ, TR PINK WH FELD, BIOT MICA, BLK MAFIC
	35 65		G	MINERALS, GNEISSIC TEXTURE ORIENTED MAFIC MINS. SH a/a TR M SDGR.
2200	5 95			GNEISS a/a, CHLORITIC IN PT.
	5 95			GNEISS.
	T H			GNEISS.
2225				
2250				

DAWSON – LONG & ASSOCIATES LTD.

RESOURCE CONSULTANTS

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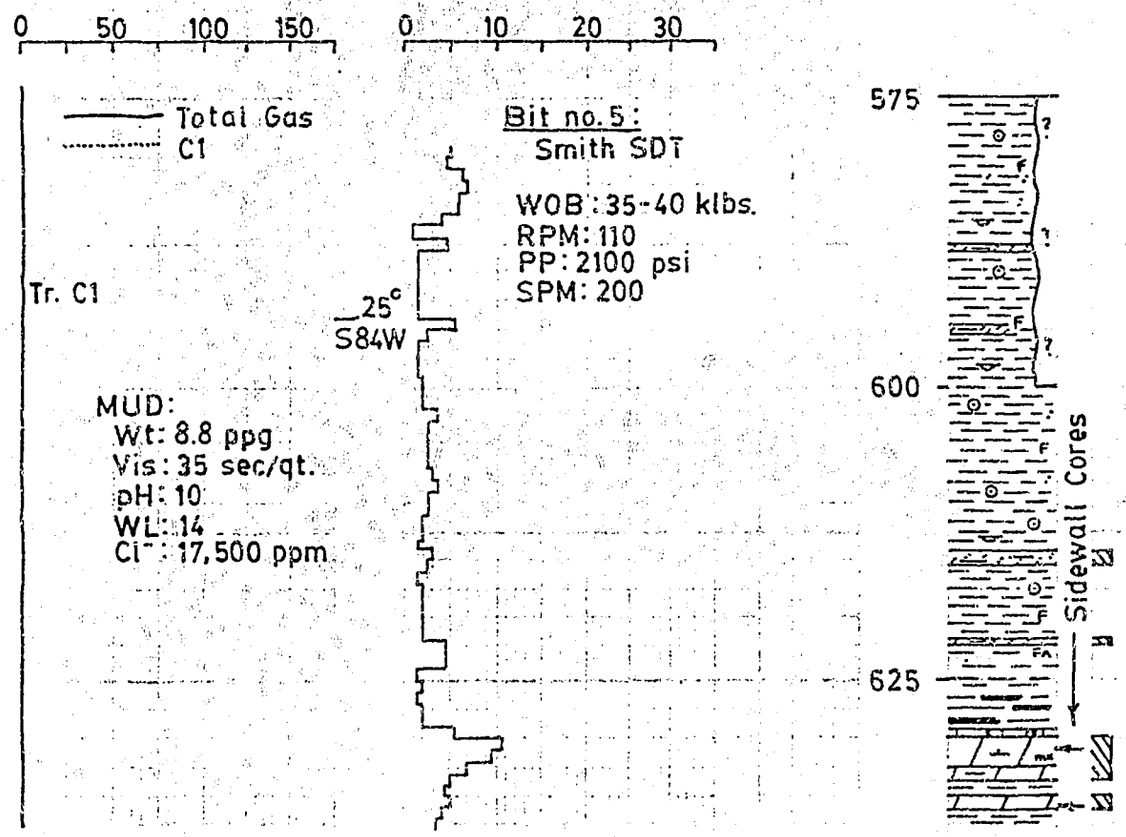
WELL NAME: TRILLIUM et al BELUGA 0-23 — T.D. FORMATION:

LOCATION: Lat. 59°12'54.4" N Long. 88°33'26.6" W — GEOLOGIST: J. TUCKER

ELEVATION: K.B. 13.7 m WATER DEPTH: 179.8 m — SPUD DATE: JULY 28, 1985 2030 Hrs.

FORMATION GAS IN UNITS (1 UNIT = 200 ppm)	DRILLING TIME IN MINS/1 METER	SHOWS	POROSITY TYPE	POROSITY BAR PLOT (10 20 / 5 15 25)	INTERVAL/TOPS	COLOURED STRIP LOG	CORES, DSTS, PERFS	PARTICLE SIZE (SILT, MICRO / VF-FINE / MEDIUM / COARSE)	LITHOLOGY (% LIMESTONE / % DOLOMITE / % ANHYDRITE / % SHALE / % SILTSTONE / % SANDSTONE)	DESCRIPTION



726 mm (30") Casing Landed at 228.5 m
508 mm (20") Casing Landed at 558.7 m

CANADA OIL AND GAS LANDS ADMINISTRATION
ON PÉTROLE ET DU GAZ CANADA
SEP 19 1985
ENGINEERING BRANCH

100% CEMENT

PRED. CEMENT; MNR. MD RD, V. SOFT MUDST; TR. CRINOID FRAGS. & UNIDENT. CALC. FOS. DEBRIS

a/a

a/a

MISSED SAMPLE

H T MUDST, LT GY, SL. CALC (STREAKS), LOC. SILTY GRDG TO TR. LT GY, V. CLAYEY SLTST (SOFT) ABUND. CRIN. FRAGS. & OCC. TR. CALC. FOS. DEBRIS; SOME SHELL FRAGS.

H T MUDST a/a, BUT GRDG TO MD GY, TR. LOC. SILTY; GRDG TO MD GY, V. ARG., SOFT SLTST a/a; TR. CRIN. FRAGS.

90 10 MUDST a/a, SOMEWHAT CALC; SLTST a/a, SL. PYRITIC IN PT; 5% CRIN. FRAGS. a/a; TR. PELECYPOD FRAGS. & UNIDENT. FOS.

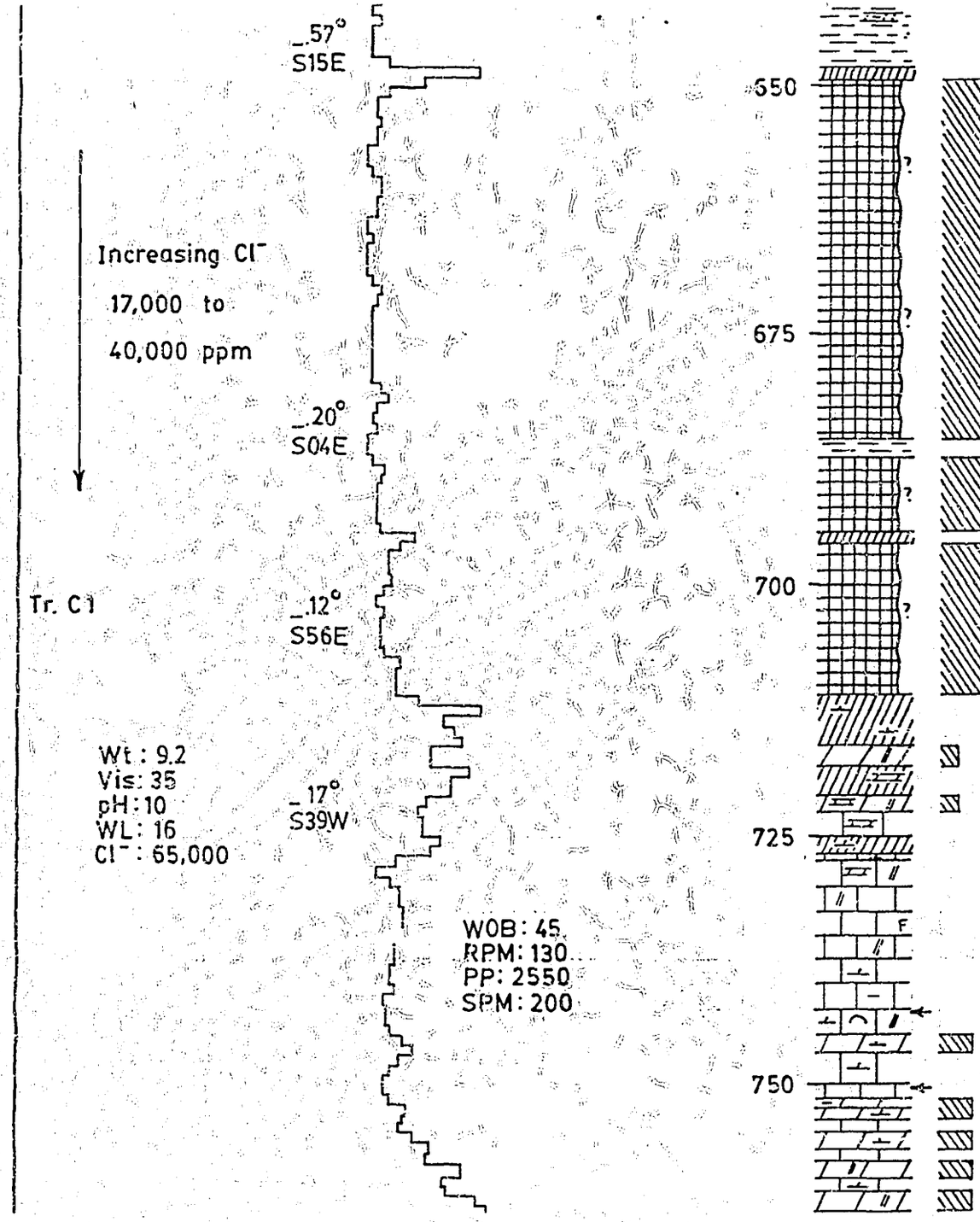
H MUDST a/a, EXTREM. SOFT, TR. CALC, NO VIS. SILT; 5-10% CRIN & FOS. FRAGS a/a.

95 5 MUDST a/a, LOC. SL. SILTY, GRDG TO V. ARG., MD GY, SOFT SLTST, TR. CALC; OCC. FOS. FRAGS. a/a; TR. FOS. ASSEMBLAGE w/ ASSOC. CIL. INCLUS.

10 90 SHALE, DK BN-BK, V. CARB., BLOCKY, MICRO-LAM'D., COALY IN PT (IMMATURE), CONTAINS STRGRS & LENSES LMST, BF-LT BN, PRED. CRYPTOXL, FOS. IN PT, SOFT-FRM., TITE

T H DOL, LT BN, PRED. MICROXL (LOC. CRYPTOXL, LOC. SOMEWHAT CALC, SL. ARG IN PT, NO VIS &; TR. LMST STRGRS.

40 45 15 MUDST, MD RD, SOFT, NON-CALC, NON-SILTY; DOL, MICROXL a/a; SLTST, LT-MD



						MICROXL, TITE o/a
					H	MUDST; 60% LT GY, SOFT-FRM, BLOCKY; 40% MD RD, PRED. V. SOFT; TR BK SHALE, COALY
				20	80	MUDST; 40% LT GY o/a; 40% RD o/a; ANHY, BF-LT BN, CRYPTOXL, DENSE, MD. HRD.
				10	10 80	MUDST o/a; ANHY o/a; DOL, BF-LT GY, CRYPTO-MICROXL, PRED. ANHYDR'IC, BLOCKY, DENSE, CLEAN, TITE
			T	5	10 85	MUDST; 55% MD RD, V. SOFT o/a; 30% BF-LT GY o/a; ANHY o/a, IN PT LT GY, DENSE, CRYPTOXL; MNR. DOL o/a; TR. TITE, FOS. LMST
				5	5 90	MUDST o/a; MNR. LT GY DOL, MICROXL, CLEAN, TITE; MNR. ANHY o/a; TR. BK. COALY SHALE (CVGS?)
			5	T	10 85	MUDST: 50% RD o/a; GRDG (MIXED) TO LT GY (35%); LMST, LT GY, MICROXL, DOLIC, TITE; ANHY, IN PT WH, SOFT; IN PT LT GY o/a; TR. DOL o/a
			5	T	40 5	MUDST o/a, TR. PYR INCLUS.; DOL, BF-LT BN, PRED. MICROXL, ANHYD'IC (?), TITE; MNR. SLTST, ARG., FRM-HRD; TR. ANHY o/a; TR. BK SHALE
			5		80 15	MUDST o/a; SLTST, LT GY, SILICEOUS, FRM-HRD, CALC IN PT; MNR. LMST, LT GY, PROB. V. FOS., DOL'IZED IN PT, NO VIS ϕ
			5	5 5	70 15	MUDST o/a; SLTST o/a, CALC IN PT; LMST, PROB. V FOS. (CRIN.), NO VIS ϕ; GRDG TO CALC DOL; ANHY, PRED WH, SOFT; TR. BK; COALY SHALE
			5	15	70 10	MUDST, RDISH & GY o/a; SLTST o/a, FAIRLY HRD; ANHY, WH-LT GY, PRED. SOFT-FRM, OCC. CALC; MNR. LMST o/a, DOLIC.; TR. BK SHALE
				60	30 10	ANHY, BF-LT GY, INCR. DOLIC (IN PT); SLTST o/a, CALC IN PT; MUDST, PRED. LT GY, SOFT-FRM (5% RD o/a)
			5	60	30 5	ANHY, WH-BF, SOFT-FRM, PRED. CLEAN, NON-DOL-SL. DOL; MUDST LT GY o/a; MNR. SLTST o/a; MNR. LMST, BF, MICROXL, DOLIC., TITE, OCC. FOS.
				20	60 20	ANHY o/a; GRDG TO DOL, CRYPTO-MICROXL, HRD, ANHYD'IC IN PT, LOC. CALC; MUDST, LT GY o/a (10%) & RD (5%); 5% BK. COALY SHALE
			5		90 5	ANHY, BF-LT GY, PRED. CRYPTOXL, LOC. SL. DOLIC; MNR. STRGRS. LMST, LT BN, SL. DOLIC; MNR. MUDST o/a (CVGS?)
				40	60	ANHY o/a, BUT PRED. V DOLIC., GRDG TO DOL, WH-LT GY & BN, SL-V ANHYDR'IC, CRYPTO-MICROXL, SOME MIXED CLAY (SWELLING); NO VIS ϕ
				40	25 35	LMST, BF-LT BN, SOMEWHAT MOTTLED, CLEAN, BUT SL-V. DOLIC &/OR ANHYDR'IC; GRDG TO DOL o/a, BUT PRED. MICROXL, SL-V CALC; ANHY WH-BF o/a; TR. BK SHALY STRGRS
				70	10 20	LMST o/a, CLEAN BUT INCR. ANHYDR'IC & DECR. DOLIC IN PT; GRDG. TO CALC WH ANHY & CALC DOL o/a, NO VIS ϕ; TR. BK SHALY STRGRS.
				90	10	LMST, BF-LT BN, CRYPTOXL, CLEAN, PRED. MOD. ANHYDR'IC, FAIRLY SOFT, DECR. DOLIC. TO TR.; GRDG TO INCLUS. & STREAKS ANHY, CALC IN PT; NO VIS ϕ
				95	5	LMST, BF-LT BN, CRYPTOXL - SOMEWHAT "EARTHY", POSS. FOSS'IFEROUS, V. CLEAN, OCC. DOLIC.; DECR. ANHYDR'IC (5%) w/ MNR. GRDG TO ANHY o/a; NO VIS. ϕ
				H	T T	LMST o/a, POSS. BIOCLASTIC (?) (SOME VF. CRINOIDS), OCC. DOLIC. &/OR ANHYDR'IC (OCC. ANHY INCLUS.); OCC. SHALY INCLUS.; TITE
				70	30	LMST, PRED o/a, BUT IN PT, INCR. DOLIC (MICRO-VF XTALLINE); GRDG TO DOL, LT-MD BN, VF-XTALLINE, SL.-V. CALC, SOMEWHAT ARG. IN PT, NO VIS ϕ, OCC. DOL'IZED CRINOIDS
				40	60	DOL, MD BN, MICRO-VF XTALLINE, PRED. V. CALC, CLEAN-SL. ARG., OCC. TR. DISSEM. PYR; LMST o/a TITE
				30	70	DOL, MD BN o/a, OCC. BK SHALY MAT, CALC, OCC. ANHYDR'IC, PRED. TITE, BUT OCC. TR. IC ϕ?; LMST o/a, CLEAN, DOLIC IN PT, OCC. ANHYDR'IC
				20	75 5	DOL, MD BN o/a, NO VIS ϕ; LMST o/a; MNR. ANHY, WH-BF, CALC IN PT (INCLUS.

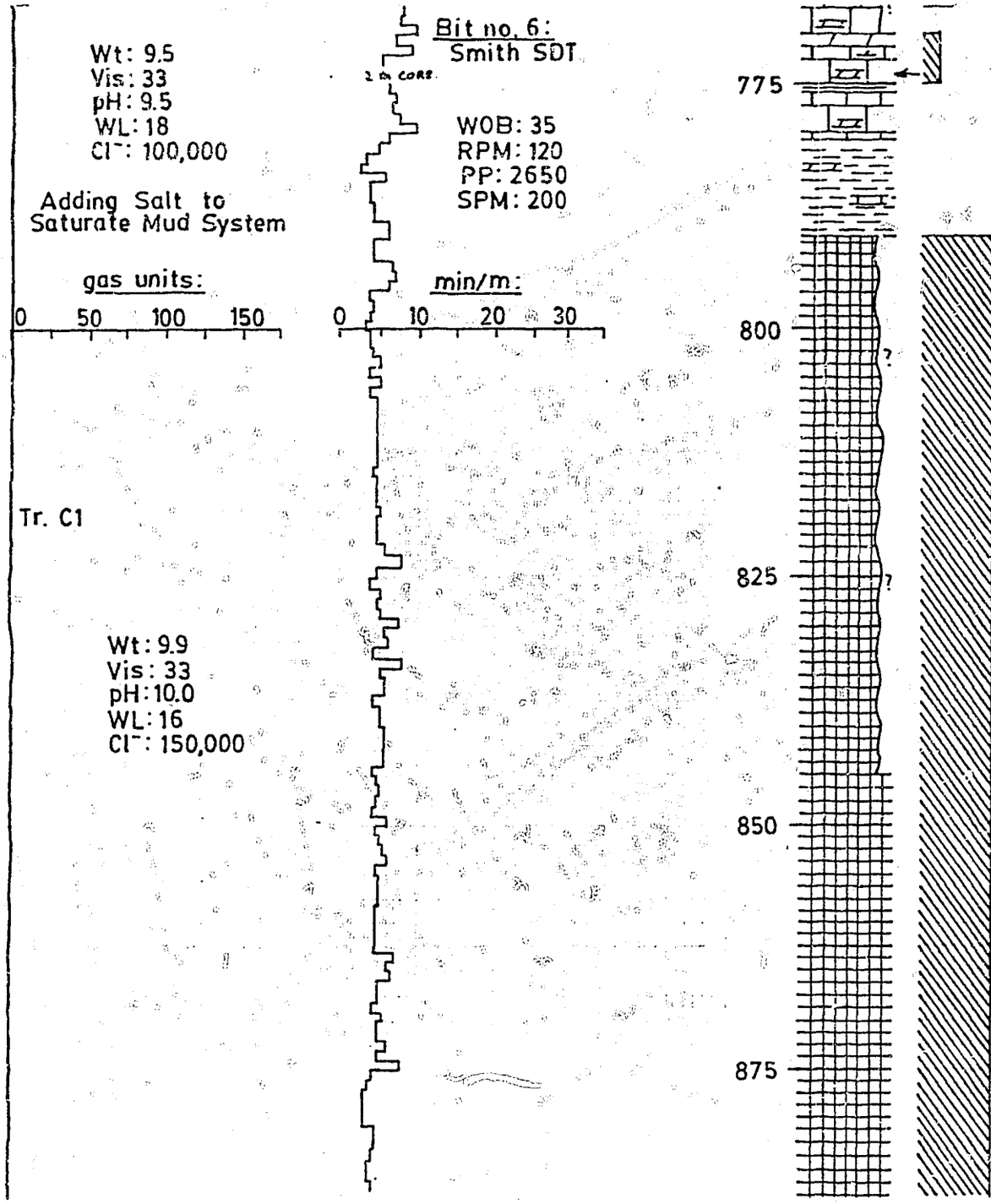
NOTE: THESE DESCRIPTIONS ARE OF THE ACTUAL SAMPLES OBTAINED OVER THIS INTERVAL; LITHOLOGY IS PROBABLY PRED. SALT, WHICH HAS DISSOLVED INTO MUD SYSTEM.

Wt: 9.5
Vis: 33
pH: 9.5
WL: 18
Cl⁻: 100,000

Adding Salt to Saturate Mud System

Tr. C1

Wt: 9.9
Vis: 33
pH: 10.0
WL: 16
Cl⁻: 150,000



75	25			LMST, BF - LT GY, CRYPTO - MICROXL, IN PT SOMEWHAT CHALKY, FRI &/OR V. SOFT IN PT (ARG.); IN PT V. DOLIC.; GRDG. TO DOL, MD GY, MICROXL, CALC, TITE
80	10	10		LMST o/a, BUT PRED. LT GN, SOFT, SOMEWHAT CHALKY & ARG.; IN PT DOLIC o/a, GRDG TO DOL; SOME CLAY (MUDST), LT GY, V. SOFT
20	60	20		DOL, LT GY, CRYPTOXL - CHALKY, V. ARG. (GRDG. TO 10% GY, DOLIC. SHALE) V. SOFT & FRI; LOC. SL. HRDER, CALC; LMST o/a, PRED. DOLIC; MUDST, RDISH, NON-CALC.
20	80			CLYST, LT GY; MIXED W/ PK-MD RD, V. SOFT, NON-CALC, BUT NUMEROUS INCLUS. LMST, SOFT o/a; OCC. TR. GYPSUM (FIBROUS)
T		H		MUDST, PRED. PK-RD o/a, SOME MIXED LT GY, V. SOFT, SWELLS & DISINTEGRATES IN WTR., OCC. CALC INCLUS. (POSS. SL. DOLIC.?)
T		H		MUDST o/a, SOME CALC INCLUS. o/a (MICRO), DOLIC ?
T		H		MUDST o/a (CLYST)
		H		MUDST o/a
		H		MUDST o/a
		H		MUDST o/a, PRED PK-RD, MNR. MIXED LT GY, V. SOFT, UNSTABLE IN WTR, SOMEWHAT CALC (POSS. DOLIC) - VERY LITTLE SAMPLE
		H		MUDST o/a
35		65		MUDST, PRED. RD o/a, BUT INCR. COMPETENT IN WTR.; SOME (15%) LT GY, SOFT; LMST, WH-BF, CRYPTOXL, CLEAN-MOD. ARG., LOC. V. SILICEOUS
30		70		MUDST, PRED. RD & SOME LT GY o/a (10%); LMST o/a, SOMEWHAT DOLIC.; TR. GYPSUM
25		75	SALT %	MUDST, PRED W/ MIXED LT GY, NON-CALC; LMST o/a, CLEAN-SL. ARG., PRED. OCC. DOLIC., TR. CRINOID
70		30		LMST, WH-BF, CRYPTOXL (MICRITIC), OCC. BLEBS ARG. MAT.; SOME DOL'IZATION (F-XTALLINE), TITE
20?		30?	50?	SALT, BF & LT GN, C-XTALLINE, CLEAN (HALITE); MUDST & LMST o/a
T		T	H	SALT o/a
T		T	H	SALT o/a
T		T	H	SALT o/a
T		T	H	SALT o/a
T		T	H	SALT o/a
T		T	H	SALT o/a
T		T	H	SALT o/a
T		T	H	SALT o/a

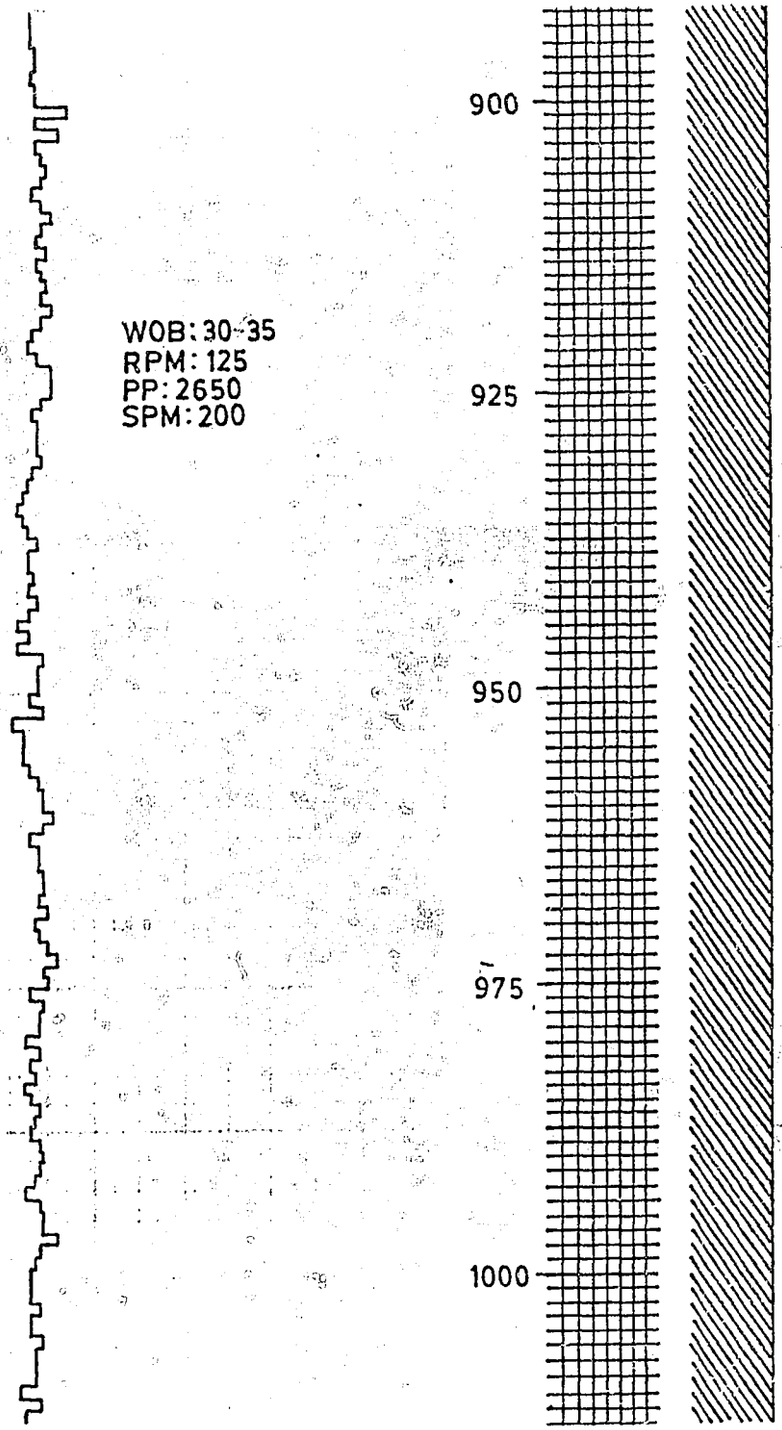
NOTE: THESE DESCRIPTIONS ARE OF THE ACTUAL SAMPLES OBTAINED OVER THIS INTERVAL; LITHOLOGY IS PROBABLY PRED. SALT, WHICH HAS DISSOLVED INTO MUD SYSTEM

Vis: 33
pH: 10.5
WL: 16
Cl^-: 174,000
(saturated)

WOB: 30-35
RPM: 125
PP: 2650
SPM: 200

Tr. C1

Wt: 10.2
Vis: 32
pH: 10.5
WL: 18
Cl^-: 174,000



H SALT c/a, BF & LT BN (OCC CLR.), SL PK IN PT., C-XTALLINE, CLEAN, PRED HALITE ; POSS. MNR KCl SALT

H SALT c/a

H SALT c/a

H SALT c/a

H SALT c/a

H SALT c/a

H SALT c/a

H SALT c/a

H SALT c/a

H SALT c/a ; TR. OCC KCl

H SALT c/a

H SALT c/a, BF & LT BN (IN PT CLR), PKISH IN PT, C-XTALLINE, CLEAN, PRED. HALITE BUT POSS. SL. INCR KCl SALT

H SALT c/a, OCC CLR, SOME PLATY XTALS

H SALT c/a

H SALT c/a ; SL. INCR CLR ; SOME KCl

H SALT c/a

H SALT c/a

H SALT c/a, BF-TRANSLUCENT, TR. CLR., OCC PLATY XTALS

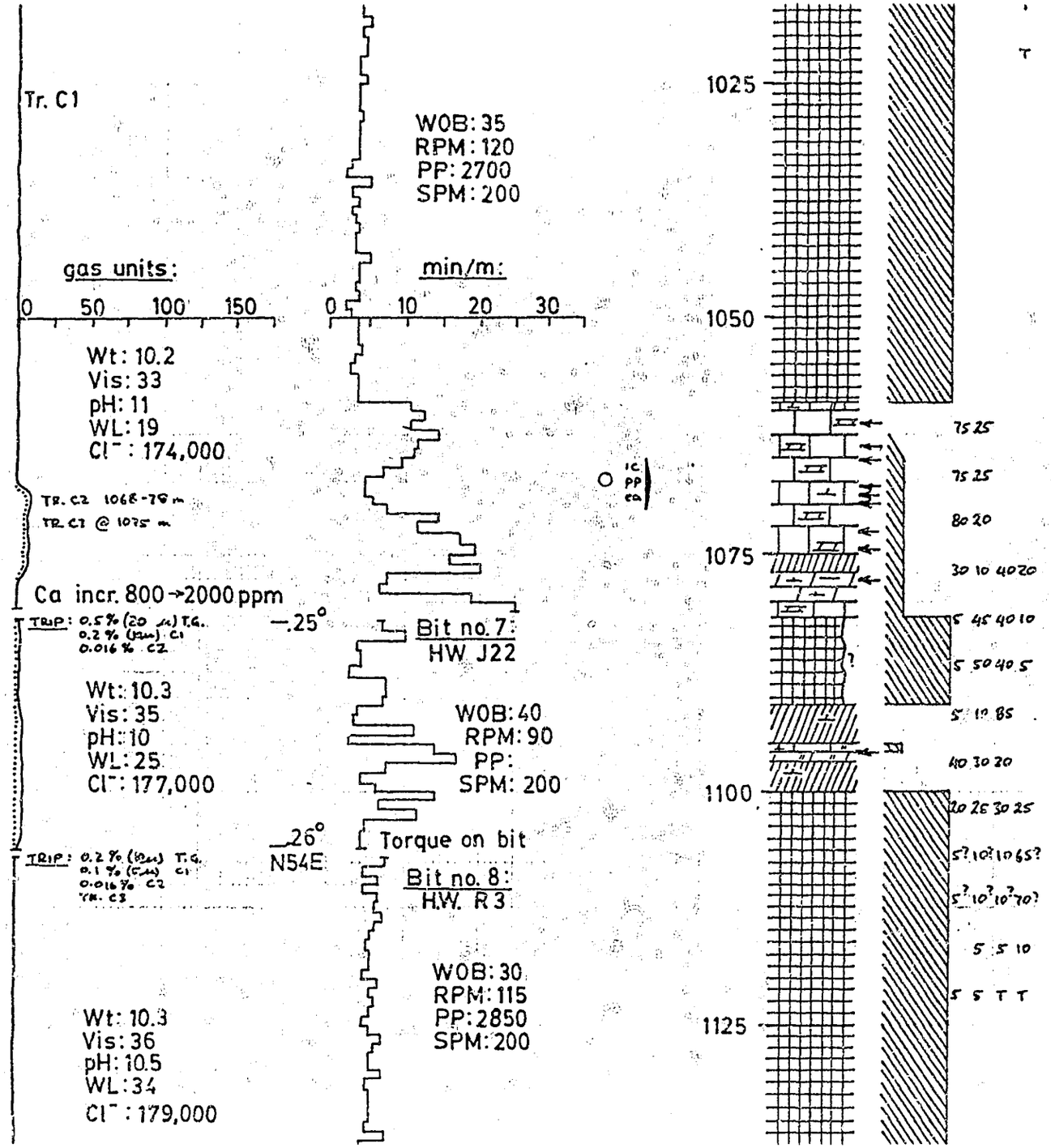
H SALT c/a

H SALT c/a, SOMEWHAT DECR XTAL SIZE, IN PT TO M-C XTALLINE

H SALT c/a, CLR-TRANSLUCENT, INCR. PLATY XTALS

H SALT c/a

T H SALT, BCMING. PRED. XTALLINE, XTALS SOMEWHAT PLATY ; TR. KCl



H SALT o/a ; DECR. CLAY TO TR.

H SALT o/a , CLR -TRANSLUCENT (TR. WHITE) ; TR. CLAY

H SALT o/a

H SALT o/a

H SALT o/a

H SALT o/a

H SALT o/a, CLR-TRANSLUCENT, NO CLAY, NO KCl

H SALT o/a

75 25 LMST, WH-BF, MICRITIC-CHALKY, SOFT, SL-V ARG.; IN PT MD BN, CX-MX, HRD, DOLIC IN PT, SL. ARG., TITE ; DOL, MD BN, MICROXL, CALC, SOMEWHAT ARG., HRD; GRDG TO LMST IN PT.

75 25 LMST, BF-LT BN, CRYPTOXL (SL CHALKY)-MICROXL, CLEAN BUT PRED SL-V. DOLIC, TR. CRIN, FORAM TR. PP & "EARTHY" ø; DOL (GRDG FROM LMST) PRED. MICROXL., CALC., OCC IC & PP ø; POSS. V. FAINT FLUOR.

80 20 LMST, PRED o/a, PRED. SOMEWHAT DOL'IZED, OCC. MD WH STRMG. CUT FL., LT BN OIL RESID. OCC. BITUM. STREAKS (BK); OCC. GRDG. TO CALC DOL ; OCC. TR. (DECR.) ø o/a

30 10 40 20 LMST o/a, DOL'IZED IN PT. ; GRDG TO DOL o/a, LOC. V. ARG., GRDG TO LT-MD GY, SOFT, CALC SHALE ; ANHY, MILKY-WH, XTALLINE, CLEAN ; NO VIS ø IN LMST/DOL ; TR. TENTACULITES

5 45 40 10 ANHY, 15% WH, SILKY, CLEAN ; 25% BF-LT GY, SL-V. DOLIC ; GRDG TO DOL, LT GY, CRYPTOXL, DENSE, M-V ANHYDR'IC, HRD, TITE ; A FEW CALC CRIN. ; MUDST, GY & RD (CVGS?) ; MNR. DOLIC. LMST o/a

5 50 40 5 DOL o/a, V. ANHYDR'IC ; GRDG TO ANHY o/a (15% WH, NON-DOLIC), TR. PYR, NO VIS. FOS. ; MNR. LMST o/a ; MNR. MUDST o/a

5 10 85 ANHY, WH-BF o/a, CRYPTOXL, SL. WAXY, IN PT (~10%) DOLIC w/ MNR. GRDG TO DOL o/a, ANHYDR'IC ; MNR. LMST o/a, WH, CRYPTO-MICROXL, DOLIC, TITE ; TR. CRIN. FRAGS.

40 30 20 LMST, LT BN, CRYPTOXL - SL. SUCROSIC, FRM, BLOCKY, CLEAN, IN PT. ANHYDR'IC ; ANHY o/a & DOL o/a, LT GY, ANHYDR'IC IN PT, SL. ARG., NO VIS ø

20 25 30 25 POOR SAMPLE (TRIP) : LMST o/a ; MUDST, GY & RD ; ABUND. CLYST, V. STICKY ; PROB. ABUND. SALT (?)

5? 10? 10 65? 5 CLYST, V. SOFT, STICKY ; DOL, LT GY, CRYPTO-MICROXL, SOFT (LOC WH, HRD.), SL. ANHYDR'IC IN PT, TITE ; ANHY, WH-BF, WAXY ; MUDST o/a ; PROB. SALT (?)

5? 10? 10? 70? 5 CLAY, LT-MD GY, V. SOFT, CALC ; 5% RDISH MUDST o/a ; DOL, ANHY, LMST o/a (%?) ; TR. CRINOIDS, SPONGE SPICULES PROB. SALT ?

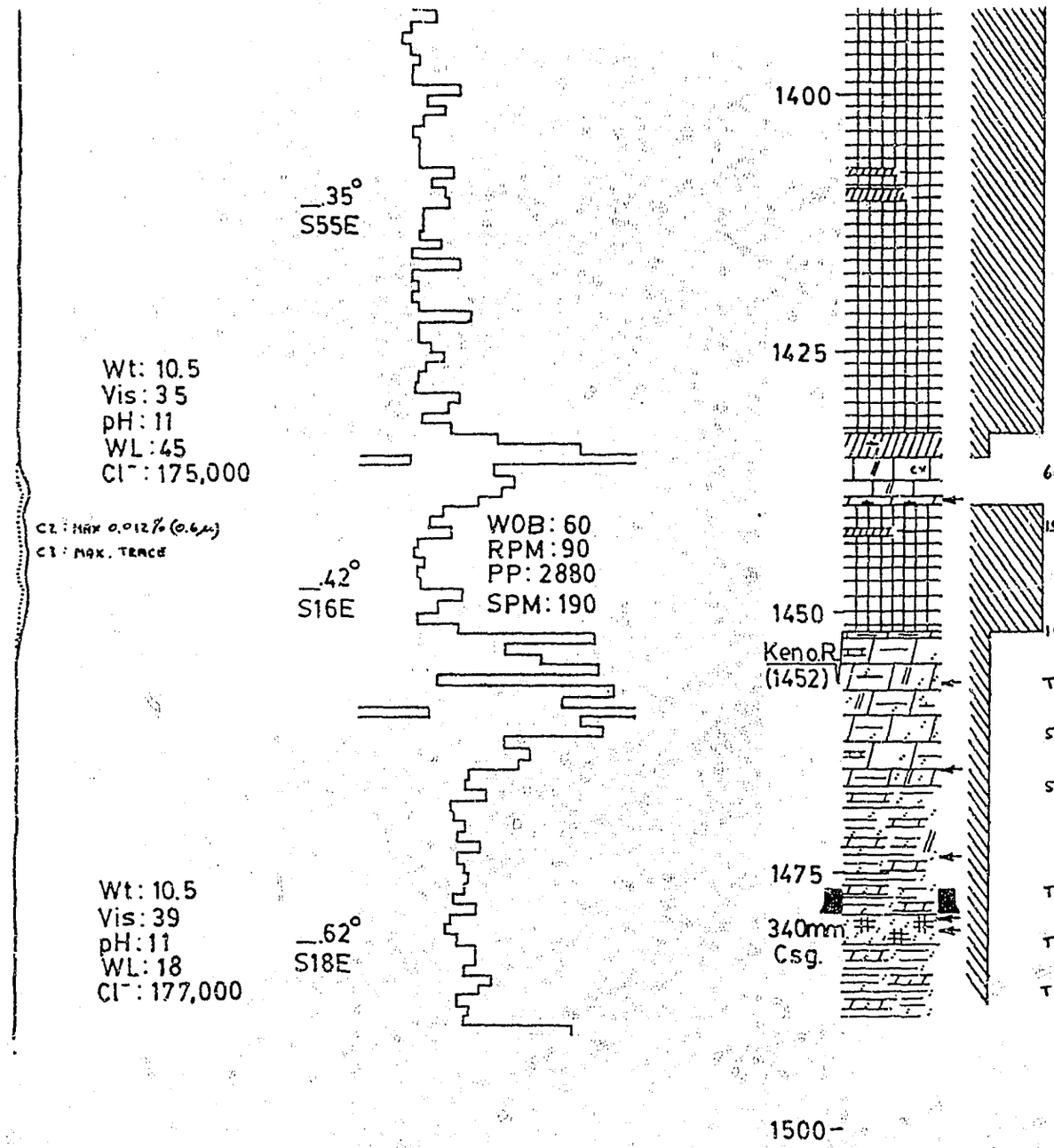
5 5 10 80 SALT (HALITE), TRANSLUCENT, PLATY XTALS ; CLAY, GY o/a (10%?) ; MNR. ANHY, DOL o/a (CVGS?)

5 5 T T 90 SALT o/a ; MNR. CLYST o/a ; TR. RD MUDST, BCMING. SL. HRDER., DOLIC. ; DOL, LMST o/a TR. TENTACULITES

H SALT, CLR-TRANSLUCENT

H SALT o/a, XTALS. PRED. PLATY

H SALT o/a



H SALT o/a, BF-SL MILKY, CLR-TRANSLUCENT, VC-XTALLINE, CLEAN

H SALT (HALITE)

H SALT o/a ; POSS. TR. ANHY

H SALT o/a

H SALT o/a

H SALT o/a

H SALT o/a

20? 15 65 SALT o/a (TR. KCl SALT, PINK) ; INCLUS. SHALE, RDISH, DOLIC, HRD ; SOME ANHY, WH, MICROXL-SUCROSIC, CLEAN, SOFT-HRD, SL. CALC IN PT.

60 ? 10 30 LMST, WH-BF, CRYPTOXL, V. ANHYDRITIC, SOFT, TITE ; SALT o/a ; ANHY o/a, SL CALC IN PT. ; 1435 : DOL, BF-LT GY, CRYPTOXL, DENSE, V. CALC, CLEAN, HRD, TITE (SIDEWALL CORE)

15 15 70 SALT, BF-TRANSLUCENT (HALITE) ; LMST, WH-BF, CRYPTOXL, CLEAN, BUT SL ANHYDRITIC, FRM, TITE ; ANHY, WH, CRYPTOXL, SL. CALC IN PT.

10 90 SALT o/a ; INCLUS. ANHY, WH, CRYPTOXL

10 45 5 20 20? DOL, BNISH-RD, CRYPTO-MICROXL (SL. SUCROSIC), V. ARG. (GRDG TO DOLIC. SHALE (MUD), RD, SILTY), SILTY, FRM-HRD, SOMEWHAT FRI IN PT, OCC. ANHYDRITIC (SOME INCLUSIONS), TITE ;

T 80 10 10? 10% BF, CRYPTOXL, CLEAN, HRD, TITE ; LMST, WH, CRYPTOXL, ANHYDRITIC, CLEAN, TITE. POSS. SALT STRGRS. (PROB. CVGS.)

5 75 5 15 DOL o/a, IN PT INCR. SHALY (GRDG TO DOLIC., SILTY RD SHALE (MUD)) ; POSS. TR. PP ⌀ ; IN PT LT GY, CRYPTOXL, ARG., FRM-HRD, TITE ; INCLUS. ANHY & LMST o/a, TITE

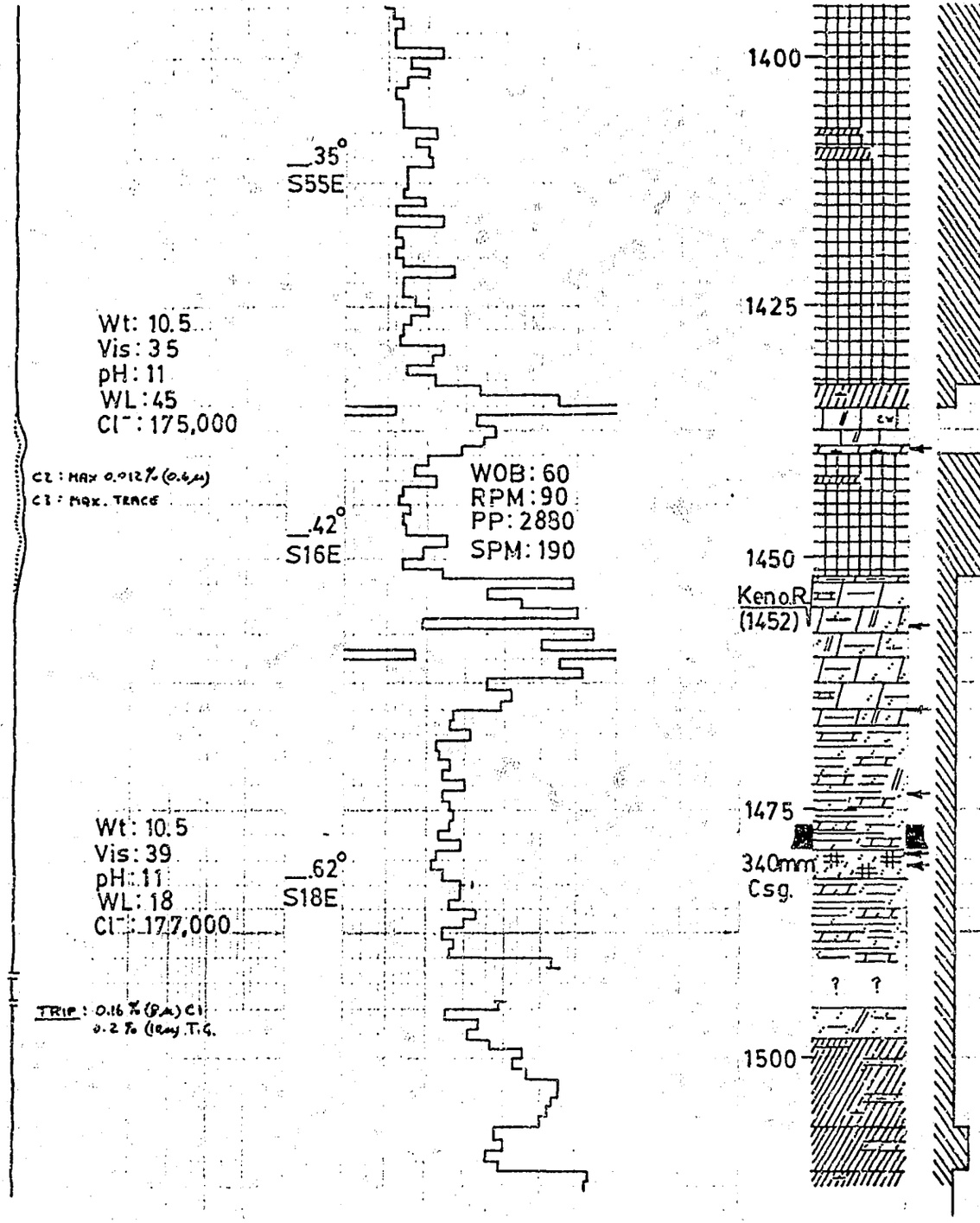
5 65 10 10 10 DOL o/a (OR "DOLIMITIZED MUD"), V. SILTY (SOME GRDG TO DOLIC., SOMEWHAT ANHYDRITIC SLTST), INCR. ARG., OCC. ANHY INCLUS. ; ANHY & LMST o/a

40? 10 40? 10 DOL, RD-BN, CRYPTOXL-"EARTHY", HRD, DECR. SILTY IN PT (SOME GRDG TO DOLIC, ARG, RD SLTST), OCC. ANHY INCLUS. ; INCR. SHALY GRDG TO V. DOLIC SHALE (HYDRATING TO SOFT CLAY?)

T 40 50 10 DOL o/a, BUT INCR. SHALY GRDG TO SHALE o/a ; INCR. HYDRATING (?) TO RD CLAY ; SOME GRDG TO DOLIC., ARG., RD SLTST o/a ; DOL IN PT WH-BF, CRYPTOXL, V. SILTY, ARG. ; NO VIS. ⌀

T 40 10 40 10 DOL, IN PT BF-LT GY, CRYPTOXL, ARG., FRM-HRD, TITE ; IN PT REDDISH, SILTY & ARG. o/a ; GRDG TO DOLIC, ARG. SLTST, BF & REDDISH & SILTY, DOLIC SHALE (HYDRATING TO MUDST) ; ANHY, WH, CRYPTOXL ; MUDST LT-MD GY, SOFT-FRM. ; 1478-82 m : PROB. SLTST, PINK, CLEAN, SOFT, SALT-FILLED, TITE (SIDEWALL CORE)

T 50 5 25 20



H SALT o/a, BF-SL MILKY, CLR-TRANSLUCENT, VC-XTALLINE, CLEAN

H SALT (HALITE)

H SALT o/a ; POSS. TR. ANHY

H SALT o/a

H SALT o/a

H SALT o/a

H SALT o/a

20? 15 65 SALT o/a (TR. KCl SALT, PINK) ; INCLUS. SHALE, RDISH, DOLIC, HRD ; SOME ANHY, WH, MICROXL-SUCROSIC, CLEAN, SOFT-HRD, SL. CALC IN PT.

60 ? 10 30 LMST, WH-BF, CRYPTOXL, V. ANHYDRITIC, SOFT, TITE ; SALT o/a ; ANHY o/a, SL CALC IN PT. ; 1439 : DOL, BF-LT GY, CRYPTOXL, DENSE, V. CALC, CLEAN, HRD, TITE (SIDEWALL CORE)

15 15 70 SALT, BF-TRANSLUCENT (HALITE) ; LMST, WH-BF, CRYPTOXL, CLEAN, BUT SL. ANHYDRITIC, FRM, TITE ; ANHY, WH, CRYPTOXL, SL. CALC IN PT.

10 90 SALT o/a ; INCLUS. ANHY, WH, CRYPTOXL

10 45 5 20 20? DOL, BNISH-RD, CRYPTO-MICROXL (SL. SUCROSIC), V. ARG. (GRDG TO DOLIC. SHALE (MUD), RD, SILTY), SILTY, FRM-HRD, SOMEWHAT FRI IN PT, OCC. ANHYDRITIC (SOME INCLUSIONS), TITE ;

T 80 10 10? 10% BF, CRYPTOXL, CLEAN, HRD, TITE ; LMST, WH, CRYPTOXL, ANHYDRITIC, CLEAN, TITE. POSS. SALT STRGRS. (PROB. CVGS.)

5 75 5 15 DOL o/a, IN PT. INCR. SHALY (GRDG TO DOLIC., SILTY. RD SHALE (MUD)) ; POSS. TR. PP ϕ ; IN PT LT GY, CRYPTOXL, ARG., FRM-HRD, TITE ; INCLUS. ANHY & LMST o/a, TITE

5 65 10 10 10 DOL o/a (OR "DOLIMITIZED MUD"), V. SILTY (SOME GRDG TO DOLIC., SOMEWHAT ANHYDRITIC SLTST), INCR. ARG., OCC. ANHY INCLUS. ; ANHY & LMST o/a

40? 10 40? 10 DOL, RD-BN, CRYPTOXL-"EARTHY", HRD, DECR. SILTY IN PT (SOME GRDG TO DOLIC, ARG, RD SLTST), OCC. ANHY INCLUS. ; INCR SHALY GRDG TO V. DOLIC SHALE (HYDRATING TO SOFT CLAY?)

T 40 50 10 DOL o/a, BUT INCR. SHALY GRDG TO SHALE o/a ; INCR. HYDRATING (?) TO RD CLAY ; SOME GRDG TO DOLIC., ARG., RD SLTST o/a ; DOL IN PT WH-BF, CRYPTOXL, V. SILTY, ARG. ; NO VIS. ϕ

T 40 10 40 10 DOL, IN PT BF-LT GY, CRYPTOXL, ARG., FRM-HRD, TITE ; IN PT. REDDISH, SILTY & ARG. o/a ; GRDG TO DOLIC, ARG. SLTST, BF & REDDISH & SILTY, DOLIC SHALE (HYDRATING TO MUDST) ; ANHY, WH, CRYPTOXL ; MUDST, LT-MD GY, SOFT-FRM. ; 1478-82 m :

T 50 5 25 20 PROB. SLTST, PINK, CLEAN, SOFT, SALT-FILLED, TITE (SIDEWALL CORE)

VERY POOR SAMPLE (TRIP - DRILL OUT CASING SHOE) ; PRED. CEMENT

15 10 55 5 SLTST, IN PT REDDISH, DOLIC, SL ARG ; IN PT BF-LT GY, CLEAN-SL ARG, NON-DOLIC, LOC. SDY, F-MG,

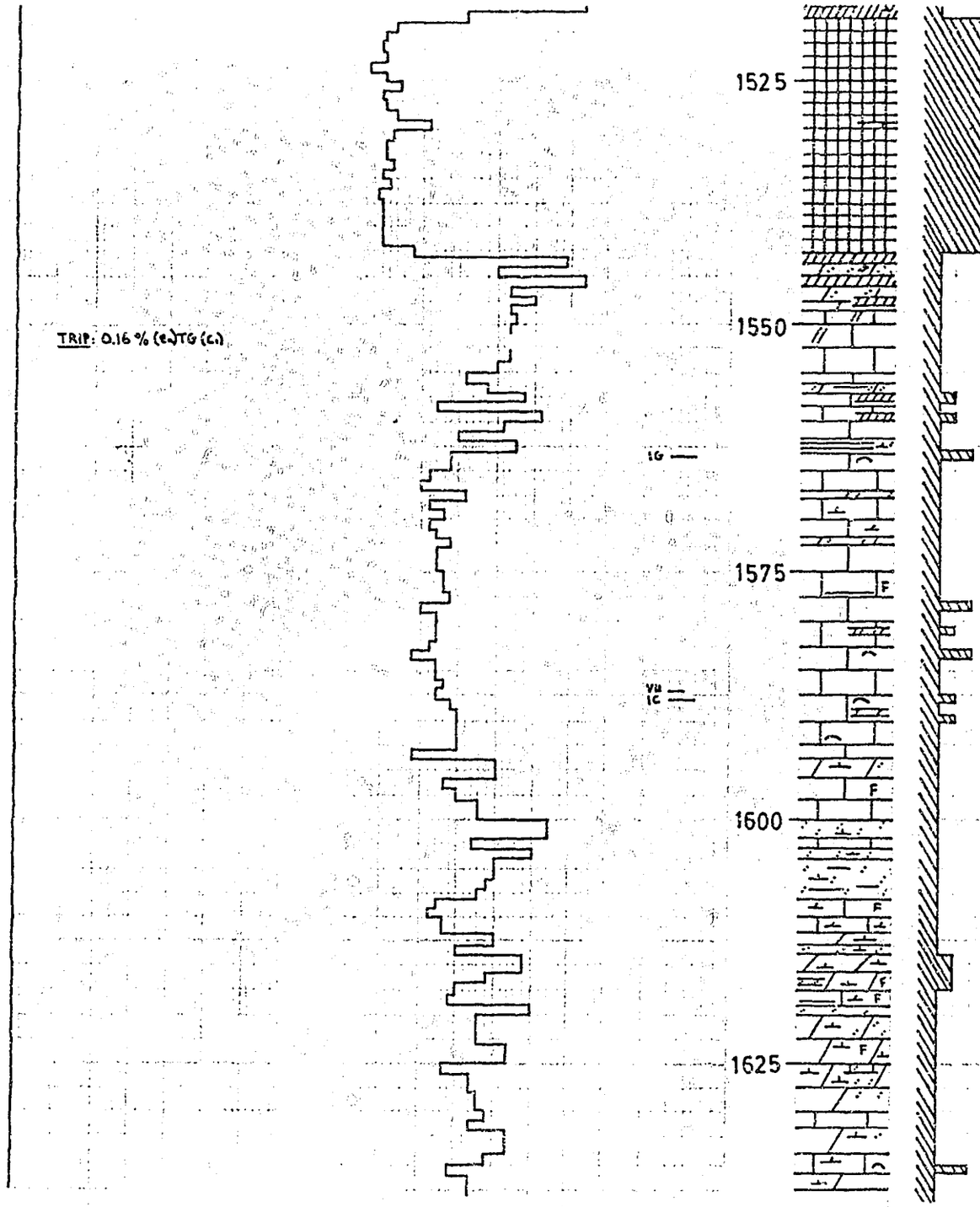
CEMENT: 15 S-RDED QTZ & CHT, OCC. BIT. & CALC STREAKS ; ANHY, WH, MICROXL, SL. CALC IN PT, MNR CLR GYP. SHALE, REDDISH, SILTY

90 T ANHY o/a, PRED. MICROXL, OCC. CALC, OCC. REDDISH STREAKS ;

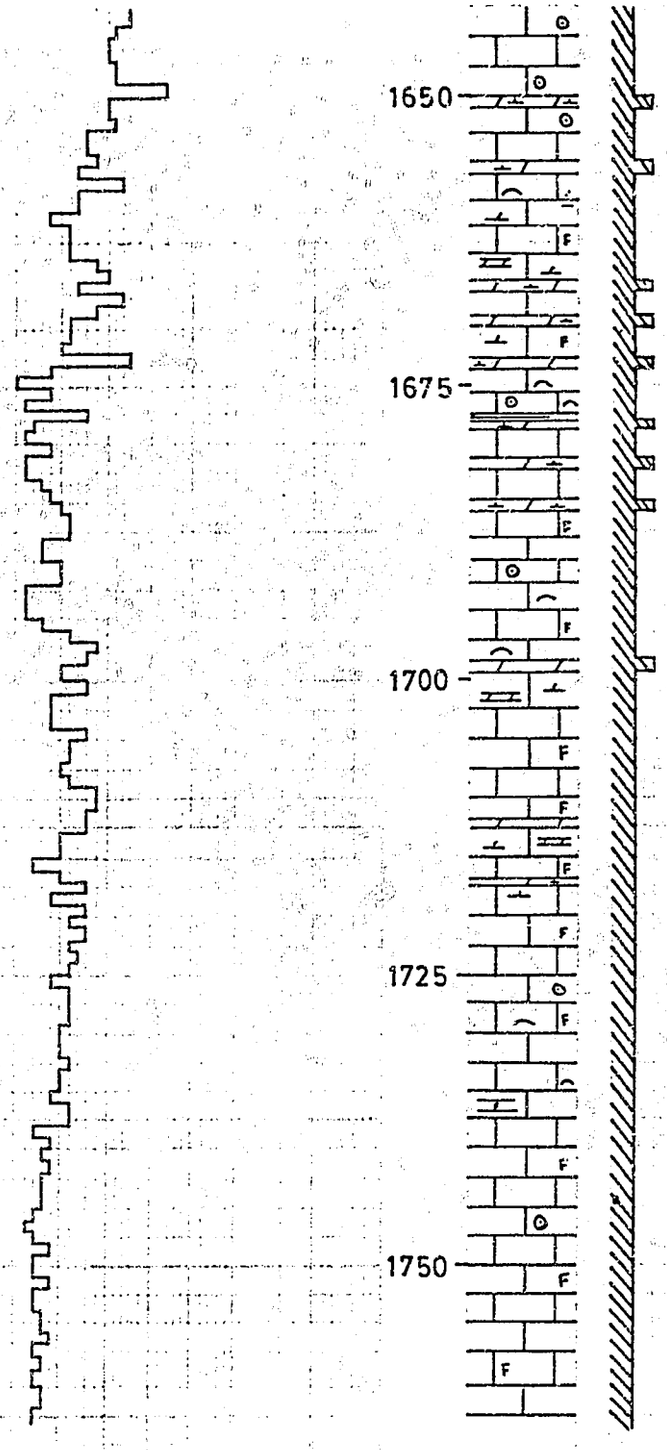
CEMENT: 10 TR. RDED UNCONSOL. SAND GRNS., PRED CLR. QTZ

95 5 ANHY, WH-BF-LT BN, MICRO-F-XTALLINE, PRED. SL. CALC. ; MNR. SLTST, PK, SL. CALC & ANHY

15 85 T ANHY o/a, BUT CRYPTOXL, DENSE IN PT, SOMEWHAT CALC & IN PT SL-V. DOLIC. ; SOME



			CRYPTOXL, DENSE, V. ARG., TITE ; TR. SLTST a/a
20	80		ANHY a/a, DOLIC GRDG TO DOL, BF-LT GY, MICROXL, V. ANHYDIC, CLEAN, CL. ARG. ; MNR. CRYPTOXL a/a
30?	70?		ANHY / DOL a/a
50	50		DOL, LT GY, CRYPTOXL, DENSE, ARG, TT, ANHY a/a, V DOL IN PT, PRED MICRO XL.
75?	25?		DOL a/a IN PT LT GN/GY GRDG TO MICRO XL, ANHYDRITIC. ANHY a/a.
30	70	T	LMST BF - LT BRN, MICRO - V FINE XL, FOS IN PT, GAST ?, ANHYDRITIC. DOL LTGY-GY, CRYPTO XL, SILTY-SANDY, SL ANHYDRITIC. ANHY WH-LT GY, CRYPTO XL, MAS.
5	95	T	DOL a/a, V SLTY, OCC RED STREAK.
30	T	70?	LMST LT BRN, CRYPTO - V FINE XL, DENSE, ANHYDRITIC.
30	40	30?	LMST a/a, V DOL IN PT, ANHY IN PT, DENSE. DOL WH-LT GY, V SLTY-SDY. ANHY WH-CLR, CRYPTO - V FINE XL, DOL IN PT.
60	40	T	LMST BUFF-LT BRN, CRYPTO-MICRO XL, DENSE, ALSO F-M GRAINED BIOCL W/ 10-15 % + 1G Ø TRACE ONLY. DOL a/a, V SLTY. SH GY, SL CALC, SLTY.
85	15		LMST WH, OFF WH, LT BRN, CRYPTO - MICRO XL, NON FOS, DENSE, ANHY IN PT, DOL IN PT.
90	10	T	LMST
95	5	T	LMST a/a RARE FOS, TR F-M GRAINED BIOCL DENSE. SH GY, SL CALC, SLTY.
95	5	T	LMST a/a DOL WH-LT GY, MICRO - V FINE XL, SUC, V SLTY, DENSE
90	10		LMST a/a TR BIOCL W/Ø ALSO a/a, TR VUGGY Ø, SL-V DOLOMITIC, GRDG TO LIMEY DOL IN PT. DOL a/a PRED V FINE XL, DENSE, V CALC IN PT.
90	10		LMST
60	40		LMST PRED a/a, ALSO LT BRN-BRN, MICRO XL, MICRO SUCROSIC, RR FOS, V SL ARG, NO VIS Ø, NO FLOR. DOL - A/A.
40	20	40	SLTST LT GY - LT GY/BRN, PRED CALC, SL DOL IN PT, NON ARG, LMST a/a DOL a/a
10	T	90	SLTST a/a, CALC VNS, SL ARG IN PT. LMST WH, CRYPTO XL, DENSE SH GY, NON CALC, NON DOL, BLK SPECS, SLTY.
50	30	20	LMST WH, OFF WH, CRYPTO XL, RR FOS, SL-V DOLOMITIC, GRDG TO DOL IN PT, DENSE. DOL WH, V FINE TO FINE XL, V CALC, DENSE.
30	45	5 20	DOL a/a, ALSO MNR LT BRN MIC XL, TR FOS, W OCC BRN/BLK ORGANIC FRAGS (TO ½ mm), NO VIS Ø.
10	85	T 5	DOL LT BRN-BRN, MICRO XL, MICROSUC TEXTURE, V SLTY IN PT, V CALC IN PT TR ORG FRAGS, NO FLOR, V WK CUT FLOR, NO VIS Ø, RR FOS, GRDG TO LS IN PT.
10	90	T	DOL OFF WH, LT GY, LT BRN, SL ARG IN PT, CRYPTO-MICRO XL, V CALC IN PT, GRDG TO LMST, SLTY IN PT. LMST OFF WH-BRN, CRYPTO-MICRO XL, SLTY.
30	70		DOL a/a, GEN V SLTY, CALC PATCHES. LMST V DOL IN PT GRDG TO LIMEY DOL.
60	40		DOL a/a. LMST a/a TR BIOCL, MUDST, DENSE.



		M GRAINED, LOC 5-10% IG Ø, NO SHOWS.
	H T	LMST a/a, CRIN MUDST, RR BLK ORG SPECS.
	80 20	LMST a/a TR CRIN, V DOL IN PT GRADING TO DOLOMITE IN PART. DOL LT GY, VF-F XL, V CALC.
	90 10	LMST a/a SL INCR IN BIOCL DEB, MUDST-WACKEST, DENSE, TR GY SL ARG & SLTY. DOL a/a
	95 5	LMST a/a MUDST, DENSE, TR DOL.
	70 30	LMST a/a V DOL IN PT. DOL LT GY-WH, VF XL, V CALC, TR FOS, DENSE, FROM LMST.
	70 30	LMST a/a DOL a/a
	80 20	LMST OFF WH-LT BRN, CRYPTO-MICRO XL, TR CRIN, PRED MUDST, MNR BIOCL PACKSTONE, DENSE. DOL-a/a. TR QTZ+CALC VN/FRAC FILL.
	80 20	LMST a/a. DOL a/a
	80 20	LMST a/a, NON DOLOMITIC, DENSE. DOL a/a V CALC.
	90 10	LMST a/a, CRIN, SL BIOCL. DOL a/a
	95 5	LMST a/a NON DOL, TR FOS. DOL a/a
	95 5	LMST a/a SL DOL IN PT. DOL LT GY, MICRO-V FINE XL, CALC, DENSE.
	H T	LMST OFF WH-LT BRN, CRYPTO-MICRO XL, BRITTLE, DENSE, RR FOS, MUDST.
	90 10	LMST a/a, NON DOL, TR FOS, DENSE. DOL a/a.
	95 5 T	LMST a/a, DOL IN PT. DOL WH-LT GY, a/a, V CALC, FOS IN PT, FROM LMST.
	95 5	LMST a/a, TR FOS.
	H T	LMST a/a, SL DOL IN PT, CRIN, MUDSTONE
	H T	LMST a/a, MNR PACKSTONE, BIOCL
	85 15	LMST a/a DOL a/a V CALC, TR FOS, FROM LMST.
	90 10	LMST a/a DOL a/a, SLTY IN PT.
	95 5	LMST OFF WH-LT BRN-BRN, BIOCL IN PT, CRYPTO-MICRO XL, V FINE XL IN PT, CRIN, GEN NON DOL. TRACE CEMENT.
	H T	LMST a/a, TR FOS.
	H T	LMST a/a.
	H T	LMST a/a, SL DOL IN PT.

```
SPLI  DISA            0
PM                    SING
DIRE                  AUTO
CMDT                  IDH
MARK  DISA            *
TREF        N    N    4448.22 N
E         LB-1 LB-1   7.43000E-7  LB-1
POS         M    M    0.0 M
CGM                   NORM
PP                    NORM
SPEE        F/HR F/HR 6000 F/HR
PANN                  ALL
ODES                  NEIT
LD                    FILM
CSD                   FILM
LSM                   0
OMD                   UP
VCON  ALLO            *
CDS                   ALL
EDS                   PROP
DIFF        M    M    .304800 M

   CP 28.15           FILE    2       13-AUG-85 16:48


  OUTP SUMM :
OUTP  STAT PUNI TUNI PROT

HTEN  ALLO N    N
MTEM  ALLO DEGC DEGC
MRES  ALLO OHMM OHMM
AMC9  ALLO
AMC8  ALLO
AMC7  ALLO
AMC6  ALLO
AMC5  ALLO
AMC4  ALLO
AMC3  ALLO
AMC2  ALLO
AMC1  ALLO
AMC0  ALLO
TEMP  DISA DEGC DEGC
AVOL  DISA V    V    PROP
EPV   DISA VDC  VDC  PROP
ACUR  DISA MA   MA   PROP
MCUR  DISA MA   MA   PROP
MVOL  DISA V    V    PROP
EVOL  DISA V    V    PROP
CCSW  ALLO           PROP
HV    ALLO V    V    PROP
VBAR  DISA           PROP
VSDI  DISA
VSCG  DISA
VSSG  DISA
VSPC  DISA
VSUC  DISA
VSTC  DISA
UPRA  DISA
TURA  DISA
TPRA  DISA
CGR   ALLO GAPI GAPI
SGR   ALLO GAPI GAPI
POTA  ALLO
URAN  ALLO PPM  PPM
THOR  ALLO PPM  PPM
W1NG  ALLO CPS  CPS
W2NG  ALLO CPS  CPS
W3NG  ALLO CPS  CPS
W4NG  ALLO CPS  CPS
W5NG  ALLO CPS  CPS
CHVS  ALLO V    V    PROP
DHVF  ALLO V    V    PROP
APLW  ALLO CPS  CPS  PROP
APUW  ALLO CPS  CPS  PROP
PPLW  ALLO CPS  CPS  PROP
PPUW  ALLO CPS  CPS  PROP
TPLW  ALLO CPS  CPS  PROP
TPUW  ALLO CPS  CPS  PROP
SNGT  ALLO           PROP
NGPE  ALLO           PROP
RSGR  ALLO GAPI GAPI AUX
RW1N  ALLO CPS  CPS  AUX
RW2N  ALLO CPS  CPS  AUX
RW3N  ALLO CPS  CPS  AUX
RW4N  ALLO CPS  CPS  AUX
RW5N  ALLO CPS  CPS  AUX
NDPD  DISA
PHIX  DISA
QS    DISA
RHGX  ALLO K/M3 K/M3
RO    DISA OHMM OHMM
RWA   DISA OHMM OHMM
SCNL  ALLO           AUX
NPHI  ALLO
NRAT  ALLO
NCNL  ALLO CPS  CPS
FCNL  ALLO CPS  CPS
RNRA  ALLO           AUX
DPHI  DISA
DRHO  ALLO K/M3 K/M3
RHOB  ALLO K/M3 K/M3
QSS   ALLO
QLS   ALLO
QRSS  ALLO
QRLS  ALLO
LURH  ALLO K/M3 K/M3
LSRH  ALLO K/M3 K/M3
SIRH  ALLO K/M3 K/M3
PEF   ALLO
SLDT  ALLO           PROP
RSS2  ALLO CPS  CPS  AUX
RSS1  ALLO CPS  CPS  AUX
RLIT  ALLO CPS  CPS  AUX
RLS   ALLO CPS  CPS  AUX
RLU   ALLO CPS  CPS  AUX
RLL   ALLO CPS  CPS  AUX
FFLS  ALLO           AUX
FFSS  ALLO           AUX
SSHV  ALLO V    V    AUX
LSHV  ALLO V    V    AUX
PARI  ALLO           PROP
SS2   ALLO CPS  CPS
SS1   ALLO CPS  CPS
LITH  ALLO CPS  CPS
LS    ALLO CPS  CPS
LU    ALLO CPS  CPS
LL    ALLO CPS  CPS
RDPS  ALLO CPS  CPS  PROP
RTCS  ALLO CPS  CPS  PROP
RDPL  ALLO CPS  CPS  PROP
RDCL  ALLO CPS  CPS  PROP
RSUU  ALLO CPS  CPS  PROP
RSLU  ALLO CPS  CPS  PROP
RSUL  ALLO CPS  CPS  PROP
RSLL  ALLO CPS  CPS  PROP
RLUU  ALLO CPS  CPS  PROP
RLLU  ALLO CPS  CPS  PROP
RLUL  ALLO CPS  CPS  PROP
RLLL  ALLO CPS  CPS  PROP
LHVD  ALLO V    V    PROP
SHVD  ALLO V    V    PROP
IHV   DISA F3   F3
DCAL  DISA MM   MM
CALI  ALLO MM   MM
RCAL  ALLO MM   MM   AUX
BS    DISA MM   MM
DMOR  DISA M    M    AUX
MARK  ALLO M    M
DUM2
DUMM
ZERO
CS    ALLO F/HR F/HR
TENS  ALLO N    N
ETIM  ALLO S    S
TIME  ALLO MS   MS
TOD   ALLO S    S
DIFF  ALLO M    M    AUX
TDEP  DISA M    M    AUX

   CP 28.15           FILE    2       13-AUG-85 16:47


  INPU SUMM :
INPU  STAT PUNI TUNI MPOI CNUM    ZREF     PREF     GAIN     OFFS  DCON

MRES  ALLO OHMM OHMM 70
MTEM  ALLO DEGC DEGC 70
EPV        VDC  VDC  0     4
ACUR       MA   MA   0     4
MCUR       MA   MA   0     2
CTEM  ALLO DEGC DEGC 0                                            0
HV    ALLO V    V    0
CCSW  ALLO           0
EVOL       VDC  VDC  0     5
AVOL       V    V    0     0
MVOL       V    V    0     3
APLW  ALLO CPS  CPS  88
APUW  ALLO CPS  CPS  88
NGPE  ALLO           88
PPLW  ALLO CPS  CPS  88
PPUW  ALLO CPS  CPS  88
SNGT  ALLO           88
TPLW  ALLO CPS  CPS  88
TPUW  ALLO CPS  CPS  88
W1NG  ALLO CPS  CPS  88          0.0      489.0
W2NG  ALLO CPS  CPS  88          0.0      284.0
W3NG  ALLO CPS  CPS  88          0.0      44.00
W4NG  ALLO CPS  CPS  88          0.0      24.00
W5NG  ALLO CPS  CPS  88          0.0      45.00
FCNL  ALLO
NCNL  ALLO
SCNL  ALLO           34
LITH  ALLO CPS  CPS  31                                           1
LL    ALLO CPS  CPS  31                                           1
LS    ALLO CPS  CPS  31                                           1
LU    ALLO CPS  CPS  31                                           1
PARI  ALLO           25
SLDT  ALLO           25
SS1   ALLO CPS  CPS  25                                           1
SS2   ALLO CPS  CPS  25                                           1
DTCL  ALLO CPS  CPS  31
DTCS  ALLO CPS  CPS  25
```

DRHO	ALLO	K/M3	K/M3	
RHOB	ALLO	K/M3	K/M3	
QSS	ALLO			
QLS	ALLO			
QRSS	ALLO			
QRLS	ALLO			
LUPH	ALLO	K/M3	K/M3	
LSRH	ALLO	K/M3	K/M3	
S1RH	ALLO	K/M3	K/M3	
PEF	ALLO			
SLDT	ALLO			PROP
RSS2	ALLO	CPS	CPS	AUX
RSS1	ALLO	CPS	CPS	AUX
RLIT	ALLO	CPS	CPS	AUX
RLS	ALLO	CPS	CPS	AUX
RLU	ALLO	CPS	CPS	AUX
RLL	ALLO	CPS	CPS	AUX
FFLS	ALLO			AUX
FFSS	ALLO			AUX
SSHV	ALLO	V	V	AUX
LSHV	ALLO	V	V	AUX
PARI	ALLO			PROP
SS2	ALLO	CPS	CPS	
SS1	ALLO	CPS	CPS	
LITH	ALLO	CPS	CPS	
LS	ALLO	CPS	CPS	
LU	ALLO	CPS	CPS	
LL	ALLO	CPS	CPS	
RDPS	ALLO	CPS	CPS	PROP
RTCS	ALLO	CPS	CPS	PROP
RDPL	ALLO	CPS	CPS	PROP
RDCL	ALLO	CPS	CPS	PROP
RSUU	ALLO	CPS	CPS	PROP
RSLU	ALLO	CPS	CPS	PROP
RSUL	ALLO	CPS	CPS	PROP
RSLL	ALLO	CPS	CPS	PROP
RLUU	ALLO	CPS	CPS	PROP
RLLU	ALLO	CPS	CPS	PROP
RLUL	ALLO	CPS	CPS	PROP
RLLL	ALLO	CPS	CPS	PROP
LHVD	ALLO	V	V	PROP
SHVD	ALLO	V	V	PROP
IHV	DISA	F3	F3	
DCAL	DISA	MM	MM	
CALI	ALLO	MM	MM	
RCAL	ALLO	MM	MM	AUX
BS	DISA	MM	MM	
DMAR	DISA	M	M	AUX
MARK	ALLO	M	M	
DUM2				
DUMM				
ZERO				
CS	ALLO	F/HR	F/HR	
TENS	ALLO	N	N	
ETIM	ALLO	S	S	
TIME	ALLO	MS	MS	
TOD	ALLO	S	S	
DIFF	ALLO	M	M	AUX
TDEP	DISA	M	M	AUX

CP 28.15 FILE 2 13-AUG-85 16:47

INPU SUMM :

INPU	STAT	PUNI	TUNI	MPOI	CNUM	ZREF	PREF	GAIN	OFFS	DCON
MRES	ALLO	OHMM	OHMM	70						
MTEM	ALLO	DEGC	DEGC	70						
EPV		VDC	VDC	0	4					
ACUR		MA	MA	0	4					
MCUR		MA	MA	0	2					
CTEM	ALLO	DEGC	DEGC	0						0
HV	ALLO	V	V	0						
CCSW	ALLO			0						
EVOL		VDC	VDC	0	5					
AVOL		V	V	0	0					
MVOL		V	V	0	3					
APLW	ALLO	CPS	CPS	88						
APUW	ALLO	CPS	CPS	88						
NGPE	ALLO			88						
PPLW	ALLO	CPS	CPS	88						
PPUW	ALLO	CPS	CPS	88						
SNGT	ALLO			88						
TPLW	ALLO	CPS	CPS	88						
TPUW	ALLO	CPS	CPS	86						
W1NG	ALLO	CPS	CPS	88		0.0	489.0			
W2NG	ALLO	CPS	CPS	88		0.0	284.0			
W3NG	ALLO	CPS	CPS	88		0.0	44.00			
W4NG	ALLO	CPS	CPS	88		0.0	24.00			
W5NG	ALLO	CPS	CPS	88		0.0	45.00			
FCNL	ALLO									
NCNL	ALLO									
SCNL	ALLO			34						
LITH	ALLO	CPS	CPS	31						1
LL	ALLO	CPS	CPS	31						1
LS	ALLO	CPS	CPS	31						1
LU	ALLO	CPS	CPS	31						1
PARI	ALLO			25						
SLDT	ALLO			25						
SS1	ALLO	CPS	CPS	25						1
SS2	ALLO	CPS	CPS	25						1
DTCL	ALLO	CPS	CPS	31						
DTCS	ALLO	CPS	CPS	25						
DTPL	ALLO	CPS	CPS	31						
DTPS	ALLO	CPS	CPS	25						
LLLC	ALLO	CPS	CPS	31						
LULC	ALLO	CPS	CPS	31						
LLUC	ALLO	CPS	CPS	31						
LUUC	ALLO	CPS	CPS	31						
SLLC	ALLO	CPS	CPS	25						
SULC	ALLO	CPS	CPS	25						
SLUC	ALLO	CPS	CPS	25						
SUUC	ALLO	CPS	CPS	25						
CALI	ALLO	MM	MM	32		203.2	304.8	.910223	48.6777	
TENS	ALLO	N	N	0	20					
SGR	ALLO	GAPI	GAPI	88			162.0	.955973		1
NRAT	ALLO			40			2.158	.960055		1

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TOOL SUMM :

TOOL	STAT	LENG	WEIG
AMS	ALLO	92	130
TCCA	ALLO	36	57
NGTC	ALLO	100	165
CNTH	ALLO	87	155
LDTD	ALLO	210	311
TEMP	ALLO	0	0
BTT	ALLO	0	0

COMPANY: CANTERRA ENERGY LTD.

WELL: TRILLIUM SOQUIP ONEXCO ET AL BELUGA O-23

FIELD: HUDSON BAY

PROV. : MANITOBA
NATION: CANADA
LOCATION:

LATITUDE: 59 12' 54.4" N
LONGITUDE: 88 33' 26.6" W

PERMANENT DATUM: M.S.L. ELEVATIONS-
ELEV. OF PERM. DATUM: 0.0 M KB: 13.7 M
LOG MEASURED FROM: K.B. DF: 13.1 M
13.7 M ABOVE PERM. DATUM GL: -179.8 M
DRLG. MEASURED FROM: KELLY BUSHING

DATE: 15 AUG 85
RUN NO: 1

OTHER SERVICES-
DLL-MSFL
DDBHC
DIL
RFT

PROGRAM TAPE NO: 28.15
SERVICE ORDER NO: 129401

DEPTH-DRILLER: 1492.0 M
DEPTH-LOGGER: 1490.0 M
BTM. LOG INTERVAL: 1489.0 M
TOP LOG INTERVAL: 558.0 M

CASING-DRILLER: 558.3 M 0.0 M 0.0 M
CASING-LOGGER: 558.0 M 0.0 M 0.0 M
CASING: 508 MM 0
WEIGHT: 197.925 KG/M 0.0 KG/M 0.0 KG/M
BIT SIZE: 374.7 MM

Schlumberger

COMPENSATED NEUTRON LITHOLOGY DENSITY

CSU Field Log

DB1		DB2					
0.0	5000.0	0.0	5000.0	0.0	50.000		
RB (DEG)				DB3A		DB4A	
-40.00			360.00	-1000.	4000.0	-1000.	4000.0
PIAZ(DEG)				DB3		DB4	
-40.00			360.00	0.0	5000.0	0.0	5000.0
HAZI(DEG)				C1 (MM)			
-40.00			360.00	600.00			100.00
DEVI(DEG)				C2 (MM)			
0.0			10.000	600.00			100.00

SENSOR MEASURE POINT TO TOOL ZERO

MTEM	10.67 METER	MRES	10.67 METER
STSG	.38 METER	GR	7.69 METER
TENS	.38 METER	SHDW	.38 METER
C1	.38 METER	ADCR	.38 METER
DCHV	.38 METER	C2	.38 METER
EV	.38 METER	EI	.38 METER
FY	.38 METER	FX	.38 METER
PP	.38 METER	FZ	.38 METER
RAD2	.38 METER	RAD1	.38 METER
RAD4	.38 METER	RAD3	.38 METER
ATEM	.38 METER	ADCZ	.38 METER
VPR	.38 METER	VMR	.38 METER
AY	.38 METER	AX	.38 METER
AZ	.38 METER		

PARAMETERS

NAME	VALUE	UNIT	NAME	VALUE	UNIT
XOFF	0		SOFF	-25.4000	MM
XMOD	MANU		XGAI	2	
VREF	-5.00000	VDC	FCDD	1.	
MDEC	-7.00000	DEG	SHDI	BB	
BS	374.700	MM	BHS	OPEN	

BEFORE SURVEY CALIBRATION SUMMARY

PERFORMED: 09-AUG-85 13:03
PROGRAM FILE: SHDT (VERSION 28.15 85/01/03)

SGTL DETECTOR CALIBRATION SUMMARY

	MEASURED BKGD	MEASURED JIG	CALIBRATED	UNITS
GR	7	168	165	GAPI

SHDT CALIPER CALIBRATION SUMMARY

	MEASURED SMALL	MEASURED LARGE	CALIBRATED SMALL	CALIBRATED LARGE	UNITS
C1	194.6	305.9	203.10	304.8	MM
C2	194.1	304.8	203.10	304.8	MM

COMPANY: CANTERRA ENERGY LTD.

WELL: TRILLIUM SOQUIP ONEXCO ET AL BELUGA O-23

FIELD: HUDSON BAY

PROV. : MANITOBA
NATION: CANADA
LOCATION:

LATITUDE: 59 12' 54.4" N
LONGITUDE: 88 33' 26.6" W

PERMANENT DATUM: M.S.L.
ELEV. OF PERM. DATUM: 0.0 M
LOG MEASURED FROM: K.B.
13.7 M ABOVE PERM. DATUM
DRLG. MEASURED FROM: KELLY BUSHING

ELEVATIONS-
KB: 13.7 M
DF: 13.1 M
GL: -179.8 M

DATE: 15 AUG 85
RUN NO: 1

OTHER SERVICES-
DLL-MSFL
DDBHC
CNL-LDT-NGT
DIL-SFL
RFT

PROGRAM TAPE NO:
28.15
SERVICE ORDER NO:
129401

DEPTH-DRILLER: 1492.0 M
DEPTH-LOGGER: 1490.0 M
BTM. LOG INTERVAL: 1489.0 M
TOP LOG INTERVAL: 558.0 M

CASING-DRILLER: 558.3 M 0.0 M 0.0 M
CASING-LOGGER: 558.0 M 0.0 M 0.0 M
CASING: 508 MM 0
WEIGHT: 197.925 KG/M 0.0 KG/M 0.0 KG/M
BIT SIZE: 374.7 MM

Schlumberger

STRATIGRAPHIC DIPMETER

CSU Field Log

PARAMETERS

NAME	VALUE	UNIT	NAME	VALUE	UNIT
BS	14.7500	IN	BHS	OPEN	

SHOT SUMMARY LISTING PERFORMED 00- -00 01:44

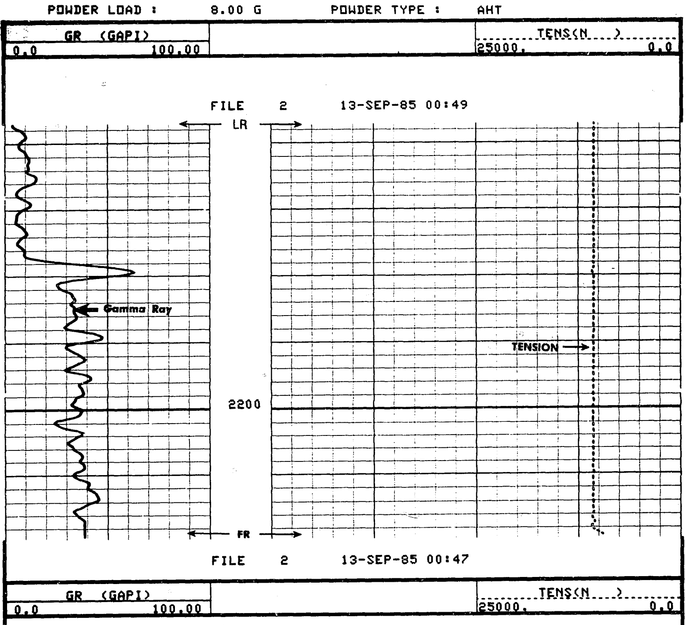
Run 2

SHOT	STATUS	DEPTH	TENSION
1	EMPTY	2209.9	198.8
2	FIRED	2200.0	168.7
3	FIRED	2192.0	1207.
4	FIRED	2192.0	969.0
5	FIRED	2191.0	1296.
6	FIRED	2191.0	1050.
7	LOST	2190.5	1078.
8	FIRED	2189.5	1543.
9	MISFIRED	2180.0	173.1
10	EMPTY	2160.0	114.5
11	LOST	2160.0	301.2
12	MISFIRED	2139.9	110.1
13	FIRED	2120.0	160.5
14	FIRED	2100.0	137.2
15	MISFIRED	2100.0	106.0
16	FIRED	2080.0	156.2
17	FIRED	2060.0	103.6
18	MISFIRED	2040.0	123.9
19	EMPTY	2020.0	85.50
20	FIRED	2020.0	105.5
21	MISFIRED	2000.0	118.8
22	EMPTY	1992.5	123.5
23	FIRED	1992.5	195.3
24	MISFIRED	1980.0	165.3
25	EMPTY	1959.0	162.2
26	EMPTY	1959.0	143.2
27	FIRED	1949.0	105.1
28	FIRED	1920.0	100.5
29	EMPTY	1905.0	77.06
30	EMPTY	1905.0	135.6
31	EMPTY	1893.9	99.50
32	EMPTY	1893.8	219.8
33	FIRED	1880.0	127.5
34	FIRED	1875.9	113.4
35	MISFIRED	1876.0	125.0
36	EMPTY	1852.0	129.2
37	EMPTY	1852.0	98.75
38	EMPTY	1840.0	166.3
39	FIRED	1820.5	228.8
40	EMPTY	1820.5	194.1
41	MISFIRED	1800.0	165.7
42	EMPTY	1780.0	124.0
43	FIRED	1765.0	85.62
44	MISFIRED	1765.0	67.87
45	FIRED	1745.0	84.43
46	FIRED	1745.0	112.0
47	FIRED	1720.0	131.6
48	FIRED	1710.0	123.9
49	FIRED	1694.0	123.5
50	FIRED	1694.0	85.62
51	EMPTY	1680.0	126.0
52	FIRED	1680.0	125.8
53	FIRED	1660.0	88.81
54	MISFIRED	1659.9	149.8
55	FIRED	1620.0	99.87
56	FIRED	1620.0	131.0
57	FIRED	1600.0	128.2
58	FIRED	1577.9	130.5
59	FIRED	1578.0	119.8
60	FIRED	1565.0	86.00
61	FIRED	1565.0	127.1
62	FIRED	1550.0	91.25
63	MISFIRED	1510.9	93.87
64	FIRED	1507.0	92.50
65	EMPTY	1507.0	89.18
66	FIRED	1486.0	97.75

DEPTH UNITS : METE BIT SIZE : 311.150 MM

RING TYPE : NONE BULLET TYPE : DHOL

POWDER LOAD : 8.00 G POWDER TYPE : AHT



Run 2 SENSOR MEASURE POINT TO TOOL ZERO

TENS 5.8 METER GR 7.3 METER

PARAMETERS

NAME	VALUE	UNIT	NAME	VALUE	UNIT
BS	311.150	MM	BHS	OPEN	

COMPANY CANTERRA ENERGY LTD.

WELL TRILLIUM SOQUIP ONEXCO ET AL BELUGA 0-23

FIELD HUDSON BAY PROVINCE MANITOBA

Schlumberger

8710-C55-1-1

Schlumberger

DART LONG SPACING SONIC

CSU Field Log

COMPANY: CANTERRA ENERGY LTD.

WELL: TRILLIUM SOQUIP ONEXCO ET AL BELUGA D-23

FIELD: HUDSON BAY

PROV. : MANITOBA
NATION: CANADA
LOCATION:

OTTAWA COPY

LATITUDE: 59 12' 54.4" N
LONGITUDE: 88 33' 26.6" W

PERMANENT DATUM: M.S.L.
ELEV. OF PERM. DATUM: 0.0 M
LOG MEASURED FROM: K.B.
13.7 M ABOVE PERM. DATUM
DRLG. MEASURED FROM: KELLY BUSHING

ELEVATIONS-
KB: 13.7 M
DF: 13.1 M
GL: -179.8 M

OTHER SERVICES-
DLL-MSFL
DISFL
CNL-LDT-NGT
SHDT
CST

PROGRAM TAPE NO:
28.15
SERVICE ORDER NO:
129401

DATE: 15 AUG 85
RUN NO: A

DEPTH-DRILLER: 1492.0 M
DEPTH-LOGGER: 1490.5 M
BTM. LOG INTERVAL: 1489.5 M
TOP LOG INTERVAL: 558.5 M

CASING-DRILLER: 558.3 M 0.0 M 0.0 M
CASING-LOGGER: 558.5 M 0.0 M 0.0 M
CASING: 508 MM 0
WEIGHT: 197.925 KG/M 0.0 KG/M 0.0 KG/M
BIT SIZE: 374.7 MM

TYPE FLUID IN HOLE: NACL SATURATED GEL POLYMER
DENSITY: 1258. K/M3
VISCOSITY: 40.0 S
PH: 10.6
FLUID LOSS: 20.0 C3
SOURCE OF SAMPLE: CIRC.
RM: .056 OHMM AT 23.0 DEGC
RMF: .046 OHMM AT 23.0 DEGC
RMC: .112 OHMM AT 21.0 DEGC
SOURCE RMF/RMC: PRESS /PRESS
RM AT BHT: .049 OHMM AT 29.0 DEGC
RMF AT BHT: .040 OHMM AT 29.0 DEGC
RMC AT BHT: .094 OHMM AT 29.0 DEGC

TIME CIRC. STOPPED: 17:30 / 14
TIME LOGGER ON BTM.: 08:00 / 15

MAX. REC. TEMP: 29.0 DEGC

LOGGING UNIT NO: 922
LOGGING UNIT LOC: ST. JOHN'S
RECORDED BY: BEBB
WITNESSED BY: W. GONNASON

REMARKS:

TOOL STRING CENTRALIZED WITH CME-Z
RUN IN COMBINATION WITH DISFL

EQUIPMENT NUMBERS-

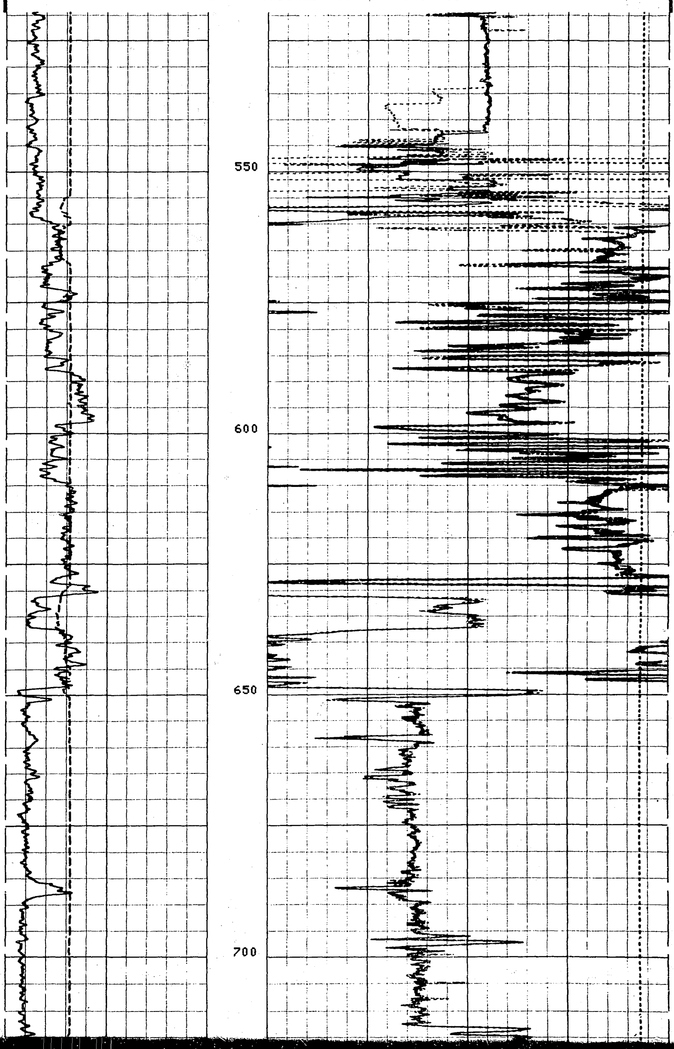
SLM-DA 2083 NSM 3727 IEM-BD 1497 SLC-FA 2011
SLS-SC 455 SGC-JC 1695 MCD-DA 311

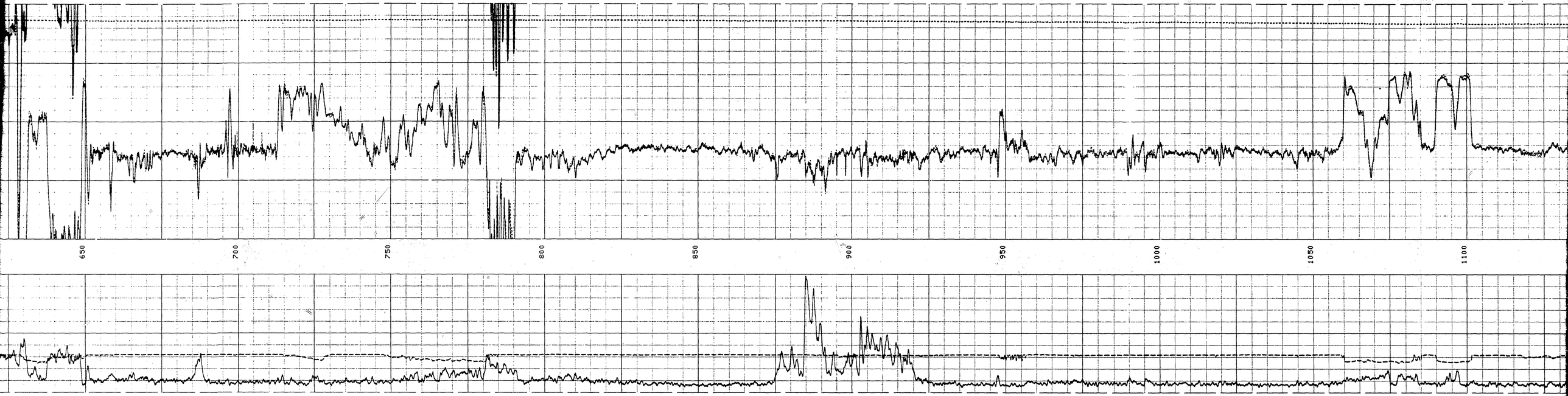
ALL INTERPRETATIONS ARE OPINIONS BASED ON INFERENCES FROM ELECTRICAL OR OTHER MEASUREMENTS AND WE CANNOT, AND DO NOT GUARANTEE THE ACCURACY OR CORRECTNESS OF ANY INTERPRETATIONS, AND WE SHALL NOT, EXCEPT IN THE CASE OF GROSS OR WILLFUL NEGLIGENCE ON OUR PART, BE LIABLE OR RESPONSIBLE FOR ANY LOSS, COSTS, 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 OUR GENERAL TERMS AND CONDITIONS AS SET OUT IN OUR CURRENT PRICE SCHEDULE.

CP 28.15 FILE 0 15-AUG-85 17:39
DATA ACQUIRED 15-AUG-85 09:15

CALI(MM)		TENS(N)
300.00 550.00	DTL (US/M)	50000. 0.0
GR (GAPI)		300.00 100.00
0.0 150.00	DT (US/M)	
		300.00 100.00

CP 28.15 FILE 2 15-AUG-85 17:37
DATA ACQUIRED 15-AUG-85 09:15

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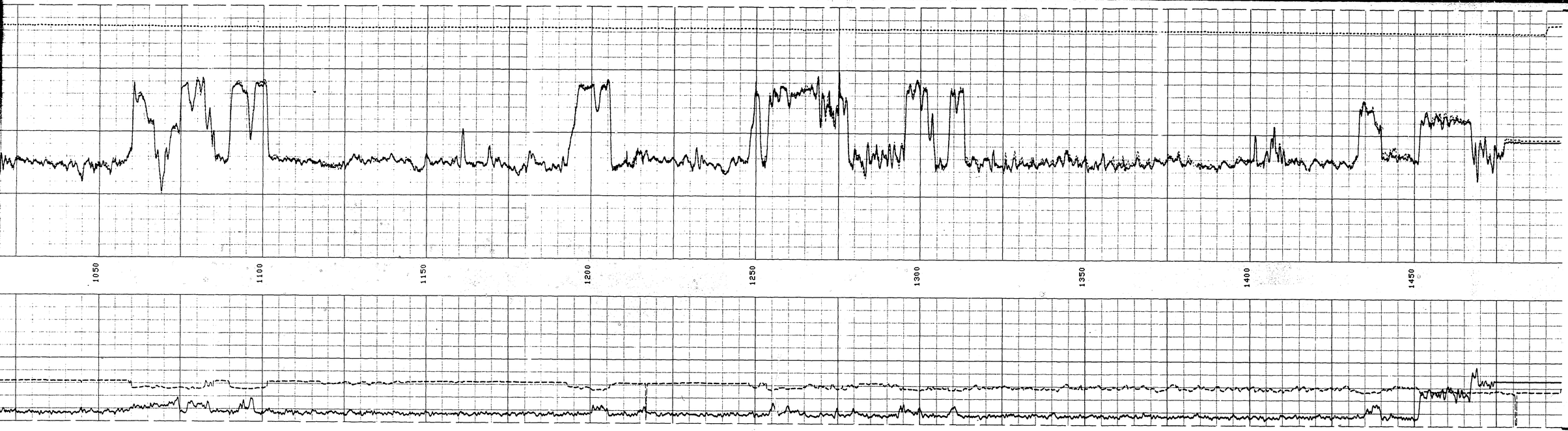
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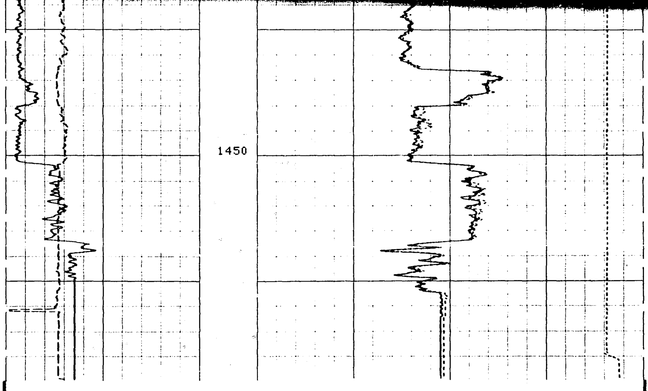
1100
1150
1200
1250
1300
1350
1400
1450
CP 28.15
FILE 2
DATA ACQUIRED 15-AUG-85 17:30
15-AUG-85 07:45
TENS(N)
50000. 0.0
DTL (US/M)
300.00 100.00
DT (US/M)
300.00 100.00
CALI(MM)
300.00 550.00
GR (GAPI)
0.0 150.00
SENSOR MEASURE POINT TO TOOL ZERO



CP 28.15 FILE 2 15-AUG-85 17:30
DATA ACQUIRED 15-AUG-85 07:45

CALI(MM)		TENS(N)	
300.00	550.00	50000.	0.0
GR (GAPI)		DTL (US/M)	
0.0	150.00	300.00	100.00
		DT (US/M)	
		300.00	100.00

SENSOR MEASURE POINT TO TOOL ZERO

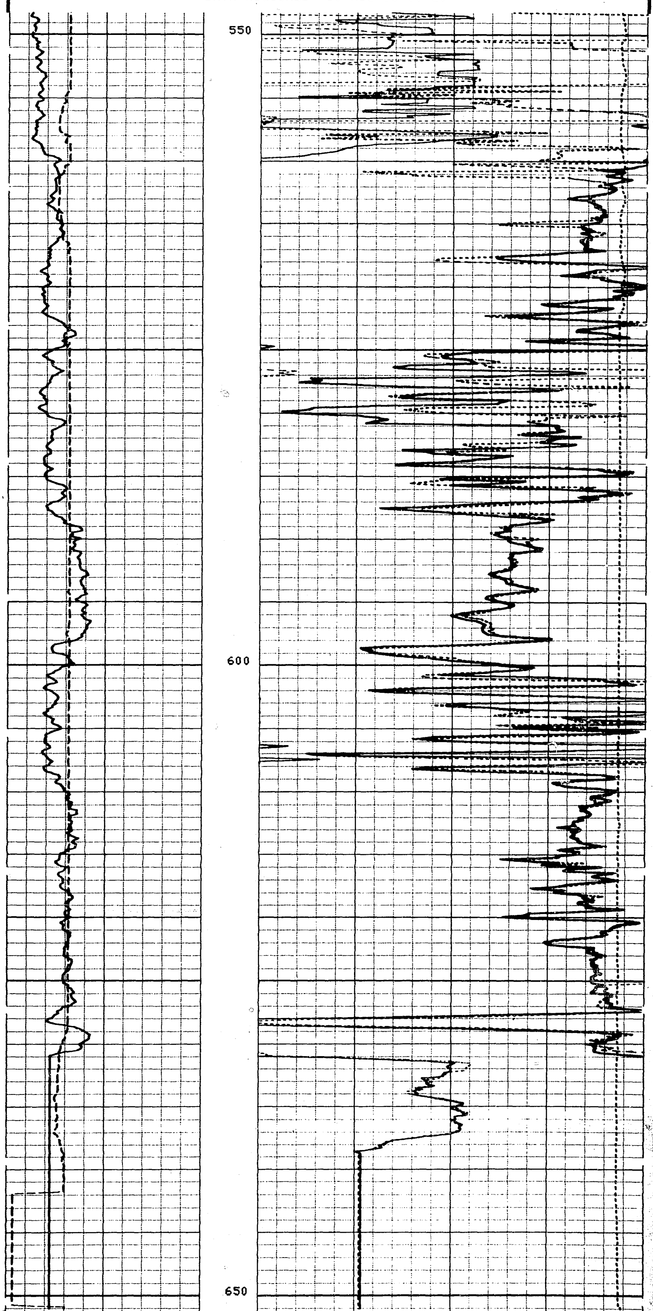
SRAT	15.82	METER	AMPL	14.30	METER
TT1	14.60	METER	CBL	14.30	METER
TT3	14.30	METER	TT2	14.30	METER
T0	14.30	METER	TT4	13.99	METER
SLTT	14.30	METER	TT	14.30	METER
GR	20.70	METER	SCBL	14.30	METER
ILD	2.87	METER	CALI	9.70	METER
SFL	1.95	METER	ILM	1.75	METER
SPAR	.76	METER	SP	.76	METER
NDIS	.76	METER	TENS	.76	METER

PARAMETERS

NAME	VALUE	UNIT	NAME	VALUE	UNIT
CDTS	100.000		SPFS	R-H	
DTF	620.075	US/M	DTM	183.727	US/M
SPS	DT		ITTS	DTL	
DSIN	5	US	DDEL	200	US
WMUD	8.00000	LB/G	DWCO	512	
SBR	1.00000	OHMM	DSEC	6.30000	MMHO
BHS	OPEN		MSEC	8.60000	MMHO
DO	0.0	M	BS	374.700	MM
PP	OFF				

BS (MM)		TENS(N)	
300.00	550.00	50000.	0.0
CALI(MM)		DTL (US/M)	
300.00	550.00	300.00	100.00
GR (GAPI)		DT (US/M)	
0.0	150.00	300.00	100.00

CP 28.15 FILE 3 15-AUG-85 17:02
DATA ACQUIRED 15-AUG-85 09:29



CP 28.15 FILE 3 15-AUG-85 17:01
DATA ACQUIRED 15-AUG-85 09:20

BS (MM)		TENS(N)	
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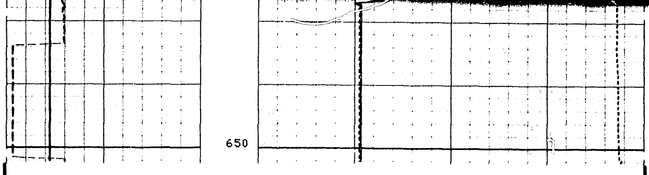
CALI(MM)		DTL (US/M)	
300.00	550.00	300.00	100.00
GR (GAPI)		DT (US/M)	
0.0	150.00	300.00	100.00

SENSOR MEASURE POINT TO TOOL ZERO

SRAT	15.82	METER	AMPL	14.30	METER
TT1	14.60	METER	CBL	14.30	METER

4 of



CP 28.15 FILE 3 15-AUG-85 17:01
DATA ACQUIRED 15-AUG-85 09:20

BS (MM)		TENS(N)	
300.00	550.00	50000.	0.0
CALI(MM)		DTL (US/M)	
300.00	550.00	300.00	100.00
GR (GAPI)		DT (US/M)	
0.0	150.00	300.00	100.00

SENSOR MEASURE POINT TO TOOL ZERO

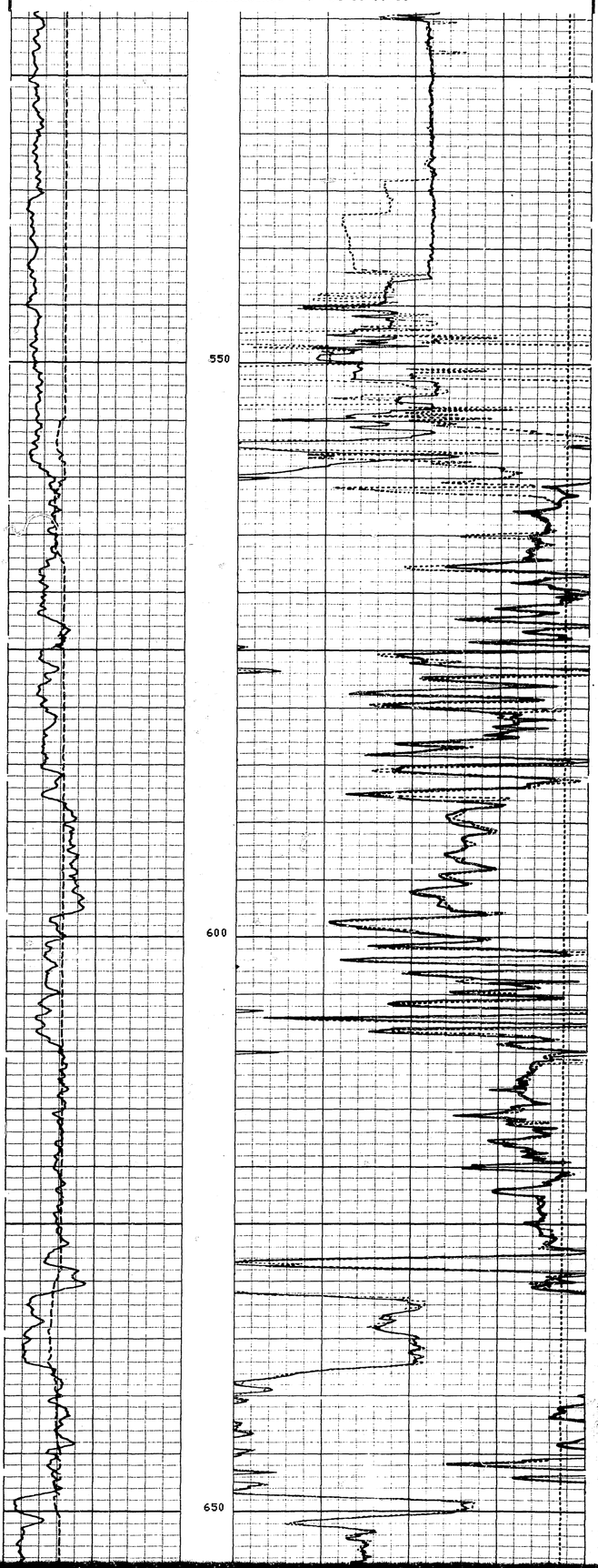
SRAT	15.82	METER	AMPL	14.30	METER
TT1	14.60	METER	CBL	14.30	METER
TT3	14.30	METER	TT2	14.30	METER
T0	14.30	METER	TT4	13.99	METER
SLTT	14.30	METER	TT	14.30	METER
GR	20.70	METER	SCBL	14.30	METER
ILD	2.87	METER	CALI	9.70	METER
SFL	1.95	METER	ILM	1.75	METER
SPAR	.76	METER	SP	.76	METER
NOIS	.76	METER	TENS	.76	METER

PARAMETERS

NAME	VALUE	UNIT	NAME	VALUE	UNIT
CDTS	100.000		SPFS	R-H	
DTF	620.079	US/M	DTM	183.727	US/M
SPS	DT		ITTS	DTL	
DSIN	5	US	DDEL	200	US
WMUD	8.00000	LB/G	DWCO	512	
SBR	1.00000	OHMM	DSEC	6.30000	MMHO
BHS	OPEN		MSEC	8.60000	MMHO
DO	0.0	M	BS	374.700	MM
PP	OFF				

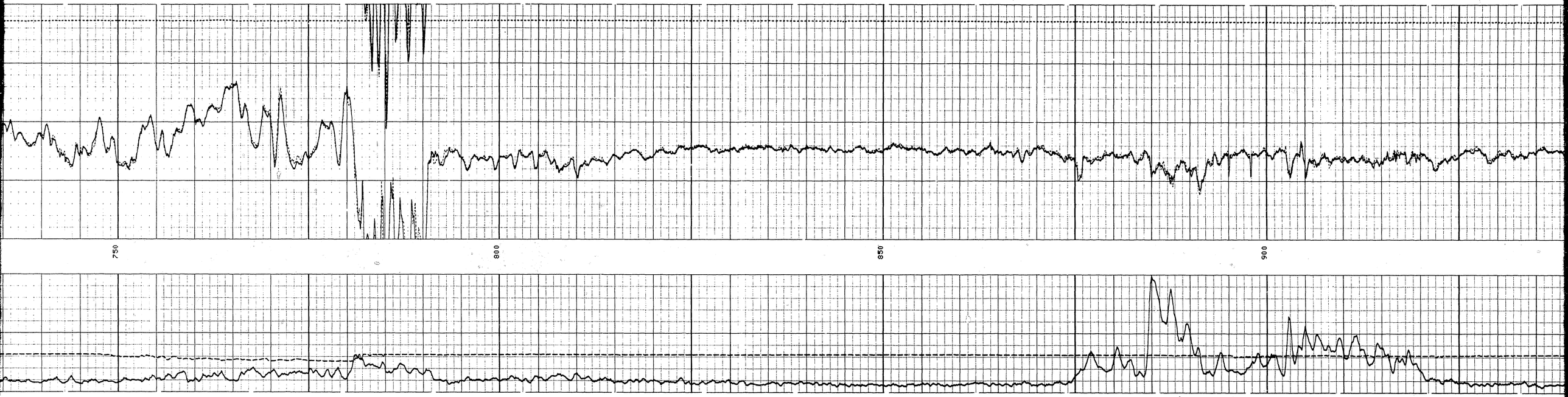
BS (MM)		TENS(N)	
300.00	550.00	50000.	0.0
CALI(MM)		DTL (US/M)	
300.00	550.00	300.00	100.00
GR (GAPI)		DT (US/M)	
0.0	150.00	300.00	100.00

CP 28.15 FILE 2 15-AUG-85 16:59
DATA ACQUIRED 15-AUG-85 09:15



5 of

600
650
700
750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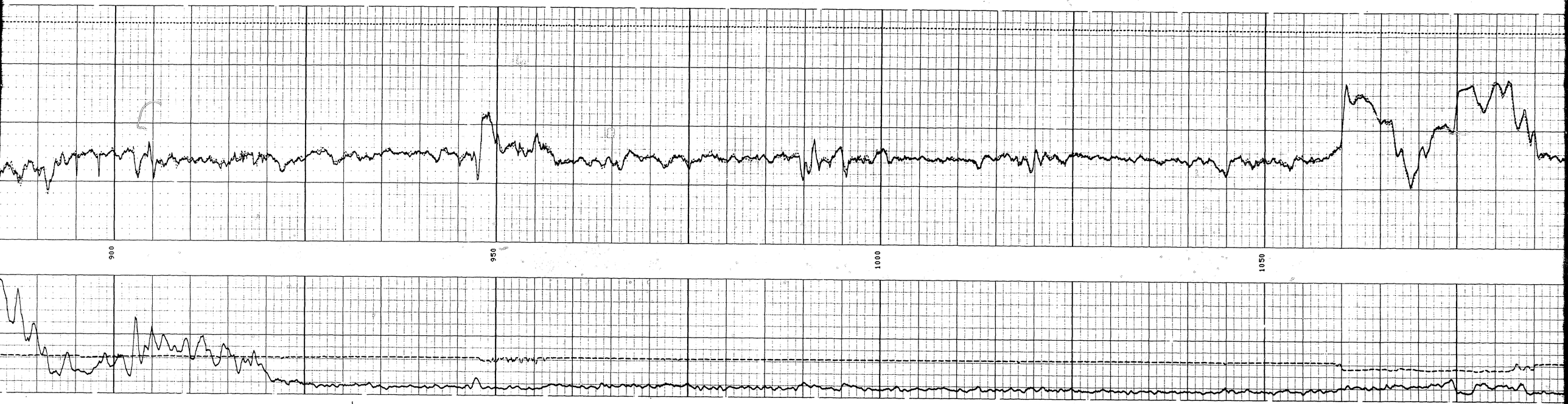
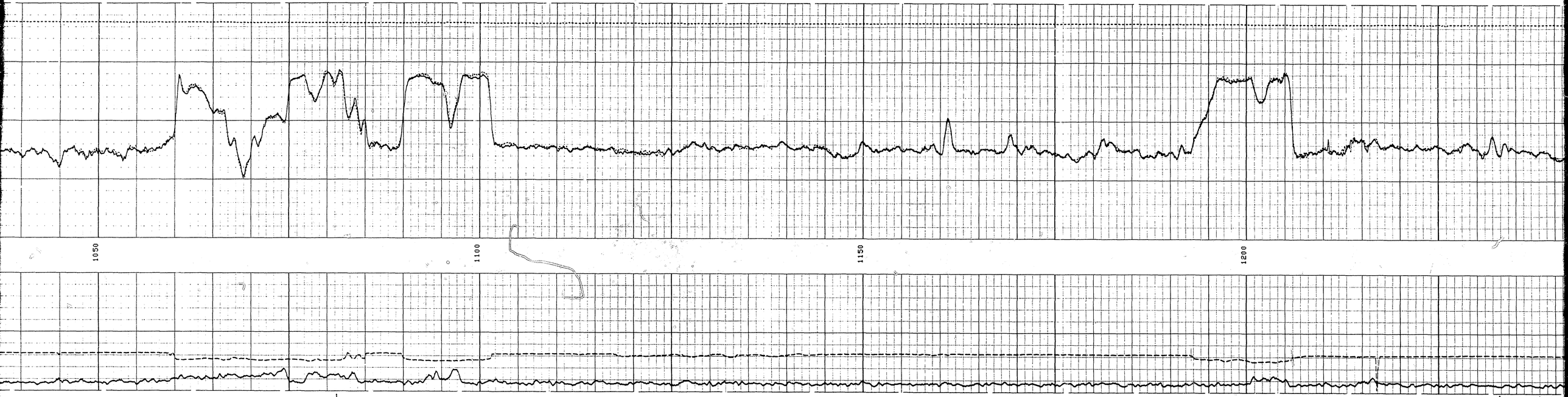


8 OF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1150
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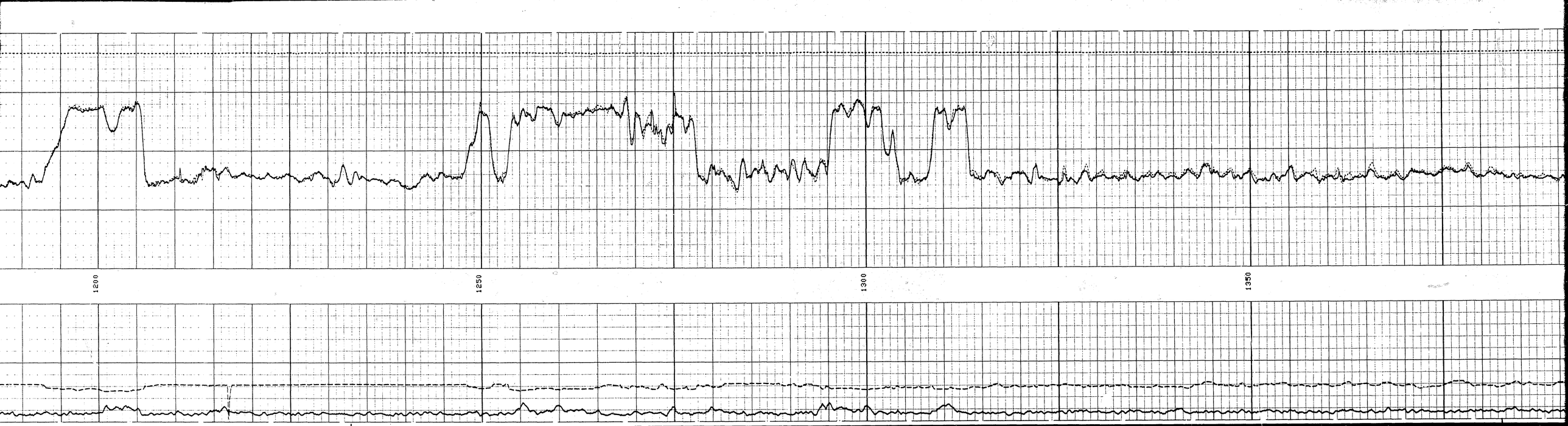
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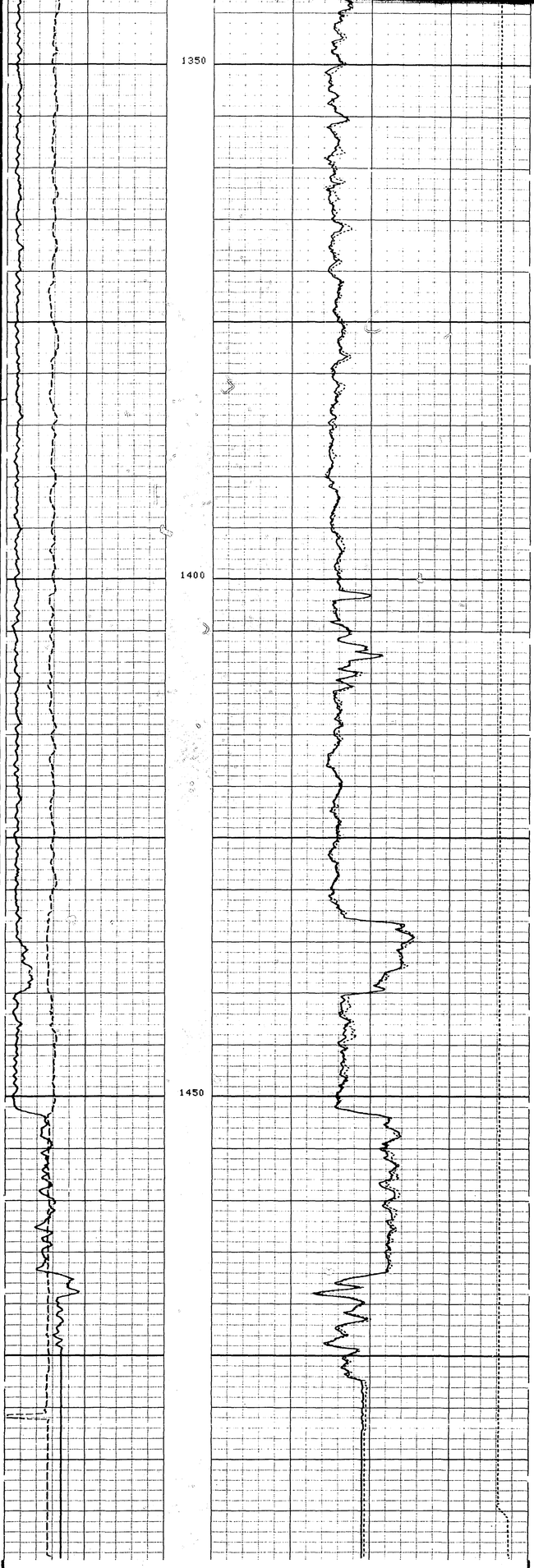

CP 28.15 FILE 2 15-AUG-85 16:52
DATA ACQUIRED 15-AUG-85 07:45

BS (MM) 300.00 550.00		TENS(N) 50000. 0.0
CALI(MM) 300.00 550.00		DTL (US/M) 300.00 100.00
GR (GAPI) 0.0 150.00		DT (US/M) 300.00 100.00

SENSOR MEASURE POINT TO TOOL ZERO

SRAT	15.82	METER	AMPL	14.30	METER
TT1	14.60	METER	CBL	14.30	METER
TT3	14.30	METER	TT2	14.30	METER
T0	14.30	METER	TT4	13.99	METER
SLTT	14.30	METER	TT	14.30	METER
GR	20.70	METER	SCBL	14.30	METER
ILD	2.87	METER	CALI	9.70	METER
SFL	1.95	METER	ILM	1.75	METER
SPAR	.76	METER	SP	.76	METER
NOIS	.76	METER	TENS	.76	METER

PARAMETERS

NAME	VALUE	UNIT	NAME	VALUE	UNIT
CDTS	100.000		SPFS	R-H	
DTF	620.079	US/M	DTM	183.727	US/M
SPS	DT		ITTS	DTL	
DSIN	5	US	DDEL	200	US
WMUD	8.00000	LB/G	DWCO	512	
SBR	1.00000	OHMM	DSEC	6.30000	MMHO
BHS	OPEN		MSEC	8.60000	MMHO
DO	0.0	M	BS	374.700	MM
PP	OFF				

BS (MM)		TENS(N

1G

2OF2

[redacted]

ROBERTSON RESEARCH CANADA LIMITED

EXPLORATION REPORT 2300

THE MICROPALEONTOLOGY, PALYNOLOGY AND STRATIGRAPHY OF THE TRILLIUM ET. AL BELUGA O-23 WELL

8710-CSS-1-1-
Ottawa

BY

G. Dolby

CANADA OIL AND GAS LANDS ADMINISTRATION
ADMINISTRATION DU PÉTROLE ET DU GAZ DES TERRES DU CANADA
MAR 26 1986
ENGINEERING AND CONTROL BRANCH
TECHNIQUE ET DU CONTRÔLE

Prepared for: CANTERRA ENERGY
604 - 5th Avenue S.W.
CALGARY, ALBERTA
T2P 2K7

Prepared by: ROBERTSON RESEARCH CANADA LIMITED
300, 604 - 1st Street S.W.
CALGARY, ALBERTA
T2P 1M7

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SECTION I

INTRODUCTION

The Trillium et al Beluga O-23 well was drilled in Hudson Bay at 59°12'54.4"N., 88°33'26.6"W.

Cuttings samples were received covering the interval 580m to to 2185m. Nineteen samples at 30m intervals were prepared for palynology over the 580m-1120m interval and 43 samples composited over 30m intervals in suitable lithologies were prepared for conodonts from 620m to 2185m.

The prepared samples and raw data on which this report is based are curated in the confidential files of Robertson Research Canada Limited.

SECTION II

BIOSTRATIGRAPHIC BREAKDOWN

Interval Top	Age
610m	Middle Devonian, Givetian - ?Eifelian
----------?Unconformity----------	
705m	Early Devonian, Emsian
1490m	Early Devonian, Emsian to Siegenian
1785m	Indeterminate
----------?Unconformity----------	
1905m	Ordovician, ?Late - Middle
2150m - 2185m	Indeterminate

SECTION III

SUMMARY AND CONCLUSIONS

The following are the main features of stratigraphic interest which have emerged during the course of this study.

1. The highest productive sample in the well at 610m is Late Givetian in age based on the palynoflora.

2. A composite sample from the 620m - 90m yielded pteropods which may range into the Late Givetian but are more typical of Eifelian and Emsian strata.

3. A stratigraphic break is postulated at 705m at the top of the Emsian section. However, because of the lithologies (evaporites and red beds) which make up a considerable portion of the overlying section, this break (unconformity?) could be higher. There is very little evidence to indicate the presence of Early Givetian and Eifelian strata.

4. Emsian microfaunas were recovered from the 705m - 1490m section.

5. From 1490m to 1785m, Early Devonian faunas of Emsian to Siegenian age were recovered.

6. No identifiable faunas were recovered between 1785m and 1905m.

7. Ordovician strata comprise the section between 1905m and 2150m. Most of the evidence points to a Middle Ordovician age although an Late Ordovician age cannot be ruled out for the highest sample.

8. No identifiable microfossils were recovered below 2150m.

Environments of Deposition

1. A shallow marine environment prevailed during Ordovician times at this locality.

2. Although little was recovered from the interval 1785m - 1905m, shallow marine conditions probably existed.

3. Apart from the evaporitic and red-bed intervals, shallow shelf to shallow marine conditions were present throughout the remainder of the well.

Organic Maturity

1. The spore floras and conodonts indicate immature to barely mature sediments down to 1805m. The conodont index at the low end of CAI 1 indicates temperatures in the 50°C - 80°C range.

2. The CAI index of 1.5 between 1810m and 1920m indicates fully mature sediments in the oil window.

SECTION IV

DEVONIAN

Interval: 610m - 705m. Middle Devonian, Givetian - ?Eifelian

The age of this interval is based on the following criteria:

- The presence of Geminospora svalbardiae at and below 610m.
- The presence of Verrucosisporites cf. premnus, Grandispora tomentosa and Contagisporites optivus in the 610m sample.
- The presence of the Nowackia sulcata group of pteropods in the 620 - 690m composite.
- The presence of Angochitina cf. milanensis at 675m.

Micropalaeontology

A sample composited over the 620 - 690m interval yielded specimens of the Nowakia sulcata group of pteropods which are known to range into the lowermost Givetian. There is some evidence to suggest that this group may range into the Late Givetian but this is still questionable.

Palynology

The 610m sample yielded a Late Givetian spore assemblage including the following species:

Geminospora svalbardiae,	Late Givetian and younger
Contagisporites optivus,	Late Givetian and younger
Stenozonotriletes notatus,	Givetian - Frasnian
Grandispora tomentosa,	Late Eifelian - Givetian
Convolutispora cf. tegula,	Givetian
Verrucosisporites cf. premnus,	Late Givetian
Auroraspora macromanifesta,	Givetian - Late Devonian

Samples at 675m and 700m also yielded G. svalbardiae and the higher sample yielded a specimen of the chitinozoan, Angochitina cf. milanensis, which characterises the Givetian elsewhere. However, since the recorded lithologies are doubtful below 650m, these specimens may be cavings contaminants.

In view of the fact that below 705m the section is of Emsian age, a major unconformity probably exists somewhere in this upper sequence (see Summary and Conclusions).

Environment of Deposition

From 610m - 650m (top of salt), rare acritarchs along with pteropods, sponge spicules and crinoid fragments indicate a shallow marine environment.

Interval: 705m - 1490m. Early Devonian, Emsian

The age of this interval is based on the following criteria:

- The presence of the pteropods Nowackia karpinskii gp. and N. sulcata gp. in the 705m - 780m cuttings samples.

- The presence of the conodont Icriodus corniger ancestralis in the 725m - 740m cuttings sample.

- The presence of the conodont Polygnathus kendalli in the 765m - 785m sample and Icriodus fusiformis in the 1200m - 1205m sample.

- The presence of the pteropods Tentaculites sp. and Styliolina sp. in the 1475m - 1490m sample.

Micropalaeontology

The microfossil yield throughout this interval varied considerably due to the thick sections of evaporites present between 790m and 1452m. Occasional thin dolomitic horizons yielded conodonts, pteropods, crinoid fragments and sponge spicules.

The appearance below 705m of abundant pteropods belonging to the Nowackia karpinski and N. sulcata groups indicates the penetration of Early Devonian strata.

The Upper Emsian conodonts Icriodus corniger ancestralis and Polygnathus kendalli appear in the 725m - 740m and 765m - 785m cuttings samples respectively and the Emsian form Icriodus fusiformis is present in the 1200 - 1205m sample.

The pteropods Tentaculites sp. and Styliolina sp. in the 1475m - 1490m composite indicate that the age at this point is no older than Emsian. The early Devonian form Styliolina cf. fissurella is present at 1070m and Tentaculitid and Dacryonarid pteropods are present below 1310m.

Palynology

Samples were processed for palynology down to 1000m but in view of the predominantly evaporitic lithologies it is unlikely that the recovered palynofloras are in situ. Most of the taxa recovered are relatively long-ranging and can characterise late Lower and Middle Devonian strata.

Verrucosisporites cf. devonicus in the 820m sample has been recorded from Emsian strata on the Gaspe Peninsula and confirms the age determined from the microfauna. The spore assemblages below 790m however, are dominated by specimens of Enigmophytospora simplex and ?Foveosporites pertusus which have long ranges. Specimens of Geminospora svalbardiae in the 730m, 760m and 1030m samples and Gandispora cf. tomentosa in the 940m sample are interpreted as cavings contaminants from the overlying section.

Most samples yielded acritarchs with Early to Middle Devonian (or younger) ranges. Significant species recovered include:

Stellinium micropolygonale	Diexallophasis remota
Veryhachium lairdii	Palacanthus ledanoisii
Navifusa bacillum	Gorgonisphaeridium aff. sericum
Duvernaysphaera sp.	Lophosphaeridium cf. dumalis

Environment of Deposition

Apart from the evaporitic intervals, the environments of deposition were predominantly shallow marine but the abundance of Dacryocnarid pteropods below 1460m indicates a deeper, open marine environment.

Interval: 1490m - 1785m. Early Devonian, Emsian-Siegenian

The age of this interval is based on the following criteria:

- The overlying Emsian section.
- The presence of Coelerodontus sp. at 1645m - 1660m and 1745m - 1760m.
- The presence of Polygnathus sp. at 1765m - 1785m.

Micropalaeontology

Few samples yielded microfaunas in this section. The specimens of Coelerodontus sp. at 1645m - 1660m and 1745m - 1760m indicate an Early Devonian age and the presence of Polygnathus sp. at 1765m - 1785m indicates an Emsian - Siegenian age.

Environment of Deposition

Apart from the evaporitic interval 1519m - 1543m, a shallow marine environment is indicated by the conodonts, infrequent as they are, and a shallow-water shelf environment is indicated by the fauna recovered from the 1765m - 1785m sample.

Interval: 1785m - 1905m, Indeterminate

Only rare, unidentifiable conodont fragments were recovered from this predominantly clastic interval.

SECTION V

ORDOVICIAN AND ?OLDER

Interval: 1905m - 2150m. ?Late to Middle Ordovician

The age of this interval is based on the following criteria:

- The conodont Panderodus gracilis at and below 1905m - 1920m.
- The conodont Plectodina aculeatus at and below 2020m - 2030m.
- The conodonts Drepanoistodus suberectus and Belodina compressa at and below 2095m - 2110m.

Micropalaeontology

The presence of Panderodus gracilis in the 1905m - 1920m sample is indicative of an Upper to Middle Ordovician age. However, the assemblages below 2020m, characterised by Plectodina aculeatus, Drepancistodus suberectus and Belodina compressa are Middle Ordovician in age.

No distinctly Upper Ordovician faunas were recovered and most faunas are Middle Ordovician in age.

Environment of Deposition

The faunas indicate a shallow marine environment of deposition.

Interval: 2150m - 2185m. Indeterminate

Micropalaeontology

Only rare conodont fragments were recovered from this interval.

SECTION VI

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SECTION VII

SPECIES LISTS

Only productive samples are described.

Palynomorphs

610m	Geminospora svalbardiae Verrucosiporites cf. premnus Grandispora tomentosa Contagisporites optivus Convolutispora cf. tegula Stenozonotriletes notatus Auroraspora macra	
675m	G. svalbardiae Angochitina cf. milanensis	
700m	G. svalbardiae Stenozonotriletes inspissatus	
730m	G. svalbardiae	
760m	G. svalbardiae	Stellinium micropolygonale Veryhachium lairdii
790m	Enigmophytospora simplex ?Fovesporites pertusus	Navifusa bacillum Diexallophasis remota
820m	E. simplex ?F. pertusus Verrucosisporites cf. devonicus	cf. Palacanthus ledanoisii V. lairdii
850m	E. simplex ?F. pertusus	
910m		Diexallophasis remota
940m	E. simplex G. tomentosa ?F. pertusus	Gorgonisphaeridium aff. sericum V. lairdii
970m	E. simplex ?F. pertusus	Lophosphaeridium cf. dumalis
1030m	G. svalbardiae E. simplex V. cf. premnus	

MICROFAUNA

FAUNA	
620 - 690m	Pteropoda **Nowakia sulcata** Gp. Sponge spicules Crinoid fragments
705 - 780m	Pteropoda **Nowakia karpinskii** Gp. **Nowakia sulcata** Gp. Sponge spicules Crinoid fragments
725-740m	Conodonts **Icriodus corniger ancestralis**
745-760m	Conodonts Fragments
765-785m	Conodonts **Polygnathus kendalli**
805 - 845m	Sponge spicules Crinoid plates
1070m	Pteropoda **Styliolina** cf. **fissurella**
1200-1205m	Conodonts **Icriodus fusiformis**
1310m	Crinoid columnals Sponge spicules Tentaculitid pteropods
1460m	Sponge spicules Scolecodont Dacryoconarid pteropods Crinoid columnals Tentaculid pteropods
1475-1490m	Conodonts Fragments Pteropods **Tentaculites** sp. **Styliolina** sp.

1480m	Sponge spicules Dacryoconarid pteropods Tentaculitied pteropods
1645-1660m	Conodonts **Coelerodontus** sp.
1665-1680m	Conodonts **Spathognathodus** sp.
1745-1760m	Conodonts **Coelerodontus** sp. Fragments
1765-1785m	Conodonts **Polygnathus** sp. Fragments
1790-1805m	Conodonts Simple cone
1810-1815m	Conodonts Simple cone
1905-1920m	Conodonts **Panderodus gracilis**
1925-1945m	Conodonts **Ozarkodina** sp.
2020-2030m	Conodonts **Panderodus gracilis** **Plectodina aculeatus**
2035-2050m	Conodonts **Fragments**
2055-2070m	Conodonts **Drepanoistodus** sp.
2095-2110m	Conodonts **Drepanoistodus suberectus** **Panderodus gracilis** **Belodina compressa**
2115-2130m	Conodonts **Panderodus gracilis** **Plectodina aculeatus**

2135-2150m	Conodonts **Belodina compressa** **Drepanoistodus suberectus** **Panderodus gracilis**
2155-2170m	Conodonts Fragments

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ADMINISTRATION DU PÉTROLE ET DU GAZ DES TERRES DU CANADA
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ENGINEERING AND CONTROL BRANCH
TECHNIQUE ET DU CONTROLE

GEOCHEMICAL EVALUATION OF TRILLIUM SOQUIP ONEXCO BELUGA O-23 WELL

0-23-59-20-88-30

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Table 2 Extraction Data:
630, 690, 710, 1 070, 1 270, 1 290, 1 750, 1 870 and 1 990 metres

Summary and Conclusion

The geochemical evaluation of the Beluga O-23 well section allows us to summarize the following points:

- An immature source rock for oil occurs in the shallow part of the section at a depth of 630 m. The richness in organic carbon is high at a 3.4 percent level. At 710 m a smaller amount of organic matter of a nature similar to the 630 m source interval could be a second source horizon but is more likely due to caving from the 630 m interval. Contamination somewhat affects that data but not significantly.

    - Another horizon between 1720 m and 1850 m displays minor source potential consisting of oil-prone organic matter but in a very minute amount, at incipient maturity level.

    - The rest of the section shows poor source rock potential.

- The maturation in the Beluga O-23 sedimentary section varies from immature to weakly mature. According to the pyrolysis temperature data, the onset of the oil generation zone can be located at 1 800 m. The very weak maturation gradient sets up a maximum maturity level equivalent to at most 0.6% R_o, on a vitrinite reflectance scale, at total depth.

- Few hydrocarbons are present at different depths as follows:

    - The source rock interval at 630 m contains few hydrocarbons; the gas chromatographic signature of which indicates a good preservation of oil-prone organic matter deposited in a anoxic environment and it also confirms the immaturity.

    - At 1 070 m where the gas-mud log indicates the presence of gas (C_1 to C_3), few hydrocarbons were extracted. The C_{15+} gas chromatographic signature of the saturate fraction shows a wide distribution of the hydrocarbon molecules up to C_{35} with a strong concentration of heavy ends in the sterane-triterpane range (C_{27} to C_{35}).

    On one hand the concentration of heavy molecules is indicative of immaturity. On the other hand, the low pristane/C_{17} and phytane/C_{18} ratios could indicate either good maturity therefore contradictory to the previous statement or be interpreted as an effect of the nature of the organic matter. The combination of the mature and immature characters could also reflect the presence of immature material mixed with migrated oil.

1.0 INTRODUCTION

The Trillium Soquit Onexco et al Beluga O-23 well was drilled at the location 59°12'54.033"N, 88°33'27.184"W, Figure 1A, to a total depth of 2 215 m.

The stratigraphic section, summarized in Figure 1B, provides a tentative age framework as well as the lithological succession for the section penetrated.

The present geochemical report of the Beluga O-23 well purposes to evaluate the following points:

- Source rock potential evaluation of the well sedimentary section
- Maturity evaluation of the section
- Characterization of the source rock and correlation to recovered oil

2.0 ANALYTICAL TECHNIQUES AND RESULTS

2.1 Analytical Procedures

Cutting and some sidewall core samples of the Beluga O-23 well were routinely analyzed in a screen program by the Oil Show Analyzer (OSA - modified Rock Eval pyrolysis).

The Oil Show Analysis is a modified Rock Eval type analysis displaying gaseous and liquid hydrocarbons already present as an S_0 and S_1 peak respectively, the potential of a rock to generate hydrocarbons as an S_2 peak and the total organic carbon content (TOC). The pyrolysis temperature marking the kerogen breakdown to give gaseous and liquid hydrocarbons is referred to as T_{max}. T_{max} is a rough guideline to the organic maturation level of the rock.

A more detailed program on selected samples comprises

a. soxhlet extraction of extractable organic compounds

b. chemical group analyses of extract into a saturate fraction (paraffinic/napthenic), aromatic hydrocarbons and NSO compounds (heteros - resines and asphaltenes) by means of liquid chromatography on column

c. C_{15+} molecular hydrocarbon distribution of the saturate fraction

d. thermal alteration index (Th.C. Masran, Geochem Laboratories)

e. maceral analyses as an optical method for kerogen (Th. C. Masran, Geochem Laboratories)

2.2 Results

2.2.1 Total Organic Carbon Content (TOC) (Oil Show Analyzer)

The total organic carbon content obtained by Oil Show Analyses varies from 0.00 to 3.07 percent. (Table 1, Figure 2A).

The shallow part of the well displays high TOC values up to 3.07 percent at the 630 m level and 1.22 percent at 710 m. Below that depth the section is generally lean in TOC with the highest value of 0.37 percent at 1 070 m.

2.2.2 Pyrolysis Yield (Oil Show Analyzer)

Pyrolysis yields (S_2, Table 1 - Figure 2B) are high in the shallow part of the section, reaching 15.10 mg/g of rock at 630 m and 3.26 mg/g of rock at 710 m. Below that depth the pyrolysis yield is generally very low, less than 1 mg/g of rock, except at 1 070, 1 270 and 1 770 m where it reaches values slightly in excess of 1 mg/g of rock.

2.2.3 Hydrogen Index (Oil Show Analyzer)

The high hydrogen indices (S_2/TOC, Table 2 - Figure 2C) encountered in the well section are associated with high pyrolysis yields in the shallow part of the well at 630 m with a value of 491. At 690 and 710 m the hydrogen indices are slightly lower.

In the deeper section, high hydrogen indices occur at 1 070 m and at the depth range between 1 750 and 1 870 m. The other high hydrogen index values in the well section are suspected to be erroneous due to extremely low TOC values and to poor resolution of the extremely small S_2 peaks; both beyond the accuracy limits of the instrumentation.

2.2.4 Liquid Hydrocarbon (S_1 - Oil Show Analyzer)

The amount of oil present in the rock (S_1) is generally low over the whole section. (Table 1, Figure 2E). Some moderately higher values of S_1 occur, sometimes associated with higher pyrolysis yield and higher

hydrogen index, for instance at 630, 690 and 1 750 m to 1 790 m, sometimes not associated with higher S_2 or hydrogen index value like at 1 870 and 1 990 m. The highest S_1 value occurs at 1 270 m with 2.39 mg/g of rock (2,390 ppm hydrocarbon/rock weight), somewhat associated with a moderately higher pyrolysis yield (S_2).

2.2.5 Pyrolysis Temperature (T_{max} - Oil Show Analyzer)

The significant pyrolysis temperatures (Table 1 and Figure 2B) range between 420 and 438°C. Some invalid T_{max} values vary from as low as 300°C to as high as 500°C reflecting a poor development of the S_2 peak. The general trend, however, clearly points to an increase of the pyrolysis temperature.

2.2.6 Extraction

The soxhlet extraction procedure was only applied to samples with promising oil yield (S_1), pyrolysis yield (S_2), TOC and hydrogen index (HI: S_2/TOC). The samples analyzed are listed in Table 2 along with the results of the chromatographic fractionation. Extract yields range between 400 and 5800 ppm.

2.2.7 C_{15+} Hydrocarbon Distribution

C_{15+} hydrocarbon distribution of saturate fractions of rock extracts are displayed in Figures 3 to 13.

2.2.8 Thermal Alteration Index and Maceral Analyses

Nineteen samples were selected for Thermal Alteration Index (TAI) measurements and visual observation of the kerogen. Thermal Alteration Index was chosen instead of vitrinite reflectance because of the general absence of vitrain in Lower Paleozoic organic matter. The analytical results acquired by Th. C. Masran of Geochem Laboratories are listed in the Appendix.

3.0 DISCUSSION OF RESULTS

3.1 Quality and Nature of the Organic Matter

Total organic carbon (percent TOC - see Table 1 and Fig. 2A) as a parameter of organic richness shows two prominent intervals enriched in organic matter in the shallow part of the well section with a TOC value of up to 3.07 percent at 630 m and 1.22 percent at 710 m. The whole section below (up to total depth) is organic poor. The highest TOC value in the deeper part of the well section is 0.49 percent at 1 270 m and then 0.37 percent at 1 070 m.

The quality of the organic matter as deduced from the pyrolysis hydrogen index (HI) illustrated at Fig. 2C is fair to good in the organic-rich upper part of the section. A hydrogen index (S_2/TOC) of 494(mg/g TOC) is measured at 630 m, corresponding to coaly black shale as described in the lithological log. Such a hydrogen index is indicative of oil-prone potential.

The remaining section below shows several high hydrogen indices which are due to extremely low TOC values, beyond the detection and accuracy limits of the analytical equipment. They are without any significance.

An interval ranging between 1 720 and 1 850 m shows a higher hydrogen index, associated with low organic carbon content. It indicates the presence, in small amounts, of an oil-prone carbonaceous material. Would it be richer in organic matter (higher TOC), that interval could constitute a potential source rock.

Optical kerogen properties as seen under the microscope parallels the observations obtained from pyrolysis. Oil-prone liptinitic material, algae, spores and amorphous material is observed in all the analyzed samples. The major compound is amorphous matter of marine origin. The unfigurated nature (amorphous) of the kerogen in most of the samples suggests an algal/microbial origin of the organic material.

Recognizable structures of woody material are observed in the upper part of the section in the samples from 520 to 710 m that reflect on the hydrogen index of 494 mg/g TOC measured at the 630 m interval.

The otherwise low hydrogen indices indicate that the organic matter has endured slight oxidation, perhaps induced by bioturbation as suggested by the presence of worms (scolecodons: worm jaws) mentioned in the Geochem Lab report (see Appendix).

3.2 Maturation in the Beluga O-23 Well

Maturation indicators, pyrolysis T_{max} and the thermal alteration index (TAI - see Appendix) indicate a low level of maturity in the whole section. The T_{max} values illustrated in Figure 20 show a weak trend of increasing maturation. The top of the oil generation zone can be picked at about 1 800 m at the 435°C temperature threshold that would correspond to a 0.5% R_0 on the vitrinite reflectance scale. (Tissot and Welte, 1978). According to the T_{max} trend, the maturity level would reach at most a level of 0.6% R_0 at total depth, suggesting that full oil generation is not reached.

The TAI values (see appendix) indicate immaturity from the top of the section down to total depth. Above 800 m where the concentration of kerogen is high enough to provide reliable data, the TAIs range at a 1.8 value which corresponds to the level indicated by the pyrolysis T_{max}. Deeper in the section there is no TAI increase as would be expected along with burial. It is attributed to the scarcity of organic material rendering TAI measurements uncertain (below the accuracy level).

Gas chromatographic data support the immature to marginally mature trend of the section. At 630 m, the n-alkane distribution and the high abundance of pristane and phytane relative to their neighbors C_{17} and C_{18} n-alkane suggest the immature level (see Figure 3). At 1 070 m (see Figure 6), despite low pristane/C_{17} and phytane/C_{18} ratios, the amount of figurated peak in the C_{27} - C_{35} range (sterane-triterpane) also indicates immaturity. The low pristane and phytane with regard to the adjacent nC_{17}-nC_{18} alkanes tend to indicate fair maturity but might rather reflect the nature of the kerogen (see Section 3.4).

The gas-chromatographic signatures of the 1 270, 1 290, 1 750, 1 870 and 1 990 m extracts are not very reliable as maturity indicators. At best, the distribution of the n-alkanes and the pristane C_{17} and phytane C_{18} ratio for the 1 750 m and 1 870 m extracts deduction made of the pipe-dope signature could suggest an incipient maturity level. This would coincide with the top of the oil window as determined by maximum pyrolysis temperature.

3.3 Free Hydrocarbons in the Beluga O-23 Section

Significant Oil Show Analyzer oil readings (Fig. 2E) occur in several intervals of the section. Extraction and gas chromatography analyses were carried out to characterize their hydrocarbon content.

In the source rock interval at 630, 690 and 710 m, extraction yielded from 450 to 5 800 ppm rock weight of soluble material. (See Table 2). The hydrocarbon yield in these source beds ranges between 310 and 850 ppm rock weight; values very comparable to the Oil Show Analyzer oil readings. Such hydrocarbon yields, although relatively high, still supports the immaturity of these source beds, when compared with the high amount of NSOs (non-hydrocarbon) compounds associated. This is particularly true for the major source bed extract at 630 m consisting of resins and asphaltenes for 85 percent of its constitution, and only 15 percent of hydrocarbons.

At 1 070 m where gas was recorded on the mud gas log, free oil is detected by the Oil Show Analyzer. The extraction of that sample yielded about 1 500 ppm rock weight of soluble material. (Table 2). The hydrocarbon yield (saturates and aromatics) represents 950 ppm. These values are two to three times higher than the Oil Show Analyzer oil reading (370 ppm rock, see Table 1). This discrepancy is attributed to the presence of heavy alkanes, steranes and triterpanes as illustrated in the chromatogram on Figure 6 that affect the S_2 rather than the S_1 readings of the pyrolysis.

In any case the genetic potential expressed by the sum of $S_1 + S_2$ equating 1.92 mg/g rock (1920 ppm rock, Table 1) classifies

the 1 070 sample as no source rock. Thus, the fairly high hydrocarbon ratio 259 mg/g TOC, in contradiction with the source potential and the immaturity of the horizon tends to suggest that part of these hydrocarbons represents migrated oil.

The other prominent isolated oil readings at 1 270, 1 290, 1 750, 1 870 and 1 990 m reflect a heavy contamination by pipe-dope affecting mostly the saturate and aromatic fraction, Table 2. The extraction yielded between 1 300 and 2 600 ppm of soluble material, except for the 1 750 m sample which yielded about 400 ppm rock weight of total extract. Yet less contaminated, the 1 750 m saturate gas chromatographic signature also displays the huge hump of the contaminants. According to the n-alkane distribution (Fig. 9), part of the hydrocarbons belong to a natural oil, present in a very minor amount relative to the contaminant. This is also true for the 1 870 m sample, illustrated in Figure 10, although it is much more contaminated (see Section 3.4, Hydrocarbon Characterization.)

3.4 Hydrocarbon Characterization

Gas chromatographic analyses were carried out to characterize the hydrocarbons of the extracted rock samples, and to evaluate how they relate to the source potential observed in the section.

Among the analyzed samples, only those at 630, 690, 710, and 1 070 m show clearly hydrocarbons of a natural origin. The other samples show heavy contamination. The C_{15+} fingerprints (Fig. 12, 13) of the two types of pipe dope used demonstrate their effect as the major contaminant of all samples at 690,. 710, 1 270, 1 290, 1 750, 1 870, and 1 990 m. (Figure 4, 5, and 7 to 11). Would the 1 270 , 1 290, and 1 990 m samples contain natural hydrocarbons, it would be an insignificant amount, unable to overprint contamination. The 1 750 and 1 870 m samples (Figure 9 and 10) show the presence of some natural oil slightly overprinting the contaminant signatures.

In the shallow part of the section at 630 m, Figure 3, the C_{15+} chromatogram of the saturate fraction shows no contamination. The

n-alkane and isoprenoid distribution reflects that source rock material mainly of algal origin deposited in a highly-reducing environment. It defines oil-prone potential for the horizon. The abundance of the isoprenoids with regard to their adjacent nC_{17}-nC_{18} alkanes, the presence of steranes, triterpanes and the irregularity of the n-alkane peak height support the immaturity defined by pyrolysis and kerogen visual obvservation. Yet slightly contaminated by pipe-dope the 690 and 710 m display similar characteristics. (Figure 4 and 5).

At 1 070 m where some gas readings appeared on the mud gas log, the extract shows contradictory characteristics. At the heavy end of the cromatogram (Figure 6) (steranes-triterpane range), numerous peaks occur which tend to confirm the low maturity level also indicated by pyrolysis and kerogen visual observation (TAI). This immaturity is also supported by the irregularity of the n-alkane peak heights.

On the other hand, the limited abundance of pristane, phytane and other isoprenoids in the C_{15} to C_{20} range with regard to their n-alkane neighbours would tend to indicate a fair maturity. The contradictory maturity data suggests that either the extract reflects the nature of in-situ source material or is a mixture of in-situ immature matter and migrated mature hydrocarbons.

As far as the nature of organic matter is concerned, the depletion in pristane and phytane would reflect a shortage of their common precursor: the chlorophyll in the source material which would, therefore, be predominantly derived from bacteria.

At 1 750 and 1 870 m (Figure 9 and 19) the C_{15+} chromatograms both show a prominent hump at the heavy end attributed to the pipe-dope contamination. The higher n-alkane peaks distributed on a wider range than that of the pipe dope indicate the presence of some natural oil overprinting the pipe dope contamination. It is also displayed by a slight predominence of the C_{17} and C_{15} n-alkanes as well as by the marked odd to even predominence in the higher range ($C+_{25}$) which are not characteristic of the pipe dope. The oil impregnation could be consistent with an in-situ generation of hydrocarbons at incipient maturity level (see Section 3.2) from the organic poor but oil prone interval situated between 1 720 m and 1 850 m (see Section 3.1).

The other extracted samples are all strongly contaminated. The C_{15+} signature of their saturate fraction fit that of the pipe-dope contaminant with a slight hump in the C_{25} range, reflecting the presence of the 60% Zn grease (Figure 12) and the high hump accompanied by few developed n-alkanes, reflecting the presence of the 60% Pb jet lube. (Figure 13).

REFERENCE

Tissot, B.P. and Welte, D.H. (1978): Petroleum Formation and Occurence. Springer-Verlag, Berlin, Heidelberg, New York, 1978.

FIGURES

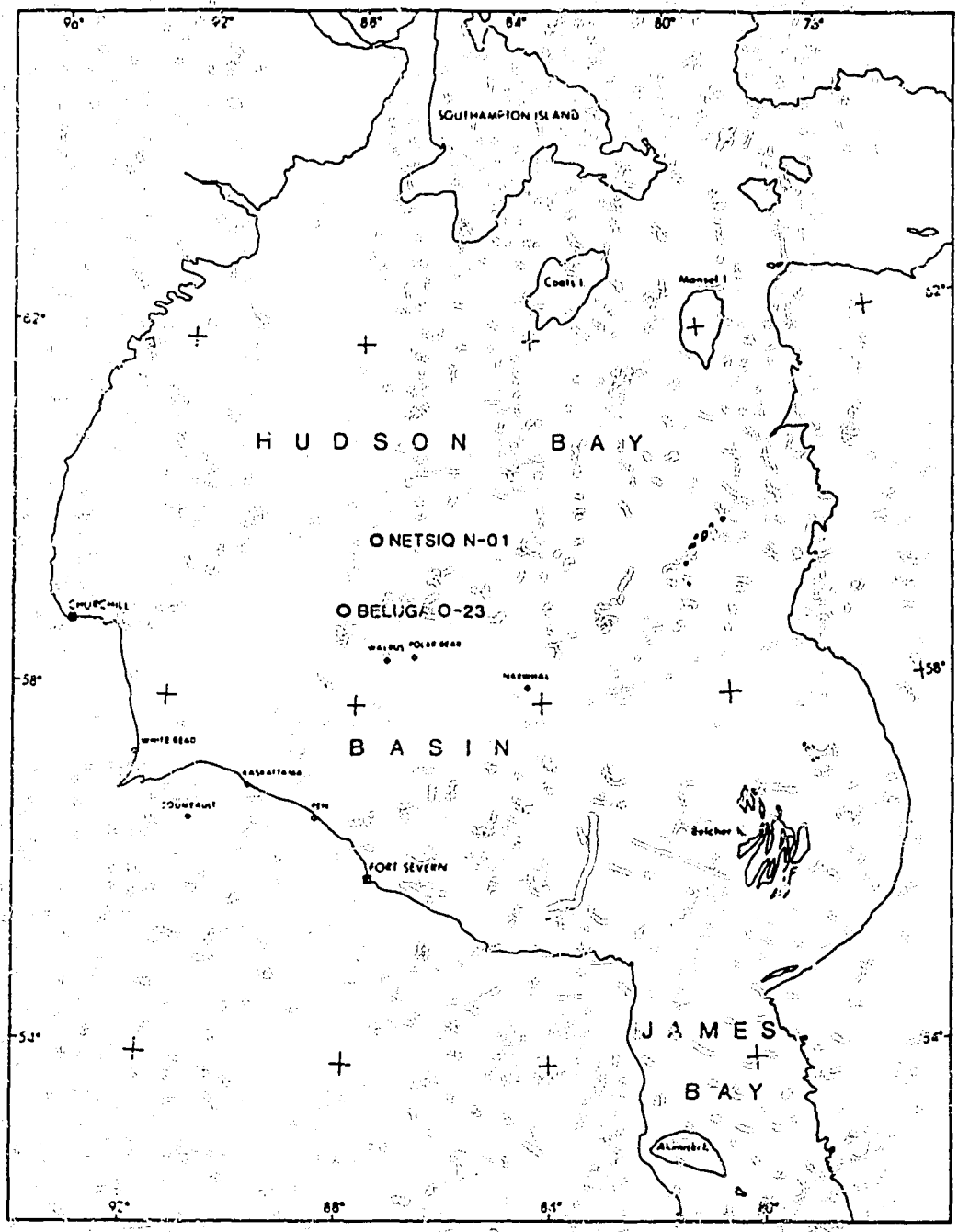


Figure 1A

Canterra Energy Ltd.

HUDSON BAY

LOCATION MAP

SCALE:	1:1,000,000	CONTOUR INTERVAL:	
PREPARED BY:	J.S. THORPE	DATE:	JUNE 1985
DRAWN BY:	TOMIYAMA	FILE:	12-2-14

Beluga O-23 Stratigraphic Column

Formation	Log Top	Subsea	Thickness	Lithology
Water Bottom	192m	178m	178	
Base Pleistocene	not picked		n/a	mudstone with minor dolomite, limestone & siltstone; basal halite unit
Devonian:				
Walrus	727m	713m	334	upper unit: limestone with dolomite, anhydrite & minor mudstone. Lower unit: halite
Polar Bear	1031m	1047m	187	upper unit: dolomitic limestone and anhydrite with minor halite. Lower unit: halite
Pen	1248m	1234m	204	upper unit: interbeds of halite, anhydrite, dolomite & limestone. Lower unit: halite with minor anhydrite & limestone
Kenogami	1452m	1438m	44	red dolomitic siltstone
Silurian:				
Narwhal	1496m	1482m	65	upper unit: anhydrite with minor siltstone, middle unit: halite Lower unit: limestone with dolomite & anhydrite
Attawapiskat	1561m	1547m	38	limestone, partly bioclastic, with minor dolomite & siltstone
Ekwan River	1559m	1585m	105	Upper unit: dolomitic siltstone Lower unit: limestone with minor dolomite
Severn River	1704m	1690m	112	limestone
Ordovician:				
Red Head Rapids	1816m	1802m	211	dolomitic siltstone grading to interbeds of siltstone & dolomitic limestone. Minor anhydrite at base.
Churchill	2027m	2013m	128	limestone, slightly fossiliferous, with minor dolomite near top
Bad Cache Rapids	2153m	2139m	36	limestone
Cambrian	2189m	2175m	4	poorly sorted, angular, feldspar rich sandstone
Pre-Cambrian	2193m	2179m	n/a	granite gneiss
Total Depth	2215m	2201m		

Figure 1B: Listed preliminary tops of the Beluga O-23 section

BELUGA O-23

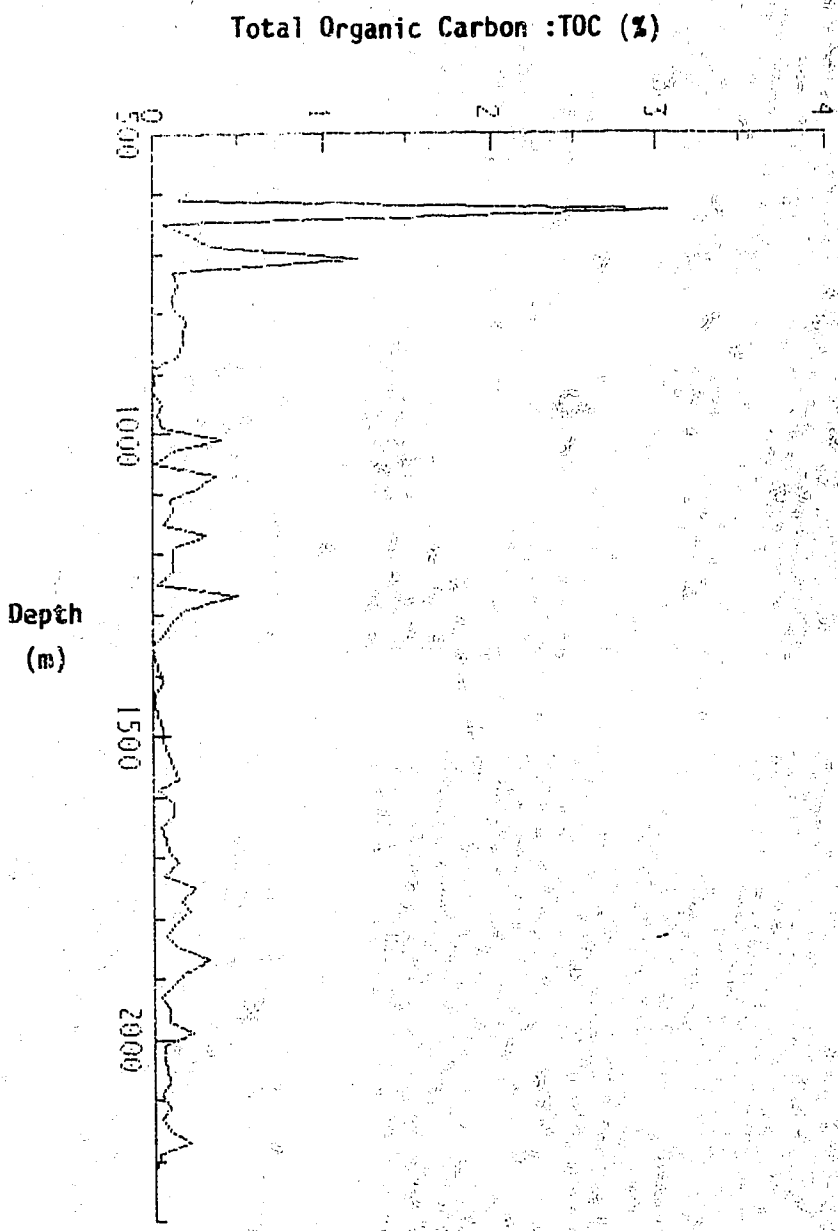
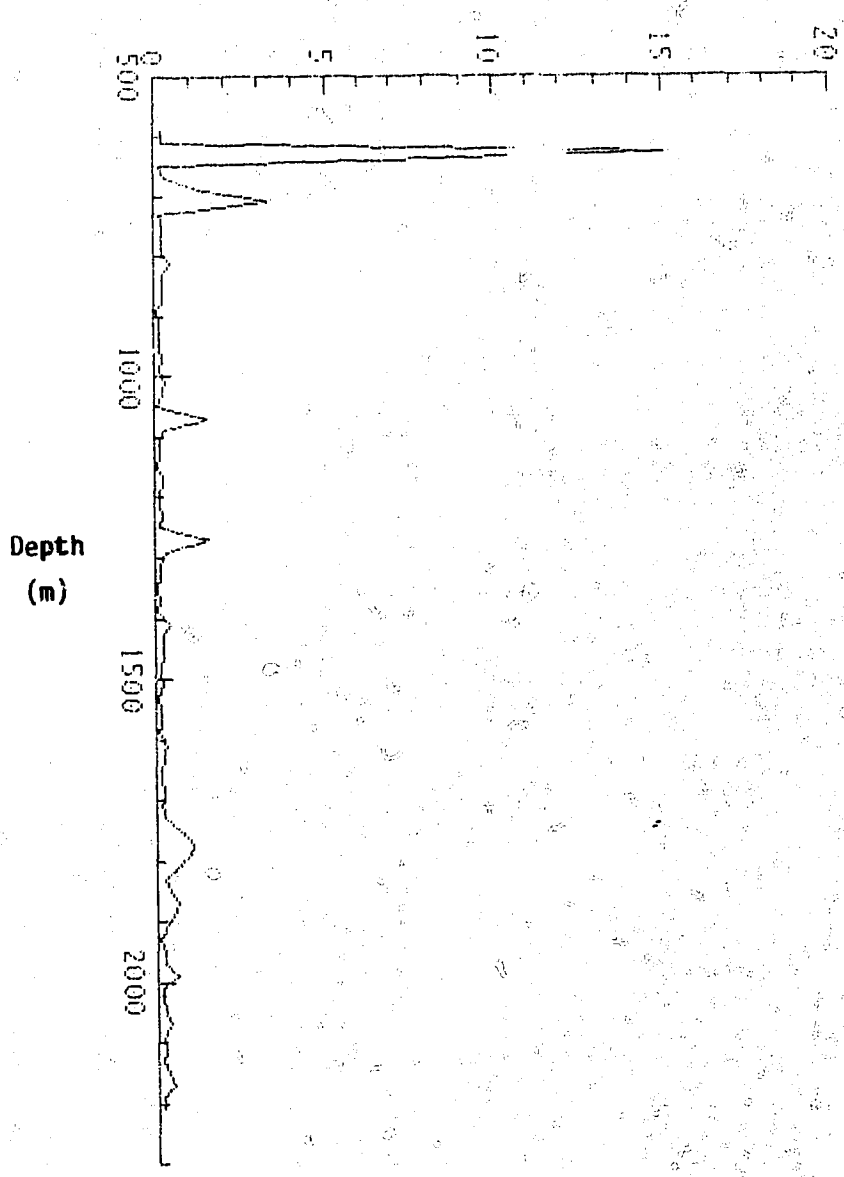


Figure 2A

BELUGA 0-23

Source Potential: S_2 (mg/g rock)



Depth (m)

Figure 2B

BELUGA O-23

Hydrogen Index: HI or S_2/TOC (mg/g TOC)

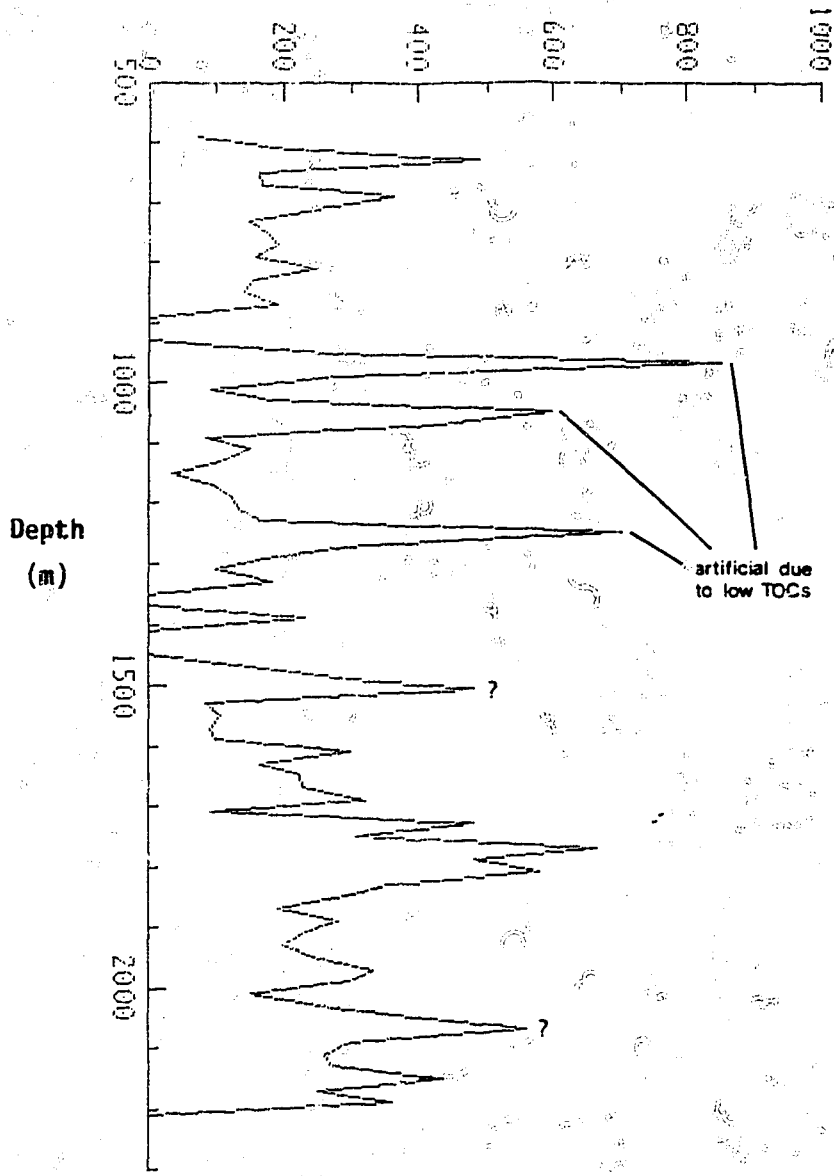


Figure 2C

BELUGA O-23

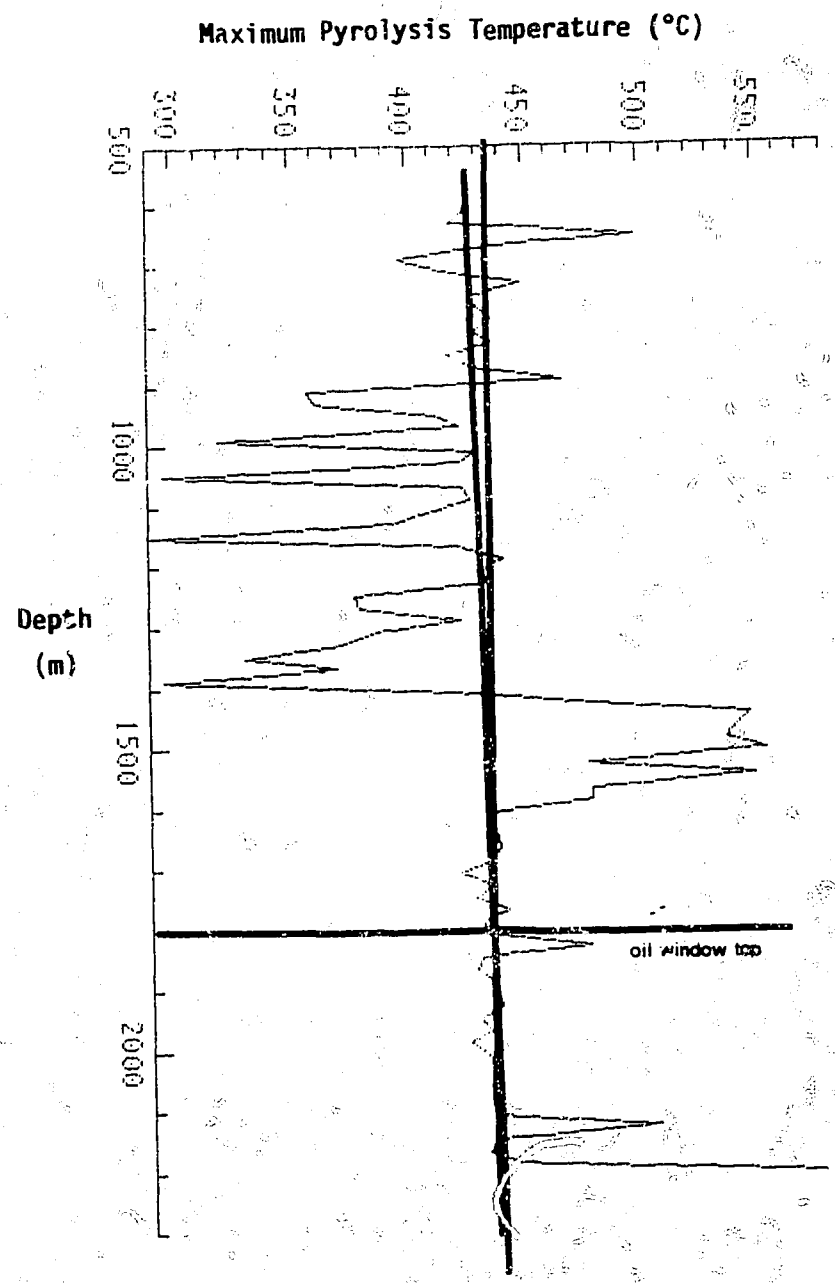


Figure 2D

BELUGA O-23

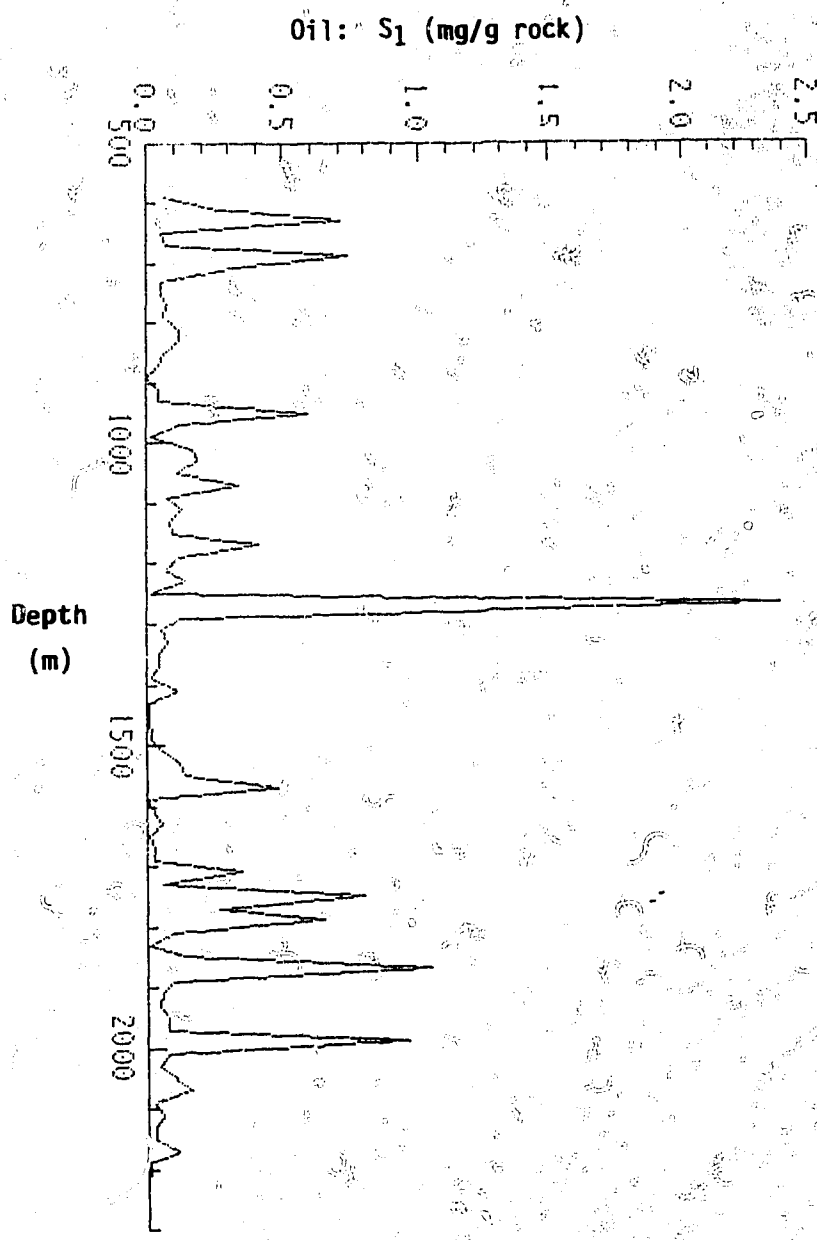


Figure 2E

BELUGA O-23

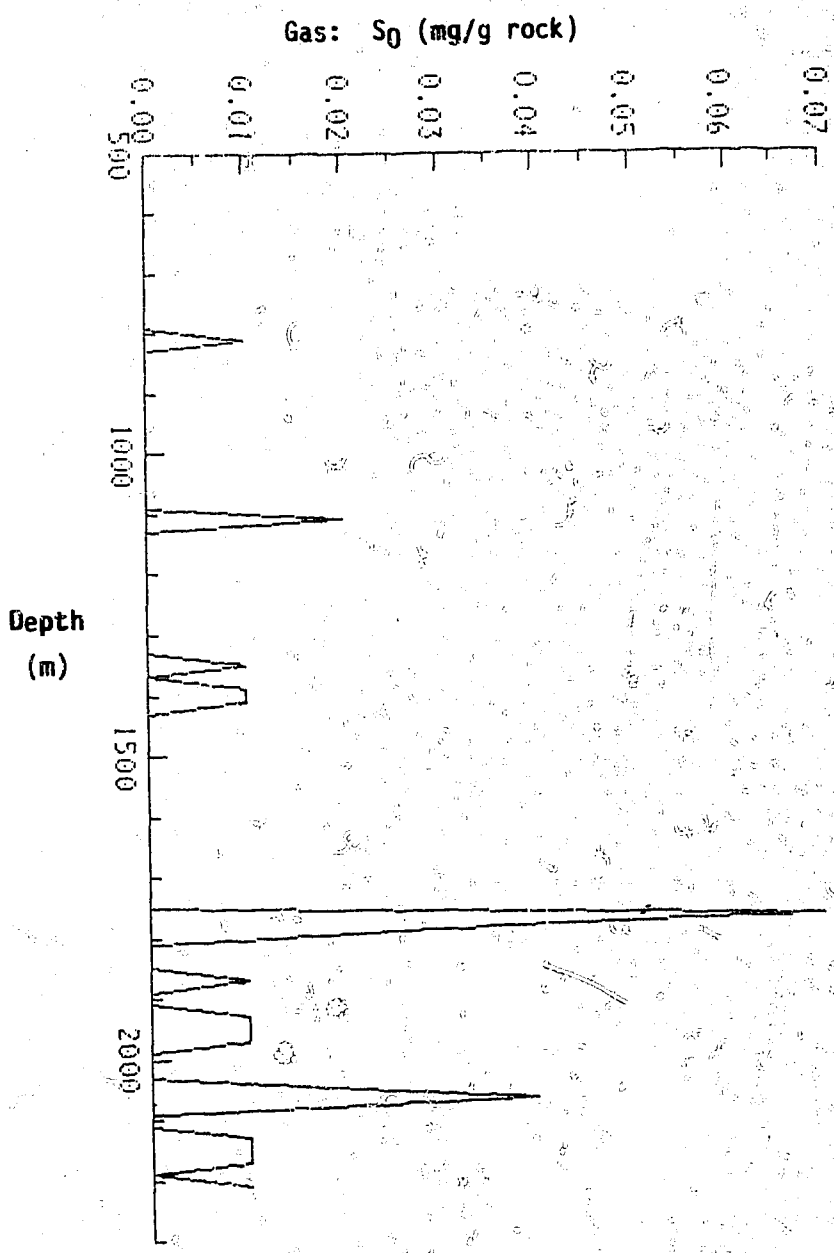


Figure 2F

Figure 3. C_{15+} Molecular Distribution of Saturate Fraction - 630 m

pr: pristane

ph: phytane

Figure 4. C_{15+} Molecular Distribution of Saturate Fraction - 690 m

pr: pristane

ph: phytane

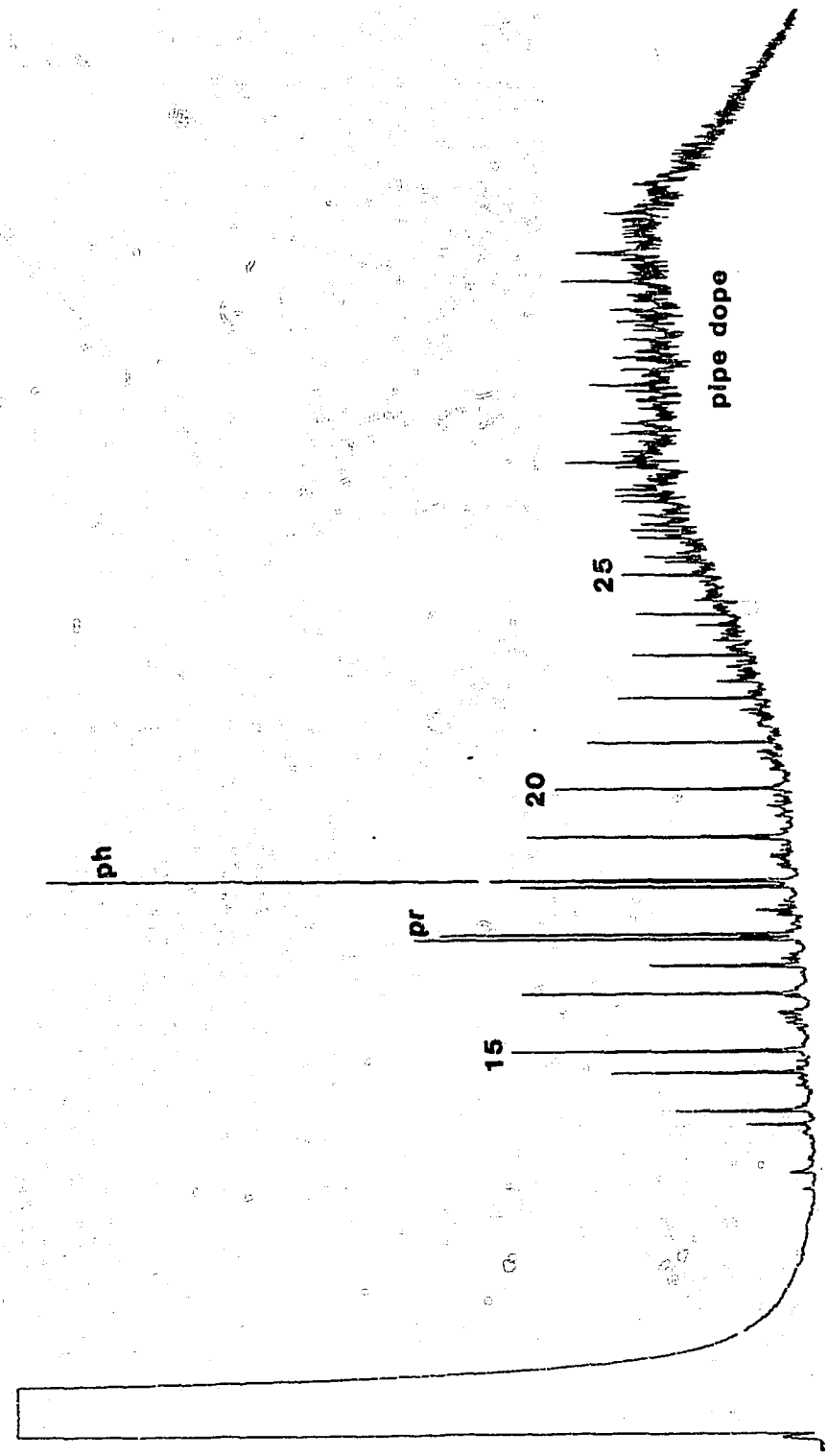


Figure 5. C_{15+} Molecular Distribution of Saturate Fraction - 710 m

pr: pristane

ph: phytane

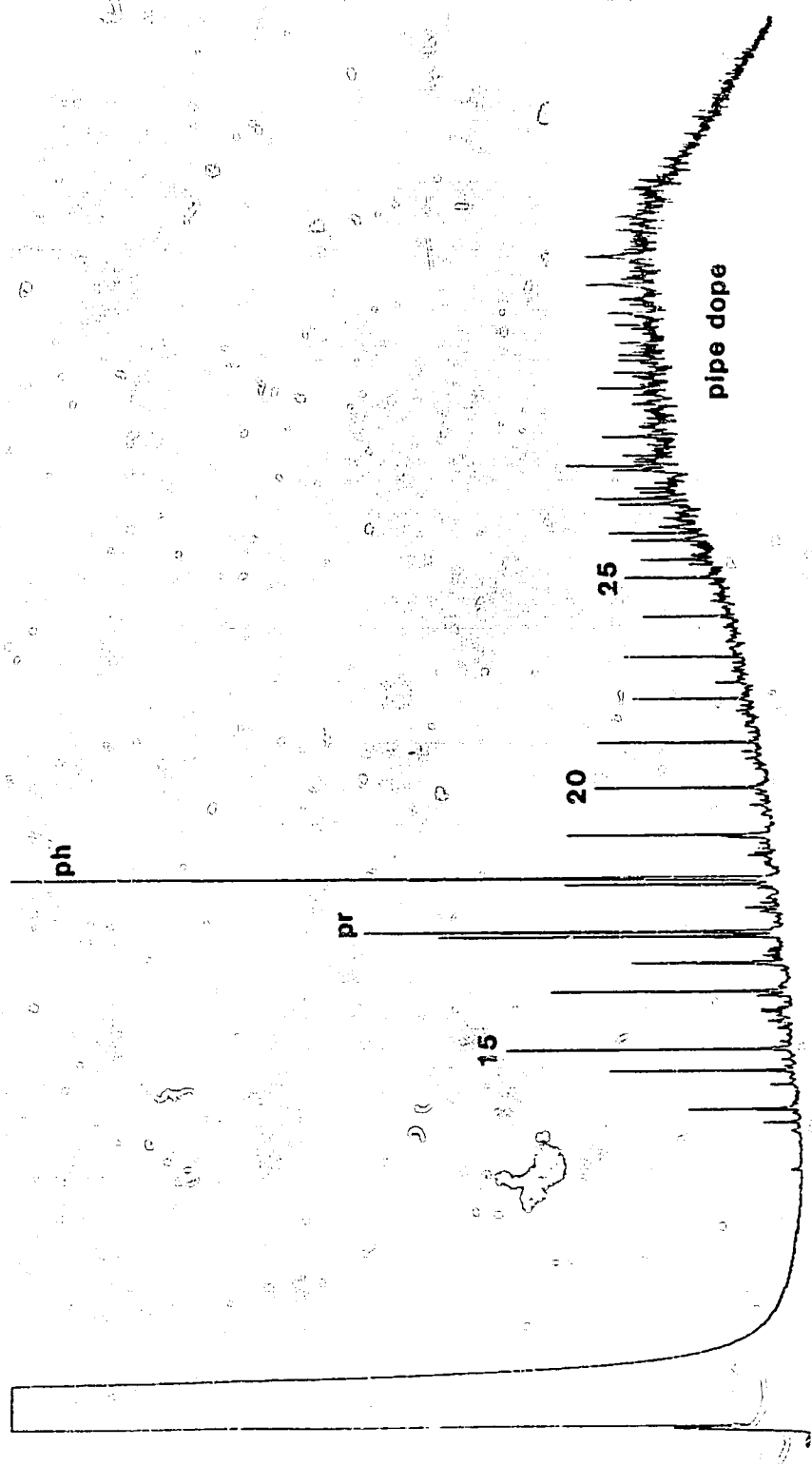


Figure 6. C_{15+} Molecular Distribution of Saturate Fraction - 1070 m

pr: pristane

ph: phytane

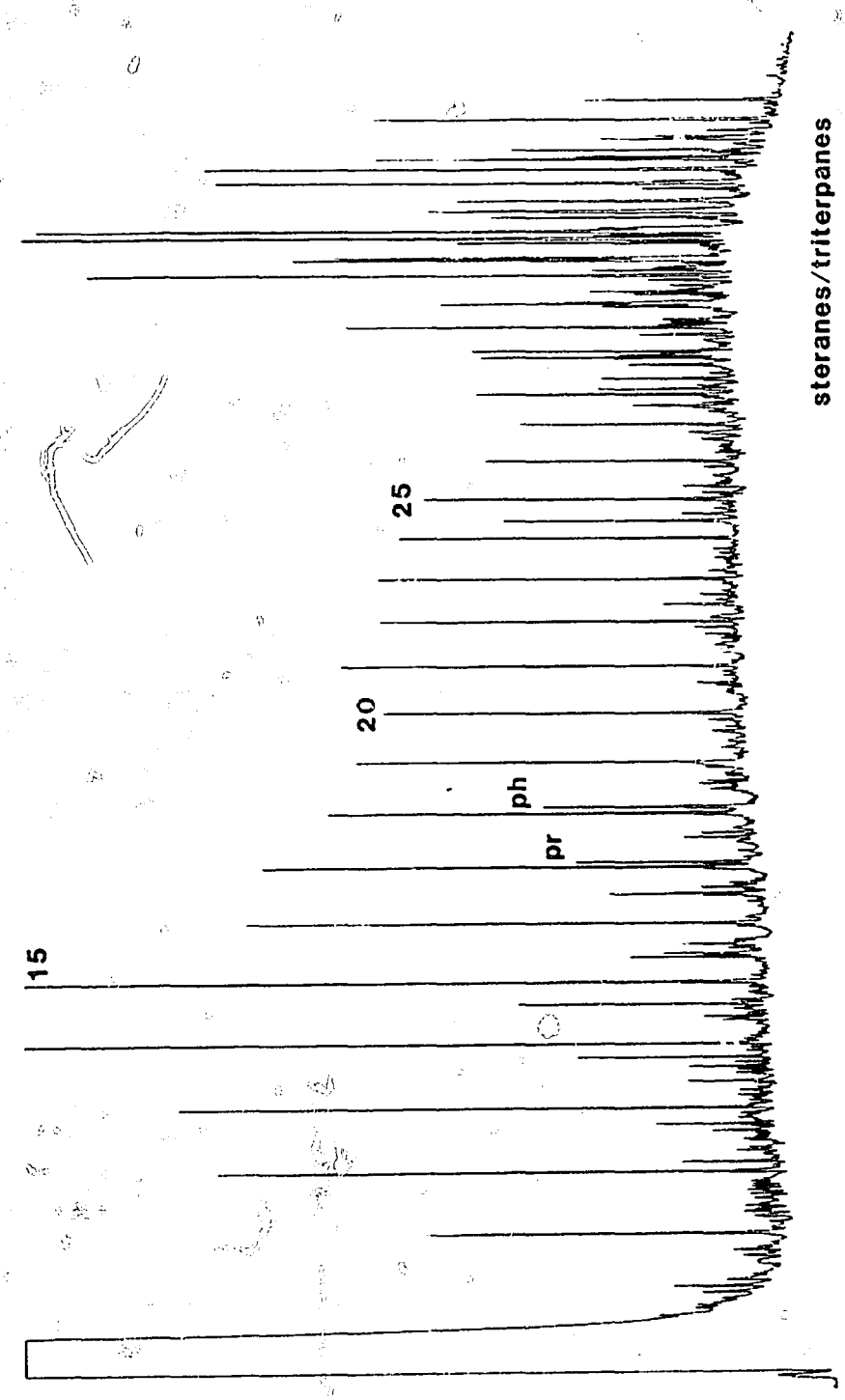


Figure 7. C_{15+} Molecular Distribution of Saturate Fraction - 1270 m

pr: pristane

ph: phytane

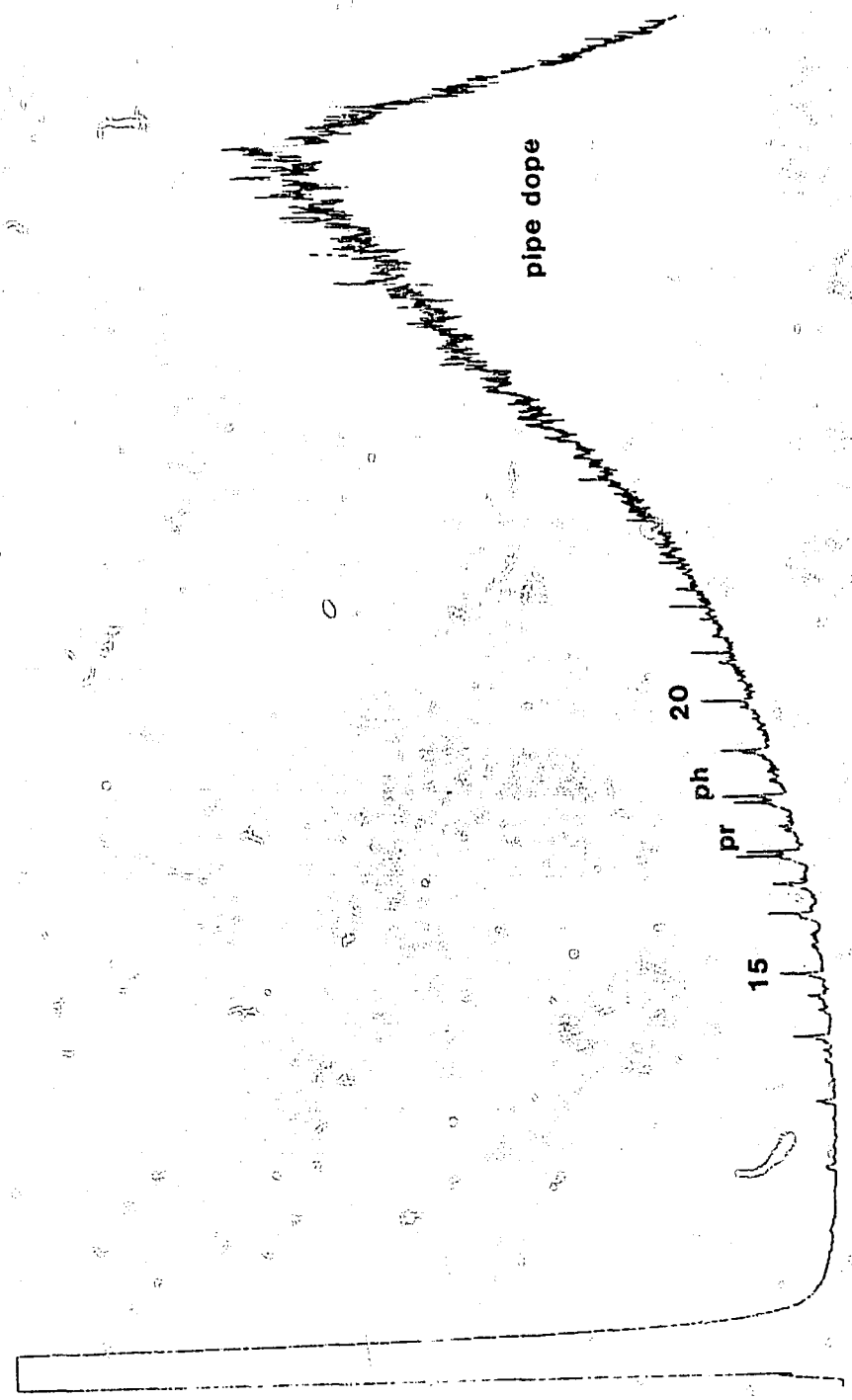


Figure 8. C_{15+} Molecular Distribution of Saturate Fraction - 1290 m

pr: pristane

ph: phytane

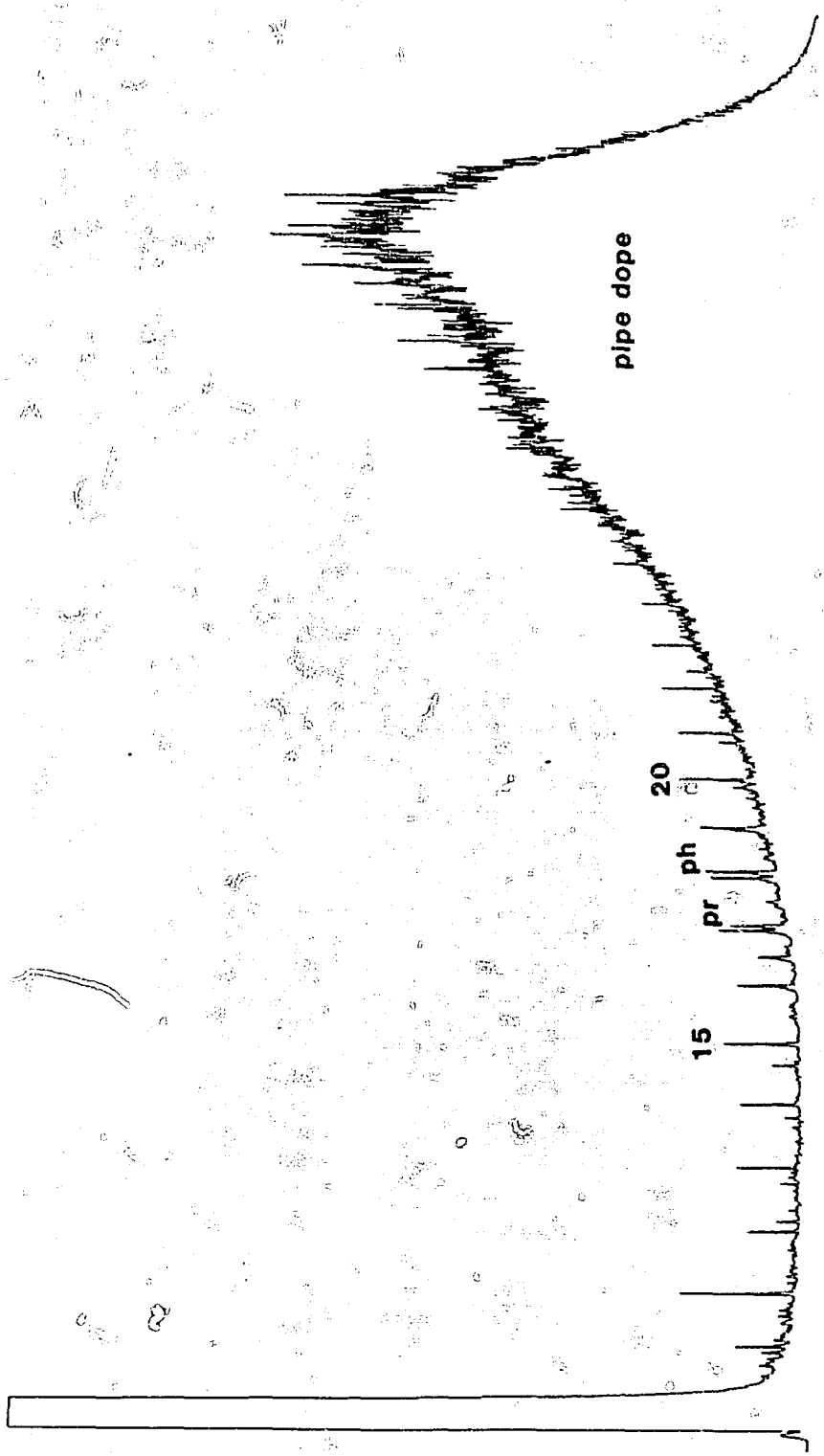


Figure 9. C_{15+} Molecular Distribution of Saturate Fraction - 1750 m

pr: pristane

ph: phytane

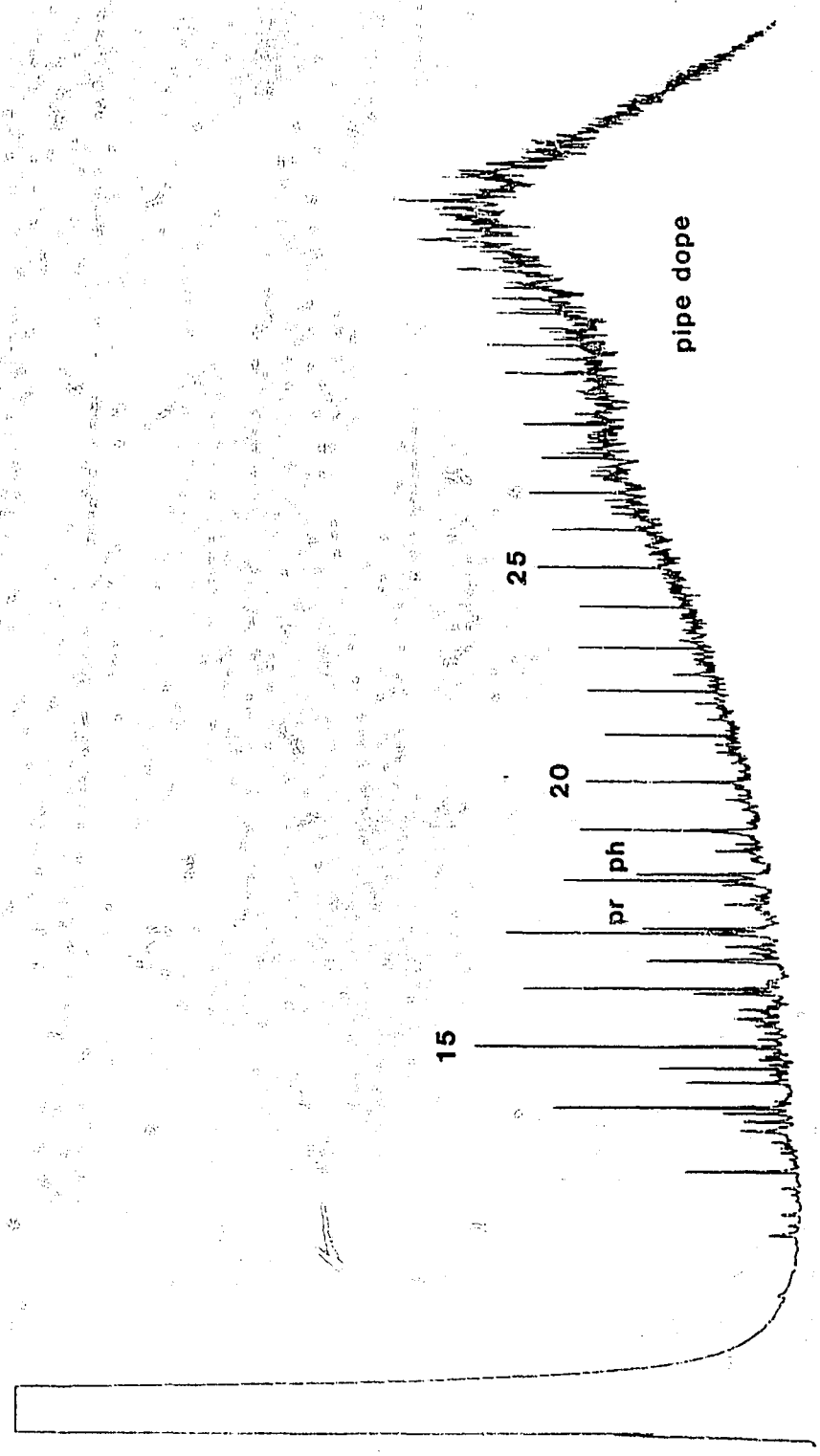


Figure 10. C_{15+} Molecular Distribution of Saturate Fraction - 1870 m

pr: pristane

ph: phytane

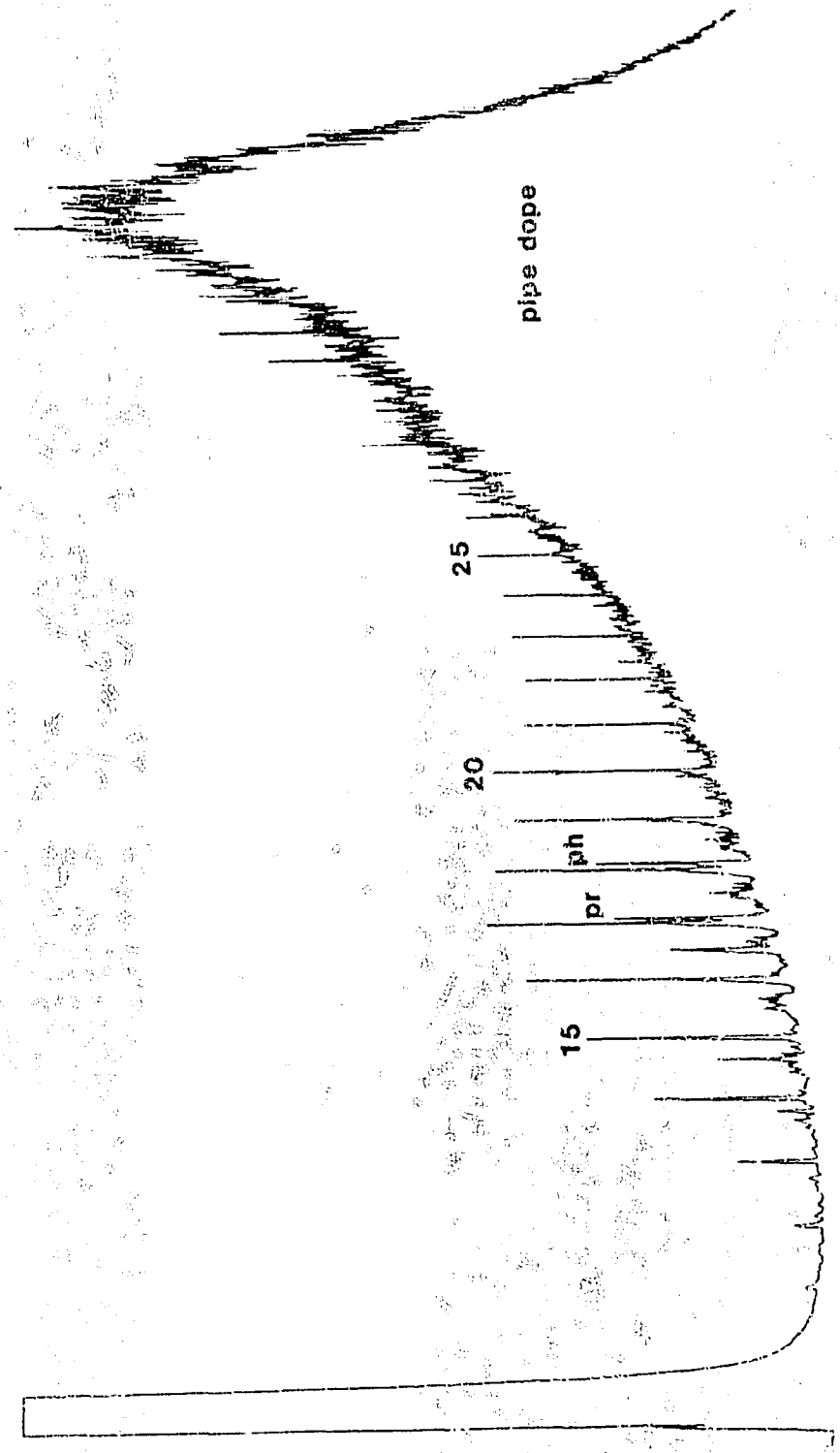


Figure 11. C_{15+} Molecular Distribution of Saturate Fraction - 1990 m

pr: pristane

ph: phytane

Figure 12. C_{15+} Molecular Distribution of Saturate Fraction Pipe Dope - 2n 60%

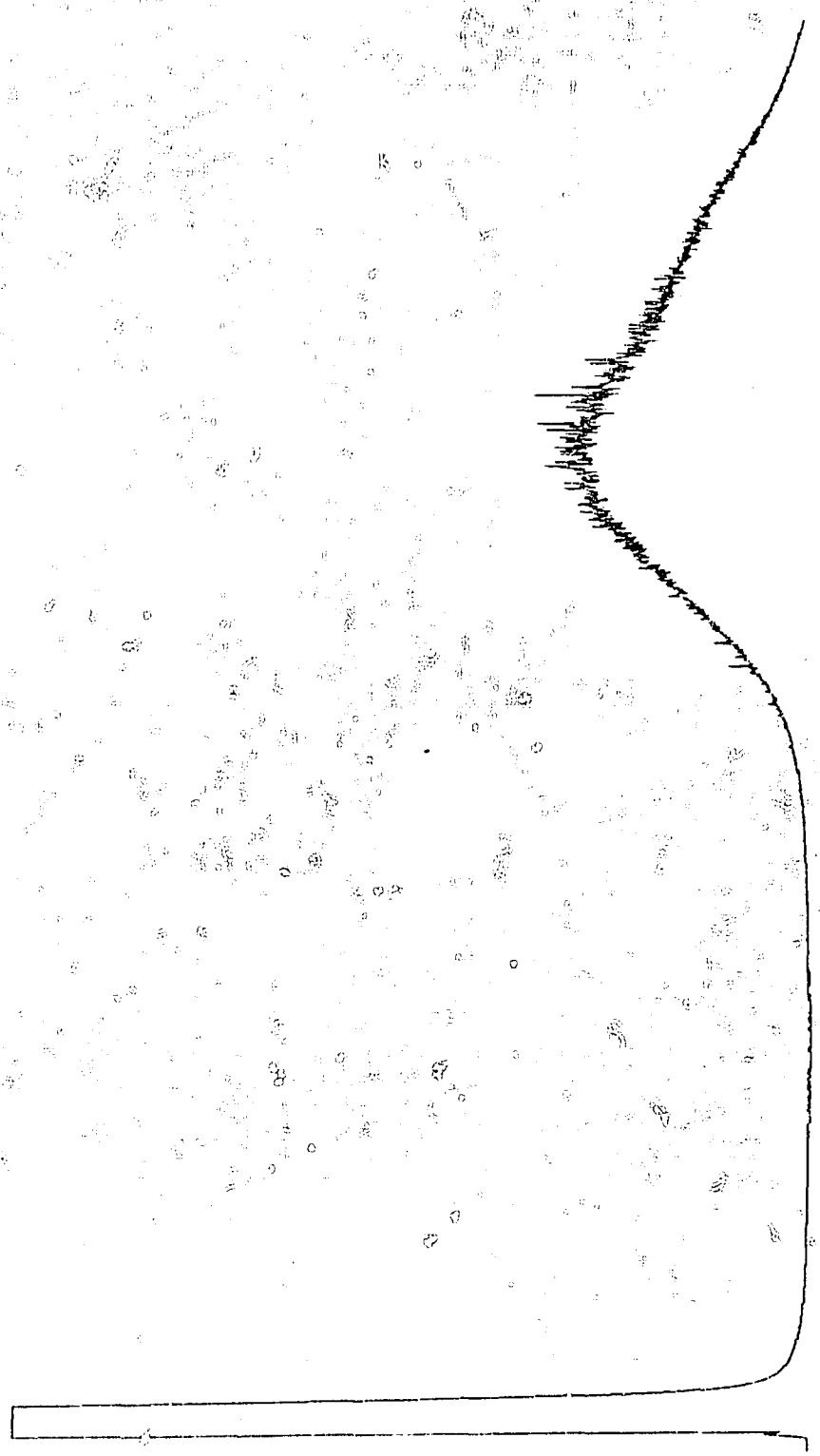
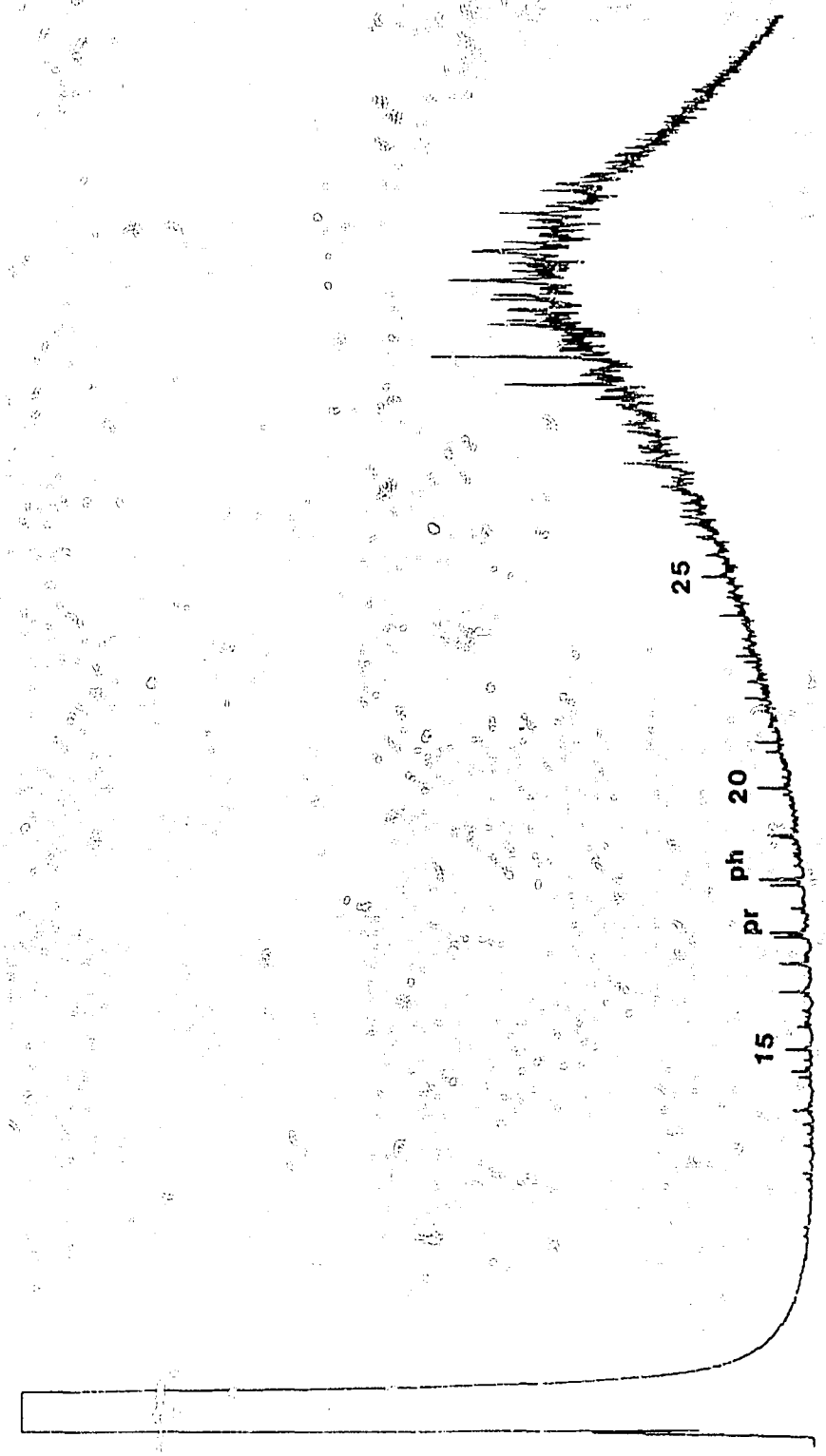


Figure 13. C_{15+} Molecular Distribution of Saturate Fraction
Pipe Dope - Pb 60%
pr: pristane
ph: phytane



TABLES

TABLE 1 : BELUGA O-23, PYROLYSIS DATA

DEPTH (m)	GAS (mg/g)	OIL (mg/g)	S2 (mg/g)	TMAX ('C)	TOC (%)	HI (mg/g)	SAMPLE type
636	0.00	0.28	0.41	418	0.40	102	SW
761	0.00	0.28	0.98	431	0.55	178	SW
1) 1068	0.00	0.46	0.50	421	0.34	147	SW
2) 1068	0.00	0.21	0.61	422	0.19	321	SW
590	0.00	0.06	0.18	427	0.24	75	
610	0.00	0.26	0.29	424	0.14	207	
630	0.00	0.71	15.10	419	3.07	491	
650	0.00	0.05	0.10	499	0.06	166	
670	0.00	0.07	0.37	429	0.22	168	
690	0.00	0.74	1.24	397	0.34	364	
710	0.00	0.32	3.26	416	1.22	267	
730	0.00	0.05	0.16	449	0.11	145	
750	0.00	0.05	0.27	428	0.15	180	
770	0.00	0.07	0.21	430	0.11	190	
790	0.00	0.06	0.19	436	0.12	158	
810	0.01	0.12	0.47	429	0.19	247	
830	0.00	0.12	0.26	436	0.17	152	
850	0.00	0.06	0.26	418	0.18	144	
870	0.00	0.04	0.27	427	0.14	192	
890	0.00	0.00	0.07	467	0.00	0	
910	0.00	0.04	0.11	358	0.01	****	
930	0.00	0.04	0.09	361	0.00	0	
950	0.00	0.59	0.16	412	0.06	266	
970	0.00	0.12	0.17	422	0.02	850	
990	0.00	0.02	0.14	319	0.05	280	
1010	0.00	0.17	0.39	429	0.41	95	
1030	0.00	0.19	0.20	422	0.11	181	
1050	0.00	0.11	0.06	296	0.01	600	
1070	0.00	0.34	1.58	423	0.37	427	
1090	0.00	0.07	0.21	426	0.25	84	
1110	0.02	0.13	0.15	411	0.10	150	
1130	0.00	0.08	0.12	392	0.11	109	
1150	0.00	0.09	0.02	291	0.06	33	
1170	0.00	0.41	0.30	421	0.31	96	
1190	0.00	0.12	0.15	441	0.12	125	
1210	0.00	0.06	0.16	430	0.12	133	
1230	0.00	0.14	0.20	435	0.12	166	
1250	0.00	0.02	0.14	377	0.02	700	
1270	0.00	2.39	1.57	379	0.49	320	
1290	0.00	0.12	0.33	422	0.19	173	
1310	0.00	0.05	0.12	386	0.12	100	
1330	0.00	0.07	0.13	372	0.07	185	
1350	0.01	0.04	0.06	330	0.00	0	

1370	0.00	0.04	0.12	369	0.01	****
1390	0.01	0.02	0.07	296	0.03	233
1410	0.01	0.11	0.50	418	0.05	****
1430	0.00	0.01	0.19	480	0.01	****
1450	0.00	0.01	0.17	548	0.01	****
1490	0.00	0.02	0.15	537	0.05	300
1510	0.00	0.05	0.24	554	0.05	480
1550	0.00	0.14	0.13	550	0.12	108
1570	0.00	0.48	0.14	479	0.15	93
1590	0.00	0.00	0.03	479	0.03	100
1610	0.00	0.03	0.33	435	0.11	300
1630	0.00	0.05	0.18	432	0.11	163
1650	0.00	0.01	0.09	437	0.04	225
1670	0.00	0.03	0.16	438	0.07	228
1530	0.00	0.12	0.07	477	0.08	87
1690	0.00	0.03	0.26	433	0.08	325
1710	0.00	0.35	0.13	421	0.14	92
1730	0.00	0.05	0.29	434	0.06	483
1750	0.00	0.80	0.70	428	0.23	304
1770	0.07	0.26	1.07	442	0.16	668
1790	0.03	0.65	0.96	431	0.20	480
1810	0.00	0.09	0.64	432	0.11	581
1830	0.00	0.01	0.25	478	0.07	357
1850	0.00	0.14	0.41	430	0.14	292
1870	0.01	1.04	0.62	427	0.32	193
1890	0.00	0.09	0.48	435	0.17	282
1910	0.00	0.05	0.28	436	0.12	233
1930	0.01	0.04	0.08	438	0.04	200
1950	0.01	0.07	0.24	429	0.09	244
1970	0.01	0.07	0.30	433	0.09	333
1990	0.00	0.96	0.66	424	0.22	300
2010	0.00	0.07	0.09	432	0.06	150
2030	0.00	0.04	0.15	434	0.06	250
2070	0.04	0.16	0.45	433	0.08	562
2090	0.00	0.03	0.12	434	0.04	300
2110	0.00	0.05	0.21	436	0.08	262
2130	0.01	0.03	0.11	506	0.04	275
2150	0.01	0.03	0.35	436	0.08	437
2170	0.01	0.11	0.53	432	0.21	252
2190	0.00	0.01	0.11	445	0.03	366
2210	0.01	0.01	0.10	578	0.01	****

TABLE 2 : Beluga O-23 Extract Data

Depth (m)	SATS (mg)	ARO (mg)	RESIN (mg)	ASPH (mg)	RK.WT (g)	SATS (%)	ARO (%)	RESIN (%)	ASPH (%)	TOT.EXTR. (mg/g)	HC. (mg/g)
630	20.5	56.5	130.0	317.4	91.1	3.9	10.8	24.8	60.5	5.7563	0.8452
690	30.1	17.6	18.9	35.9	77.4	29.4	17.2	18.4	35.0	1.3242	0.6162
710	23.8	17.0	33.2	41.8	86.9	20.5	14.7	28.7	36.1	1.3325	0.4695
1070	33.9	86.1	22.4	45.1	125.4	18.1	45.9	11.9	24.1	1.4952	0.9569
1270	199.1	73.5	9.9	5.3	110.8	69.2	25.5	3.4	1.8	2.5973	2.4602
1290	96.9	23.3	5.8	3.8	108.0	74.7	17.9	4.5	2.9	1.2018	1.1129
1750	19.4	12.8	6.9	6.8	113.7	42.3	27.9	15.0	14.8	0.4036	0.2832
1870	235.9	98.6	11.4	21.1	127.9	64.3	26.9	3.1	5.7	2.8694	2.6953
1990	162.4	45.2	11.0	2.3	114.5	73.5	20.5	5.0	1.0	1.9213	1.8131

APPENDIX

HYDROCARBON ANALYSIS

on:

CANTERRA TRILLIUM SOQUIP ONEX

BELUGA O-23

Prepared for:

CANTERRA ENERGY LTD.

Prepared by:

GEOCHEM LABORATORIES LTD.

CONFIDENTIAL

SUMMARY

The kerogen data suggests a fluctuating depositional environment. The uppermost samples are from a continental-marginal marine environment, the middle section is marine in character and the bottom samples are from a near shore area.

The organic matter is dominated by amorphous matter, however, the thermal alteration index is immature, rendering the strata unproductive.

VISUAL KEROGEN ANALYSES

CANTERRA - BELUGA O-23

Kerogen is the solvent-insoluble organic matter found in sedimentary rocks.

GeoChem Laboratories recognizes four main types of kerogen: algal, amorphous-sapropel, herbaceous-membraneous, woody-structure, and inertinite-coaly. These four groups are of interest to the exploration geologist because they, in combination with the thermal alteration index, can indicate the source potential of a sediment. The principal categories are subdivided into:

1. Algal
   - A) thick walled, cellular remains of macroscopic algae;
   - B) algal cysts, dinoflagellates (unicellular aquatic organisms), pneumatocysts (air sacs), acritarchs (cysts of unknown origin).
   - C) degraded, degraded remains of "A" and "B".

2. Amorphous
   - A) fine
   - B) coarse
   - C) grey

Amorphous material has a non-structured appearance. It can be the degraded algal remains or the biodegraded remains of land plants. "A" and "B" refers to the texture, while "C" refers to the colour. Grey amorphous matter is formed under reducing condition.

3. Herbaceous
   - A) pollen and spores
   - B) cuticle, waxy and thin cellular remains of higher and lower land plants.
   - C) degraded material of "A" and "B".

4. Woody
   - A) structured, recognizable cellular remains.
   - B) unstructured
   - C) degraded

5. Inertinite
   - A) black opaque debris.

Pyrobitumen, resin, pyrite and other organic or inorganic substances present in a sample are noted on the GeoChem worksheet.

In addition to the organic matter types, the relative abundance is determined as well as the particle size range and state of preservation.

The thermal maturity, which gives an indication of the time-temperature history of the organic matter, is also examined. The measurement of thermal maturity of visual kerogen is based on the colouration of spores and pollen.

Description of the Visual Kerogen and Thermal Alteration

C935

590-610 meters	These samples are dominated by blackened material. Some wood-like structures were recognized. Also present were thin and thick walled trilete spores. The kerogen composition indicates a continental - marginal marine strata. TAI is~1.7, rendering the samples immature.
630-710 meters	The organic matter is characterized by an abundance of coarse, brownish amorphous matter. Degraded brown algae and wood-like structures were also found. The depositional environment was possibly a marginal marine area. TAI remains immature.
810-990 meters	These samples contain a mixed fine, coarse and grey amorphous matter and some pyrite. TAI is ~1.7.
1070 meters	Is dominated by fine light coloured marine amorphous matter. Marine cysts, scolecodons (remains of worn jaws) and acritarchs are present on the slide. The sample contains grey amorphous matter and pyrite. This combination indicates a reducing marine environment. TAI is immature.
1090-1270 meters	The kerogen has again a mixed coarse, fine and grey amorphous mixture similar to the 810-990 meter interval. The influx of coarse brown material, is possibly due to an increase in the production of brown algae, and/or an influx of land derived materials.
1290 meters	Is dominated by the fine marine amorphous matter as in the sample from 1070 meters.
1550 meters	Is dominated by fine cellular stringers from algal origin.
1610 meters	Contains the same material as 1550 meters, but it is mixed with amorphous matter and scolecodons.
1630 meters	Shows a mixture of fine, coarse and grey amorphous matter, similar to the samples from 810-990 meters.
1870-1890 meters	Are dominate by fine light coloured marine amorphous matter, grey matter, marine cysts, scolecodons and acritarchs similar to the samples from 1070, and 1290 meters.
2170 meters	Is characterized by mixed fine and coarse amorphous matter. A tissue resembling moss cellular structures was found. This, combined with the mixed light coloured marine organic matter, and the brown coloured coarse organic matter, indicates a near shore environment.

Although the section from 630-2170 meters contains an abundance of good amorphous matter, the TAI of ~1.7 indicates that the section is in the immature zone, which renders it unproductive.

C935A

636 meters	Is dominated by fine and coarse amorphous matter.
1068 meters	Contains fine and grey amorphous material. The slide was contaminated with mineral matter.

The TAI in both samples is immature.

VISUAL KEROGEN DATA

[redacted] Ca[redacted]ra [redacted]liu[redacted]oqu[redacted]nex[redacted]
Beluga O-23

TABLE [redacted]
GEOCHEM JOB C935

GEOCHEM SAMPLE	INTERVAL (meters)	TYPE OF ORGANIC MATTER (%) ALGAL				AMORPHOUS			HERBACEOUS			WOODY			C-I	R	PRESER-VATION	PARTICLE SIZE	T.A.I.		AMOUNT OF KEROGEN
		THICK WALLED	ALGAL CYSTS	DEGRADED	OTHER	FINE	COARSE	SPORE POLLEN	CUTICLE	DEGRADED	STRUCTURED	UNSTRUCTURED	DEGRADED	COALY-INERTINITE (FUSAIN, VITRAIN)	POLYMERS/RESINS/OIL						
001	590		10	10		5	10	15	5			Tr	15		30		G	M	1.7		Very Small*
002	610		10	10		5	5	5	5			5	10		45		P	M	1.7		Very Small
003	630			5		10	65	10			5		Tr		5		G	Fi	1.7		Medium
004	650		Tr	5		20	45	20	Tr		5		Tr		5		G	Fi	1.7		Medium**
005	690		5	10		10	50	15	Tr		5				5		G	Fi	1.7		Medium**
006	710		5	5		10	60	10			5		Tr		5		G	Fi	1.6		Medium
007	810			5		55	10	20				Tr	5		5		G	Fi	1.7		Medium*
008	830		5	5		40	20	20	Tr				5		5		G	Fi	1.8		Small*
009	990		Tr	5		50	20	15					5		10		G	Fi	1.8		Small*
010	1070		Tr	Tr		65	5	25							5		F	Fi	1.8		Small**
011	1090		Tr	5		50	10	20			Tr		5		10		F	Fi	1.8		Small***
012	1270		Tr	10		35	15	25	Tr			Tr	5		10		P	Fi	1.8		Very Small
013	1290		Tr	Tr		60	5	25							10	Po	F	Fi	1.8		Small**
014	1550		5	50		20		20					Tr		5		F	Fi	1.8		Very Small**
015	1610	5	5	10		45	10	20							5		G	Fi	1.8		Very Small***

* Scolecodons
** Pyrite
*** Scolecodons and Pyrite

G-GOOD F-FAIR P-POOR Po-POLYMERS O-OIL RW-REWORKED ±2=YELLOW ±3=BROWN ±4=BLACK
Fi-FINE M-MEDIUM C-COARSE R-RESIN Tr-TRACE Ca-CAVED

VISUAL KEROGEN DATA

[redacted] Ca[redacted]ra [redacted]lium [redacted]oqui[redacted]hex [redacted]

Sidewall Core

Beluga O-23

TABLE [redacted]

GEOCHEM JOB C935A

GEOCHEM SAMPLE	INTERVAL (meters)	TYPE OF ORGANIC MATTER (%) ALGAL				AMORPHOUS			HERBACEOUS			WOODY			C-I	R	PRESER-VATION	PARTICLE SIZE	T.A.I.		AMOUNT OF KEROGEN
001	636			5		55	10	20					5		5	Po	G	Fi	1.7		Small
002	1068	Tr		5		70		20					Tr		5		P	Fi	1.7?		Very Small*

THICK WALLED ALGAL CYSTS | DEGRADED | OTHER | FINE | COARSE | SPORE POLLEN | CUTICLE | DEGRADED | STRUCTURED | UNSTRUCTURED | DEGRADED | COALY-INERTINITE (FUSAIN, VITRAIN) | POLYMERS/RESINS/OIL

* Pyrite

G-GOOD F-FAIR P-POOR Po-POLYMERS O-OIL RW-REWORKED ±2=YELLOW ±3=BROWN ±4=BLACK

Fi-FINE M-MEDIUM C-COARSE R- RESIN Tr-TRACE Ca-CAVED

CANADA OIL AND GAS LANDS
ADMINISTRATION
ADMINISTRATION DU PÉTROLE ET DU
GAZ DES TERRES DU CANADA

JAN 28 1986

ENGINEERING AND CONTROL
BRANCH
TECHNIQUE ET DU CONTROLE

RESERVOIR QUALITY STUDY

FOR

CANTERRA ENERGY LTD.

TRILLIUM SOQUIP ONEXCO ET AL BELUGA 0-23

Our File: 70687-85-519

Date: 1985 12 05

Petrographic Services

CORE

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INTRODUCTION

Twenty-eight sidewall samples selected by Mr. John Thorpe of Canterra Energy Ltd., from Trillium Soquip Onexco et al Beluga 0-23 were submitted for analyses as listed below from run number 2. This report contains X-ray diffraction analyses of 10 samples, scanning electron microscopy of 9 samples and thin section petrography of 28 samples.

Sample Number	Depth (m)	Analyses
2	2200.00	TS
4	2192.00	TS
6	2191.00	TS
8	2189.00	TS
13	2120.00	TS
14	2100.00	TS, XRD, SEM
16	2080.00	TS
17	2060.00	TS
20	2020.00	TS
23	1992.50	TS, XRD
27	1949.00	TS
28	1920.00	TS
33	1880.00	TS, XRD, SEM
34	1876.00	TS, XRD, SEM
39	1820.50	TS, XRD, SEM
43	1765.00	TS
45	1745.00	TS
47	1720.00	TS
48	1710.00	TS
50	1694.00	TS, XRD, SEM
52	1680.00	TS
53	1680.00	TS
56	1620.00	TS, XRD, SEM
57	1600.00	TS
58	1578.00	TS, XRD, SEM
60	1565.00	TS, XRD, SEM
62	1550.00	TS
66	1486.00	TS, XRD, SEM

SUMMARY

Out of the 23 samples chosen for analyses, the majority of these were limestones and dolomites. Two samples were found to be metamorphic crystalline basement rocks, one sample of shale and one sandstone. Porosity in these samples ranges from no visible porosity to poor amounts of porosity which generally is very poorly interconnected.

Limestones

Fifteen of the 28 samples analyzed were limestones. The majority of these limestones were micrites which range from aphanocrystalline to finely crystalline and have very poor to no porosity which is very poorly interconnected. Four of the limestones analyzed were sparites which range from very finely crystalline microsparite to medium crystalline sparite. The sparites generally have no porosity, but may show very poor amounts of intercrystalline porosity which is very poorly interconnected.

Terrigenous constituents occur in trace amounts to 1% of the total rock volume. These traces are predominantly monocrystalline quartz, carbonaceous material and bitumen. A plutonic rock fragment of a delicate nature occurs within Sample 48, its presence may be due to the method of recovery along the circulation of foreign matter into the sample. Carbonaceous material and bitumen occur in roughly half of the samples, generally as fine, elongate seams which define rough bedding planes.

The predominant allochemical constituents are fossils, ranging from trace to 21% of the rock volume. Only Samples 23 and 60 contain no visible allochemical constituents within the sample portion. Samples 13, 14, 43 and 47 are biomicrites with greater than 10% fossil allochems. Peloids are the next most abundant allochem and are generally present throughout all samples. Samples 14, 17, and 33 have significant (greater than 5%) amounts of peloids. Sample 33 is a medium crystalline pelesparite with 25% peloids. Trace amounts of grapestone and ooids are present within Sample 14. Fossil recognization is difficult in some samples due to recrystallization of the fossil fabric. The predominant fossil types are brachiopods, crinoids, bryozoans and echinoderm fragments. Preservation of fossil fragments is more complete within the micrites.

The predominant orthochemical constituent within these limestones is calcite with lesser amounts of dolomite, chert, anhydrite and traces of gypsum, pyrite and apatite. Sparry calcite occurs as both a void filling constituent and as a neomorphic replacement fabric indicated by the lack of allochems and crenulated crystal boundaries. Samples 33, 50 and 58 are

SUMMARY (CONTINUED)

sparites; Sample 48 is a microsparite. Dolomite is the second most wide spread orthochemical constituent within these limestones and ranges from 0 to 30% of the sample volume. This dolomite is generally subhedral to euhedrally formed and may contain minor amounts of intercrystalline porosity. Anhydrite occurs in significant amounts within Sample 60 as elongate blades of anhydrite floating within a micritic matrix. Traces of gypsum laths exist within Samples 47, 48 and 52.

The predominant porosity type is intercrystalline and is present in very poor amounts. Samples 14, 23, 43, 50, 52, 58 and 60 show no visible porosity. The use of the scanning electron microscope indicates that these samples show minor amounts of intercrystalline porosity which is tortuously interconnected. Traces of moldic porosity is present within Sample 47.

Dolomites

Dolomites range in size from very finely crystalline to finely crystalline, with overall trace to poor amounts of porosity which is very poorly to moderately interconnected. Dolomite include Samples 28, 34, 39, 45, 56, 57 and 62.

Monocrystalline quartz is present in all samples except in Samples 28 and 62. Trace amounts of bitumen located in elongate seams are in intercrystalline pores is present in trace amounts within Samples 34, 45 and 57.

The dolomites generally contain few allochemical constituents. Those which are present are predominantly fossils making up a trace to 2% of the rock within Samples 28, 39 and 56. These fossils are generally very poorly recognized and are perceived as ghost allochems within the dolomite matrix. Trace amounts of peloids are present in Samples 28, 39 and 56.

The predominant orthochemical constituent is dolomite with lesser amounts of calcite, anhydrite and trace amounts of pyrite, chert and apatite. Dolomite ranges from very tightly interlocking crystals with no visible porosity in thin section to more loosely packed euhedral crystals with very poor to poor intercrystalline porosity. Calcite ranges from aphanocrystalline micrite to sparry calcite, both types may make up significant amounts of the sample's volume. Samples 34, 39, 57 and 62 contain less than 2% calcite. Anhydrite is present in Samples 56 and 62 as blocky to fibrous, generally in locallized patches.

Shale

Sample 8 is an illitic shale with minor amounts of monocrystalline quartz widely dispersed throughout the sample.

SUMMARY (CONTINUED)

The shale is tightly compacted and has no visible porosity. Traces of chert, mica and calcite are also present.

Halite

Sample 27 is 95% halite with gypsum located along cleavage planes. Gypsum makes up to 5% of the rock volume. No visible porosity is present within this sample.

Chert

Sample 53 is very finely crystalline chert with poorly preserved, partially replaced calcareous fossils. Ghost fossil allochems are present throughout the chert and are recognized as being more coarsely crystalline than the very finely crystalline chert matrix which has inclusions of calcite. The sample is very poorly preserved due to the recovery method employed, therefore the presence of opaque minerals is believed to be an artificial introduction into the sample.

Sandstone

Sample 66 is a very fine, dolomitic sandstone with poor to moderate amounts of very poorly to moderately interconnected interparticle porosity. Detrital constituents are predominantly monocrystalline quartz with lesser amounts of alkaline feldspar, carbonaceous material and traces of plagioclase and mica. Orthochemical constituents are predominantly dolomite with lesser amounts of anhydrite and trace amounts of calcite. Clays make up to 10% of the sample volume and are predominantly detrital in nature. Some clays may have been introduced by circulating drilling fluids. The relatively high amounts of porosity may be due to the method of retrieval. Dolomite and anhydrite generally occur as a pore filling cement leaving no visible porosity.

X-Ray Diffraction Mineralogy

X-ray diffraction analysis shows that calcite and dolomite are the most abundant components with quartz and clay minerals occurring in lesser amounts. Clay minerals are mainly kaolinite, illite, chlorite, traces of mixed layer clay and significant amounts of smectite within Samples 34 and 58. Sample 50 shows high quartz value and is felt that this may be due to the sampling of an area with an overabundance of chert nodules. Samples 60 and 66 contain moderate to large amounts of anhydrite which occur well dispersed throughout the sample. The introduction of some clay minerals and barite as indicated in Samples 39 and 58 may be due to the invasion of drilling fluids into the reservoir sample.

TABLE 1
XRD MINERALOGY

Formation	Sample Number	Depth (m)	Quartz	Feldspar	Calcite	Dolomite	Siderite	Kaolinite	Illite	Chlorite	Smectite	Mixed Layer Clays	Anhydrite	Barite	Percent Less Than 5 micrometres
Churchill	14	2100.00	6	-	94	-	-	-	-	-	-	T	-	-	51.0
Red Head Rapids	23	1992.50	3	-	50	47	-	-	T	T	-	T	-	-	41.1
Red Head Rapids	33	1880.00	T	-	97	3	T	-	-	-	-	-	-	-	29.4
Red Head Rapids	34	1876.00	16	-	2	78	-	T	2	-	2	T	T	-	32.0
Red Head Rapids	39	1820.50	1	-	2	97	-	T	T	-	-	T	T	T	27.7
Seven River	50	1694.00	85	-	15	T	-	-	T	T	-	T	-	-	32.9
Attatwapiskat	56	1620.00	7	-	38	52	-	K	3	T	-	T	-	-	30.8
Attatwapiskat	58	1578.00	-	-	96	3	-	-	T	-	1	-	-	T	38.7
Attatwapiskat	60	1565.00	T	-	83	-	-	T	5	T	-	T	12	-	27.9
Kerogami	66	1486.00	33	15	2	25	-	T	1	2	-	T	22	-	43.2

TABLE 2
LESS THAN 5 μm CLAY MINERALOGY AS DETERMINED
BY X-RAY DIFFRACTION

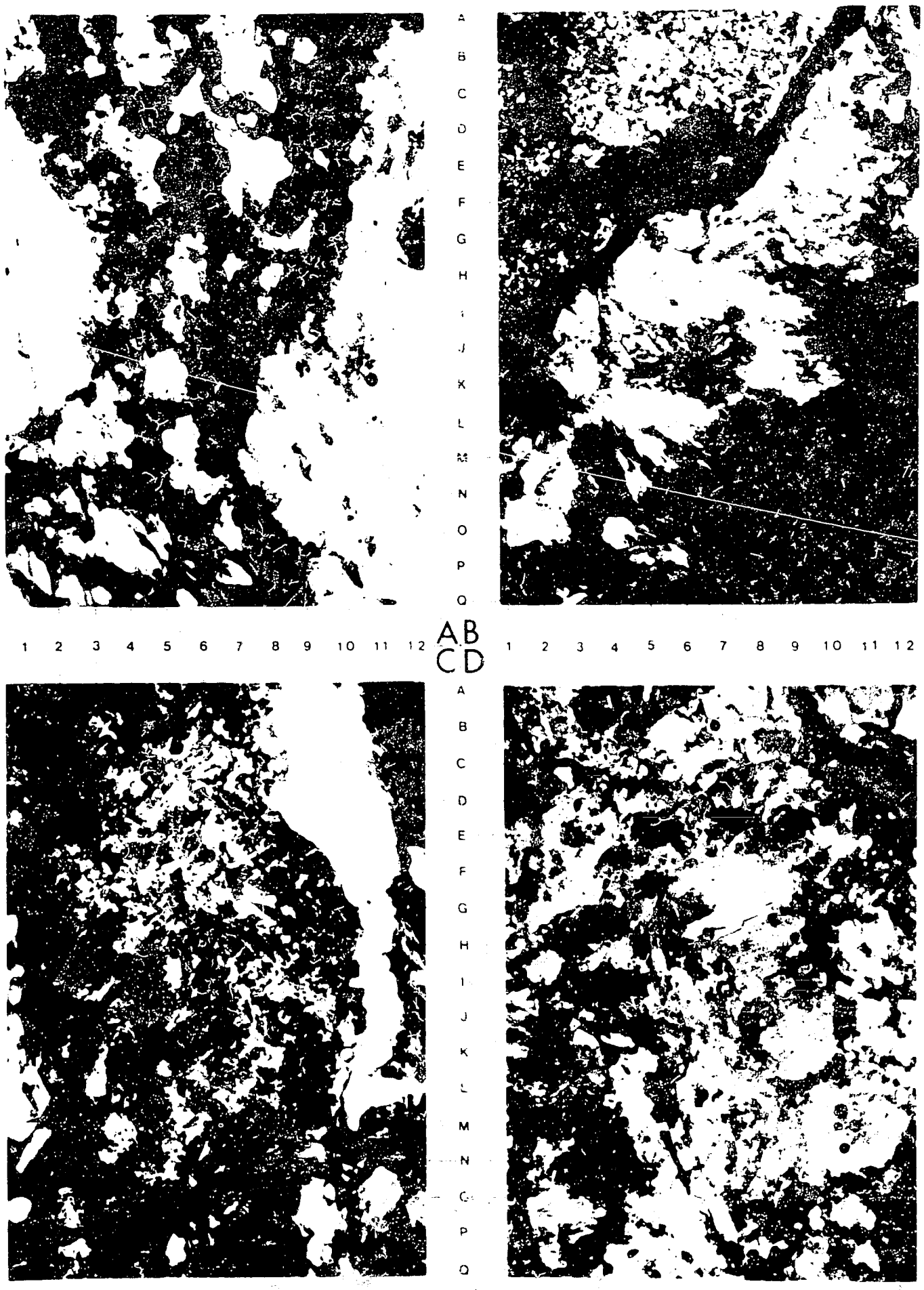
Formation	Sample Number	Depth (m)	Percent Less Than 5 micrometres	Kaolinite	Illite	Chlorite	Smectite	Mixed Layer Clays	Non-Clay Minerals
Churchill	14	2100.00	51.0	-	-	-	-	T	100
Red Head Rapids	23	1992.50	41.0	-	T	T	-	T	100
Red Head Rapids	33	1880.00	29.4	-	-	-	-	-	100
Red Head Rapids	34	1876.00	32.0	-	7	-	5	T	88
Red Head Rapids	39	1820.50	27.7	T	T	-	-	T	100
Seven River	50	1694.00	32.9	-	T	T	-	T	100
Attatwapiskat	56	1620.00	30.8	T	11	T	-	T	89
Attatwapiskat	58	1578.00	38.7	-	T	-	3	T	97
Attatwapiskat	60	1565.00	27.9	-	18	T	-	T	82
Kerogami	66	1486.00	43.2	T	3	5	-	T	92

TABLE 3
PETROGRAPHIC DATA

			Allochemical				Terrigenous						Orthochemical								Clays		
Formation	Sample Number	Depth (m)	Fossils	Peloids	Ooids	Grapestones	Quartz	Feldspar	Rock Fragments	Bitumen	Carbonaceous Material	Opaques	Calcite	Dolomite	Apatite	Anhydrite	Pyrite	Chert	Gypsum	Halite	Detrital	Chlorite	Porosity
---------	6	2191.00	10	-	-	-	-	-	-	T	-	-	80	10	-	-	T	-	-	-	-	-	VP
Bad Cache	8	2189.00	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	96	-	-
Churchill	13	2120.00	21	1	-	-	-	-	-	-	-	-	73	4	-	-	T	T	-	-	1	-	T
Churchill	14	2100.00	17	7	T	T	T	-	-	-	-	-	76	-	T	-	-	-	-	-	-	-	-
Churchill	16	2080.00	4	T	-	-	1	-	-	-	-	-	94	1	T	-	-	-	-	-	-	-	T
Churchill	17	2060.00	5	5	-	-	-	-	-	-	-	-	70	20	-	-	-	T	-	-	-	-	T
Red Head Rapids	20	2020.00	7	2	-	-	T	-	-	-	-	-	68	23	-	-	T	-	-	-	-	-	VP
Red Head Rapids	23	1992.50	-	-	-	-	T	-	-	-	-	-	70	30	-	-	T	-	-	-	-	-	-
Red Head Rapids	27	1949.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	95	-	-	-
Red Head Rapids	28	1920.00	1	T	-	-	-	-	-	-	-	-	39	60	-	-	T	-	-	-	-	-	VP-P
Red Head Rapids	33	1880.00	-	25	-	-	T	-	T	-	-	-	71	4	-	-	-	-	-	-	-	-	VP
Red Head Rapids	34	1876.00	-	-	-	-	T	-	-	T	-	-	2	98	-	-	T	T	-	-	-	-	VP
Red Head Rapids	39	1820.50	T	T	-	-	1	-	-	-	-	-	1	98	-	-	-	-	-	-	-	-	VP
Seven River	43	1765.00	15	3	-	-	T	-	-	-	-	-	82	T	-	-	-	-	-	-	-	-	-
Seven River	45	1745.00	-	-	-	-	1	-	-	1	-	-	4	92	-	-	T	-	-	-	2	-	T
Seven River	47	1720.00	12	2	-	-	T	-	-	-	-	-	84	1	-	-	-	T	T	-	1	-	T
Seven River	48	1710.00	T	T	-	-	-	-	T	T	-	-	96	3	-	-	-	-	T	-	1	-	T
Seven River	50	1694.00	10	1	-	-	-	-	-	-	T	-	64	T	-	-	T	23	-	-	2	-	-
Ekwan River	52	1680.00	T	-	-	-	T	-	-	-	T	-	99	1	T	-	-	-	T	-	-	-	-
Ekwan River	53	1660.00	T	-	-	-	-	-	-	-	-	3	28	-	-	-	-	69	-	-	T	-	-
Attatwapiskat	56	1620.00	2	T	-	-	T	-	-	-	-	-	40	58	-	T	-	-	-	-	T	-	T

TABLE 3
PETROGRAPHIC DATA (continued)

			Allochemical				Terrigenous						Orthochemical								Clays		
Formation	Sample Number	Depth (m)	Fossils	Peloids	Ooids	Grapestones	Quartz	Feldspar	Rock Fragments	Bitumen	Carbonaceous Material	Opaques	Calcite	Dolomite	Apatite	Anhydrite	Pyrite	Chert	Gypsum	Halite	Detrital	Chlorite	Porosity
Attatwapiskat	57	1600.00	-	-	-	-	T	-	-	T	-	-	-	99	T	-	T	-	-	-	1	-	VP
Attatwapiskat	58	1578.00	1	-	-	-	-	-	-	-	-	-	98	2	-	-	-	-	T	-	-	-	-
Attatwapiskat	60	1565.00	-	-	-	-	T	-	-	-	-	-	90	-	T	10	-	-	-	-	T	-	-
Narwhal	62	1550.00	-	-	-	-	-	-	-	-	-	-	T	89	-	9	T	-	-	-	2	-	T
Kerogami	66	1486.00	-	-	-	-	35	10	-	-	3	-	T	33	-	9	-	-	-	-	9	1	P-M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Q

SAMPLE NUMBER 2
DEPTH 2200.00 metres

Plate A

Thin section photomicrograph indicates that this sample is a medium grained biotite gneiss with quartz, feldspar and biotite as the principal minerals. Fractures commonly occur at right angles to foliation. (100x, plane polarized light)

Plate B

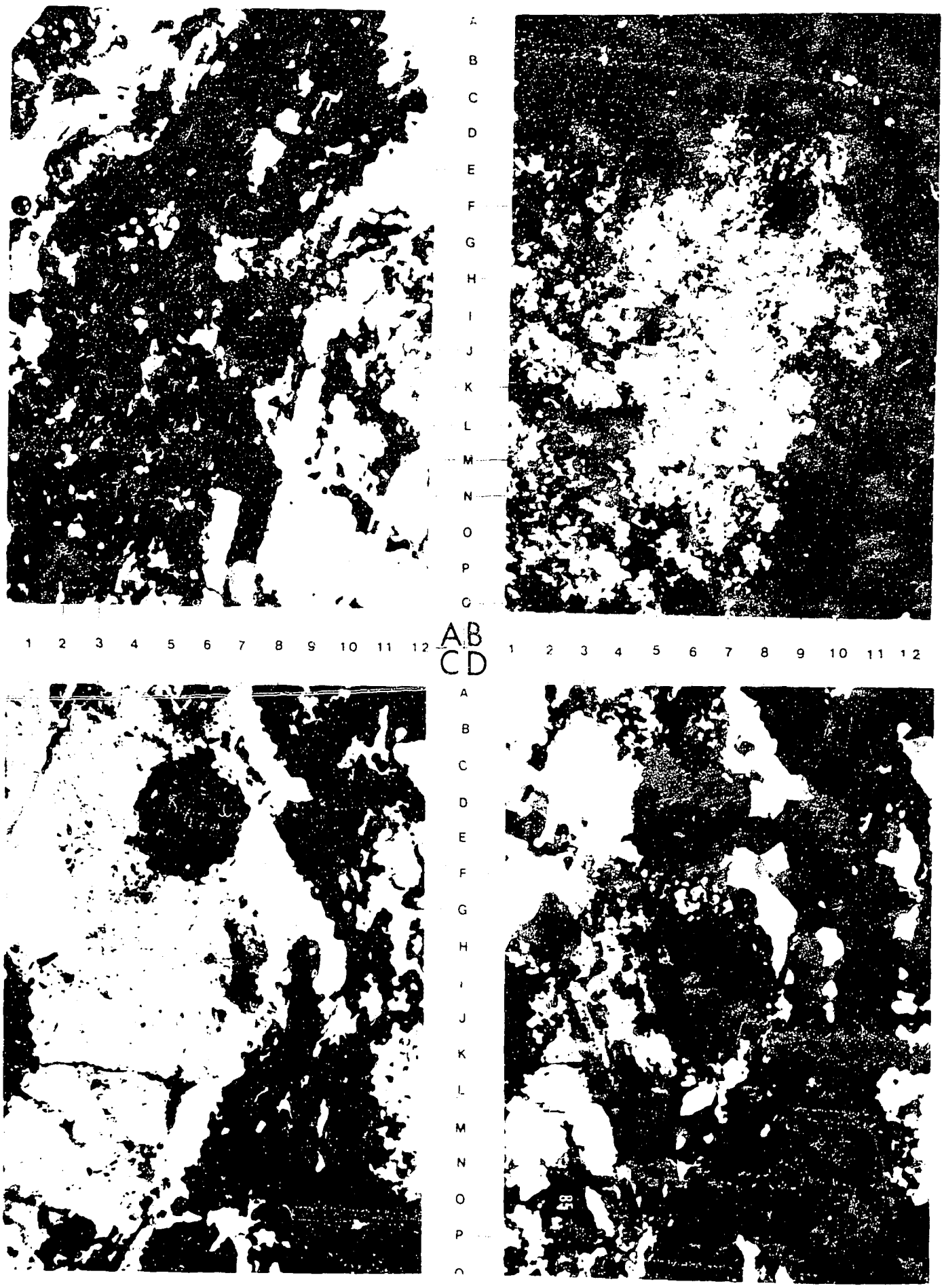
This higher magnification shows a feathery muscovite and quartz veinlet cutting across original foliation and providing further conduits. (100x, cross polarized light)

Plate C

This view highlights a sericitized potassium feldspar which commonly occurs throughout the sample. Crudely banded quartz (E10, P9) and biotite (H1-Q1) are also present (C11, H12). (100x, cross polarized light)

Plate D

This low magnification view shows a sericitized feldspar (I8) and biotite altering to iron oxide (H3). Biotite and iron oxide bands (M3, K2) occur throughout this sample. (25x, plane polarized light)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1 2 3 4 5 6 7 8 9 10 11 12
AB
CD
1 2 3 4 5 6 7 8 9 10 11 12
A B C D E F G H I J K L M N O P Q

SAMPLE NUMBER 4
DEPTH 2192.00 metres

Plate A

This low magnification overview shows the foliation of biotite, iron oxide, quartz, and minor calcite (stained red). This biotite gneiss is well crystallized and has fewer fractures than Sample 2. (25x, plane polarized light)

Plate B

High magnification photomicrograph of a completely sericitized feldspar. Iron oxide coating (C4, G11) is common throughout the photomicrograph. (100x, cross polarized light)

Plate C

Low magnification of a feldspar crystal (J4) displaying crystaloblastic strength with quartz and biotite deforming or flowing around it. Calcite (stained red) occurs in minor amounts at D5 and G12. (25x, plane polarized light)

Plate D

Same view as in Plate C showing feldspar crystals with microcline twinning and euhedral quartz grains (C8, D1). (25x, cross polarized light)

PETROGRAPHIC DATA SHEET

Well Name: Trillium Soquip Onexco et al Beluga O-23
Location:
Formation:
Porosity: K Max (mD):

Sample Number: 6
Sample Depth (m): 2191.00
Rock Name: Fossiliferous Micrite
Classification: Folk (1980)

TEXTURE

Mean Size-Transported Constituents (mm): 0.45
Class -Transported Constituents: M Calcirudite
Authigenic Constituents (mm): 0.02
Authigenic Constituents: Finely Crystalline
Depositional Texture - Broken Abraded Fossil Fragments

COMPOSITION

Allochemical Constituents

Fossils	10
Intraclasts	
Ooids	
Pisolites	
Peloids	

Terrigenous Constituents

Quartz:	Mono	T	Poly	
Feldspar:	K-spar		Plag	
Rock Fragments:	SRF	MRF	VRF	PRF
Mica				
Carbonaceous Material				
Bitumen		T		

Orthochemical Constituents

Calcite:	Sparry 1	Micrite 79	
Dolomite	10		
Gypsum			
Anhydrite			
Halite			
Quartz			
Aragonite			
Fe Dolomite			
Pyrite	T		

Clays

Kaolinite	
Illite	
Chlorite	
Detrital	

POROSITY

Porosity Types

Interparticle		Intercrystal	VP	Fenestral	
Intraparticle		Moldic		Shelter	
Growth Framework		Fracture		Chemical	
Vug					

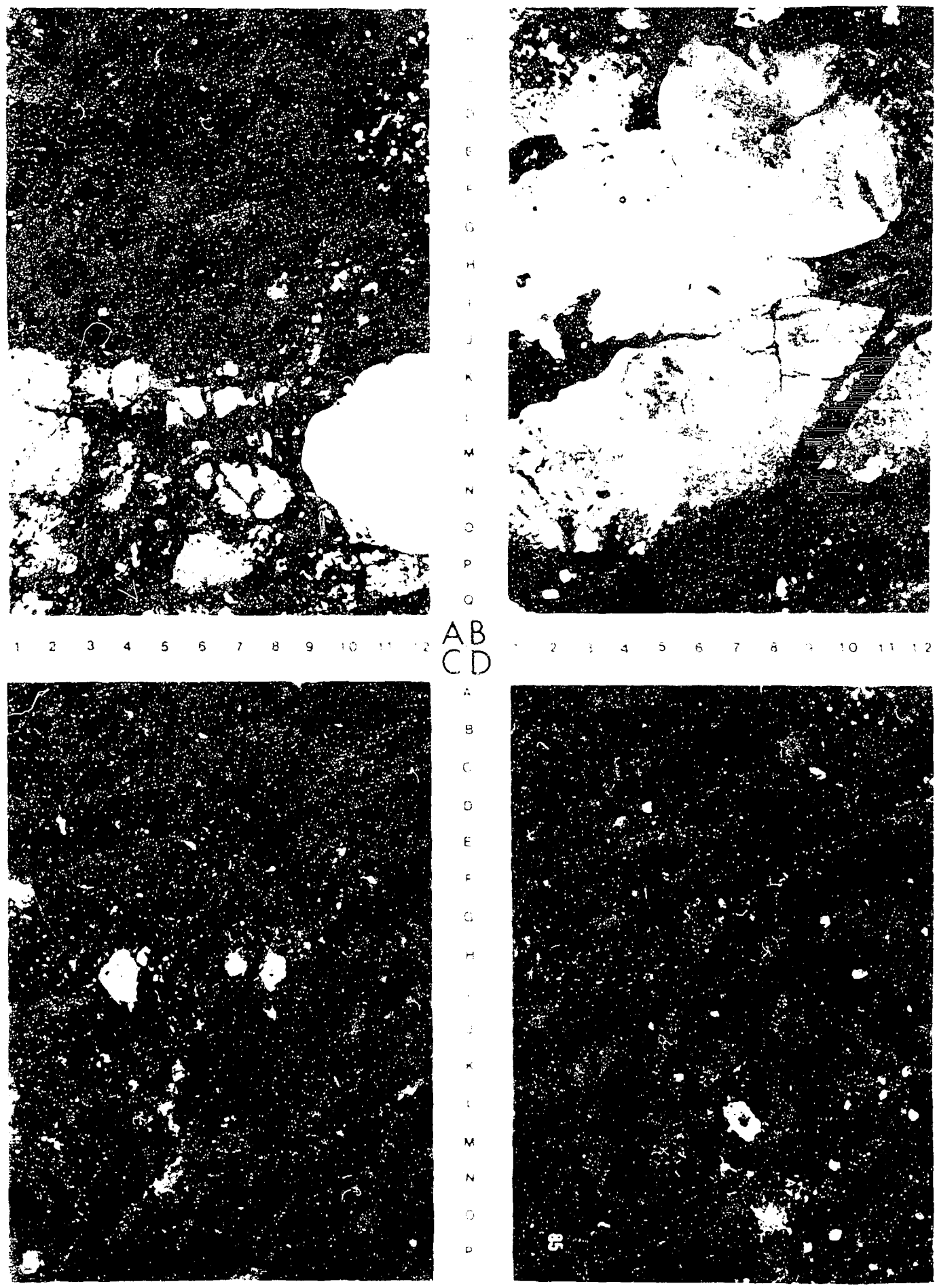
Mean: Pore Size (mm):
Mean: IC Pore Size (mm): 0.005
Interconnectedness: VP

CLAY MINERAL LOCATION

Laminae		Dispersed		Rock Fragments	
Pore Lining		Pore Bridging		Pore Filling		Grain Replacement	
Fracture Filling					

NOTES:

All percentages are based upon visual estimation.


1 2 3 4 5 6 7 8 9 10 11 12
A B
C D
A B C D E F G H I J K L M N O P

SAMPLE NUMBER 6
DEPTH 2191.00 metres

Plate A

The sample is a finely crystalline, fossiliferous micrite with minor amounts of finely crystalline dolomite. Porosity is very poorly developed, the majority of which is intercrystalline. (25x, plane polarized light)

Plate B

This higher magnification view shows the fine micrite texture of this sample. Fossils within the sample include brachiopods, crinoids (E9) and bryozoans. (25x, plane polarized light)

Plate C

This high magnification photomicrograph shows the typically tightly interlocking nature of the calcite crystals. Note the larger rhombs of dolomite (HI8, I4). Pyrite occurs in trace amounts and is present at H5. (100x, plane polarized light)

Plate D

This high magnification view shows the presence of fine rhombs of dolomite widely dispersed throughout the sample (LM7, FG7). Dolomite rhombs are noted by non-stained, white color and rhombic shape. (100x, cross polarized light)

PETROGRAPHIC DATA SHEET

Well Name: Trillium Soquip Onexco et al Beluga O-23
Location:
Formation: Bad Cache
Porosity: K Max(mD):

Sample Number: 8
Sample Depth (m): 2189.00
Rock Name: Shale
Classification: Wentworth (1922)

TEXTURE

Maximum Size (mm)	0.65	Class	Coarse Sand	Grain Contacts	Floating
Mean Size (mm)		Class	Shale	Lithification	Well
Sorting	M-W	Sphericity	Subequant	Roundness	Well Rounded-Sub

COMPOSITION

Framework Grains

Monocrystalline Quartz	4	Metamorphic Rock Frag.			Fossils
Polycrystalline Quartz		Volcanic Rock Frag.			Intraclasts
Chert	T	Plutonic Rock Frag.			Ooids
Alkali Feldspar		Mica	T		Peloids
Plagioclase Feldspar		Carbonaceous Material			
Sedimentary Rock Frag.		Glauconite			

Matrix

Percent: 96 Type: Detrital Clay Distribution: Very Well

Cements

Quartz		Siderite		Chlorite	
Feldspar		Pyrite		Smectite	
Calcite	T	Kaolinite			
Dolomite		Anhydrite			

POROSITY

Porosity Types

Intergranular		Dissolution		Fracture		Vuggy	
Intragranular		Moldic		Intercrystalline		Micro	

Pore Morphology

Maximum Size (mm): Mean Size (mm): Interconnectedness:

CLAY MINERAL LOCATION

Detrital

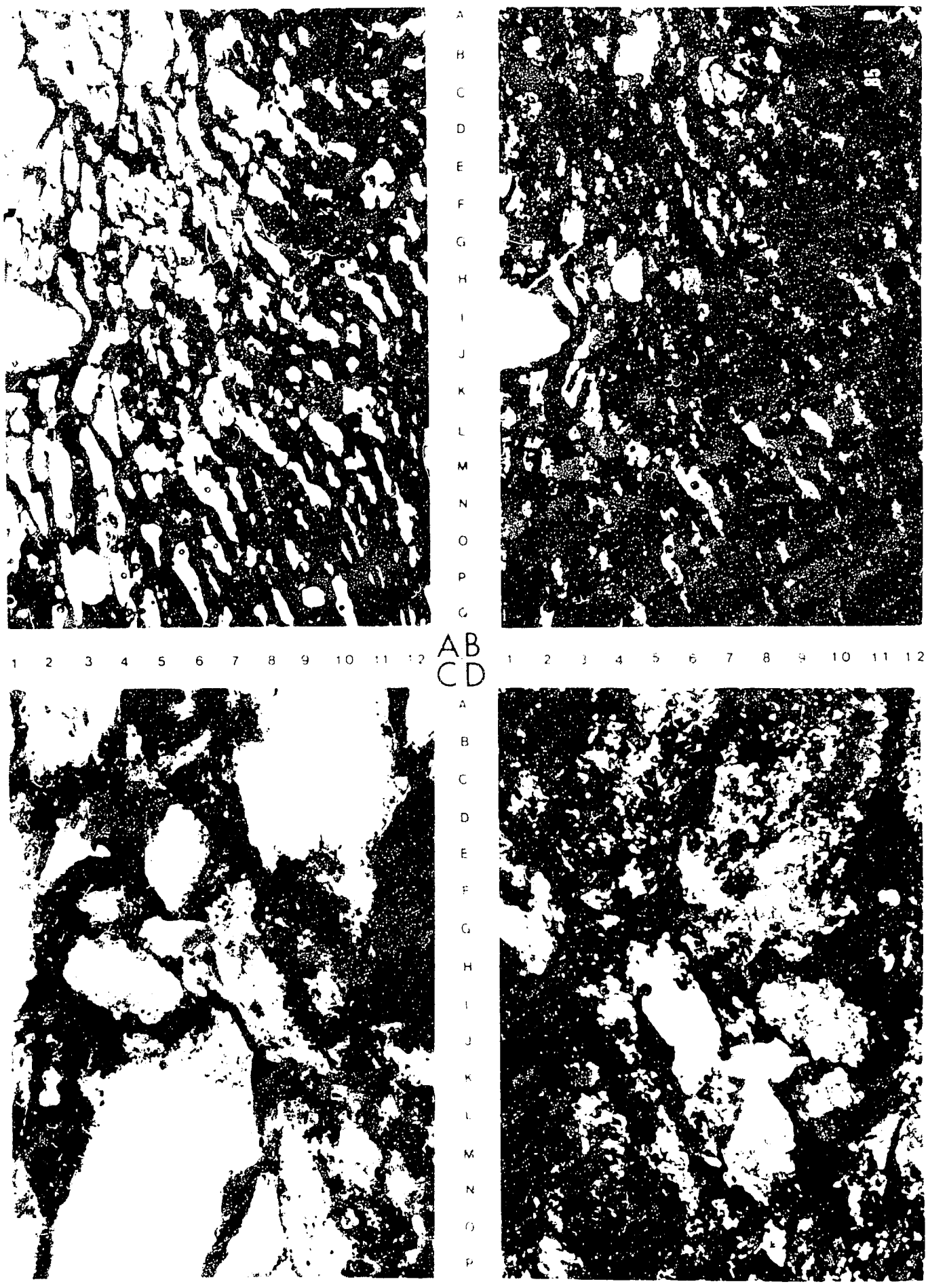
Laminae: Dispersed: Rock Fragments:

Authigenic

Pore Lining: Pore Bridging: Pore Filling: Grain Replacement:
Fracture Filling:

NOTES:

All percentages are based upon visual estimation.


A
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1 2 3 4 5 6 7 8 9 10 11 12
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1 2 3 4 5 6 7 8 9 10 11 12
A
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SAMPLE NUMBER 8
DEPTH 2189.00 metres

Plate A

This low magnification view shows the presence of a well lithified, moderately to well sorted shale. The shale contains minor amounts of monocrystalline quartz (C7.5). (25x, plane polarized light)

Plate B

This cross polarized view indicates the minor amounts of monocrystalline quartz present within the sample (B4.5, H4.5, C7). This shale shows a moderately foliated texture. (25x, cross polarized light)

Plate C

This higher magnification close up shows a very fine texture to the sample. Porosity is relatively nonexistant with blue dyed epoxy filling fractures created by sample recovery. (100x, plane polarized light)

Plate D

This high magnification view shows the highly birefringent, illitic clays which make up the majority of this sample. These clays are orientated in a subparallel direction. (100x, cross polarized light)

PETROGRAPHIC DATA SHEET

Well Name: Trillium Soquip Onexco et al Beluga O-23
Location:
Formation: Churchill
Porosity: K Max (mD):

Sample Number: 13
Sample Depth (m): 2120.00
Rock Name: Biomicrite
Classification: Folk (1980)

TEXTURE

Mean Size-Transported Constituents (mm): 0.23
Class -Transported Constituents: F Calcarenite
Authigenic Constituents (mm): 0.02
Authigenic Constituents: Finely Crystalline
Depositional Texture -

COMPOSITION

Allochemical Constituents

Fossils	21
Intraclasts	
Ooids	
Pisolites	
Peloids	1

Terrigenous Constituents

Quartz:	Mono		Poly	
Feldspar:	K-spar		Plag	
Rock Fragments:	SRF	MRF	VRF	PRF
Mica				
Carbonaceous Material				

Orthochemical Constituents

Calcite:	Sparry 2	Micrite 71	Aragonite		
Dolomite	4		Fe Dolomite		
Gypsum			Pyrite	T	
Anhydrite			Chert	T	
Halite					
Quartz					

Clays

Kaolinite	
Illite	
Chlorite	
Detrital	T

POROSITY

Porosity Types

Interparticle		Intercrystal	T	Fenestral	
Intraparticle		Moldic		Shelter	
Growth Framework		Fracture		Chemical	
Vug					

Mean: Pore Size (mm):

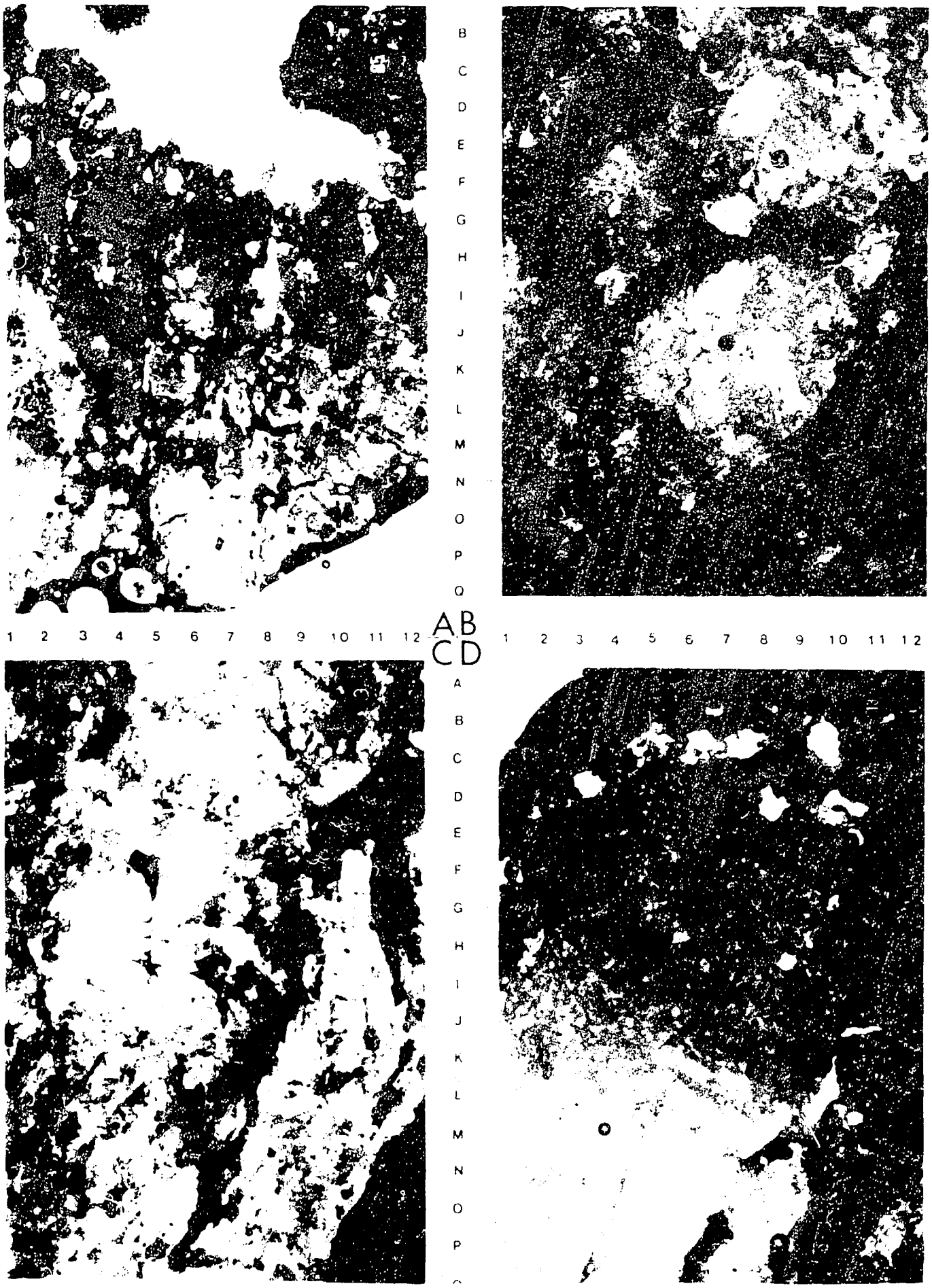
Mean: IC Pore Size (mm): 0.005 Interconnectedness: VP

CLAY MINERAL LOCATION

Laminae		Dispersed	Poorly			Rock Fragments	
Pore Lining		Pore Bridging		Pore Filling		Grain Replacement	
Fracture Filling							

NOTES:

All percentages are based upon visual estimation.


1 2 3 4 5 6 7 8 9 10 11 12
B C D E F G H I J K L M N O P Q
AB
CD
1 2 3 4 5 6 7 8 9 10 11 12
A B C D E F G H I J K L M N O P

SAMPLE NUMBER 13
DEPTH 2120.00 metres

Plate A

This low magnification overview shows a very finely crystalline biomicrite which has only traces of intercrystalline porosity that is very poorly interconnected. (25x, plane polarized light)

Plate B

This higher magnification view shows the presence of fossils (L7, L8.5), which are floating within the matrix. This type of interlocking calcite crystals completely destroy all porosity. (100x, plane polarized light)

Plate C

This view shows the presence of a brachiopod fragment (H5) within the micrite matrix. Minor amounts of finely crystalline sparry calcite are present in a fossil replacing habit (F6). (100x, cross polarized light)

Plate D

This high magnification view shows the presence of well distributed dolomite rhombs (HI9) within a very finely crystalline, micritic matrix. Dolomite rhombs are highlighted as white crystals within a red matrix by the use of alizarin-red-S (100x, plane polarized light)

X-RAY DIFFRACTION ANALYSIS

Sample Number: 14
Depth: 2100.00 metres

	Material Less than 5 Microns	Material Greater than 5 Microns	Calculated Bulk Composition
Quartz	7	4	6
Feldspar	Nil	Nil	Nil
Calcite	93	96	94
Dolomite	Nil	Nil	Nil
Siderite	Nil	Nil	Nil
Pyrite	Nil	Nil	Nil
Kaolinite	Nil	Nil	Nil
Illite	Nil	Nil	Nil
Chlorite	Nil	Nil	Nil
Smectite	Nil	Nil	Nil
Mixed Layer Clays (Swelling)	Trace	Nil	Trace

CLAY SEPARATION BY FLOATATION

Material Less Than 5 Microns: 51.0%

Material Greater Than 5 Microns: 49.0%

PETROGRAPHIC DATA SHEET

Well Name: Trillium Soquip Onexco et al Beluga 0-23
Location:
Formation: Churchill
Porosity: _____ K Max (mD) _____

Sample Number: 14
Sample Depth (m): 2100.00
Rock Name: Biomicrite
Classification: Folk (1980)

TEXTURE

Mean Size-Transported Constituents (mm): 0.12
Class -Transported Constituents: VF Calcarenite
Authigenic Constituents (mm): 0.04
Authigenic Constituents: Finely Crystalline
Depositional Texture -

COMPOSITION

Allochemical Constituents

Fossils	17
Intraclasts	
Ooids	1
Pisolites	
Peloids	7
Grapestone	T

Terrigenous Constituents

Quartz:	Mono T	Poly		
Feldspar:	K-spar	Plag		
Rock Fragments:	SRF	MRF	VRF	PRF
Mica				
Carbonaceous Material				

Orthochemical Constituents

Calcite:	Sparry 5	Micrite 71	Aragonite		Kaolinite
Dolomite			Fe Dolomite		Illite
Gypsum			Apatite	T	Chlorite
Anhydrite					Detrital
Halite					
Quartz					

Clays

POROSITY

Porosity Types

Interparticle		Intercrystal		Fenestral	
Intraparticle		Moldic		Shelter	
Growth Framework		Fracture		Chemical	
Vug					

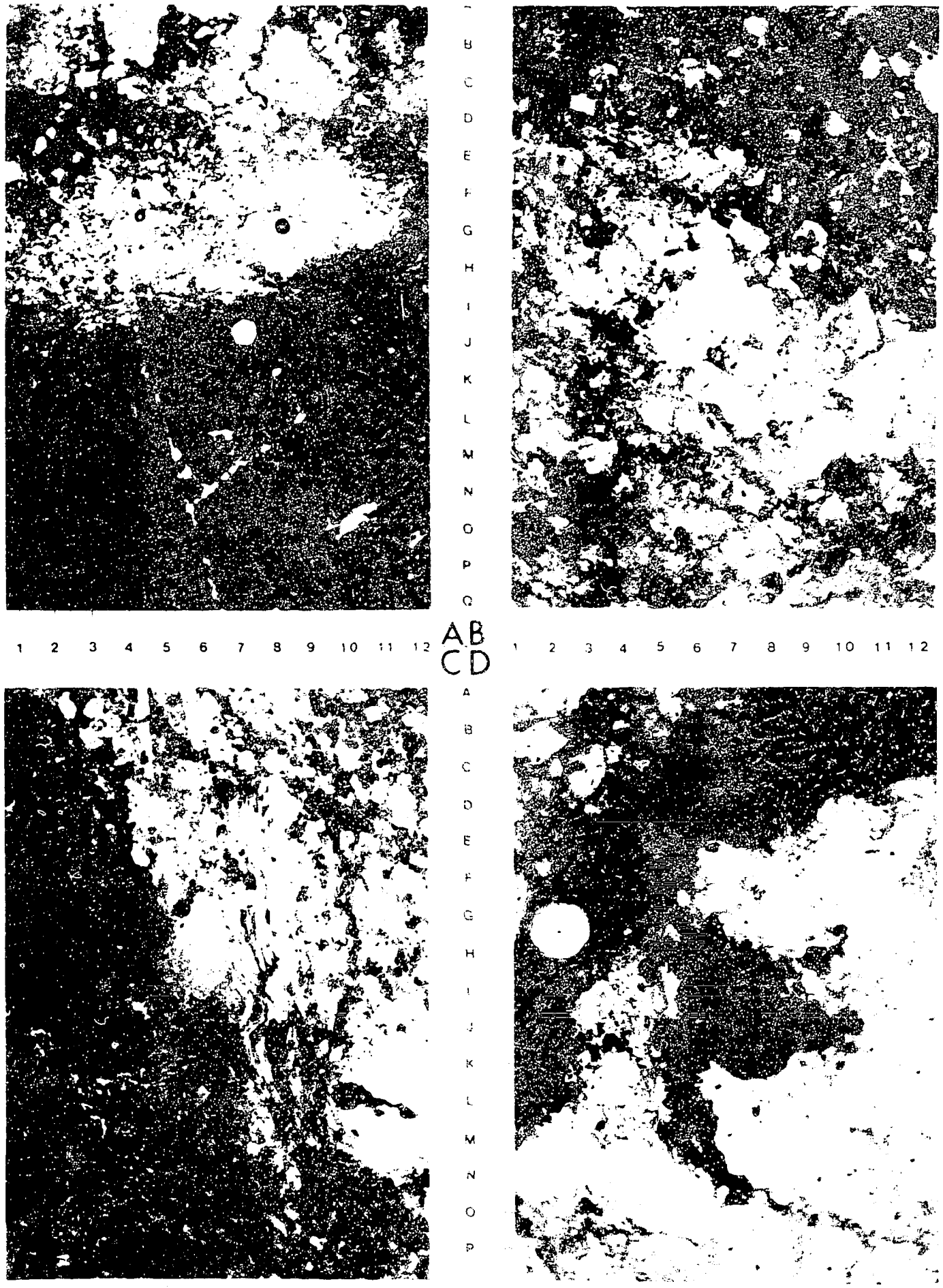
Mean ____ Pore Size (mm) ____ Mean ____ Pore Size (mm) ____ Interconnectedness ____

CLAY MINERAL LOCATION

Laminae		Dispersed		Rock Fragments	
Pore Lining		Pore Bridging		Pore Filling		Grain Replacement	
Fracture Filling					

NOTES:

All percentages are based upon visual estimation.


1 2 3 4 5 6 7 8 9 10 11 12
A B C D E F G H I J K L M N O P Q
AB
CD
1 2 3 4 5 6 7 8 9 10 11 12
A B C D E F G H I J K L M N O P

SAMPLE NUMBER 14
DEPTH 2100.00 metres

Plate A

This low magnification overview shows the contact between the stained portion of the sample and the unstained. The sample is a very finely crystalline biomicrite with no visible porosity. Allochems are, 18% fossils and 7% peloids with traces of ooids and grapestone. (25x, plane polarized light)

Plate B

This higher magnification view of an unstained portion shows the presence of sparry calcite (I7, K6) which is present in minor amounts occurring as a fossil replacement with tightly interlocking crystals. (100x, plane polarized light)

Plate C

This view shows the presence of a brachiopod fragment (F8-L8) along with the presence of echinoderm fragments (H3, H6). (100x, plane polarized light)

Plate D

This high magnification view shows the interlocking nature of the sparry calcite (F6, C3). Finely crystalline micrite is present as a matrix material throughout the sample (O3). (250x, plane polarized light)

SAMPLE NUMBER 14 (SEM)
DEPTH 2100.00 metre

Plate A

This low magnification photomicrograph is of a very fine crystalline biomicrite which has no visible porosity under the light microscope.

Plate B

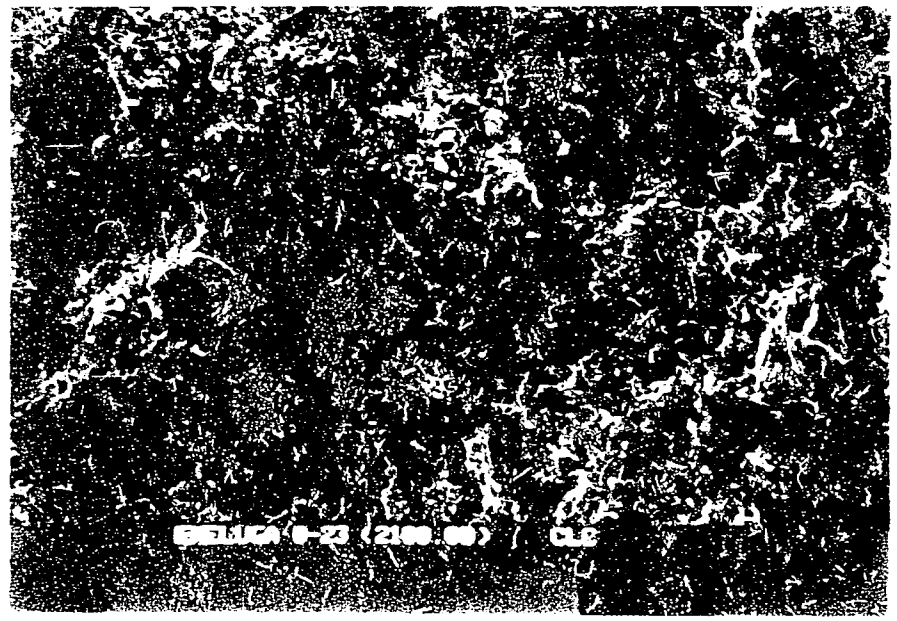
This higher magnification photomicrograph shows the presence of sparry calcite which is present in minor amounts throughout the sample (N9, E7). Sparry calcite occurs as a neomorphic replacement and/or fossil replacing constituent. Sparry calcite is surrounded by very finely crystalline calcite (K5, I10).

Plate C

This high magnification view shows minor amounts of intercrystalline porosity which is not visible with the use of a light microscope (H6, L3). This porosity is generally poorly interconnected and would not significantly add to the overall effective porosity.

Plate D

Photomicrograph D shows the presence of sparry calcite with minor intercrystalline pores (D10, G6). This sparry calcite is surrounded by more finely crystalline calcite with micro-intercrystalline pores (L8).


BELUGA 0-23 (2100.00) CLC

BELUGA 0-23 (2100.00) CLC

A B
C D

CLC

BELUGA 0-23 (2100.00) CLC

PETROGRAPHIC DATA SHEET

Well Name: Trillium Soquip Onexco et al Beluga 0-23
Location:
Formation: Churchill
Porosity: _____ K Max (mD) _____

Sample Number: 16
Sample Depth (m): 2080.00
Rock Name: Fossiliferous Micrite
Classification: Folk (1980)

TEXTURE

Mean Size-Transported Constituents (mm): 0.25
Authigenic Constituents (mm): 0.015
Class -Transported Constituents: F-M Calcarenite
Authigenic Constituents: Very Finely Crystalline
Depositional Texture - Fossiliferous

COMPOSITION

Allochemical Constituents

Fossils	4
Intraclasts	
Ooids	
Pisolites	
Peloids	T

Terrigenous Constituents

Quartz:	Mono	1	Poly	
Feldspar:	K-spar		Plag	
Rock Fragments:	SRF		MRF	VRF	PRF
Mica				
Carbonaceous Material				

Orthochemical Constituents

Calcite: Sparry	T	Micrite	94
Dolomite	1		
Gypsum			
Anhydrite			
Halite			
Quartz			

Aragonite	
Fe Dolomite	
Apatite	T
Pyrite	T

Clays

Kaolinite	
Illite	
Chlorite	
Detrital	

POROSITY

Porosity Types

Interparticle	
Intraparticle	
Growth Framework	
Vug	

Intercrystal	T
Moldic	
Fracture	

Fenestral	
Shelter	
Chemical	

Mean _____ Pore Size (mm) _____

Mean _____ Pore Size (mm) _____

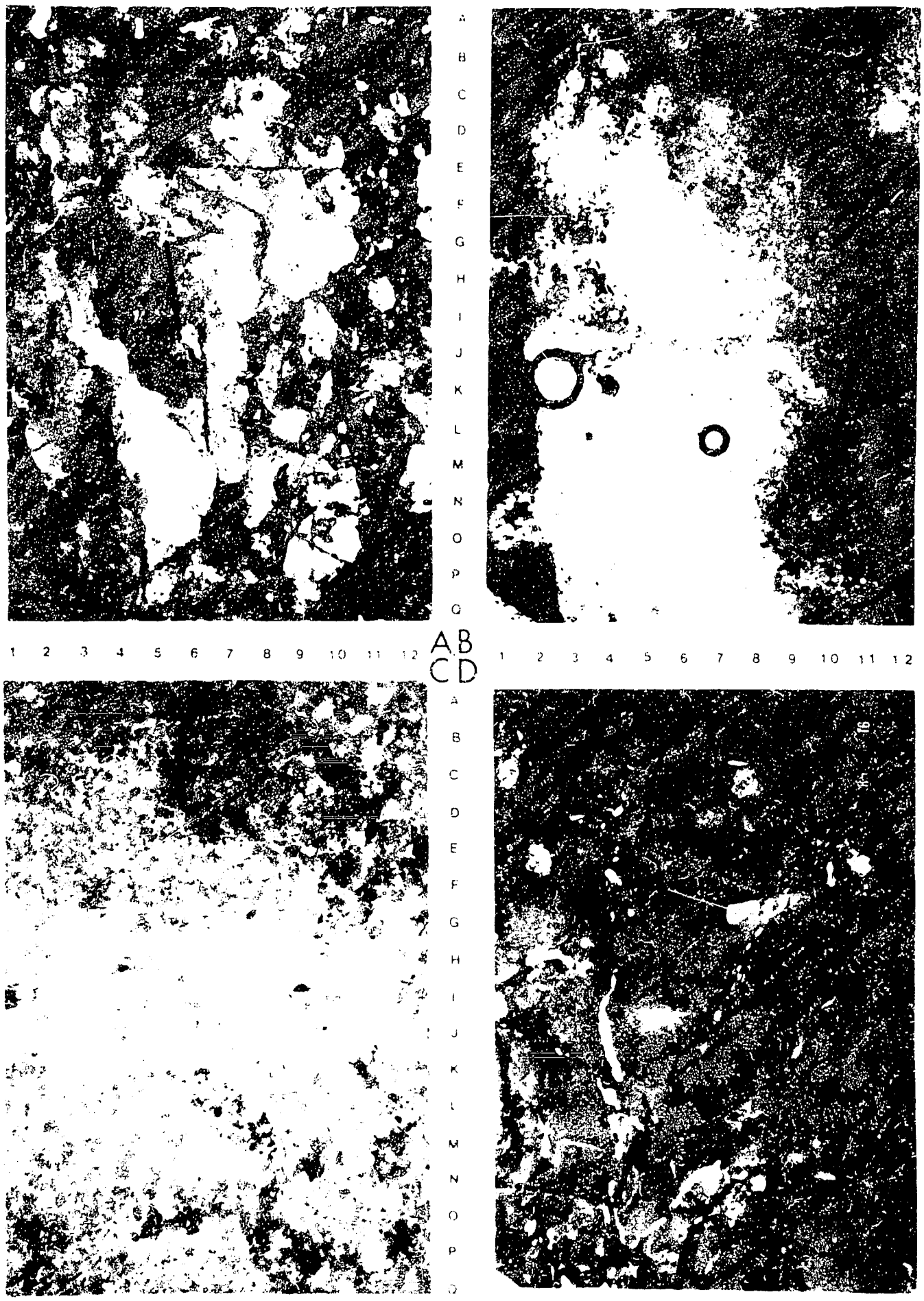
Interconnectedness VP

CLAY MINERAL LOCATION

Laminae _____
Dispersed _____
Rock Fragments _____
Pore Lining _____
Pore Bridging _____
Pore Filling _____
Grain Replacement _____
Fracture Filling _____

NOTES:

All percentages are based upon visual estimation.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1 2 3 4 5 6 7 8 9 10 11 12
AB
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SAMPLE NUMBER 16
DEPTH 2080.00 metres

Plate A

This low magnification overview shows a finely crystalline, fossiliferous micrite with traces of intercrystalline porosity that is poorly interconnected. (25x, plane polarized light)

Plate B

This higher magnification view shows the finely crystallized nature of the sample with a sparry replaced fossil fragment (G6). This photomicrograph demonstrates the difference between alizarin-red-S, stained and non-stained portions of the sample. (100x, plane polarized light)

Plate C

This high magnification view shows the presence of very finely crystalline dolomite rhombs which occur as light scatterings or patches within the sample (I6). (250x, plane polarized light)

Plate D

This low magnification overview of a stained portion of the sample shows the presence of sparry-filled fossil fragments (E2, FG8) within a micrite matrix. Note the dolomite patch which occurs at IJ5.5, and is the same patch as seen in Plate C. Dolomite makes up 1% of the samples's composition. (25x, plane polarized light)

PETROGRAPHIC DATA SHEET

Well Name Trillium Soquip Onexco et al Beluga 0-23
Location
Formation Churchill
Porosity K Max (mD)

Sample Number 17
Sample Depth (m) 2060.00
Rock Name Dolomitic Micrite
Classification Folk (1980)

TEXTURE

Mean Size-Transported Constituents (mm) 0.2
Class -Transported Constituents F Calcarenite
Authigenic Constituents (mm) 0.03
Authigenic Constituents Finely Crystalline
Depositional Texture - Fossiliferous, Mottled

COMPOSITION

Allochemical Constituents

Fossils 5
Intraclasts
Ooids
Pisolites
Peloids 5

Terrigenous Constituents

Quartz: Mono Poly
Feldspar: K-spar Plag
Rock Fragments: SRF MRF VRF PRF
Mica
Carbonaceous Material

Orthochemical Constituents

Calcite: Sparry 1 Micrite 69
Dolomite 20
Gypsum
Anhydrite
Halite
Quartz

Aragonite
Fe Dolomite
Chert I

Clays

Kaolinite
Illite
Chlorite
Detrital

POROSITY

Porosity Types

Interparticle
Intraparticle
Growth Framework
Vug

Intercrystal T
Moldic
Fracture

Fenestral
Shelter
Chemical

Mean Pore Size (mm)

Mean IC Pore Size (mm) 0.005

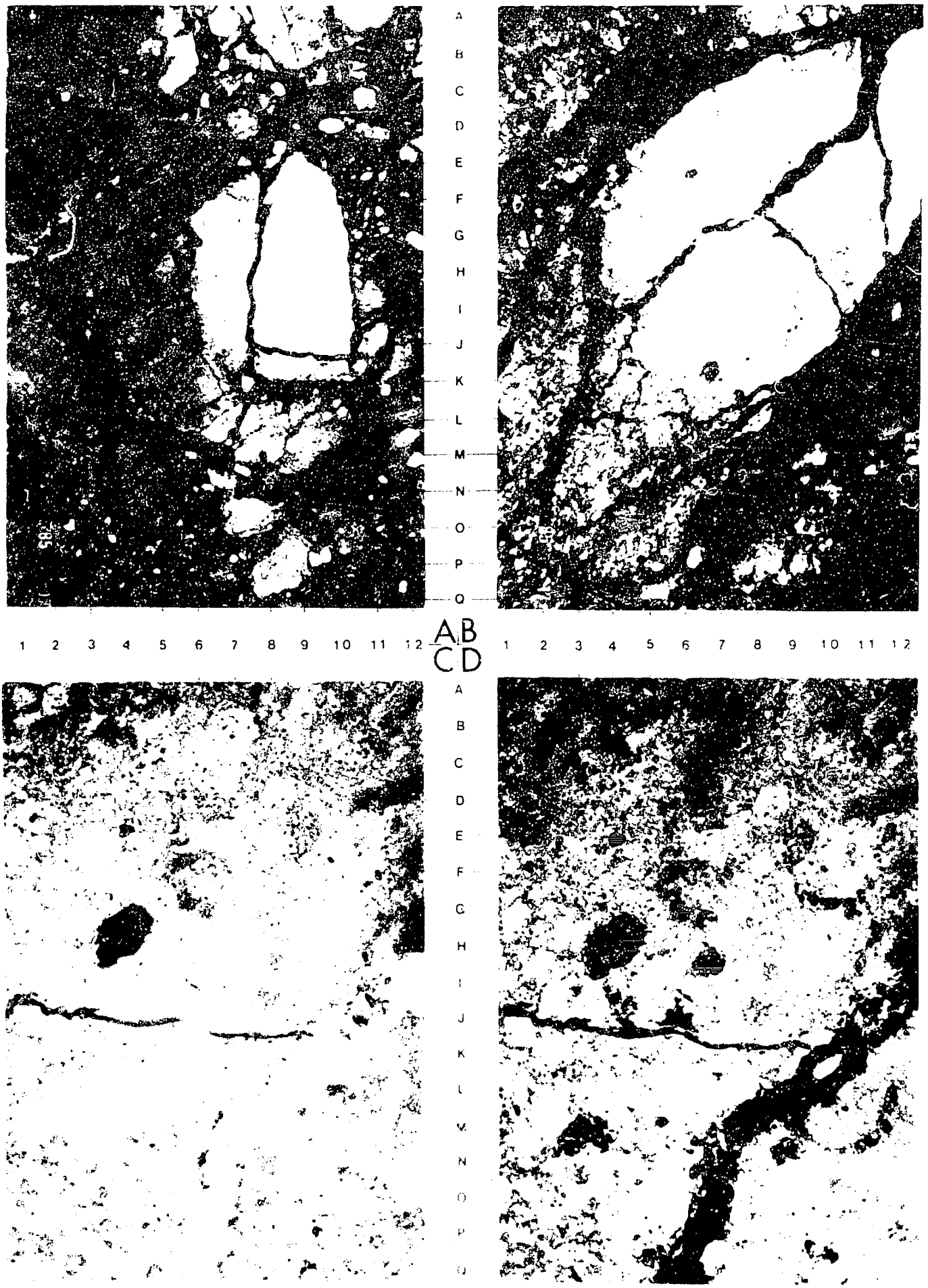
Interconnectedness VP

CLAY MINERAL LOCATION

Laminae
Dispersed
Rock Fragments
Pore Lining
Pore Bridging
Pore Filling
Grain Replacement
Fracture Filling

NOTES:

All percentages are based upon visual estimation.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1 2 3 4 5 6 7 8 9 10 11 12
A B
C D
1 2 3 4 5 6 7 8 9 10 11 12
A
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SAMPLE NUMBER 17
DEPTH 2060.00 metres

Plate A

This low magnification overview shows a highly crystalline, dolomitic micrite which has only trace amounts of intercrystalline porosity that is very poorly interconnected. Moderate amounts of fossils and peloids (J7) are also present. (25x, plane polarized light)

Plate B

This higher magnification view shows the presence of finely crystalline dolomite indicated as white flecks within alizarin-red-S stained portion of the slide (G1). These dolomite rhombs are finely distributed throughout the sample. (25x, cross polarized light)

Plate C

This higher magnification view shows the presence of dolomite rhombs (EE7, D1.5, IJ1) which are finely distributed throughout the sample within a finely crystalline micrite matrix. Note the presence of a sparry replaced fossil fragment (L11). (100x, plane polarized light)

Plate D

This cross polarized view of the previous photomicrograph, highlights the dolomite rhombs (E1, EF6.5) and sparry replaced fossil and/or peloid fragments (C7, M3, MN11). (100x, cross polarized light)

PETROGRAPHIC DATA SHEET

Well Name Trillium Soquip Onexco et al Beluga O-23
Location
Formation Red Head Rapids
Porosity K Max (mD)

Sample Number 20
Sample Depth (m) 2020.00
Rock Name Dolomitic Micrite
Classification Folk (1980)

TEXTURE

Mean Size-Transported Constituents (mm) 0.15
Class -Transported Constituents F Calcarenite
Authigenic Constituents (mm) 0.025
Authigenic Constituents Finely Crystalline
Depositional Texture - Fossiliferous

COMPOSITION

Allochemical Constituents

Fossils 7
Intraclasts
Ooids
Pisolites
Peloids 2

Terrigenous Constituents

Quartz: Mono T Poly
Feldspar: K-spar Plag
Rock Fragments: SRF MRF VRF PRF
Mica
Carbonaceous Material

Orthochemical Constituents

Calcite: Sparry 7 Micrite 61
Dolomite 23
Gypsum
Anhydrite
Halite
Quartz

Aragonite
Fe Dolomite
Pyrite T

Clays

Kaolinite
Illite
Chlorite
Detrital

POROSITY

Porosity Types

Interparticle
Intraparticle
Growth Framework
Vug

Intercrystal VP
Moldic
Fracture

Fenestral
Shelter
Chemical

Mean Pore Size (mm)

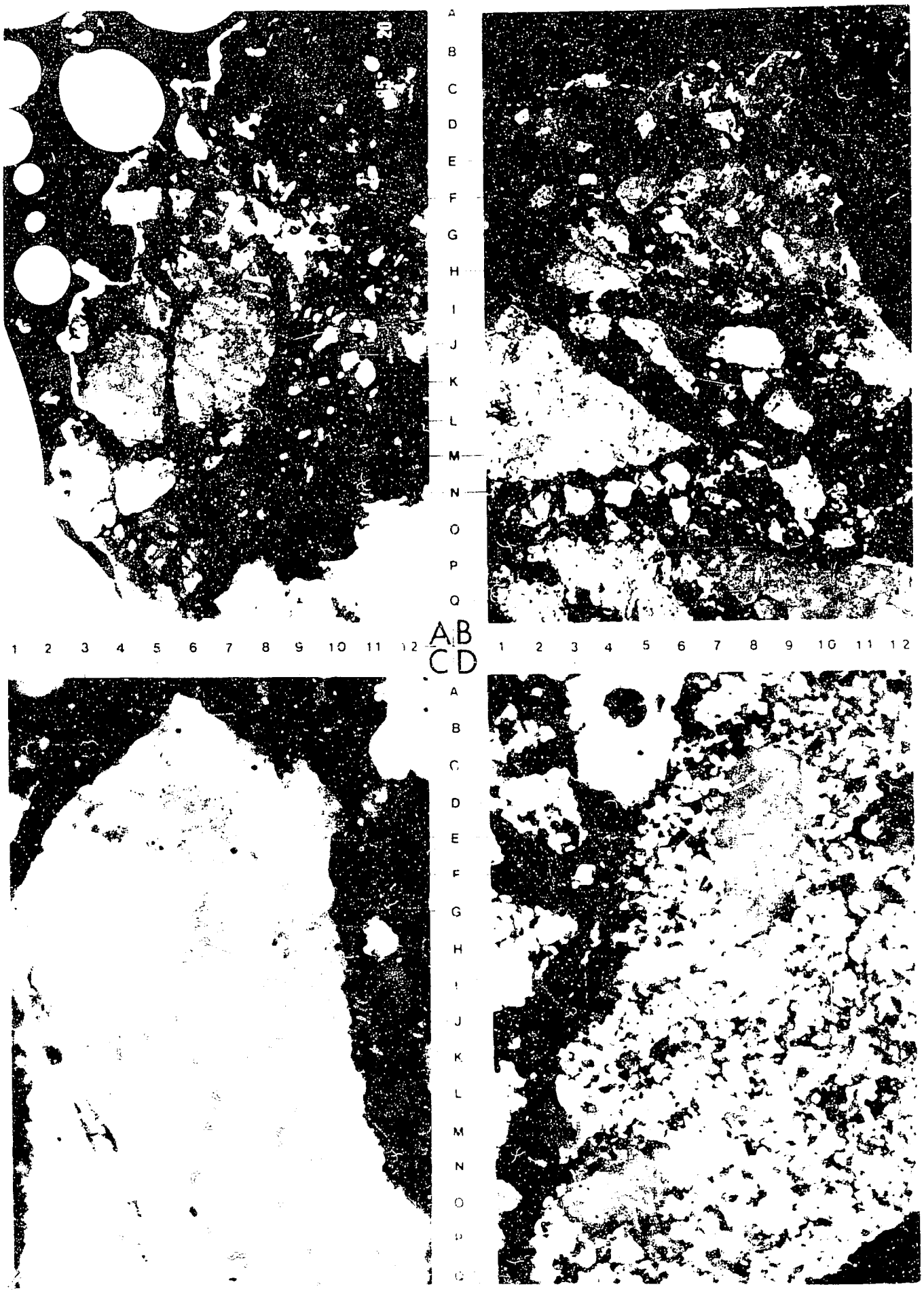
Mean IC Pore Size (mm) 0.01
Interconnectedness VP

CLAY MINERAL LOCATION

Laminae
Dispersed
Rock Fragments
Pore Lining
Pore Bridging
Pore Filling
Grain Replacement
Fracture Filling

NOTES:

All percentages are based upon visual estimation.


A B
C D
1 2 3 4 5 6 7 8 9 10 11 12
A B C D E F G H I J K L M N O P Q

SAMPLE NUMBER 20
DEPTH 2020.00 metres

Plate A

This low magnification overview shows a very finely crystalline, dolomitic micrite which is fossiliferous in nature. There are trace amounts of intercrystalline porosity which is very poorly interconnected. (25x, plane polarized light)

Plate B

This low magnification view shows the presence of sparry calcite fragments (F9, P9) and some fragments which contain predominantly dolomite with lesser amounts of calcite interspersed within (L3) as noted by alizarin-red-S stained calcite. (25x, cross polarized light)

Plate C

This high magnification view shows a fragment which represents the majority of the sample. This fragment shows the presence of crinoid stems (L9), and other fossil fragments which are sparry calcite replaced (H7, H4). These fossil fragments are dispersed within a micrite matrix. (100x, plane polarized light)

Plate D

This high magnification view shows a more dolomite rich fragment, which contains inclusions of sparry (E8, N4) calcite indicated by red stained color. Note the intercrystalline porosity present within these dolomitic fragments as noted by blue dyed epoxy. (100x, cross polarized light)

X-RAY DIFFRACTION ANALYSIS

Sample Number: 23
Depth: 1992.50 metres

	Material Less than 5 Microns	Material Greater than 5 Microns	Calculated Bulk Composition
Quartz	4	3	3
Feldspar	Nil	Nil	Nil
Calcite	63	41	50
Dolomite	33	56	47
Siderite	Nil	Nil	Nil
Pyrite	Nil	Nil	Nil
Kaolinite	Nil	Nil	Nil
Illite	Trace	Nil	Trace
Chlorite	Trace	Nil	Trace
Smectite	Nil	Nil	Nil
Mixed Layer Clays (Swelling)	Trace	Nil	Trace

CLAY SEPARATION BY FLOATATION

Material Less Than 5 Microns: 41.1%

Material Greater Than 5 Microns: 59.9%

PETROGRAPHIC DATA SHEET

Well Name Trillium Soquip Onexco et al Beluga O-23
Location
Formation Red Head Rapids
Porosity _____ K Max (mD) _____

Sample Number 23
Sample Depth (m) 1992.50
Rock Name Dolomitic Micrite
Classification Folk (1980)

TEXTURE

Mean Size-Transported Constituents (mm) _____
Class -Transported Constituents _____
Depositional Texture - _____

Authigenic Constituents (mm) 0.015
Authigenic Constituents Finely Crystalline

COMPOSITION

Allochemical Constituents

Fossils ____
Intraclasts ____
Ooids ____
Pisolites ____
Peloids ____
____ ____
____ ____

Terrigenous Constituents

Quartz: Mono T Poly ____
Feldspar: K-spar ____ Plag ____
Rock Fragments: SRF ____ MRF ____ VRF ____ PRF ____
Mica ____
Carbonaceous Material ____
____ ____
____ ____

Orthochemical Constituents

Calcite: Sparry ____ Micrite 70
Dolomite 30
Gypsum ____
Anhydrite ____
Halite ____
Quartz ____

Aragonite ____
Fe Dolomite ____
Pyrite T
____ ____
____ ____
____ ____

Clays

Kaolinite ____
Ilite ____
Chlorite ____
Detrital ____
____ ____
____ ____

POROSITY

Porosity Types

Interparticle ____
Intraparticle ____
Growth Framework ____
Vug ____

Intercrystal ____
Moldic ____
Fracture ____

Fenestral ____
Shelter ____
Chemical ____

Mean ____ Pore Size (mm) ____

Mean ____ Pore Size (mm) ____

Interconnectedness ____

CLAY MINERAL LOCATION

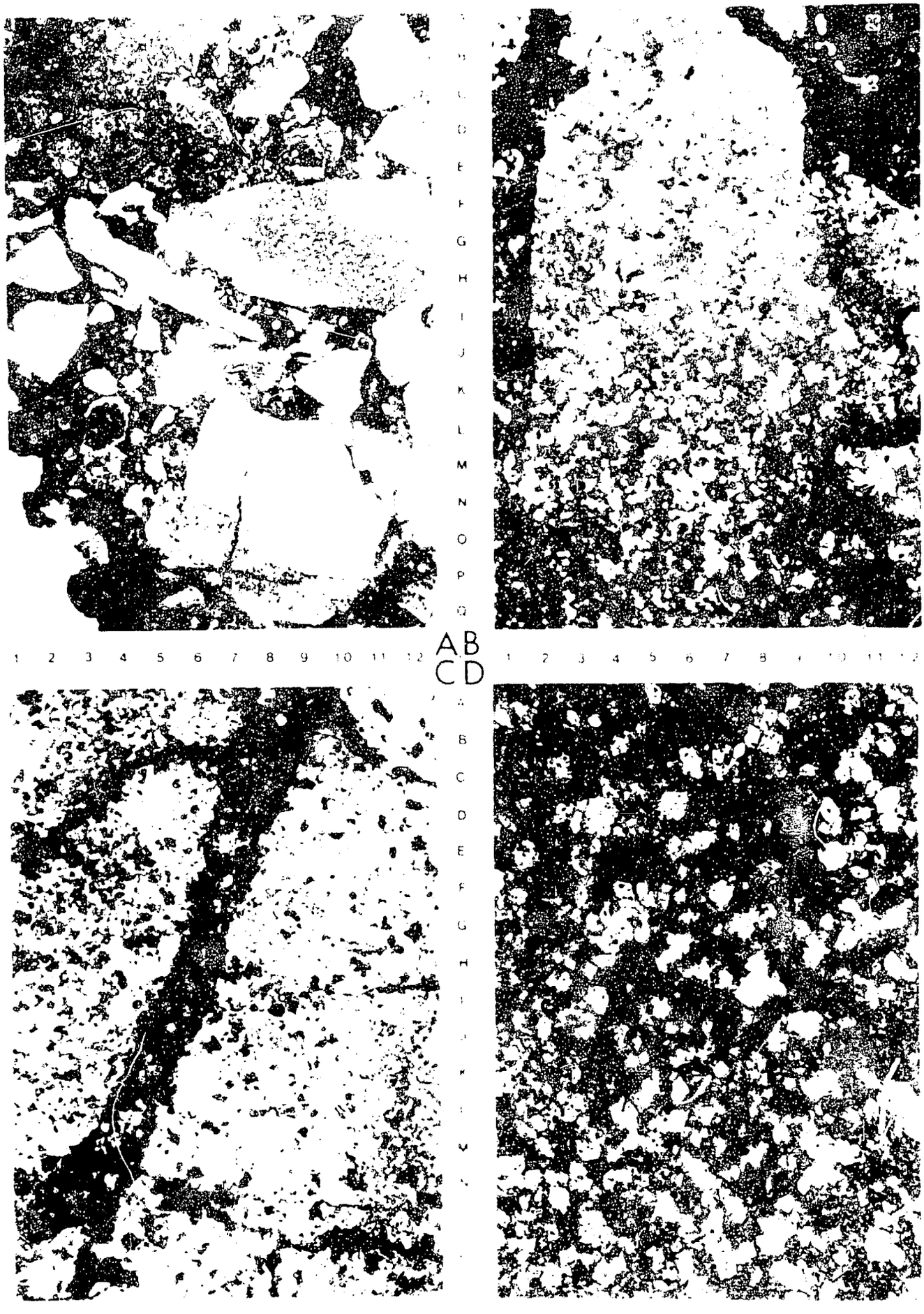
Laminae ____
Pore Lining ____
Fracture Filling ____

Dispersed ____
Pore Bridging ____
Pore Filling ____

Rock Fragments ____
Grain Replacement ____

NOTES:

All percentages are based upon visual estimation.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SAMPLE NUMBER 23
DEPTH 1992.50 metres

Plate A

This low magnification overview shows a very finely crystalline dolomitic micrite which has no visible porosity. Dolomite occurs as very finely crystalline, well formed rhombs which are well dispersed throughout the sample. Dolomite is denoted by white color within the alizarin-red-S stained portion of the sample (G9). (25x, plane polarized light)

Plate B

This higher magnification view shows an alizarin-red-S stained fragment which has dolomite rhombs dispersed throughout. Dolomite is denoted by white color within this photomicrograph. (100x, cross polarized light)

Plate C

This higher magnification view shows the typically interlocking nature of the sample, totally excluding any visible porosity. (100x, plane polarized light)

Plate D

This high magnification view shows the lack of porosity within the alizarin-red-S stained fragment. Note the well formed euhedral shape of the dolomite rhombs, which are well dispersed throughout the sample. (250x, plane polarized light)

PETROGRAPHIC DATA SHEET

Well Name Trillium Soquip Onexco et al Beluga O-23
Location
Formation Red Head Rapids
Porosity _____ K Max (mD) _____

Sample Number 27
Sample Depth (m) 1949.00
Rock Name Halite
Classification

TEXTURE

Mean Size-Transported Constituents (mm) _____
Class -Transported Constituents _____
Depositional Texture - Gypsum Filled Fractures

Authigenic Constituents (mm) _____
Authigenic Constituents _____

COMPOSITION

Allochemical Constituents

Fossils ____
Intraclasts ____
Ooids ____
Pisolites ____
Peloids ____
_____ ____
_____ ____

Terrigenous Constituents

Quartz: Mono ____ Poly ____
Feldspar: K-spar ____ Plag ____
Rock Fragments: SRF ____ MRF ____ VRF ____ PRF ____
Mica ____
Carbonaceous Material ____
_____ ____
_____ ____

Orthochemical Constituents

Calcite: Sparry ____ Micrite ____
Dolomite ____
Gypsum 5
Anhydrite ____
Halite 95
Quartz ____

Aragonite ____
Fe Dolomite ____
_____ ____
_____ ____
_____ ____
_____ ____

Clays

Kaolinite ____
Illite ____
Chlorite ____
Detrital ____
_____ ____
_____ ____

POROSITY

Porosity Types

Interparticle _____
Intraparticle _____
Growth Framework _____
Vug _____

Intercrystal _____
Moldic _____
Fracture _____

Fenestral _____
Shelter _____
Chemical _____

Mean ____ Pore Size (mm) ____

Mean ____ Pore Size (mm) ____

Interconnectedness ____

CLAY MINERAL LOCATION

Laminae _____
Pore Lining _____
Fracture Filling _____

Dispersed _____
Pore Bridging _____
Pore Filling _____

Rock Fragments _____
Grain Replacement _____

NOTES:

All percentages are based upon visual estimation.

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SAMPLE NUMBER 27
DEPTH 1949.00 metres

Plate A

This low magnification overview shows the presence of halite noted by its cubic cleavage which is accentuated by the presence of gypsum along these cleavage planes (M9.5, E7). This sample is 94% halite and 5% gypsum. (25x, plane polarized light)

Plate B

This higher magnification view shows the presence of gypsum along halite cleavage planes (H2, H6). (100x, plane polarized light)

Plate C

This high magnification view shows the presence of gypsum within the cleavage planes of the halite (E6). Halite having an extinct character under cross polarized light. (100x, cross polarized light)

Plate D

This view again shows halite with gypsum along cleavage planes (G5). (100x, plane polarized light)

PETROGRAPHIC DATA SHEET

Well Name: Trillium Soquip Onexco et al Beluga O-23
Location:
Formation: Red Head Rapids
Porosity: _____ K Max (mD): _____

Sample Number: 28
Sample Depth (m): 1920.00
Rock Name: Dolomite
Classification: Folk (1980)

TEXTURE

Mean Size-Transported Constituents (mm): 0.1
Authigenic Constituents (mm): 0.03
Class -Transported Constituents: VF Calcarenite
Authigenic Constituents: Finely Crystalline
Depositional Texture -

COMPOSITION

Allochemical Constituents

Fossils	1
Intraclasts	
Ooids	
Pisolites	
Peloids	T

Terrigenous Constituents

Quartz:	Mono		Poly	
Feldspar:	K-spar		Plag	
Rock Fragments:	SRF	MRF	VRF	PRF
Mica				
Carbonaceous Material				

Orthochemical Constituents

Calcite:	Sparry 1	Micrite 38	
Dolomite	60		
Gypsum			
Anhydrite			
Halite			
Quartz			

Aragonite	
Fe Dolomite	
Pyrite	T

Clays

Kaolinite	
Illite	
Chlorite	
Detrital	

POROSITY

Porosity Types

Interparticle		Intercrystal	VP-P	Fenestral	
Intraparticle		Moldic		Shelter	
Growth Framework		Fracture		Chemical	
Vug					

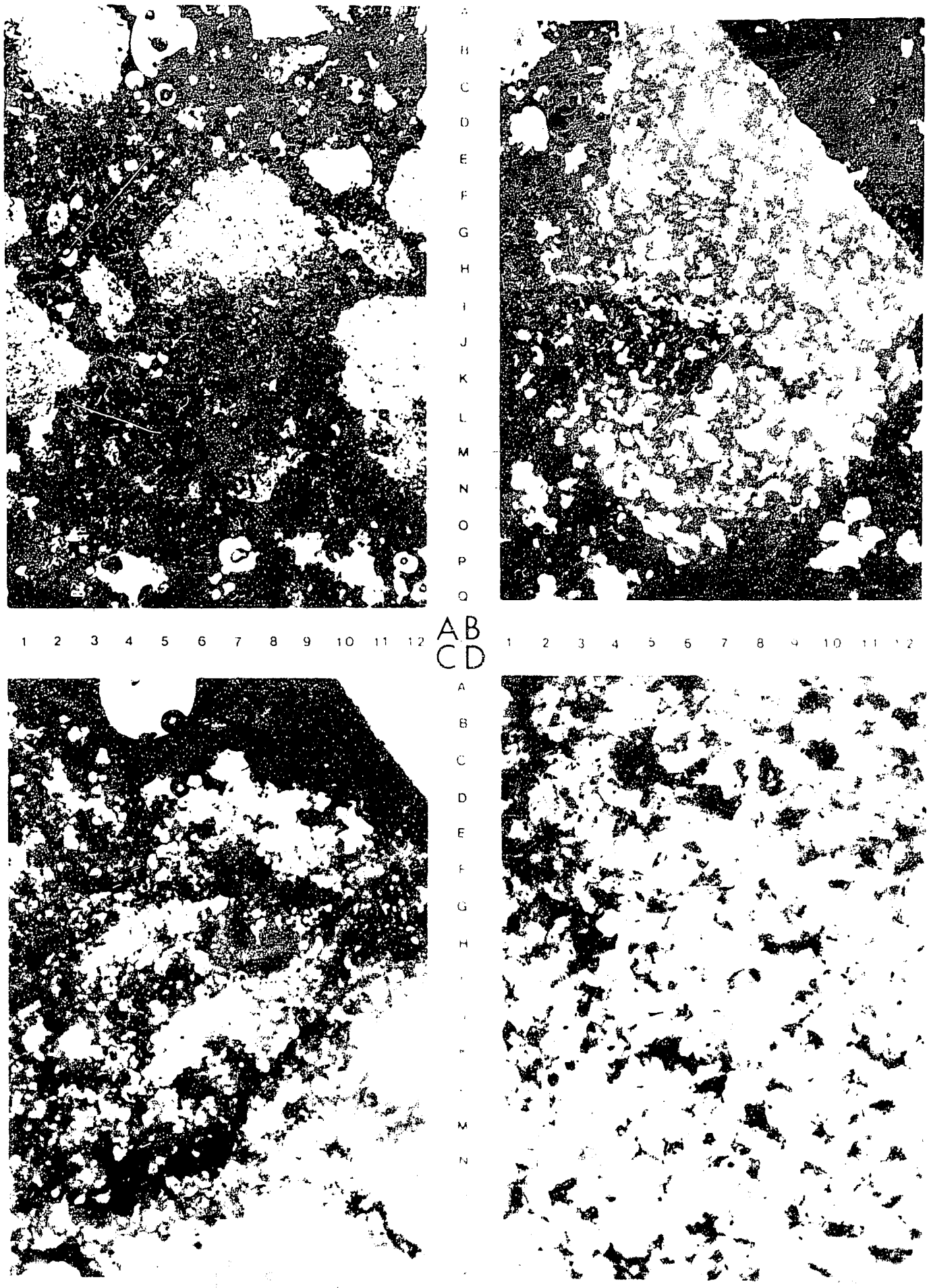
Mean IC Pore Size (mm) 0.01 | Mean ____ Pore Size (mm) ____ | Interconnectedness P

CLAY MINERAL LOCATION

Laminae		Dispersed				Rock Fragments	
Pore Lining		Pore Bridging		Pore Filling		Grain Replacement	
Fracture Filling							

NOTES:

All percentages are based upon visual estimation.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SAMPLE NUMBER 28
DEPTH 1920.00 metres

Plate A

This low magnification overview shows a finely crystalline dolomite which contains large amounts of micrite and trace amounts of sparry calcite. The more dolomite rich fragments contain very poor to poor amounts of intercrystalline porosity which is poorly interconnected. (25x, plane polarized light)

Plate B

This photomicrograph shows a fragment which is predominantly calcite with well dispersed rhombs of dolomite seen as white speckles within the red stained calcite. These fragments are in a minority within this sample. (100x, cross polarized light)

Plate C

This fragment shows the presence of sparry calcite replacing fossil fragments (GH6, GH10.5). Note, the calcite peloid at O12; these are present in trace amounts. (100x, plane polarized light)

Plate D

This high magnification view of a clean dolomite shows the loosely packed rhombs (E7), that creates overall very poor to poor porosity which is poorly interconnected. Porosity is denoted by blue dyed epoxy (C4.5). (250x, plane polarized light)

X-RAY DIFFRACTION ANALYSIS

Sample Number: 33
Depth: 1880.00 metres

	Material Less than 5 Microns	Material Greater than 5 Microns	Calculated Bulk Composition
Quartz	Trace	Nil	Trace
Feldspar	Nil	Nil	Nil
Calcite	89	100	97
Dolomite	11	Nil	3
Siderite	Nil	Trace	Trace
Pyrite	Nil	Nil	Nil
Kaolinite	Nil	Nil	Nil
Illite	Nil	Nil	Nil
Chlorite	Nil	Nil	Nil
Smectite	Nil	Nil	Nil
Mixed Layer Clays (Swelling)	Nil	Nil	Nil

CLAY SEPARATION BY FLOATATION

Material Less Than 5 Microns: 29.4%

Material Greater Than 5 Microns: 70.6%

PETROGRAPHIC DATA SHEET

Well Name: Trillium Soquip Onexco et al Beluga O-23
Location:
Formation: Red Head Rapids
Porosity: _____ K Max (mD) _____

Sample Number: 33
Sample Depth (m): 1880.00
Rock Name: Pelsparite
Classification: Folk (1980)

TEXTURE

Mean Size-Transported Constituents (mm): 0.17
Class -Transported Constituents: F Calcarenite
Authigenic Constituents (mm): 0.07
Authigenic Constituents: Medium Crystalline
Depositional Texture -

COMPOSITION

Allochemical Constituents

Fossils	
Intraclasts	
Ooids	
Pisolites	
Peloids	25

Terrigenous Constituents

Quartz:	Mono	I	Poly	
Feldspar:	K-spar		Plag	
Rock Fragments:	SRF	MRF	VRF	PRF
Mica				
Carbonaceous Material				
Bitumen	I			

Orthochemical Constituents

Calcite:	Sparry 68	Micrite 13	
Dolomite	4		
Gypsum			
Anhydrite			
Halite			
Quartz			

Aragonite	
Fe Dolomite	

Clays

Kaolinite	
Illite	
Chlorite	
Detrital	

POROSITY

Porosity Types

Interparticle		Intercrystal		Fenestral	
Intraparticle		Moldic		Shelter	
Growth Framework		Fracture		Chemical	
Vug					

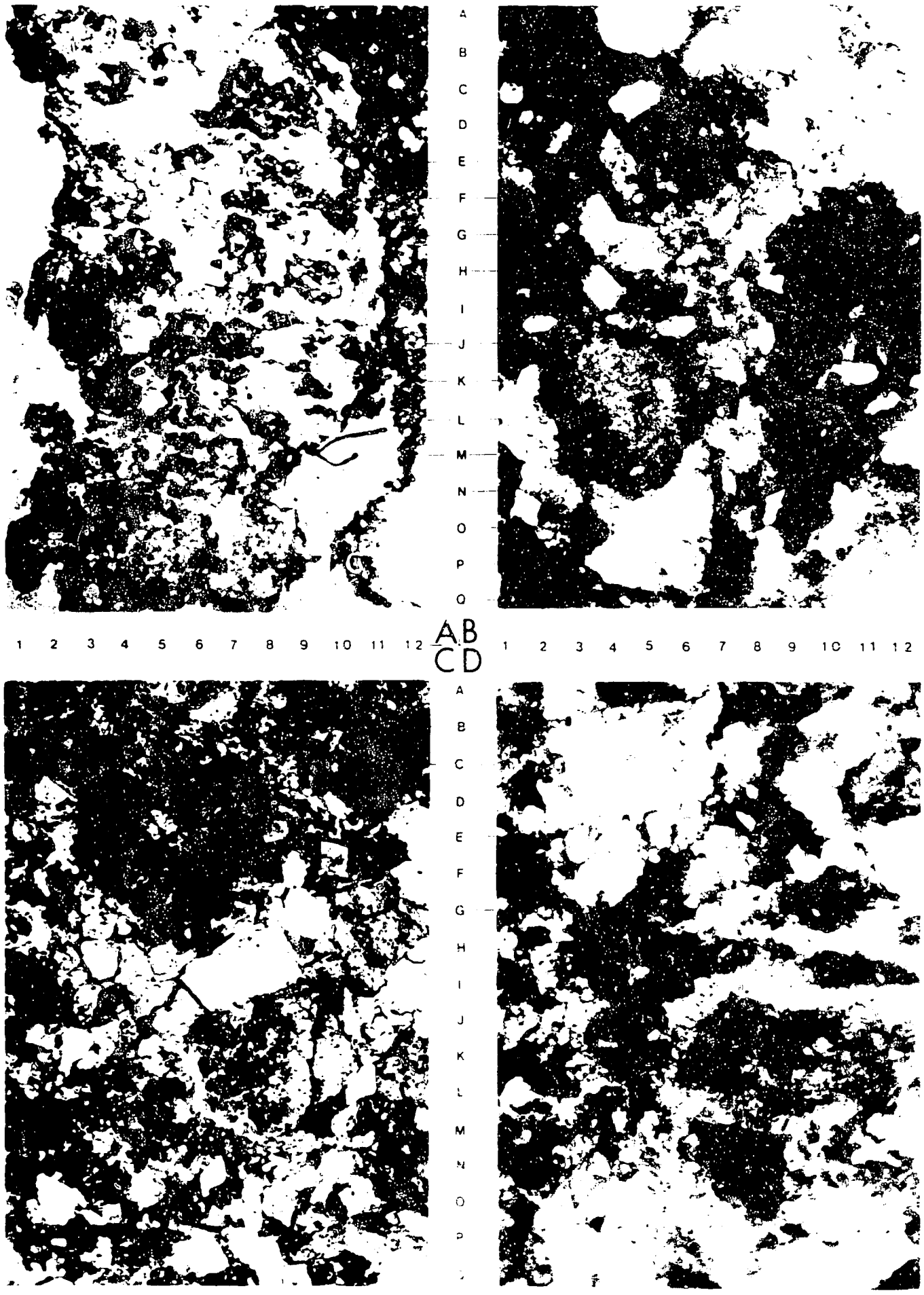
Mean IC Pore Size (mm) 0.05 | Mean _____ Pore Size (mm) _____ | Interconnectedness VP

CLAY MINERAL LOCATION

Laminae		Dispersed				Rock Fragments	
Pore Lining		Pore Bridging		Pore Filling		Grain Replacement	
Fracture Filling							

NOTES:

All percentages are based upon visual estimation.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SAMPLE NUMBER 33
DEPTH 1880.00 metres

Plate A

This overview of the sample shows a medium crystalline, pelsparite which has very poor amounts of intercrystalline porosity that is very poorly interconnected. The highly crystalline sparite (D4.5) is very tightly interconnected in a mosaic fashion. (25x, plane polarized light)

Plate B

This higher magnification view shows the presence of a micritic peloid (L4). These allochems are present in large amounts throughout the sample. Euhedral rhombs of dolomite (IJ1.5, K1.5, NO1.5) are present in minor amounts and often replace portions of the micrite peloid. Note bitumen present at I10. (100x, plane polarized light)

Plate C

This photomicrograph shows the tightly interlocking mosaic of sparry calcite which leaves little porosity throughout the sample (H9). Peloids of micrite (C11, E6, F4) are partially deformed by the growth of sparry calcite and the replacement of the peloid by sparry calcite and dolomite. (100x, cross polarized light)

Plate D

This higher magnification photomicrograph shows the contact between stained and non-stained sample and demonstrates the highly calcareous nature of the sample. Note the cloudy nature of the micrite (B8, D11) compared to the clear medium crystalline, sparry calcite (C4). (250x, plane polarized light)

SAMPLE NUMBER 33 (SEM)
DEPTH 1880.00 metres

Plate A

This low magnification view is of a medium crystalline pelsparite which has very poor amounts of poorly interconnected intercrystalline porosity.

Plate B

This higher magnification view shows the predominance of microcrystalline grains. Note the large patches of sparry calcite (H7, C11) which make up the majority of the sample in thin section. Minor amounts of dolomite are well dispersed throughout the sample (NO7.5).

Plate C

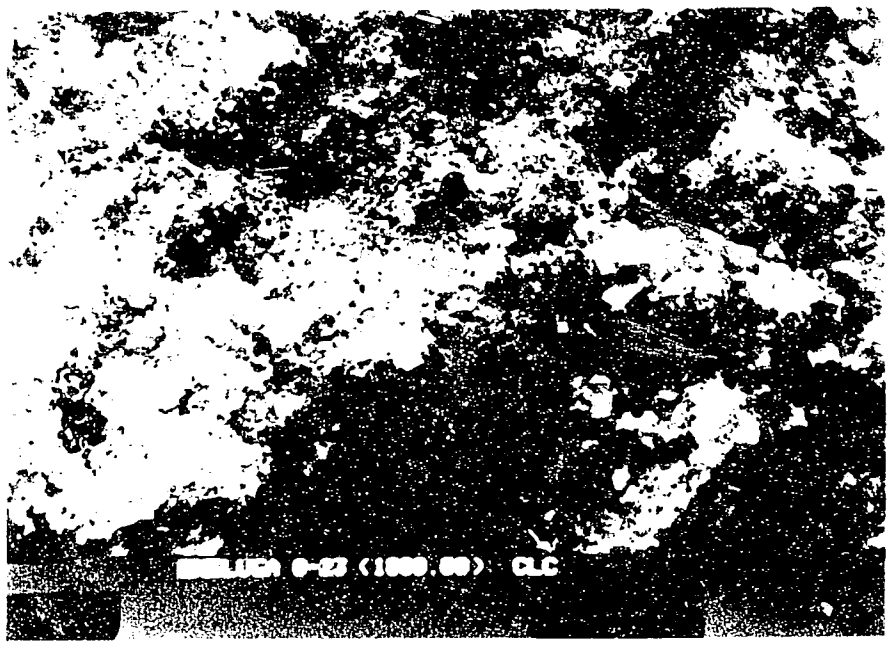
This high magnification view shows the presence of sparry calcite (C5, G7.5, J10) along with a rhomb of dolomite (N5), which is surrounded by a very finely crystalline calcite matrix.

Plate D

Intercrystalline porosity is apparent at this high magnification view. This intercrystalline porosity is generally located within the fine micritic matrix (J8). Note sparry calcite at C5.

BELUGA 0-23 (1000.00) CLC

BELUGA 0-23 (1000.00) CLC


BELUGA 0-23 (1000.00) CLC

BELUGA 0-23 (1000.00) CLC

X-RAY DIFFRACTION ANALYSIS

Sample Number: 34
Depth: 1876.00 metres

	Material Less than 5 Microns	Material Greater than 5 Microns	Calculated Bulk Composition
Quartz	36	6	16
Feldspar	Nil	Nil	Nil
Calcite	7	Trace	2
Dolomite	45	94	78
Siderite	Nil	Nil	Nil
Pyrite	Nil	Nil	Nil
Kaolinite	Trace	Nil	Trace
Illite	7	Nil	2
Chlorite	Nil	Nil	Nil
Smectite	5	Nil	2
Mixed Layer Clays (Swelling)	Trace	Nil	Trace
Anhydrite	Trace	Nil	Trace

CLAY SEPARATION BY FLOATATION

Material Less Than 5 Microns: 32.0%

Material Greater Than 5 Microns: 68.0%

PETROGRAPHIC DATA SHEET

Well Name: Trillium Soquip Onexco et al Beluga O-23
Location:
Formation: Red Head Rapids
Porosity: _____ K Max (mD): _____

Sample Number: 34
Sample Depth (m): 1876.00
Rock Name: Dolomite
Classification:

TEXTURE

Mean Size-Transported Constituents (mm): _____
Class -Transported Constituents: _____
Depositional Texture -

Authigenic Constituents (mm): 0.05
Authigenic Constituents: Finely Crystalline

COMPOSITION

Allochemical Constituents

Fossils	
Intraclasts	
Ooids	
Pisolites	
Peloids	

Terrigenous Constituents

Quartz:	Mono	T	Poly	
Feldspar:	K-spar		Plag	
Rock Fragments:	SRF		MRF	VRF	PRF
Mica				
Carbonaceous Material				
Bitumen		T		

Orthochemical Constituents

Calcite:	Sparry	Micrite	2
Dolomite	98		
Gypsum			
Anhydrite			
Halite			
Quartz			

Aragonite	
Fe Dolomite	
Pyrite	T
Chert	T

Clays

Kaolinite	
Illite	
Chlorite	
Detrital	T

POROSITY

Porosity Types

Interparticle		Intercrystal	VP	Fenestral	
Intraparticle		Moldic	T	Shelter	
Growth Framework		Fracture		Chemical	
Vug					

Mean _____ Pore Size (mm) _____

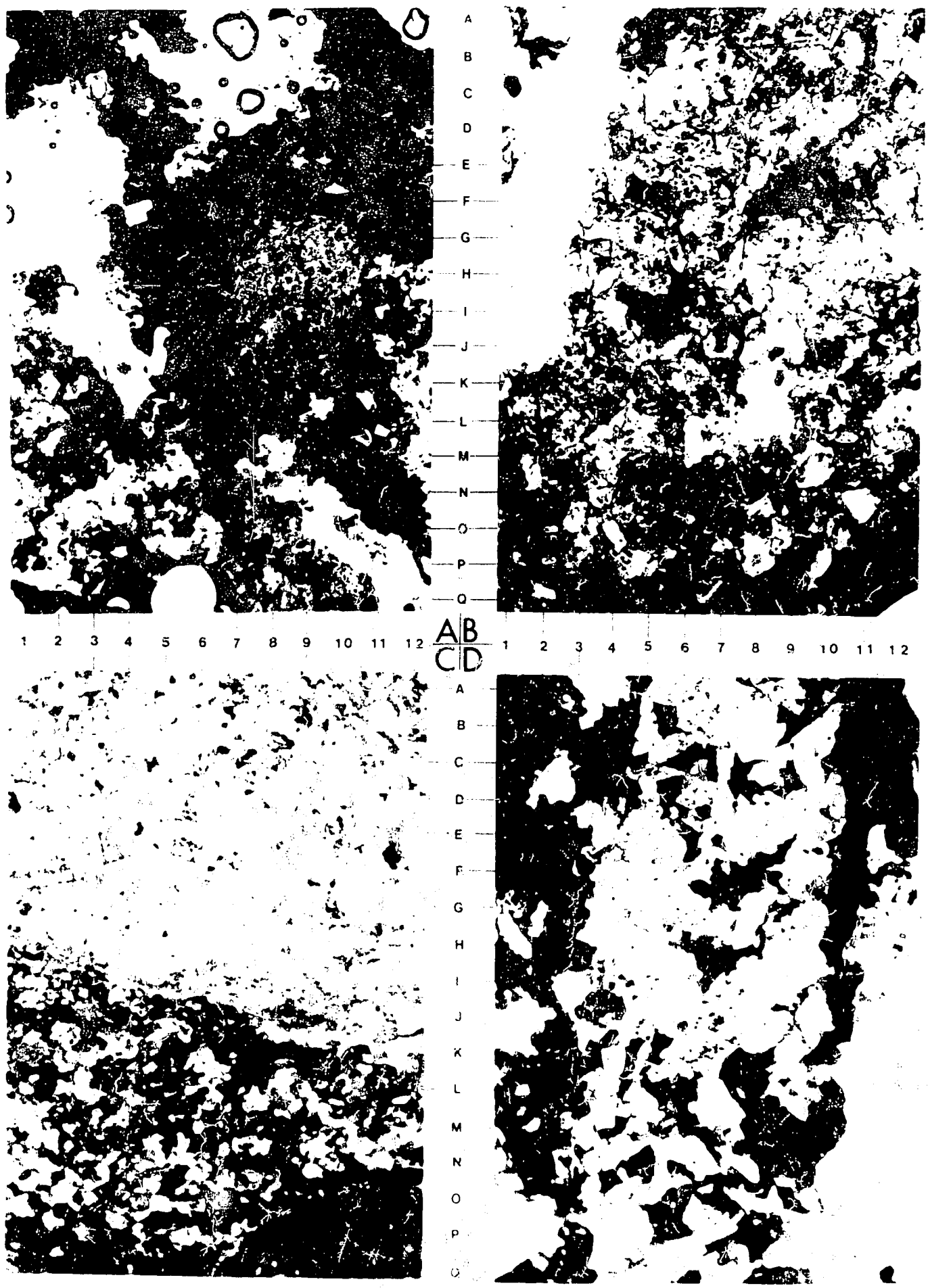
Mean IC Pore Size (mm) 0.04 Interconnectedness M

CLAY MINERAL LOCATION

Laminae	Present	Dispersed		Rock Fragments	
Pore Lining		Pore Bridging		Pore Filling	Present	Grain Replacement	
Fracture Filling					

NOTES:

All percentages are based upon visual estimation.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SAMPLE NUMBER 34
DEPTH 1876.00 metres

Plate A

This overview shows the highly crystalline nature of this dolomite, which has locallized intercrystalline porosity which is moderately interconnected. (25x, plane polarized light)

Plate B

This higher magnification view shows the typically, fine crystalline nature of the sample and the interlocking dolomite crystals which generally leave very little porosity (D5). Locallized amounts of intercrystalline porosity can be moderately interconnected as noted by blue dyed epoxy (IF). (100x, plane polarized light)

Plate C

This sample contains laminae of more finely crystalline dolomite which contains trace amounts of detrital clays and bitumen (I5-P5) but are widely dispersed and do not make up the majority of the sample. More typically, the dolomite is a mosaic of tightly interlocking crystals which leave very little porosity (E5). (100x, plane polarized light)

Plate D

This view shows a typical porous dolomite fragment. Note the moderately interconnected intercrystalline porosity denoted by the blue dyed epoxy (F7.5, H7). This intercrystalline porosity generally occurs within the more coarsely crystalline dolomite, this porosity may be partially due to the recovery method and the preparation of the sample. (100x, plane polarized light)

SAMPLE NUMBER 34 (SEM)
DEPTH 1876.00 metres

Plate A

This low magnification overview shows the finely crystalline dolomite, which has very poor porosity that is poorly interconnected. Unlike the thin section, this sample contains significant amounts of halite (GH11.5).

Plate B

This higher magnification view shows a tightly cemented sample which has very little porosity. Note intercrystalline pore space at N9.

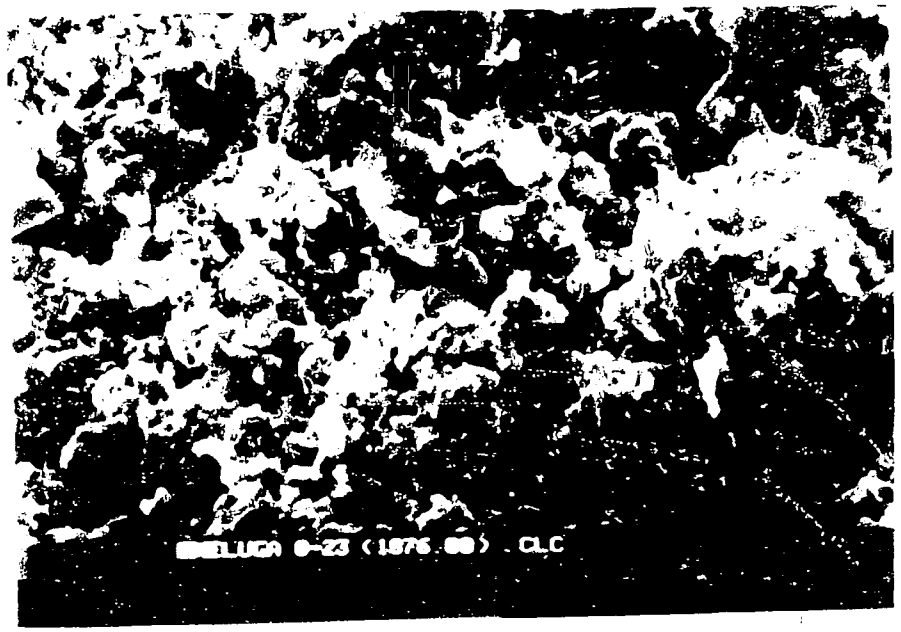
Plate C

This high magnification view shows the finely crystalline dolomite matrix (J7) surrounding more coarsely crystalline dolomite rhombs (H4). Noted within thin section, are zones of interlaminated, finely and coarsely crystalline dolomite.

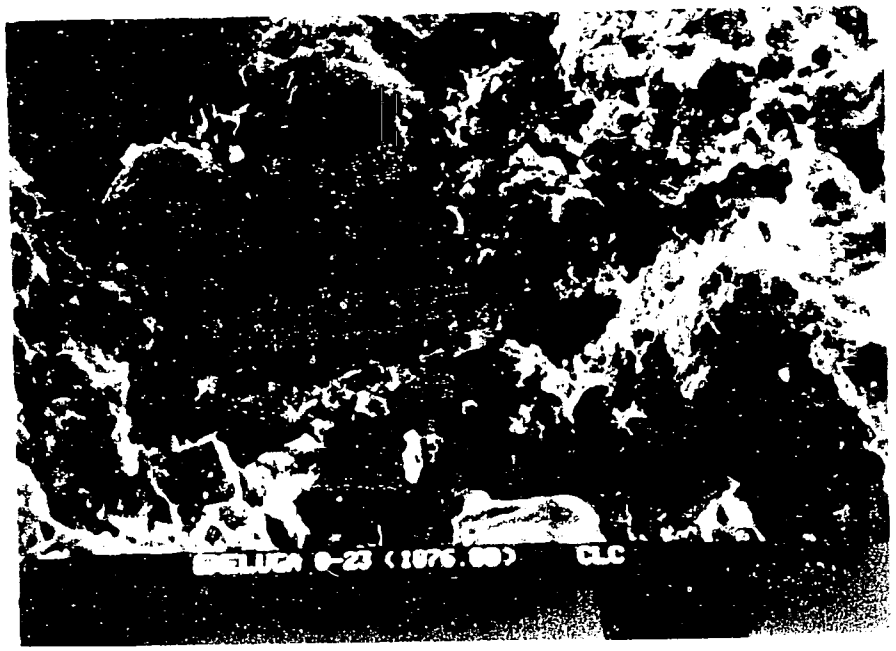
Plate D

This very high magnification view shows the very poor amounts of intercrystalline porosity among the anhedrally shaped dolomite crystals which make up the matrix material. Recovery methods may have lead to the partial disaggregation of this sample.

BELUGA 0-23 (1876.00) CLC


BELUGA 0-23 (1876.00) CLC

BELUGA 0-23 (1876.00) CLC


BELUGA 0-23 (1876.00) CLC

X-RAY DIFFRACTION ANALYSIS

Sample Number: 39
Depth: 1820.50 metres

	Material Less than 5 Microns	Material Greater than 5 Microns	Calculated Bulk Composition
Quartz	3	Nil	1
Feldspar	Nil	Nil	Nil
Calcite	7	Nil	2
Dolomite	90	100	97
Siderite	Nil	Nil	Nil
Pyrite	Nil	Nil	Nil
Kaolinite	Trace	Nil	Trace
Illite	Trace	Nil	Trace
Chlorite	Nil	Nil	Nil
Smectite	Nil	Nil	Nil
Mixed Layer Clays (Swelling)	Trace	Nil	Trace
Barite	Trace	Nil	Trace
Anhydrite	Trace	Nil	Trace

CLAY SEPARATION BY FLOATATION

Material Less Than 5 Microns: 27.7%

Material Greater Than 5 Microns: 72.3%

PETROGRAPHIC DATA SHEET

Well Name: Trillium Soquip Onexco et al Beluga O-23
Location:
Formation: Red Head Rapids
Porosity: _____ K Max (mD) _____

Sample Number: 39
Sample Depth (m): 1820.50
Rock Name: Dolomite
Classification: Folk (1980)

TEXTURE

Mean Size-Transported Constituents (mm): 0.02
Authigenic Constituents (mm): 0.01
Class -Transported Constituents: M Calcilutite
Authigenic Constituents: Very Finely Crystalline
Depositional Texture - Finely Laminated

COMPOSITION

Allochemical Constituents

Fossils	T
Intraclasts	
Ooids	
Pisolites	
Peloids	T

Terrigenous Constituents

Quartz:	Mono 1	Poly		
Feldspar:	K-spar	Plag		
Rock Fragments:	SRF	MRF	VRF	PRF
Mica				
Carbonaceous Material				

Orthochemical Constituents

Calcite:	Sparry	Micrite 1	
Dolomite	98		
Gypsum			
Anhydrite			
Halite			
Quartz			

Aragonite	
Fe Dolomite	

Clays

Kaolinite	
Illite	
Chlorite	
Detrital	

POROSITY

Porosity Types

Interparticle		Intercrystal	VP	Fenestral	
Intraparticle		Moldic		Shelter	
Growth Framework		Fracture		Chemical	
Vug					

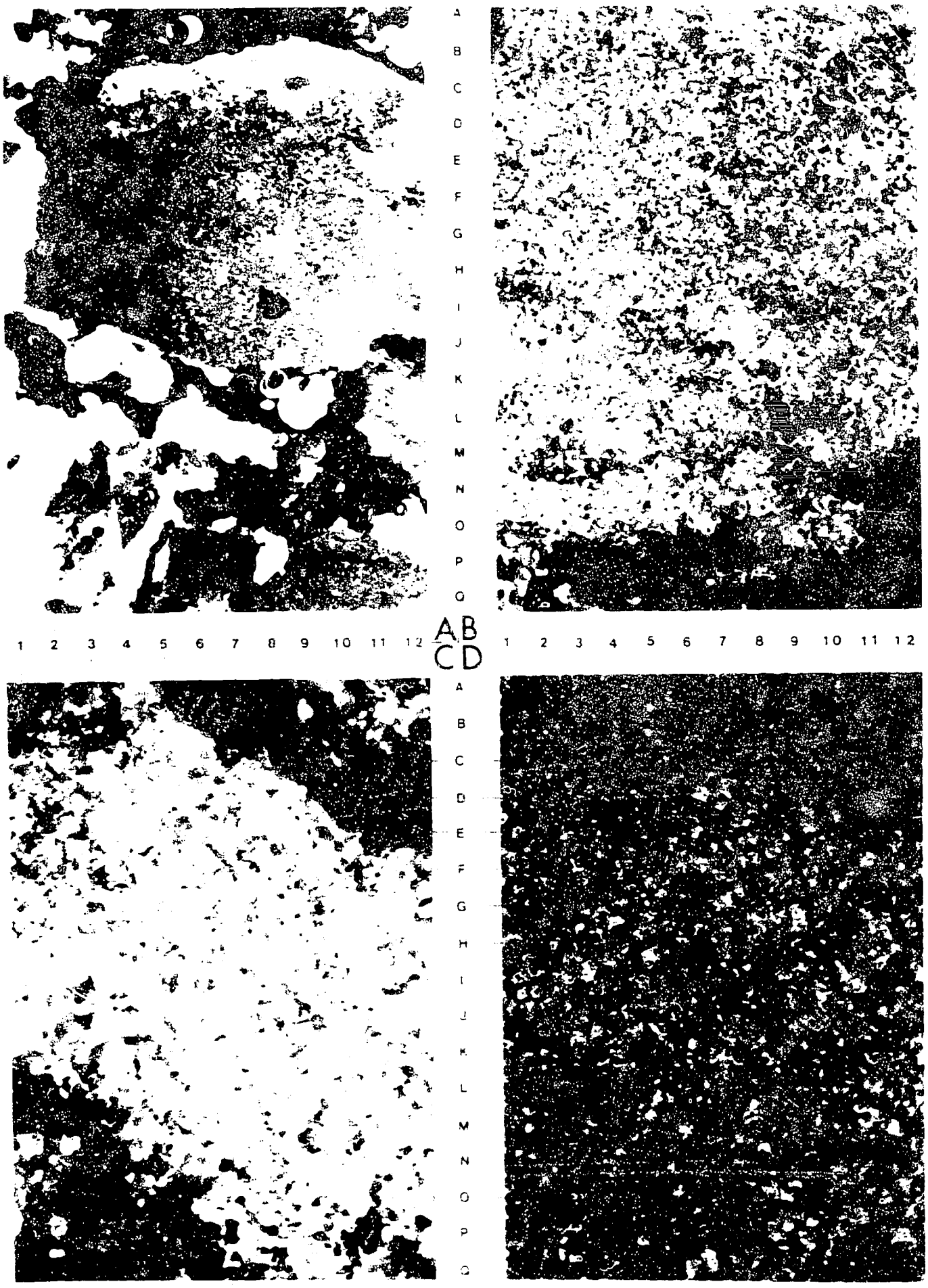
Mean _____ Pore Size (mm) _____ Mean _____ Pore Size (mm) _____ Interconnectedness VP

CLAY MINERAL LOCATION

Laminae		Dispersed		Rock Fragments	
Pore Lining		Pore Bridging		Pore Filling		Grain Replacement	
Fracture Filling					

NOTES:

All percentages are based upon visual estimation.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SAMPLE NUMBER 39
DEPTH 1820.50 metres

Plate A

This low magnification photomicrograph shows a very finely crystalline dolomite which has very poor amounts of intercrystalline porosity that is very poorly interconnected. (25x, plane polarized light)

Plate B

This view shows the faint, finely laminated nature of this sample. Note the faint pink colored lamination which runs across the photomicrograph starting at F1. Trace amounts of monocrystalline quartz are present also within the sample (IJ7.5). (100x, cross polarized light)

Plate C

This photomicrograph shows the very poor amounts of intercrystalline porosity which are present within some fragments of this sample. Porosity is defined by blue dyed epoxy (I5). (250x, plane polarized light)

Plate D

This photomicrograph shows the more typically interlocking nature of the dolomite crystals leaving little or no porosity within the sample. (250x, plane polarized light)

SAMPLE NUMBER 39 (SEM)
DEPTH 1820.50 metres

Plate A

This low magnification view is of a very finely crystalline dolomite with very poor intercrystalline porosity that is very poorly interconnected. Large vug-like areas (L10, K6) are believed to be caused by sample recovery and sample preparation.

Plate B

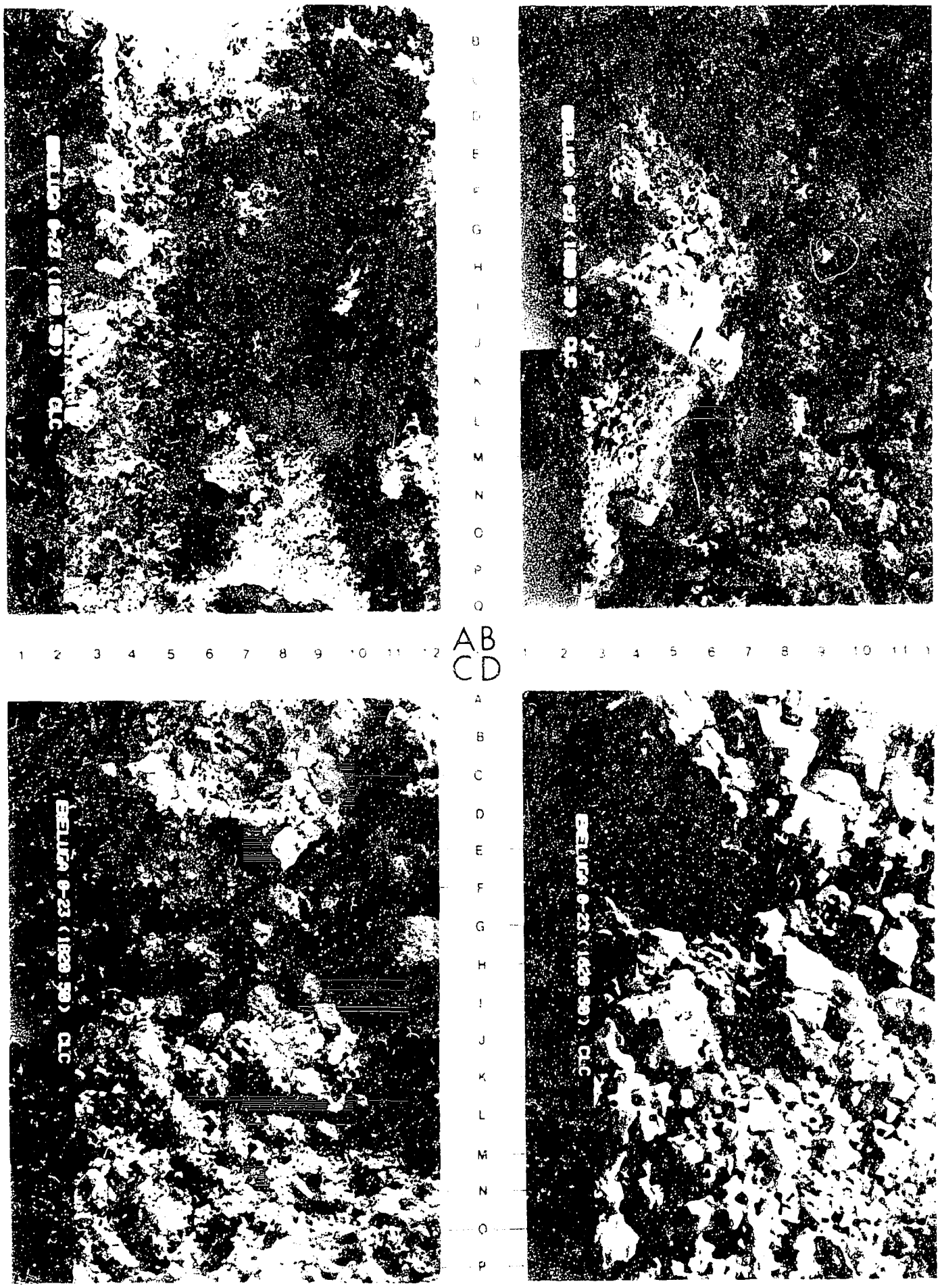
This higher magnification view shows the very tightly interlocking nature of the sample. This creates very little porosity which is generally isolated to very poorly interconnected.

Plate C

Dolomite exists as very finely crystalline, anhedral crystals throughout the matrix with zones which have larger anhedral to euhedral dolomite rhombs floating within this matrix (E8, IJ9).

Plate D

This high magnification view shows a closeup of the minor amounts of intercrystalline porosity that is generally poorly interconnected. The method of recovery is believed to create more porous sections by the disaggregation of the sample. Therefore, the porosity is probably lower than indicated in the photomicrograph.



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A B C D E F G H I J K L M N O P Q
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A B C D E F G H I J K L M N O P

PETROGRAPHIC DATA SHEET

Well Name: Trillium Soquip Onexco et al Beluga 0-23
Location:
Formation: Seven River
Porosity: _____ K Max (mD): _____

Sample Number: 43
Sample Depth (m): 1765.00
Rock Name: Biomicrite
Classification: Folk (1980)

TEXTURE

Mean Size-Transported Constituents (mm): 0.15
Class -Transported Constituents: F Calcarenite
Authigenic Constituents (mm): 1.0
Authigenic Constituents: Finely Crystalline
Depositional Texture -

COMPOSITION

Allochemical Constituents

Fossils	15
Intraclasts	
Ooids	
Pisolites	
Peloids	3

Terrigenous Constituents

Quartz:	Mono	T	Poly			
Feldspar:	K-spar		Plag			
Rock Fragments:	SRF		MRF		VRF	PRF
Mica						
Carbonaceous Material						

Orthochemical Constituents

Calcite:	Sparry 12	Micrite 70	
Dolomite			
Gypsum			
Anhydrite			
Halite			
Quartz			
Aragonite			
Fe Dolomite			

Clays

Kaolinite	
Illite	
Chlorite	
Detrital	

POROSITY

Porosity Types

Interparticle		Intercrystal		Fenestral	
Intraparticle		Moldic		Shelter	
Growth Framework		Fracture		Chemical	
Vug					

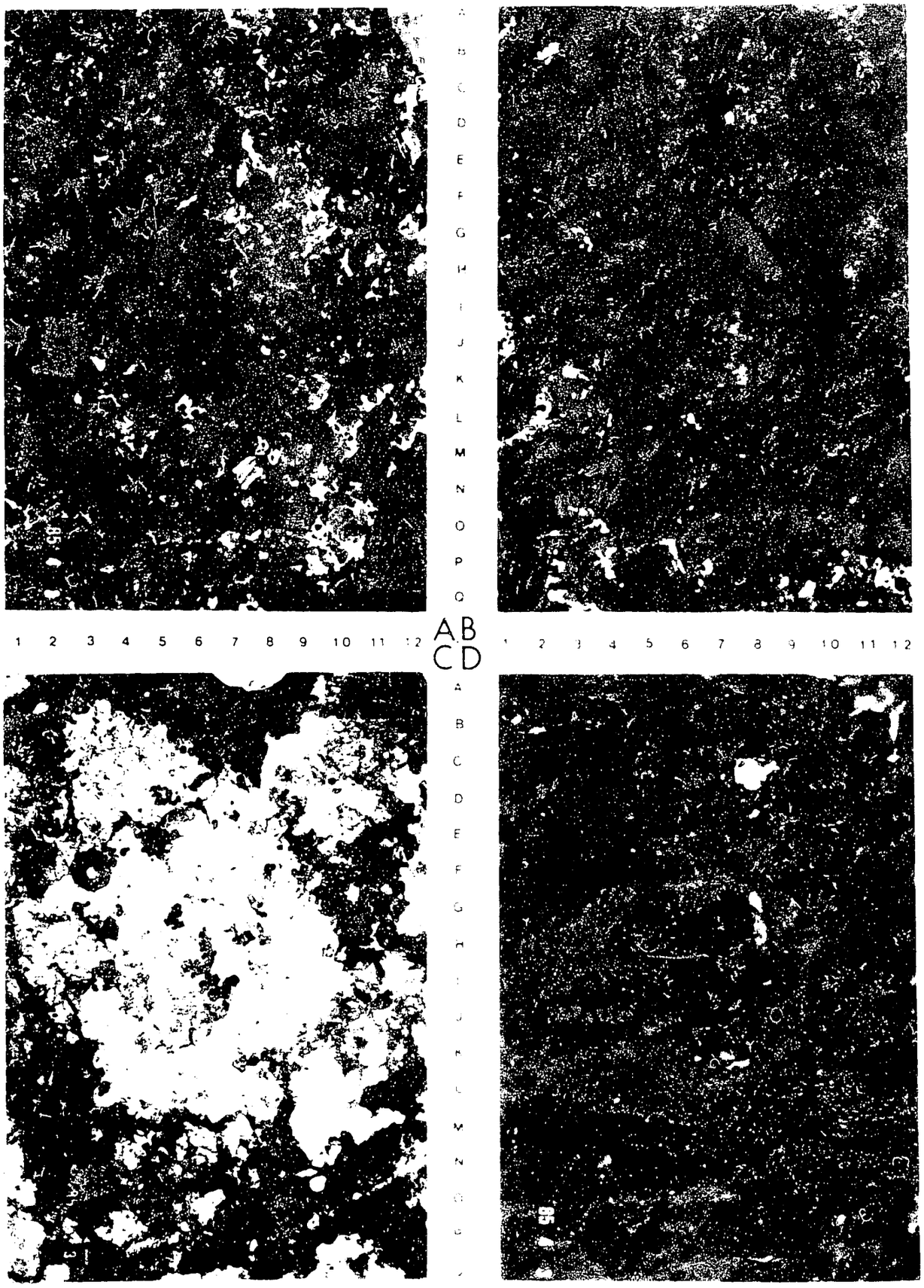
Mean ____ Pore Size (mm) ____ Mean ____ Pore Size (mm) ____ Interconnectedness ____

CLAY MINERAL LOCATION

Laminae		Dispersed	T	Rock Fragments	
Pore Lining		Pore Bridging		Pore Filling		Grain Replacement	
Fracture Filling					

NOTES:

All percentages are based upon visual estimation.


A B C D E F G H I J K L M N O P Q
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A B C D E F G H I J K L M N O P Q

SAMPLE NUMBER 43
DEPTH 1765.00 metres

Plate A

This low magnification photomicrograph shows a very finely crystalline biomicrite with no visible porosity. The red staining indicates that the sample is almost entirely calcite with only a trace of dolomite. (25x, cross polarized light)

Plate B

This limestone is predominantly micrite with moderate amounts of sparry calcite as an infilling and replacement constituent (C5). (100x, cross polarized light)

Plate C

This non-stained fragment within the sample shows an interlocking mosaic of sparry calcite which commonly occurs as a replacement within fossil fragments (G4). (100x, plane polarized light)

Plate D

This high magnification photomicrograph shows the presence of a large echinoderm fragment which is surrounded by a finer micrite matrix (I9). Fossils are made up of echinoderm, brachiopod, crinoid and bryozoan fragments which are well preserved and are commonly replaced by sparry calcite. (250x, cross polarized light)

PETROGRAPHIC DATA SHEET

Well Name: Trillium Soquip Onexco et al Beluga 0-23
Location:
Formation: Seven River
Porosity: K Max (mD):

Sample Number: 45
Sample Depth (m): 1745.00
Rock Name: Dolomite
Classification: Folk (1980)

TEXTURE

Mean Size-Transported Constituents (mm): 0.02
Class -Transported Constituents: M Calcilutite
Authigenic Constituents (mm): 0.02
Authigenic Constituents: Finely Crystalline
Depositional Texture - Very Finely Laminated

COMPOSITION

Allochemical Constituents

Fossils
Intraclasts
Ooids
Pisolites
Peloids

Terrigenous Constituents

Quartz: Mono 1 Poly
Feldspar: K-spar Plag
Rock Fragments: SRF MRF VRF PRF
Mica
Carbonaceous Material
Bitumen 1

Orthochemical Constituents

Calcite: Sparry T Micrite 4
Dolomite 92
Gypsum
Anhydrite
Halite
Quartz

Aragonite
Fe Dolomite
Pyrite T

Clays

Kaolinite
Illite
Chlorite
Detrital 2

POROSITY

Porosity Types

Interparticle
Intraparticle
Growth Framework
Vug

Intercrystal T
Moldic
Fracture

Fenestral
Shelter
Chemical

Mean Pore Size (mm)

Mean Pore Size (mm)

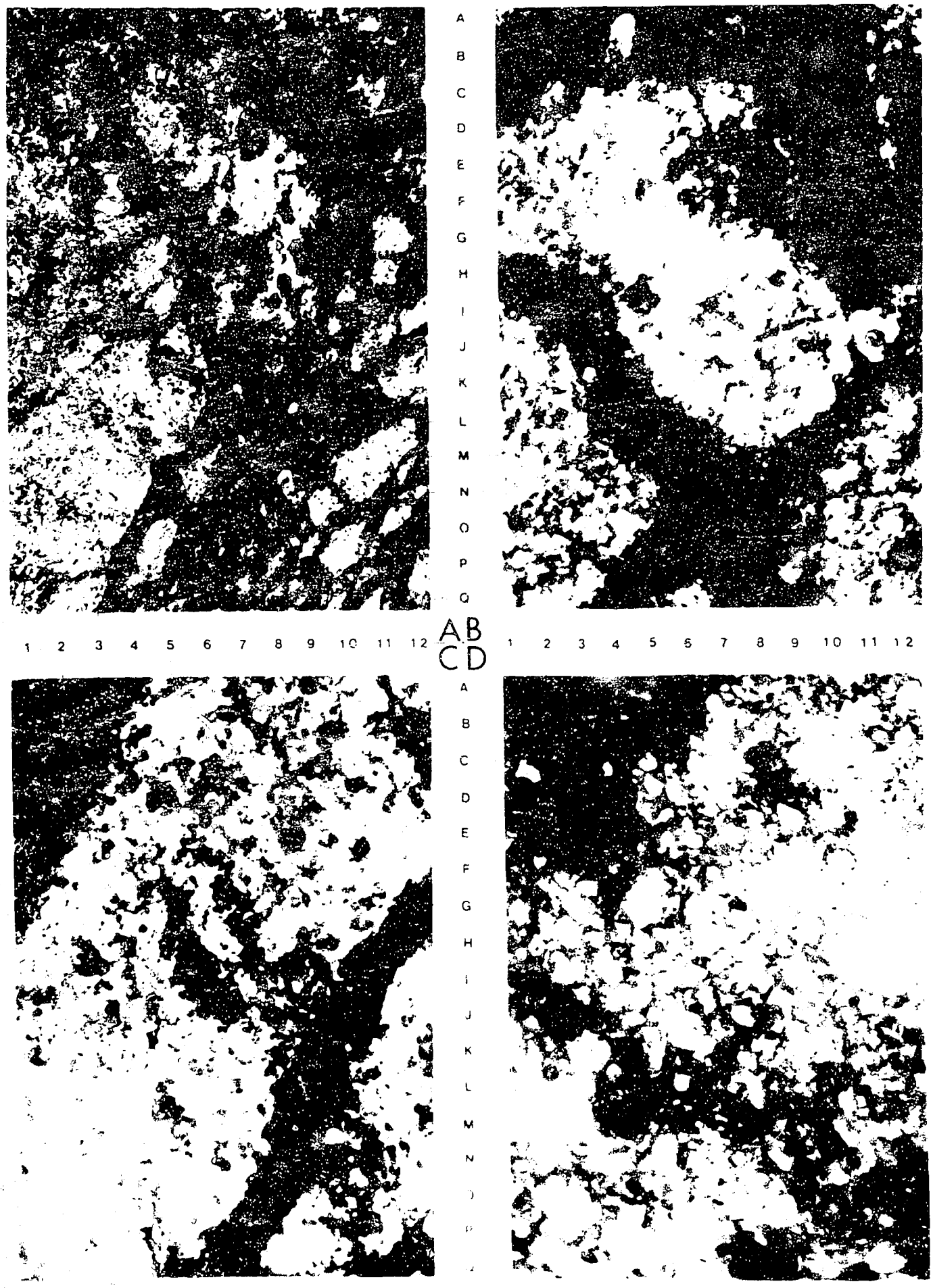
Interconnectedness VP

CLAY MINERAL LOCATION

Laminae
Dispersed
Rock Fragments
Pore Lining
Pore Bridging
Pore Filling
Grain Replacement
Fracture Filling

NOTES:

All percentages are based upon visual estimation.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SAMPLE NUMBER 45
DEPTH 1745.00 metres

Plate A

Low magnification indicates that this is a finely crystalline dolomite with traces of intercrystalline porosity that are very poorly interconnected. The sample contains very fine laminations which are difficult to distinguish. Minor amounts of calcite occur in patches throughout the sample (I9), and are indicated by red stained color. (25x, cross polarized light)

Plate B

High magnification reveals small patches of clear calcite well dispersed throughout the sample (I6.5, J8). Dolomite rhombs are anhedrally shaped, and form a tightly interlocking mosaic which completely occludes pore space. (100x, plane polarized light)

Plate C

This fragment again shows the tightly interlocking nature of the anhedral dolomite and the red flecks of calcite well dispersed throughout the sample. Pyrite is present in trace amounts and is indicated by its opaque color; the opaques in this fragment may be partially due to sample retrieval and preparation methods. (100x, plane polarized light)

Plate D

This higher magnification photomicrograph of a more porous zone reveals that rhombs are typically anhedral to subhedral in shape. Intercrystalline porosity (F7, I9) appears to be well developed in these more loosely packed areas. Porosity within these more loosely packed areas is decidely insignificant as it is poorly interconnected and makes up only traces of the overall sample. (250x, plane polarized light)

PETROGRAPHIC DATA SHEET

Well Name: Trillium Soquip Onexco et al Beluga O-23
Location:
Formation: Seven River
Porosity: _____ K Max (mD): _____

Sample Number: 47
Sample Depth (m): 1720.00
Rock Name: Aphanocrystalline Biomicrite
Classification:

TEXTURE

Mean Size-Transported Constituents (mm): 2.8
Authigenic Constituents (mm): 0.12
Class -Transported Constituents: F Calcirudite
Authigenic Constituents: Medium Crystalline
Depositional Texture - Mottled

COMPOSITION

Allochemical Constituents

Fossils	12
Intraclasts	
Ooids	
Pisolites	
Peloids	2

Terrigenous Constituents

Quartz:	Mono	T	Poly				
Feldspar:	K-spar		Plag				
Rock Fragments:	SRF		MRF		VRF		PRF
Mica							
Carbonaceous Material							

Orthochemical Constituents

Calcite:	Sparry 34	Micrite 50	Aragonite		
Dolomite	1		Fe Dolomite		
Gypsum	T		Chert	T	
Anhydrite					
Halite					
Quartz					

Clays

Kaolinite	
Illite	
Chlorite	
Detrital	T

POROSITY

Porosity Types

Interparticle		Intercrystal	T	Fenestral	
Intraparticle		Moldic	T	Shelter	
Growth Framework		Fracture		Chemical	
Vug					

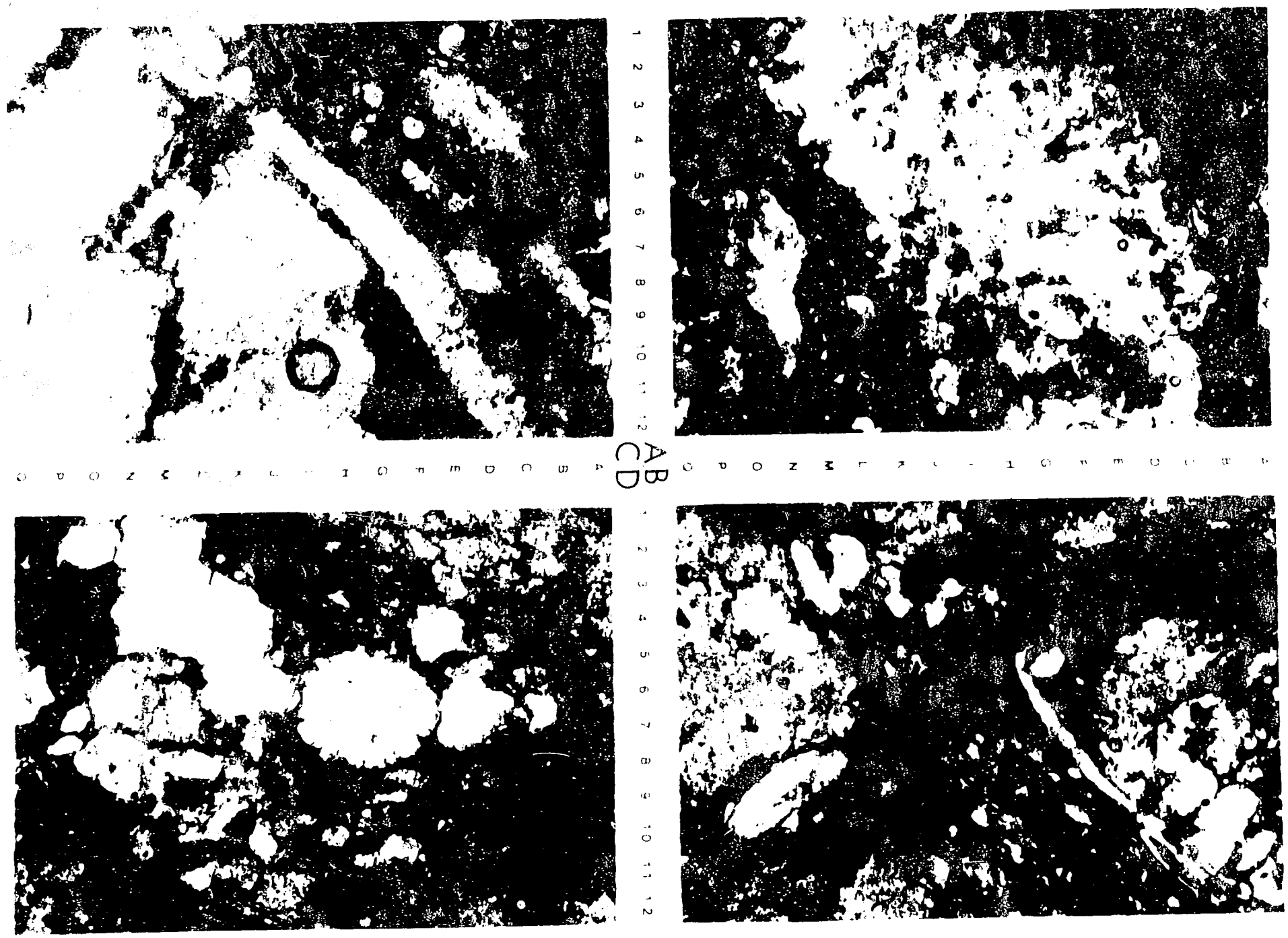
Mean _____ Pore Size (mm) _____ Mean _____ Pore Size (mm) _____ Interconnectedness VP

CLAY MINERAL LOCATION

Laminae _____ Dispersed Mainly _____ Rock Fragments _____
Pore Lining _____ Pore Bridging _____ Pore Filling _____ Grain Replacement _____
Fracture Filling _____

NOTES:

All percentages are based upon visual estimation.


A
B
C
D

SAMPLE NUMBER 47
DEPTH 1720.00 metres

Plate A

This overview shows an aphanocrystalline biomicrite which has traces of intercrystalline porosity within the sparry filled fossil fragments. The sample is made up of 50% micrite denoted by cloudy nature (M7, B3), and 34% sparry calcite, which generally occurs as a fossil replacement and fossil filling cement (H5). (25x, cross polarized light)

Plate B

This overview shows the presence of many fossil fragments (N9, M2, F7); these fossils are predominantly crinoids, echinoderms, and brachiopods. Note the sparry filled area at O4. (25x, plane polarized light)

Plate C

This closeup of the sample shows fibrous calcite replaced fossil fragments at D10 through K2. Dark micrite cement surrounds the fossil fragment at C10 and G10. Clearer sparry calcite with an interlocking mosaic pattern appears to occur as a fossil replacement and void filling (K7). (100x, plane polarized light)

Plate D

This photomicrograph shows the presence of a sparry replaced peloid at H6.5, with a fibrous calcite rim. The majority of the orthochemical constituents within this fragment are micrite (G4) with significant amounts of sparry calcite (M3) (100x, cross polarized light)

PETROGRAPHIC DATA SHEET

Well Name Trillium Soquip Onexco et al Beluga 0-23
Location
Formation Seven River
Porosity K Max (mD)

Sample Number 48
Sample Depth (m) 1710.00
Rock Name Microsparite
Classification Folk (1980)

TEXTURE

Mean Size-Transported Constituents (mm)
Class -Transported Constituents
Depositional Texture - *Dolomitic, Microspar*

Authigenic Constituents (mm) 0.03
Authigenic Constituents Finely Crystalline

COMPOSITION

Allochemical Constituents

Fossils T
Intraclasts
Ooids
Pisolites
Peloids T

Terrigenous Constituents

Quartz: Mono Poly
Feldspar: K-spar Plag
Rock Fragments: SRF MRF VRF PRF T
Mica
Carbonaceous Material T

Orthochemical Constituents

Calcite: Sparry 86 Micrite 10
Dolomite 3
Gypsum
Anhydrite
Halite
Quartz

Aragonite
Fe Dolomite

Clays

Kaolinite
Illite
Chlorite
Detrital 1

POROSITY

Porosity Types

Interparticle
Intraparticle
Growth Framework
Vug

Intercrystal T
Moldic
Fracture

Fenestral
Shelter
Chemical

Mean Pore Size (mm)

Mean Pore Size (mm)

Interconnectedness

CLAY MINERAL LOCATION

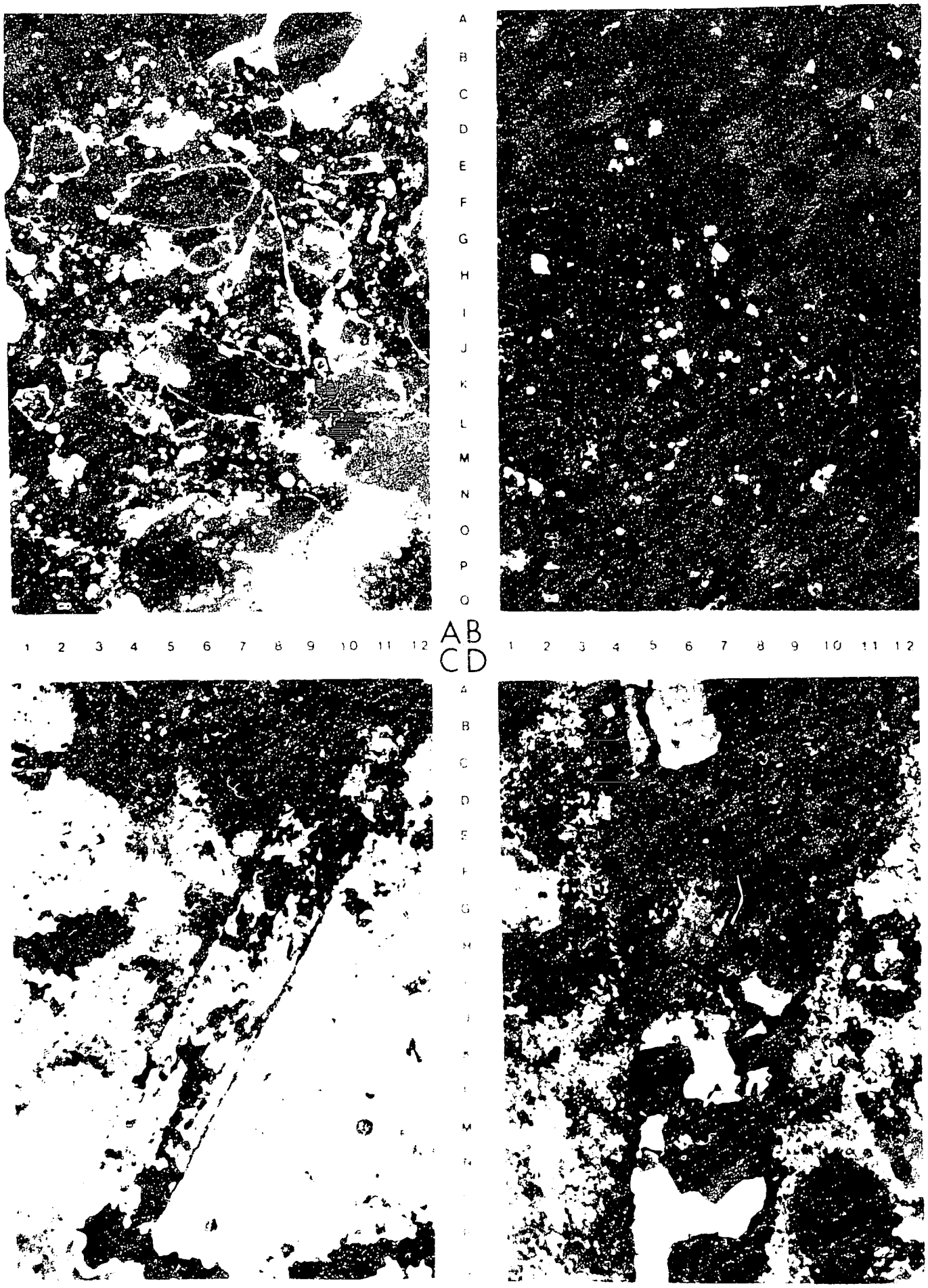
Laminae
Pore Lining
Fracture Filling

Dispersed
Pore Bridging
Pore Filling

Rock Fragments
Grain Replacement

NOTES:

All percentages are based upon visual estimation.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AB
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1 2 3 4 5 6 7 8 9 10 11 12

SAMPLE NUMBER 48
DEPTH 1710.00 metres

Plate A

Photomicrograph A shows the low magnification overview of a very finely crystalline microsparite. This sample is slightly dolomitic and has only traces of intercrystalline porosity. (25x, plane polarized light)

Plate B

Photomicrograph B shows the typical nature of this sample, which is apparently a recrystallized micrite based on the size and the morphology of the crystals. Note the subhedral to euhedrally formed dolomite rhombs which are generally dispersed thorughout the sample (GH7, J6, D5). Dolomite makes up 3% of the total rock volume. (100x, cross polarized light)

Plate C

This high magnification photomicrograph shows an elongate blade of gypsum (E9-M4), which is embedded within microsparry cement. Gypsum occurs in trace amounts within the sample generally as more finely crystalline blades. (100x, cross polarized light)

Plate D

A trace of plutonic rock fragments (H7) are present in this sample and are made up of feldspar (F7) and polycrystalline quartz (L6). It may be that these plutonic rock fragments were transported from crystalline basement rocks through the drilling fluid. (100x, cross polarized light)

X-RAY DIFFRACTION ANALYSIS

Sample Number: 50
Depth: 1694.00 metres

	Material Less than 5 Microns	Material Greater than 5 Microns	Calculated Bulk Composition
Quartz	81	87	85
Feldspar	Nil	Nil	Nil
Calcite	19	13	15
Dolomite	Trace	Nil	Trace
Siderite	Nil	Nil	Nil
Pyrite	Nil	Nil	Nil
Kaolinite	Nil	Nil	Nil
Illite	Trace	Nil	Trace
Chlorite	Trace	Nil	Trace
Smectite	Nil	Nil	Nil
Mixed Layer Clays (Swelling)	Trace	Nil	Trace

CLAY SEPARATION BY FLOATATION

Material Less Than 5 Microns: 32.9%

Material Greater Than 5 Microns: 67.1%

PETROGRAPHIC DATA SHEET

Well Name Trillium Soquip Onexco et al Beluga 0-23
Location
Formation Seven River
Porosity _____ K Max (mD) _____

Sample Number 50
Sample Depth (m) 1694.0
Rock Name Fossiliferous Sparite
Classification Folk (1980)

TEXTURE

Mean Size-Transported Constituents (mm) 0.30
Authigenic Constituents (mm) 0.23
Class -Transported Constituents M Calcarenite
Authigenic Constituents Finely Crystalline
Depositional Texture - Micritic

COMPOSITION

Allochemical Constituents

Fossils 10
Intraclasts
Ooids
Pisolites
Peloids 1

Terrigenous Constituents

Quartz: Mono ____ Poly ____
Feldspar: K-spar ____ Plag ____
Rock Fragments: SRF ____ MRF ____ VRF ____ PRF ____
Mica
Carbonaceous Material

Orthochemical Constituents

Calcite: Sparry 40 Micrite 24
Dolomite I
Gypsum
Anhydrite
Halite
Quartz

Aragonite
Fe Dolomite
Chert 23
Pyrite I

Clays

Kaolinite
Illite
Chlorite
Detrital 2

POROSITY

Porosity Types

Interparticle
Intraparticle
Growth Framework
Vug

Intercrystal
Moldic
Fracture

Fenestral
Shelter
Chemical

Mean ____ Pore Size (mm) ____

Mean ____ Pore Size (mm) ____

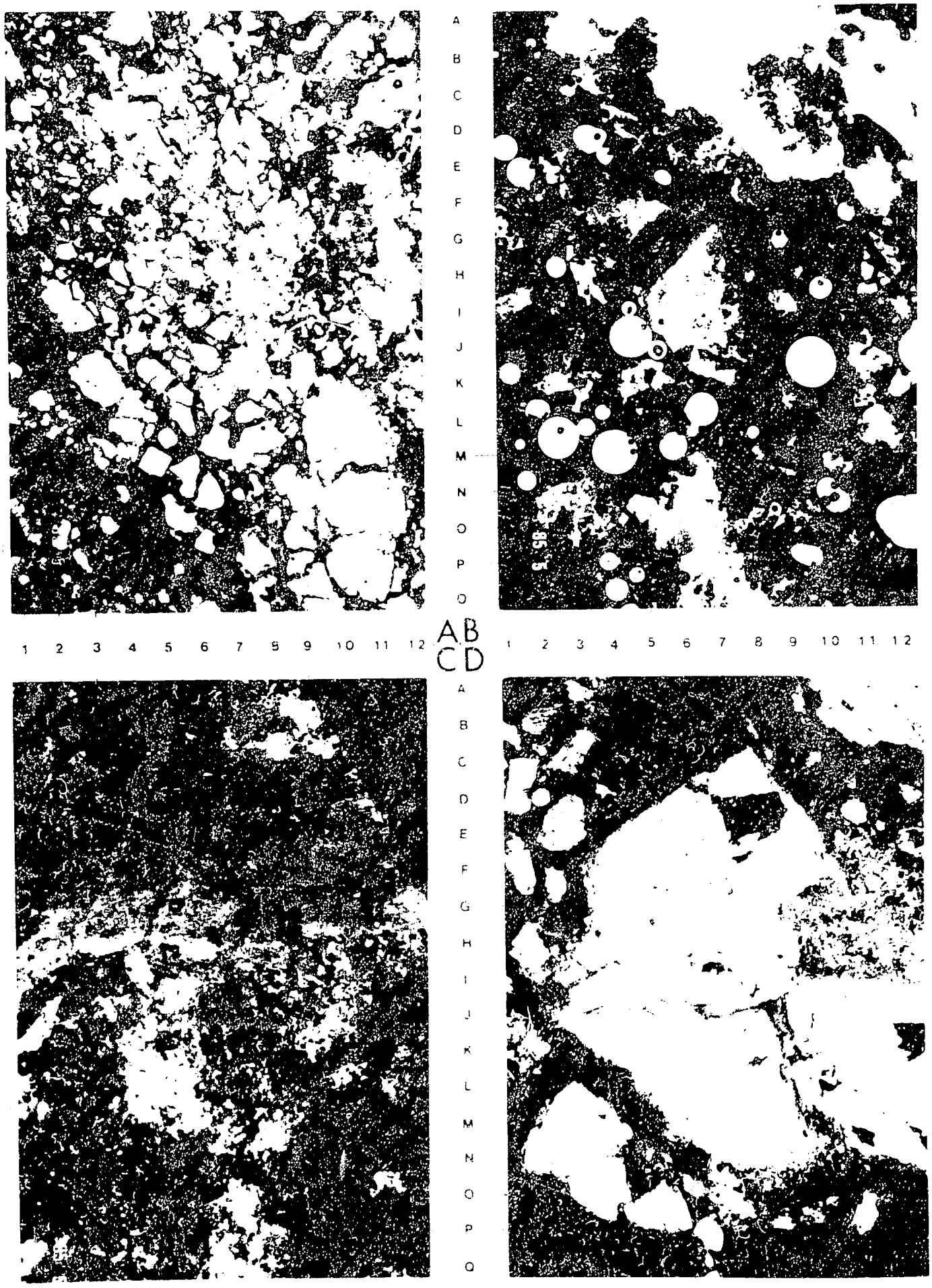
Interconnectedness ____

CLAY MINERAL LOCATION

Laminae
Dispersed
Rock Fragments Mainly
Pore Lining
Pore Bridging
Pore Filling
Grain Replacement
Fracture Filling

NOTES:

All percentages are based upon visual estimation.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SAMPLE NUMBER 50
DEPTH 1694.0 metres

Plate A

Photomicrograph A shows an overview of a finely crystalline, fossiliferous, micritic sparite which has large portions of chert and minor amounts of detrital clays, pyrite and dolomite. Porosity is virtually non-existent throughout this sample. Micrite makes up 24% of the sample and is present as a cloudy matrix material (G10, P2). (25x, plane polarized light)

Plate B

Chert makes up 23% of the total rock volume, and contains minor calcite inclusions as indicated by large red stained areas (G5). Chert commonly contains traces of pyrite and higher concentrations of detrital clays. (25x, plane polarized light)

Plate C

Photomicrograph C shows the close-up of calcite within a chert fragment, often where chert is in contact with calcite, it is partially corroded. X-ray diffraction analysis indicates that the sample is 85% quartz, therefore it is believed that this sample may not have been representative. (100x, cross polarized light)

Plate D

Photomicrograph D shows the sparry calcite which exists as a fossil replacement and void filling constituent. The calcite has large clear crystals which are badly shattered due to the sample collection method (B11, I6, L11). (100x, cross polarized light)

SAMPLE NUMBER 50 (SEM)
DEPTH 1694.00 metres

Plate A

This low magnification overview shows the very finely crystalline fossiliferous sparite which has large amounts of chert and micritic calcite present. Thin section reveals no visible porosity. Note impressions within matrix created by the chert inclusions (HI7, M9, K11).

Plate B

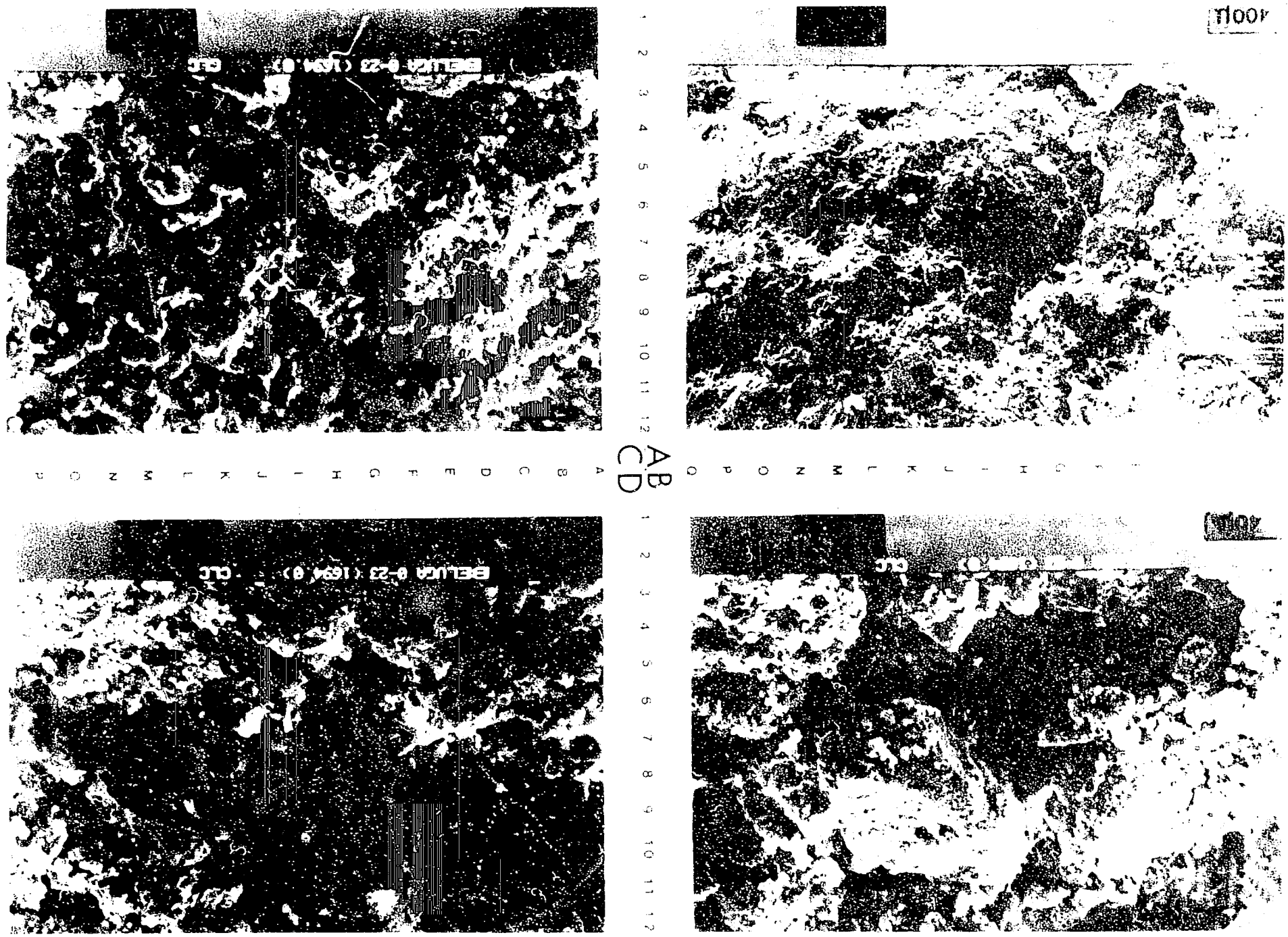
Chert is present in large amounts and can be seen at J8 within a finely crystalline calcite matrix (N4, C7). Chert is commonly partially dissolved where in contact with calcite.

Plate C

Intercrystalline porosity visible at this high magnification, is very poorly interconnected. Calcite crystals within the finer micrite matrix are anhedrally formed.

Plate D

This view shows the development of intercrystalline porosity within a more fragmented zone of the sample. This may be caused by the recovery method employed.


BELUGA 0-23 (1694.0) CLC
BELUGA 0-23 (1694.0) CLC

PETROGRAPHIC DATA SHEET

Well Name: Trillium Saquip Onexco et al Beluga O-23
Location:
Formation: Ekwan River
Porosity: _____ K Max (mD) _____

Sample Number: 52
Sample Depth (m): 1680.00
Rock Name: Aphanocrystalline Micrite
Classification: Folk (1980)

TEXTURE

Mean Size-Transported Constituents (mm): 0.03
Authigenic Constituents (mm): 0.15
Class -Transported Constituents: M Calcilutite
Authigenic Constituents: Very Finely Crystalline
Depositional Texture - Very Finely Laminated

COMPOSITION

Allochemical Constituents

Fossils	T
Intraclasts	
Ooids	
Pisolites	
Pelcids	

Terrigenous Constituents

Quartz:	Mono	T	Poly	
Feldspar:	K-spar		Plag	
Rock Fragments:	SRF	MRF	VRF	PRF
Mica				
Carbonaceous Material	T			

Orthochemical Constituents

Calcite:	Sparry	Micrite 99	Aragonite		
Dolomite	1		Fe Dolomite		
Gypsum	T		Apatite	T	
Anhydrite					
Halite					
Quartz					

Clays

Kaolinite	
Illite	
Chlorite	
Detrital	

POROSITY

Porosity Types

Interparticle		Intercrystal		Fenestral	
Intraparticle		Moldic		Shelter	
Growth Framework		Fracture		Chemical	
Vug					

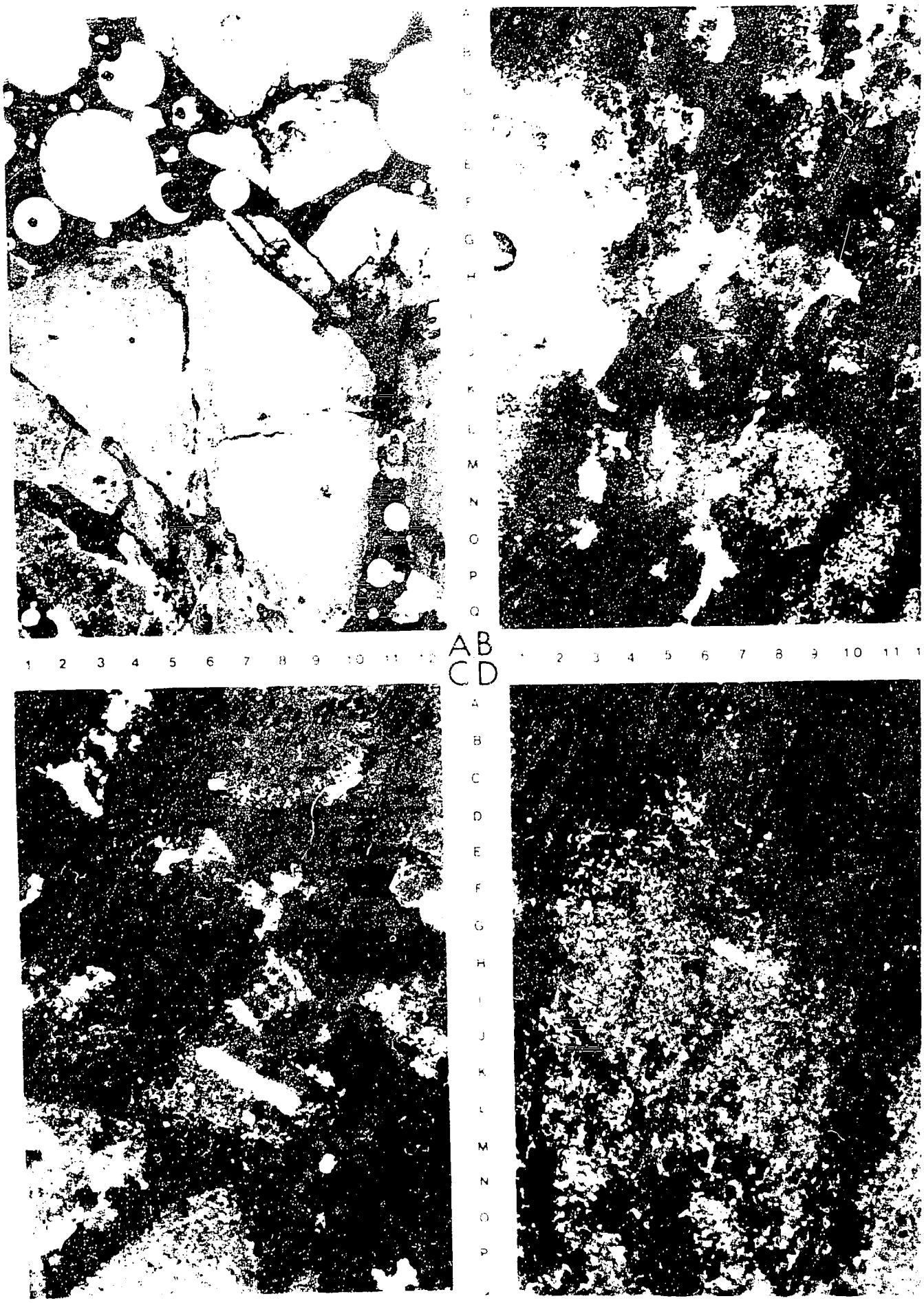
Mean _____ Pore Size (mm) _____ Mean _____ Pore Size (mm) _____ Interconnectedness _____

CLAY MINERAL LOCATION

Laminae		Dispersed				Rock Fragments	
Pore Lining		Pore Bridging		Pore Filling		Grain Replacement	
Fracture Filling							

NOTES:

All percentages are based upon visual estimation.


A B
C D
1 2 3 4 5 6 7 8 9 10 11 12
A B C D E F G H I J K L M N O P Q

SAMPLE NUMBER 52
DEPTH 1680.00 metres

Plate A

This low magnification photomicrograph shows a aphanocrystalline micrite which has minor amounts of dolomite inclusions with no visible porosity. This sample is very thinly laminated as indicated by darker streaks trending from P6 through G6. (25x, plane polarized light)

Plate B

This higher magnification view of an unstained portion of the sample shows the aphanocrystalline texture of this rock. These crystals interlock to form a tightly cemented non-porous rock. (100x, plane polarized light)

Plate C

This photomicrograph of the stained portion of the slide shows the presence of gypsum laths in trace amounts (K7). These gypsum laths are very fine and are found floating within a micrite matrix. (100x, cross polarized ligth)

Plate D

Photomicrograph D again is a high magnification view of a stained portion of the sample. Very finely crystalline dolomite rhombs are well dispersed throughout the sample and make up 1% of the total rock volume (GH3) and are indicated by white flecks within the red stained calcite. Note the fine laths of gypsum at H6.5. (100x, cross polarized light)

PETROGRAPHIC DATA SHEET

Well Name Trillium Soquip Onexco et al Beluga O-23
Location
Formation Ekwan River
Porosity K Max (mD)

Sample Number 53
Sample Depth (m) 1660.00
Rock Name Chert
Classification

TEXTURE

Mean Size-Transported Constituents (mm) 0.03
Class -Transported Constituents M Calcilutite
Authigenic Constituents (mm) 0.01
Authigenic Constituents Very Finely Crystalline
Depositional Texture - Poorly Preserved, Calcareous

COMPOSITION

Allochemical Constituents

Fossils T
Intraclasts
Ooids
Pisolites
Peloids

Terrigenous Constituents

Quartz: Mono Poly
Feldspar: K-spar Plag
Rock Fragments: SRF MRF VRF PRF
Mica
Carbonaceous Material
Opaques 3

Orthochemical Constituents

Calcite: Sparry 2 Micrite 26
Dolomite
Gypsum
Anhydrite
Halite
Quartz

Aragonite
Fe Dolomite
Chert 69
Pyrite T

Clays

Kaolinite
Illite
Chlorite
Detrital T

POROSITY

Porosity Types

Interparticle
Intraparticle
Growth Framework
Vug

Intercrystal
Moldic
Fracture

Fenestral
Shelter
Chemical

Mean Pore Size (mm)

Mean Pore Size (mm)

Interconnectedness

CLAY MINERAL LOCATION

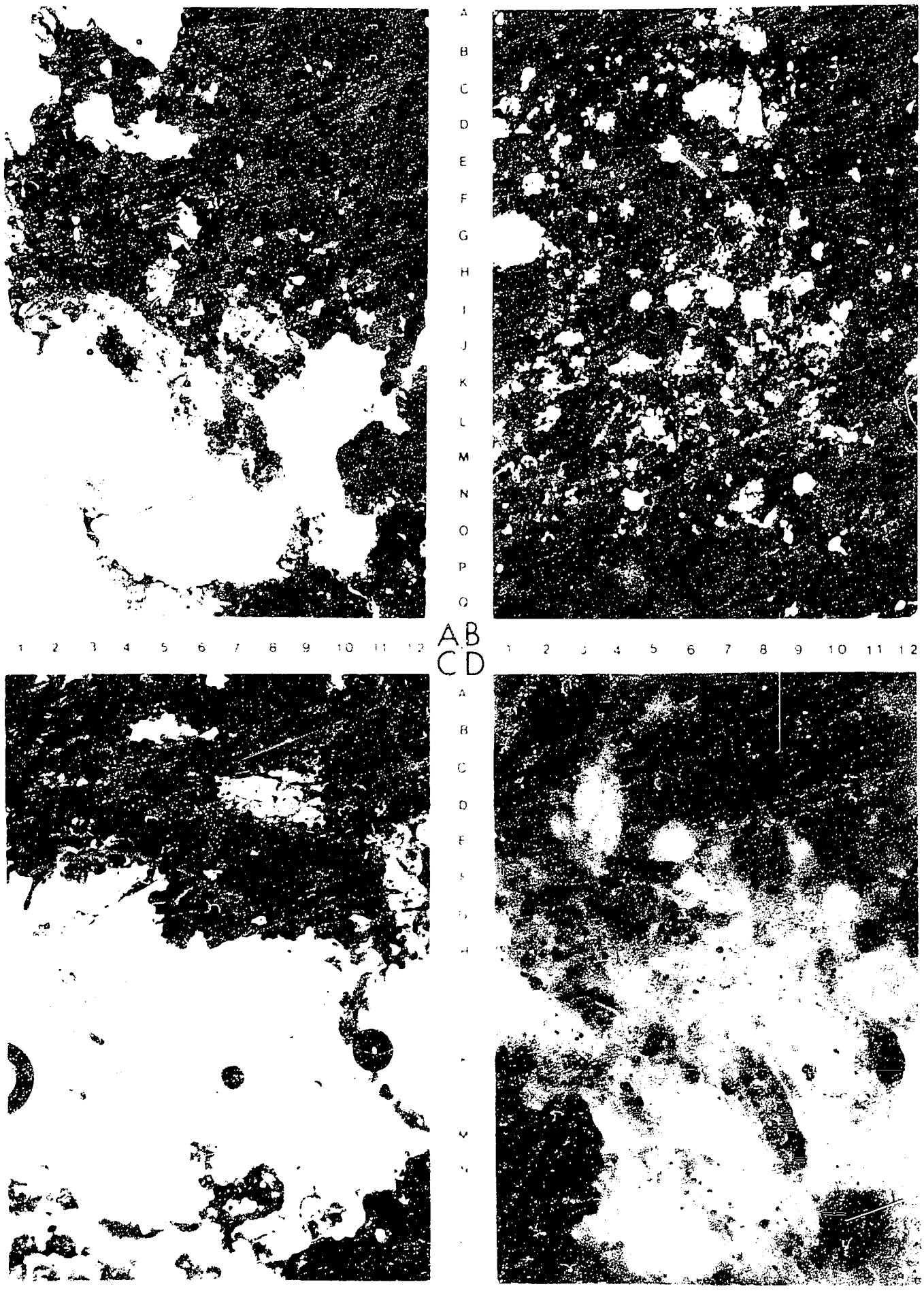
Laminae
Pore Lining
Fracture Filling

Dispersed Mainly
Pore Bridging
Pore Filling

Rock Fragments
Grain Replacement

NOTES:

All percentages are based upon visual estimation.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SAMPLE NUMBER 53
DEPTH 1660.00 metres

Plate A

This low magnification overview shows the very finely crystalline chert which has no visible porosity and is poorly preserved due to the recovery method employed. The chert appears as a pink stained fragment with ghost allochems appearing as light colored portions of the fragments J4). (25x, plane polarized light)

Plate B

Photomicrograph B is a higher magnification view of a chert fragment which shows the very finely crystalline nature of the chert that surrounds the more coarsely crystalline nodules of chert (C7, HI6, and 9). (100x, cross polarized light)

Plate C

This photomicrograph shows pink stained chert. This color is attributable to the inclusions of calcite which absorb some of the alizarin-red-S with which these samples were stained. The fragment at B8 is a non-stained portion of the slide. There is no visible porosity within these fragments. (100x, plane polarized light)

Plate D

This high magnification view shows the pink stained matrix chert which has a high portion of included calcite (B8, H2). Ghost allochems of microfossils are generally white to clear colored and have a more coarsely crystalline chert replacement (D3.5, I1, L8). Minor inclusions of pyrite present as opaque minerals are scattered throughout the sample (G6) and are small framboidal masses. (250x, plane polarized light)

X-RAY DIFFRACTION ANALYSIS

Sample Number: 56
Depth: 1520.00 metres

	Material Less than 5 Microns	Material Greater than 5 Microns	Calculated Bulk Composition
Quartz	11	5	7
Feldspar	Nil	Nil	Nil
Calcite	39	37	38
Dolomite	39	58	52
Siderite	Nil	Nil	Nil
Pyrite	Nil	Nil	Nil
Kaolinite	Trace	Nil	Trace
Illite	11	Nil	3
Chlorite	Trace	Nil	Trace
Smectite	Nil	Nil	Nil
Mixed Layer Clays (Swelling)	Trace	Nil	Trace

CLAY SEPARATION BY FLOATATION

Material Less Than 5 Microns: 30.8%

Material Greater Than 5 Microns: 69.2%

PETROGRAPHIC DATA SHEET

Well Name Trillium Soquip Onexco et al Beluga 0-23
Location
Formation Attatwapiskat
Porosity K Max (mD)

Sample Number 56
Sample Depth (m) 1620.00
Rock Name Calcareous Dolomite
Classification Folk (1980)

TEXTURE

Mean Size-Transported Constituents (mm) 0.03
Authigenic Constituents (mm) 0.05
Class -Transported Constituents M Calcilutite
Authigenic Constituents Finely Crystalline
Depositional Texture - Mottled

COMPOSITION

Allochemical Constituents

Fossils 2
Intraclasts
Ooids
Pisolites
Peloids T

Terrigenous Constituents

Quartz: Mono T Poly
Feldspar: K-spar Plag
Rock Fragments: SRF MRF VRF PRF
Mica
Carbonaceous Material

Orthochemical Constituents

Calcite: Sparry 25 Micrite 15
Dolomite 58
Gypsum
Anhydrite T
Halite
Quartz

Aragonite
Fe Dolomite

Clays

Kaolinite
Illite
Chlorite
Detrital T

POROSITY

Porosity Types

Interparticle
Intraparticle
Growth Framework
Vug

Intercrystal T
Moldic T
Fracture

Fenestral
Shelter
Chemical

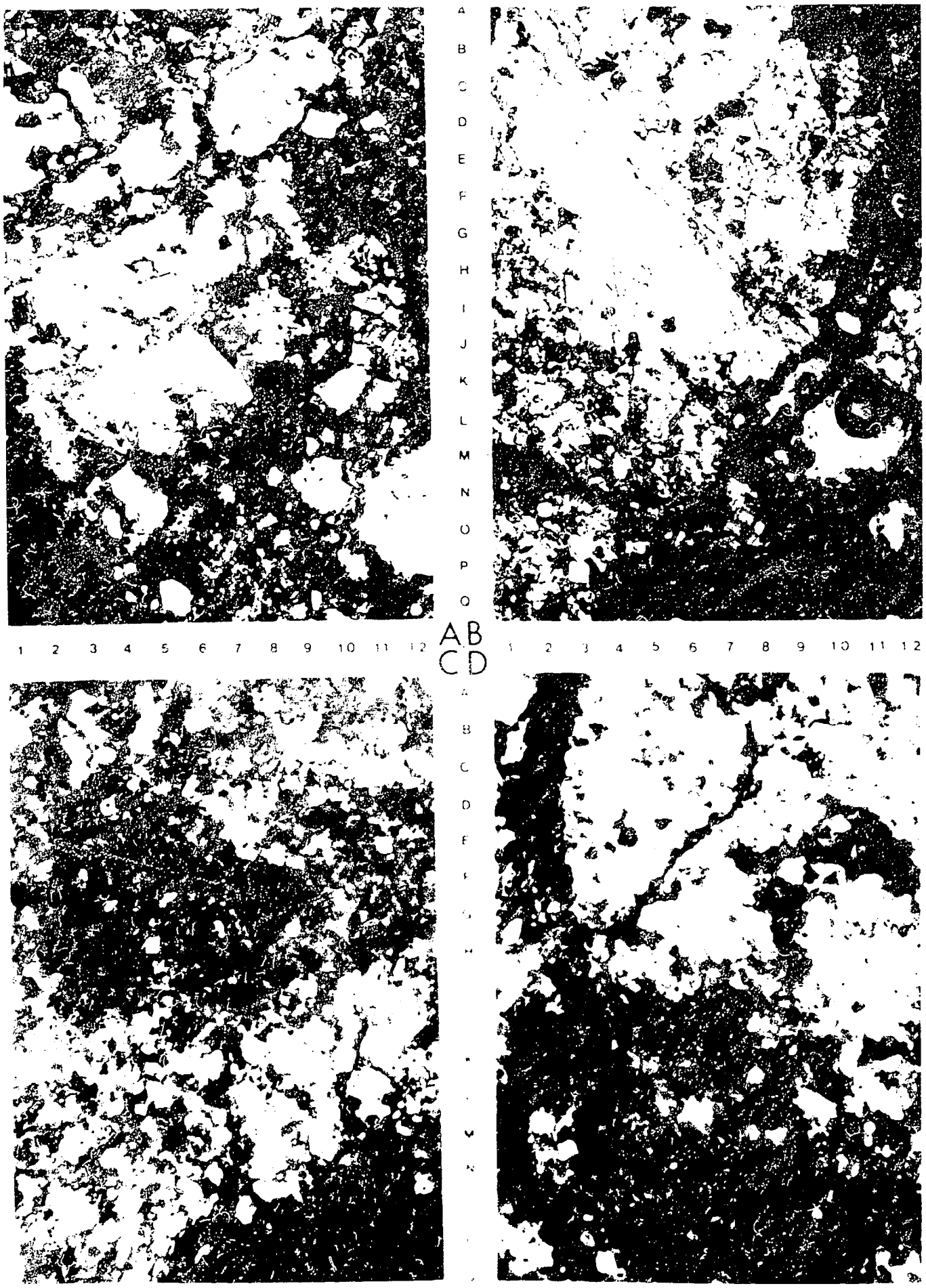
Mean IC Pore Size (mm) 0.005
Mean Pore Size (mm)
Interconnectedness VP

CLAY MINERAL LOCATION

Laminae
Dispersed Mainly
Rock Fragments
Pore Lining
Pore Bridging
Pore Filling
Grain Replacement
Fracture Filling

NOTES:

All percentages are based upon visual estimation.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SAMPLE NUMBER 56
DEPTH 1620.00 metres

Plate A

Photomicrograph A shows a finely crystalline, highly calcareous dolomite which has only traces of porosity that is very poorly interconnected. Large amounts of sparry calcite (C8, I5) are present throughout the sample along with moderate amounts of micrite and traces of anhydrite (K6). (25x, cross polarized light)

Plate B

This higher magnification view shows the tightly interlocking mosaic of sparry calcite (H5), and an elongate fossil fragment which is partially replaced by sparry calcite (B2-H6). Fossil fragments are present in minor amounts and are generally poorly distinguished due to the replacement by dolomite and sparry calcite. (100x, cross polarized light)

Plate C

This view shows a stained portion of the sample which is predominantly calcite as indicated by the red staining. Note the euhedrally formed dolomite rhombs which disrupt the calcite (C4.5, K13). (100x, cross polarized light)

Plate D

Higher magnification of a representative fragment shows the predominance of finely crystalline dolomite (D5, H10) with pockets of sparry calcite indicated by red dyed color (E10, M4). Note the peloid at K6. (100x, cross polarized light)

SAMPLE NUMBER 56 (SEM)
DEPTH 1620.00 metres

Plate A

The sample is a finely crystalline, calcareous dolomite which has only traces of porosity within thin section. The trace amount of porosity is predominantly intercrystalline, but moldic porosity is also present (O5).

Plate B

Photomicrograph B shows sparry calcite within a dolomitic cement (HI4.5, FG8). Minor amounts of well formed halite is also present (I8). It is not known whether this halite is primary as none was found within thin section.

Plate C

Photomicrograph C shows sparry calcite (B4, I7), within a predominantly dolomite matrix (D7).

Plate D

High magnification reveals the presence of minor amounts of intercrystalline pores within the sample (H7, IJ3). Note the large crystal of halite at J5.

CLC

CLC

CLC

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PETROGRAPHIC DATA SHEET

Well Name: Trillium Soquip Onexco et al Beluga O-23
Location:
Formation: Attatwapiskat
Porosity: _____ K Max (mD): _____

Sample Number: 57
Sample Depth (m): 1600.00
Rock Name: Dolomite
Classification: Folk (1980)

TEXTURE

Mean Size-Transported Constituents (mm): 0.02
Class -Transported Constituents: Coarse Silt
Authigenic Constituents (mm): 0.01
Authigenic Constituents: Very Finely Crystalline
Depositional Texture - Massive, Very Finely Laminated

COMPOSITION

Allochemical Constituents

Fossils	
Intraclasts	
Ooids	
Pisolites	
Peloids	

Terrigenous Constituents

Quartz:	Mono	T	Poly	
Feldspar:	K-spar		Plag	
Rock Fragments:	SRF		MRF	VRF	PRF
Mica				
Carbonaceous Material				
Bitumen		T		

Orthochemical Constituents

Calcite:	Sparry	Micrite	
Dolomite	99		
Gypsum			
Anhydrite			
Halite			
Quartz			

Aragonite	
Fe Dolomite	
Apatite	T
Pyrite	T

Clays

Kaolinite	
Illite	
Chlorite	
Detrital	1

POROSITY

Porosity Types

Interparticle		Intercrystal	T	Fenestral	
Intraparticle		Moldic		Shelter	
Growth Framework		Fracture		Chemical	
Vug					

Mean IC Pore Size (mm) 0.008

Mean _____ Pore Size (mm) _____

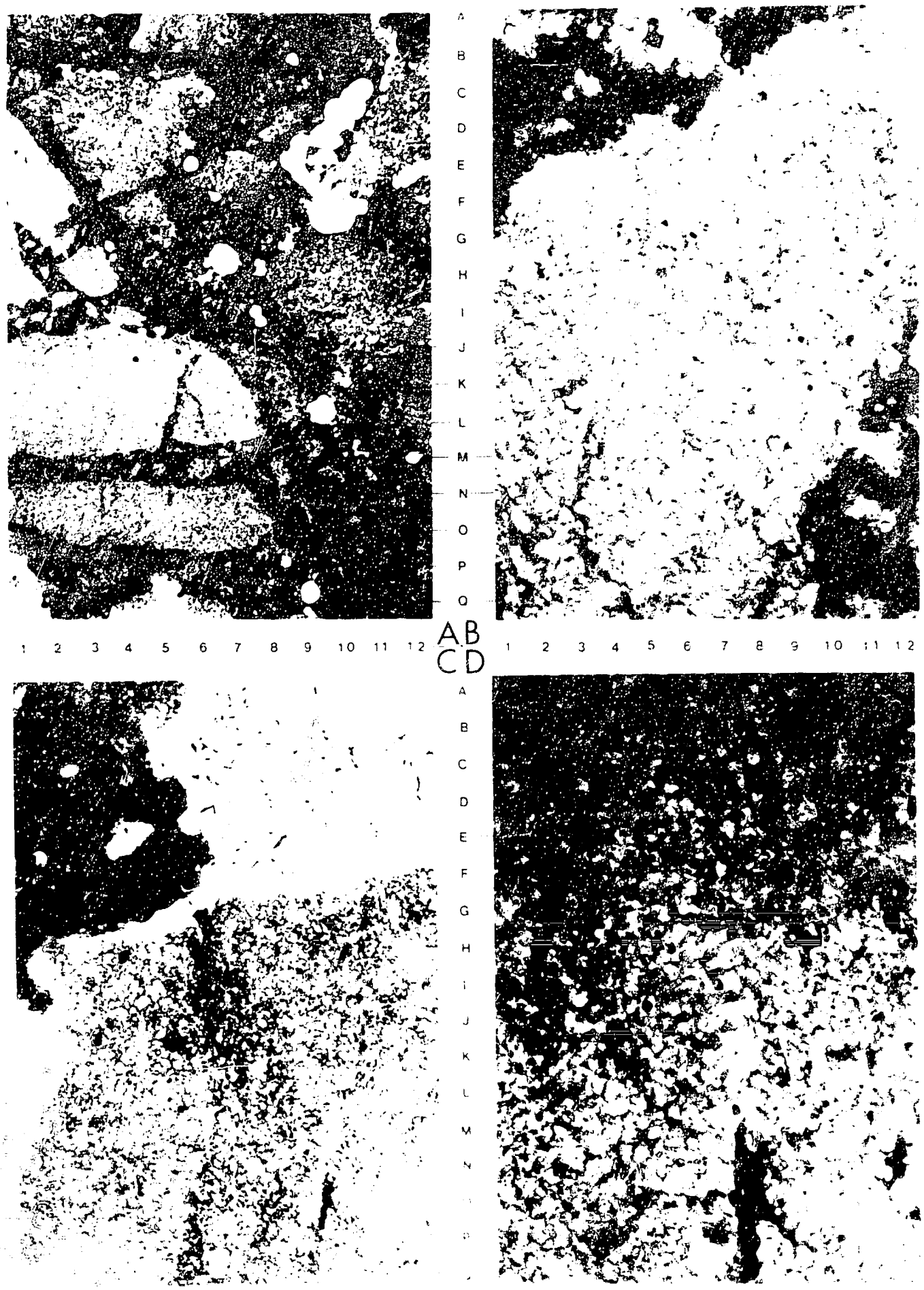
Interconnectedness VP

CLAY MINERAL LOCATION

Laminae		Dispersed				Rock Fragments	
Pore Lining		Pore Bridging		Pore Filling		Grain Replacement	
Fracture Filling							

NOTES:

All percentages are based upon visual estimation.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SAMPLE NUMBER 57
DEPTH 1600.00 metres

Plate A

This low magnification overview of the contact between the stained and non-stained portion of the sample indicates that the sample is a very finely crystalline dolomite with traces of bitumen, apatite and pyrite. The sample is very finely laminated with laminations being highlighted by bitumen and detrital clays. (25x, plane polarized light)

Plate B

This higher magnification photomicrograph shows a more loosely compacted fragment with traces of intercrystalline porosity noted by blue dyed epoxy at H8. This intercrystalline porosity is very poorly interconnected and is believed to be relatively insignificant. (100x, plane polarized light)

Plate C

This photomicrograph shows the presence of elongate seams of bitumen and detrital clays (H6, P6, O9.5) which highlight the very fine laminations throughout the sample. Note that this fragment contains no visible porosity within the dolomite. (100x, plane polarized light)

Plate D

This high magnification photomicrograph shows the tightly interlocking nature of the dolomite crystals. Also present are minor flecks of pyrite (IJ4.5, LM1.5). Bitumen and detrital clays highlight laminations throughout the sample (O7). Note a monocrystalline quartz grain at I6.5. (250x, cross polarized light)

X-RAY DIFFRACTION ANALYSIS

Sample Number: 58
Depth: 1578.00 metres

	Material Less than 5 Microns	Material Greater than 5 Microns	Calculated Bulk Composition
Quartz	Trace	Trace	Nil
Feldspar	Nil	Nil	Nil
Calcite	94	97	96
Dolomite	3	3	3
Siderite	Nil	Nil	Nil
Pyrite	Nil	Nil	Nil
Kaolinite	Nil	Nil	Nil
Illite	Trace	Nil	Trace
Chlorite	Nil	Nil	Nil
Smectite	3	Nil	1
Mixed Layer Clays (Swelling)	Trace	Nil	Trace
Barite	Trace	Nil	Trace

CLAY SEPARATION BY FLOATATION

Material Less Than 5 Microns: 38.7%

Material Greater Than 5 Microns: 61.3%

PETROGRAPHIC DATA SHEET

Well Name Trillium Soquip Onexco et al Beluga O-23
Location
Formation Attatwapiskat
Porosity K Max (mD)

Sample Number 58
Sample Depth (m) 1578.00
Rock Name Sparite
Classification Folk (1980)

TEXTURE

Mean Size-Transported Constituents (mm)
Class -Transported Constituents
Authigenic Constituents (mm) 0.12
Authigenic Constituents Medium Crystalline
Depositional Texture -

COMPOSITION

Allochemical Constituents

Fossils 1
Intraclasts
Ooids
Pisolites
Peloids

Terrigenous Constituents

Quartz: Mono Poly
Feldspar: K-spar Plag
Rock Fragments: SRF MRF VRF PRF
Mica
Carbonaceous Material

Orthochemical Constituents

Calcite: Sparry 98 Micrite 2
Dolomite 2
Gypsum 1
Anhydrite
Halite
Quartz
Aragonite
Fe Dolomite

Clays

Kaolinite
Illite
Chlorite
Detrital

POROSITY

Porosity Types

Interparticle
Intraparticle
Growth Framework
Vug
Intercrystal
Moldic
Fracture
Fenestral
Shelter
Chemical

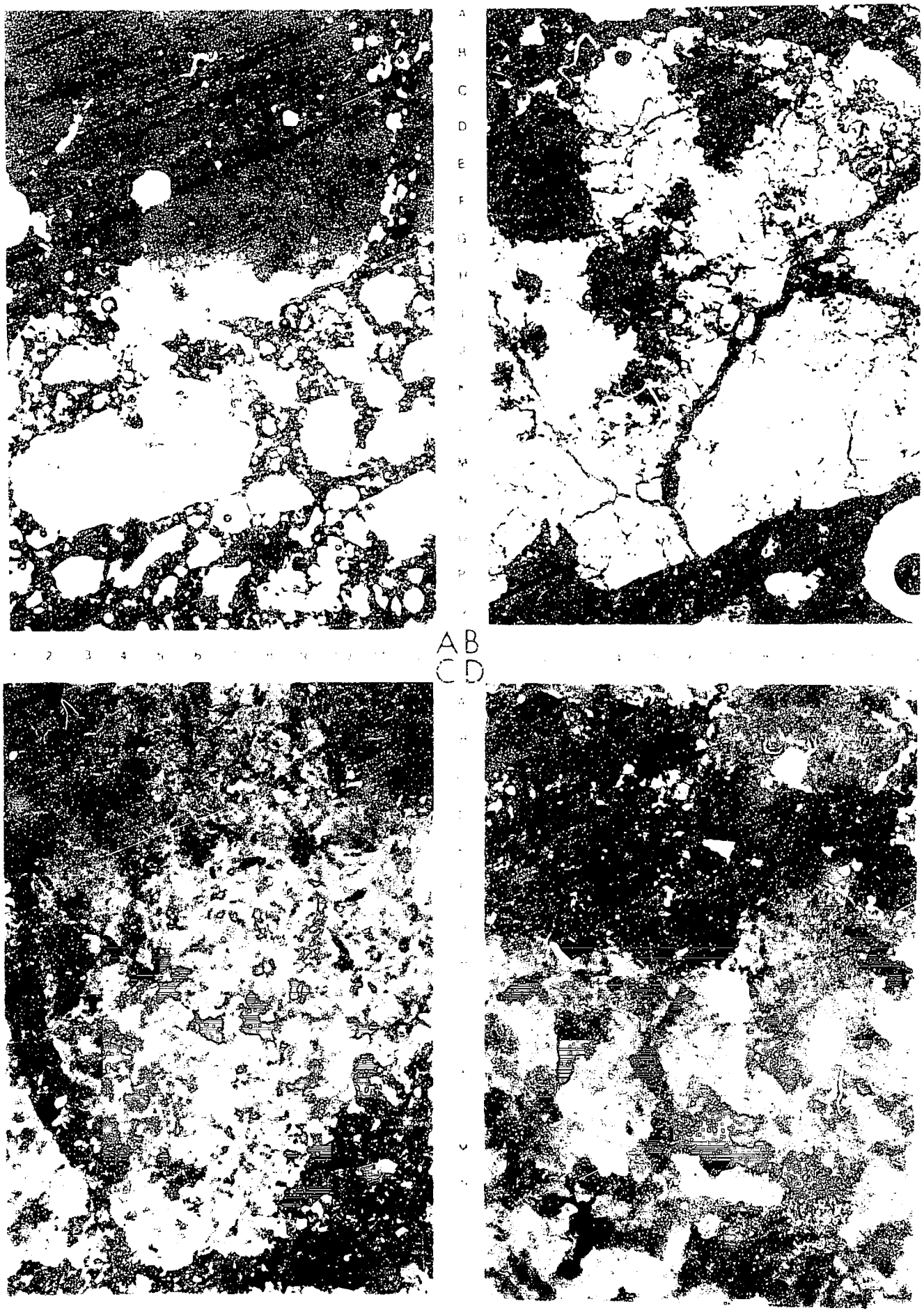
Mean Pore Size (mm)
Mean Pore Size (mm)
Interconnectedness

CLAY MINERAL LOCATION

Laminae
Dispersed
Rock Fragments
Pore Lining
Pore Bridging
Pore Filling
Grain Replacement
Fracture Filling

NOTES:

All percentages are based upon visual estimation.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SAMPLE NUMBER 58
DEPTH 1578.00 metres

Plate A

This low magnification overview shows the contact between the alizarin-red-S stained portion of the sample and the non-stained portion. This photomicrograph indicates that this is a medium crystalline sparite that has minor amounts of micrite and dolomite cement with traces of gypsum. Fossils make up only 1% of the whole and are generally poorly preserved. (25x, plane polarized light)

Plate B

This higher magnification photomicrograph shows a medium crystalline, interlocking mosaic of sparry calcite (G6). Due to the lack of allochemical constituents, it is believed that this sparry calcite is formed by neomorphism of the previous matrix material. (100x, plane polarized light)

Plate C

This overview shows a stained fragment of the sample which indicates a tightly interlocking mosaic of sparry calcite with minor inclusions of dolomite (DC8); dolomite is indicated by white color. This tightly interlocking pattern of sparry calcite eliminates porosity. (100x, cross polarized light)

Plate D

Photomicrograph D is a high magnification of the typical fragment within this sample and indicates the euhedral shape of the dolomite which is floating within the sparry calcite cement (I6.5, J9, IJ11). No visible porosity is present within this tightly interlocking mosaic of sparry calcite (N6). (250x, cross polarized light)

SAMPLE NUMBER 58 (SEM)
DEPTH 1578.00 metres

Plate A

This low magnification overview shows a medium crystalline sparite which has minor amounts of dolomite and micrite. This sample appears to be contaminated by sample recovery method as a high portion of finely crystalline material is apparent within the photomicrograph.

Plate B

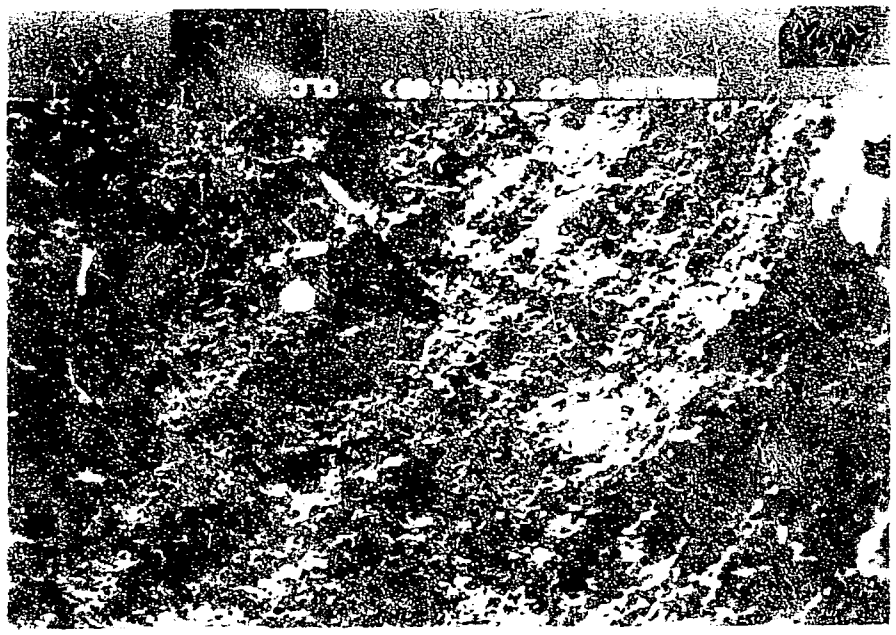
Photomicrograph B shows the presence of euhedrally formed dolomite rhombs which are irregularly dispersed throughout the sample (F10, M6).

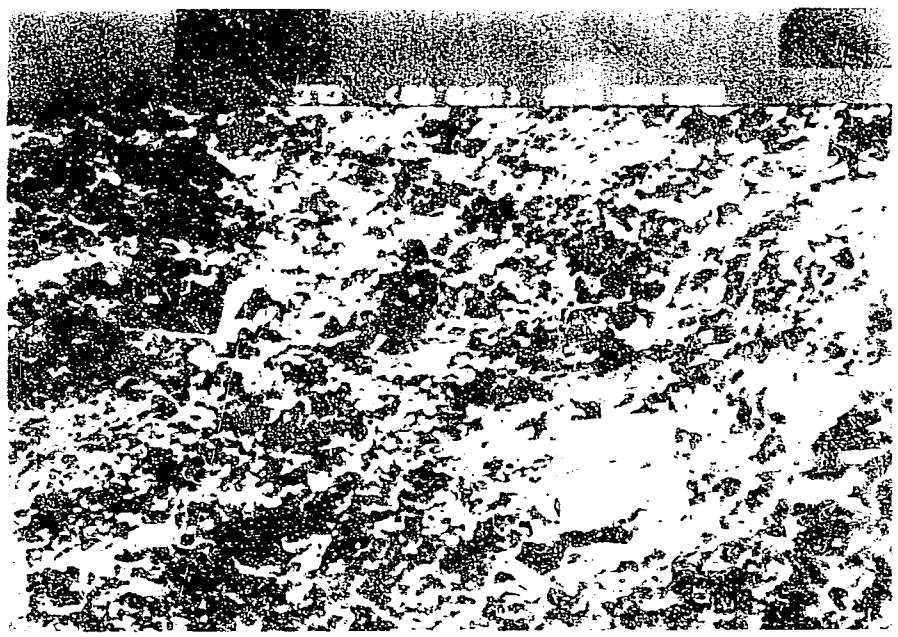
Plate C

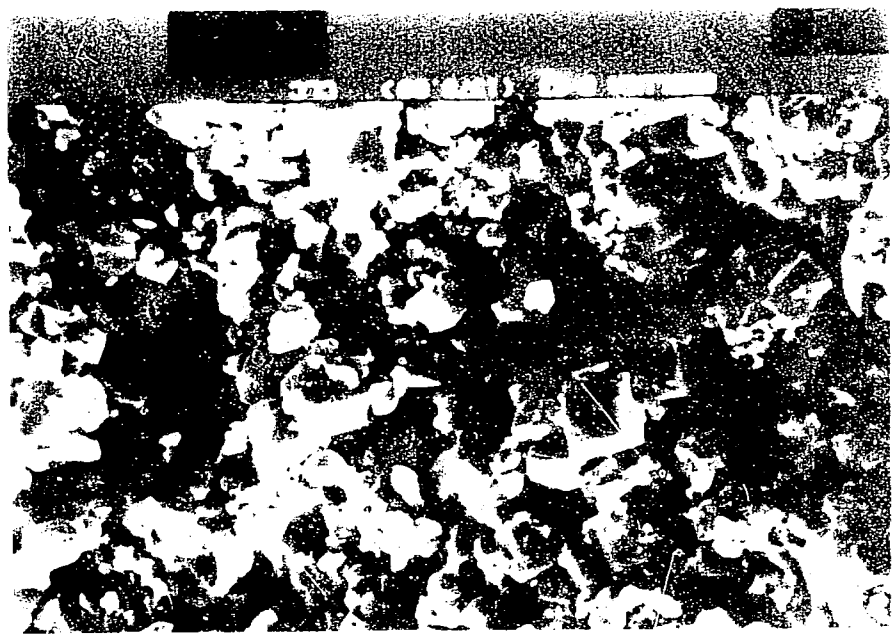
This higher magnification view shows the presence of euhedrally formed dolomite (G5, L8) along with sparry calcite (D10). It is believed that the sparry calcite formed neomorphically due to poorly formed crystal margins and the lack of allochems throughout the sample.

Plate D

This view shows the presence of intercrystalline porosity within microcrystalline calcite and dolomite. The presence of halite (D5) and well developed intercrystalline porosity may be caused by the recovery method which would disaggregatie samples and contaminate them with foreign matter.







X-RAY DIFFRACTION ANALYSIS

Sample Number: 60
Depth: 1565.00 metres

	Material Less than 5 Microns	Material Greater than 5 Microns	Calculated Bulk Composition
Quartz	Trace	Nil	Trace
Feldspar	Nil	Nil	Nil
Calcite	74	86	83
Dolomite	Nil	Nil	Nil
Siderite	Nil	Nil	Nil
Pyrite	Nil	Nil	Nil
Kaolinite	Trace	Nil	Trace
Illite	18	Nil	5
Chlorite	Trace	Nil	Trace
Smectite	Nil	Nil	Nil
Mixed Layer Clays (Swelling)	Trace	Nil	Trace
Anhydrite	8	14	12

CLAY SEPARATION BY FLOATATION

Material Less Than 5 Microns: 27.9%

Material Greater Than 5 Microns: 72.1%

PETROGRAPHIC DATA SHEET

Well Name: Trillium Soquip Onexco et al Beluga 0-23
Location:
Formation: Attatwapiskat
Porosity: _____ K Max (mD) _____

Sample Number: 60
Sample Depth (m): 1565.00
Rock Name: Micrite
Classification: Folk (1980)

TEXTURE

Mean Size-Transported Constituents (mm): 0.06
Class -Transported Constituents: Coarse Silt
Authigenic Constituents (mm): 0.6
Authigenic Constituents: Coarsely Crystalline
Depositional Texture - _____

COMPOSITION

Allochemical Constituents

Fossils ____
Intraclasts ____
Ooids ____
Pisolites ____
Peloids ____
_____ ____
_____ ____

Terrigenous Constituents

Quartz: Mono I Poly ____
Feldspar: K-spar ____ Plag ____
Rock Fragments: SRF ____ MRF ____ VRF ____ PRF ____
Mica ____
Carbonaceous Material ____
_____ ____
_____ ____

Orthochemical Constituents

Calcite: Sparry 20 Micrite 70
Dolomite ____
Gypsum ____
Anhydrite 10
Halite ____
Quartz ____

Aragonite ____
Fe Dolomite ____
Apatite I
_____ ____
_____ ____
_____ ____

Clays

Kaolinite ____
Illite ____
Chlorite ____
Detrital I
_____ ____
_____ ____

POROSITY

Porosity Types

Interparticle ____
Intraparticle ____
Growth Framework ____
Vug ____

Intercrystal ____
Moldic ____
Fracture ____

Fenestral ____
Shelter ____
Chemical ____

Mean ____ Pore Size (mm) ____

Mean ____ Pore Size (mm) ____

Interconnectedness ____

CLAY MINERAL LOCATION

Laminae ____
Pore Lining ____
Fracture Filling ____

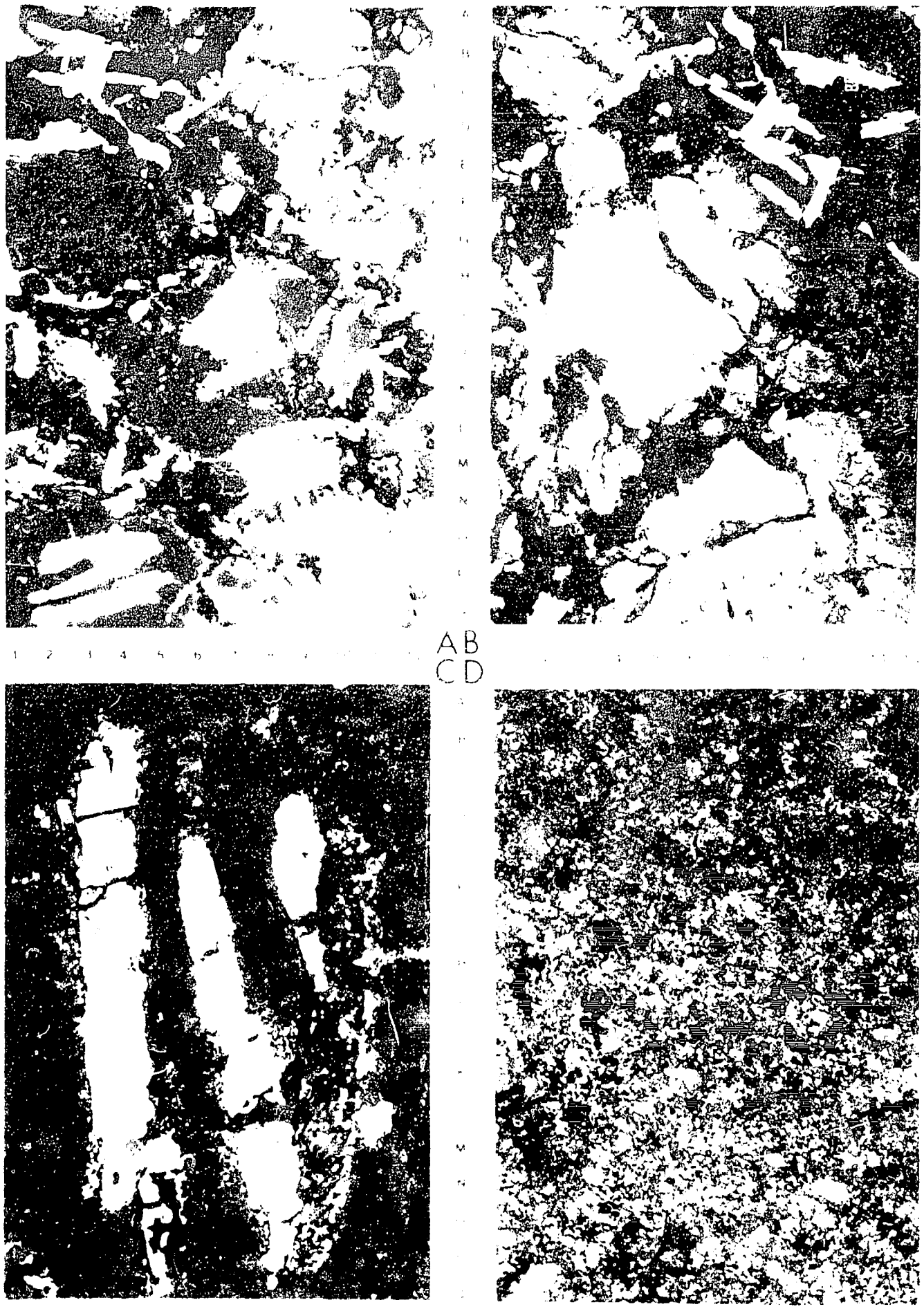
Dispersed ____
Pore Bridging ____

Pore Filling ____

Rock Fragments ____
Grain Replacement ____

NOTES:

All percentages are based upon visual estimation.


A B
C D

SAMPLE NUMBER 60
DEPTH 1565.00 metres

Plate A

This low magnification view shows the finely crystalline micrite with abundant inclusions of bladed anhydrite (G10, M8, P3). This micrite has no visible porosity. (25x, plane polarized light)

Plate B

This low magnification overview again shows the micritic nature of the sample with the randomly orientated inclusions of anhydrite (D8) which are unevenly dispersed throughout the sample. (25x, plane polarized light)

Plate C

Photomicrograph C is a high magnification photomicrograph of gypsum laths within a finely crystalline micrite matrix. Anhydrite is highly birefringent (J10), but may show lower orders of birefringence if the sample has been ground to thin. (100x, cross polarized light)

Plate D

This closeup of the micrite matrix shows the total lack of intercrystalline porosity due to the tight cementation by calcite. 20% of the sample is sparry calcite which is believed to be formed neomorphically destroying any relic depositional texture. (100x, plane polarized light)

SAMPLE NUMBER 60 (SEM)
DEPTH 1565.00 metres

Plate A

This low magnification overview is of a finely crystalline micrite which has relatively large amounts of sparry calcite and anhydrite.

Plate B

Photomicrograph 8 shows a higher magnification view of the micritic matrix (D6, H10) along with a large lath of anhydrite (L5). This micro-sparry ranges in size from 5 to 15 microns and is present at P6.

Plate C

The sample contains zones of very poor amounts of intercrystalline porosity and areas of densely compacted areas of no porosity. This particular photomicrograph shows very poor amounts of intercrystalline porosity which is poorly interconnected. Note annydrite at N4.

Plate D

This high magnification photomicrograph shows an area of ry densely cemented microspar and micrite which leaves little to no pore space.

AB
CD

PETROGRAPHIC DATA SHEET

Well Name: Trillium Soquip Onexco et al Beluga O-23
Location:
Formation: Narwhal
Porosity: _____ K Max (mD): _____

Sample Number: 62
Sample Depth (m): 1550.00
Rock Name: Dolomite
Classification: Folk (1980)

TEXTURE

Mean Size-Transported Constituents (mm): _____
Class -Transported Constituents: _____
Depositional Texture - Very Finely Laminated

Authigenic Constituents (mm): 0.03
Authigenic Constituents: Finely Crystalline

COMPOSITION

Allochemical Constituents

Fossils: ____
Intraclasts: ____
Ooids: ____
Pisolites: ____
Peloids: ____

Terrigenous Constituents

Quartz: Mono ____ Poly ____
Feldspar: K-spar ____ Plag ____
Rock Fragments: SRF ____ MRF ____ VRF ____ PRF ____
Mica ____
Carbonaceous Material ____

Orthochemical Constituents

Calcite: Sparry ____ Micrite T
Dolomite 89
Gypsum ____
Anhydrite 9
Halite ____
Quartz ____

Aragonite ____
Fe Dolomite ____
Pyrite T

Clays

Kaolinite ____
Illite ____
Chlorite ____
Detrital 2

POROSITY

Porosity Types

Interparticle ____
Intraparticle ____
Growth Framework ____
Vug ____

Intercrystal T
Moldic ____
Fracture ____

Fenestral ____
Shelter ____
Chemical ____

Mean ____ Pore Size (mm) ____

Mean ____ Pore Size (mm) ____

Interconnectedness VP

CLAY MINERAL LOCATION

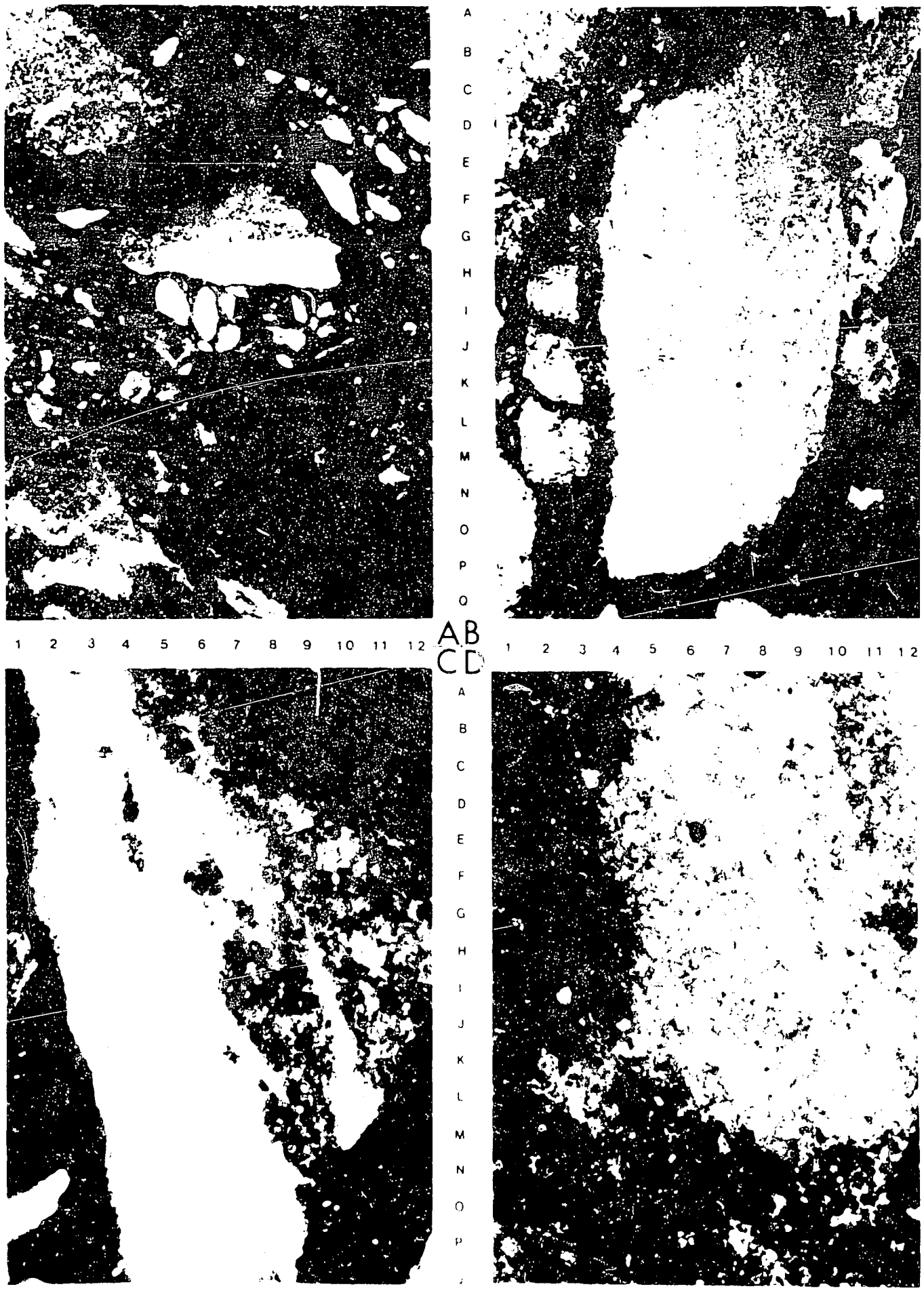
Laminae Present
Pore Lining ____
Fracture Filling ____

Dispersed Mainly
Pore Bridging ____
Pore Filling ____

Rock Fragments ____
Grain Replacement ____

NOTES:

All percentages are based upon visual estimation.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SAMPLE NUMBER 62
DEPTH 1550.00 metres

Plate A

This low magnification photomicrograph shows a finely crystalline dolomite with moderate amounts of felty anhydrite (H7). The sample contains only trace amounts of intercrystalline porosity that seems to be completely isolated. (25x, cross polarized light)

Plate B

This low magnification view shows the finely laminated nature of the sample indicated by elongate darker seams which run from O7 to B7. These laminations contain minor amounts of detrital clays and rare pyrite. (25x, cross polarized light)

Plate C

This closeup shows felty anhydrite which occurs on the end of one fragment (C3-P5). Felty anhydrite makes up to 9% of the sample and occurs within locallized seams throughout. Note the densely cemented nature of the dolomite cement (E9). (100x, cross plolarized light)

Plate D

Photomicrograph D is an overview of a fragment which demonstrates the coarser laminations with more coarsely crystalline dolomite (B9), versus the more finely crystalline dolomite (H5) which commonly has inclusions of detrital clay (100x, cross polarized light)

X-RAY DIFFRACTION ANALYSIS

Sample Number: 66
Depth: 1486.00 metres

	Material Less than 5 Microns	Material Greater than 5 Microns	Calculated Bulk Composition
Quartz	11	48	33
Feldspar	6	21	15
Calcite	3	2	2
Dolomite	23	27	25
Siderite	Nil	Nil	Nil
Pyrite	Nil	Nil	Nil
Kaolinite	Trace	Nil	Trace
Illite	3	Trace	1
Chlorite	5	Trace	2
Smectite	Nil	Nil	Nil
Mixed Layer Clays (Swelling)	Trace	Nil	Trace
Anhydrite	49	2	22

CLAY SEPARATION BY FLOATATION

Material Less Than 5 Microns: 43.2%

Material Greater Than 5 Microns: 56.8%

PETROGRAPHIC DATA SHEET

Well Name: Trillium Soquip Onexco et al Beluga O-23
Location:
Formation: Kerogami
Porosity: _____ K Max (mD) _____

Sample Number: 66
Sample Depth (m): 1486.00
Rock Name: Dolomitic Sandstone
Classification: Folk (1980)

TEXTURE

Mean Size-Transported Constituents (mm): 0.065
Class -Transported Constituents: VF Sand
Authigenic Constituents (mm): 0.016
Authigenic Constituents: VF-F Crystalline
Depositional Texture - Poorly Sorted

COMPOSITION

Allochemical Constituents

Fossils	
Intraclasts	
Ooids	
Pisolites	
Peloids	

Terrigenous Constituents

Quartz:	Mono	35	Poly	
Feldspar:	K-spar	10	Plag	T
Rock Fragments:	SRF		MRF	VRF	PRF
Mica		T		
Carbonaceous Material		3		

Orthochemical Constituents

Calcite:	Sparry		Micrite	T
Dolomite		33		
Gypsum				
Anhydrite		9		
Halite				
Quartz				

Aragonite	
Fe Dolomite	

Clays

Kaolinite	
Illite	
Chlorite	1
Detrital	9

POROSITY

Porosity Types

Interparticle	P-M
Intraparticle	
Growth Framework	
Vug	

Intercrystal	
Moldic	
Fracture	

Fenestral	
Shelter	
Chemical	

Mean _____ Pore Size (mm) _____

Mean _____ Pore Size (mm) _____

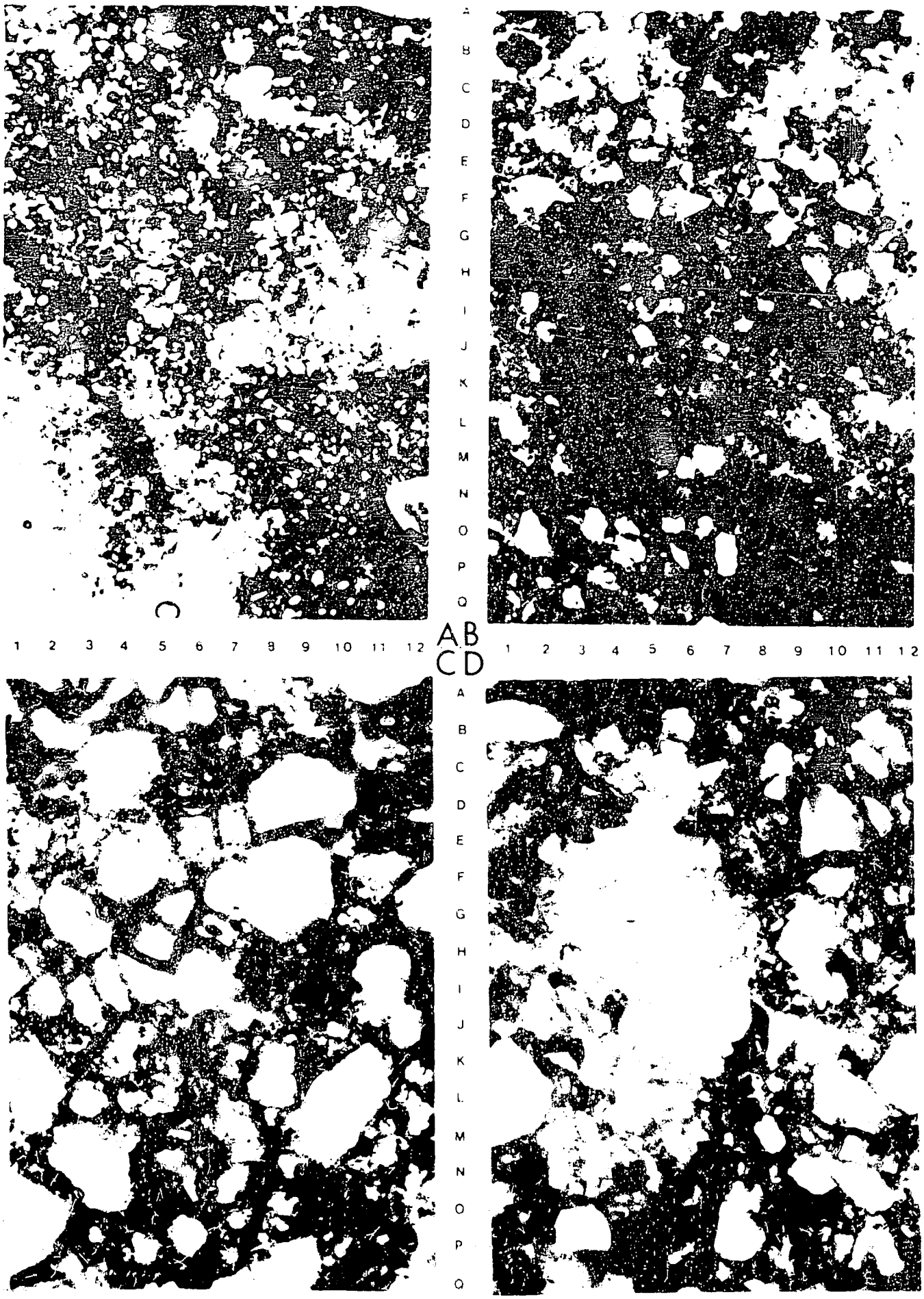
Interconnectedness VP-M

CLAY MINERAL LOCATION

Laminae		Dispersed		Rock Fragments
Pore Lining		Pore Bridging		Pore Filling		Grain Replacement
Fracture Filling				

NOTES:

All percentages are based upon visual estimation.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SAMPLE NUMBER 66
DEPTH 1486.00 metres

Plate A

This low magnification overview shows the very fine dolomitic sandstone which contains moderate amounts of detrital clays and anhydrite. Intercrystalline porosity is poor to moderate and interconnectedness is very poor to moderate. (25x, plane polarized light)

Plate B

This higher magnification view shows the moderately cemented nature of this rock with dolomite occurring as a pore filling cement (N7) and anhydrite occurring as a finely crystalline, locally pore filling cement. Terrigenous constituents consist of 35% monocrystalline quartz, 10% k-spar, 3% carbonaceous material and traces of mica and plagioclase. (100x, cross polarized light)

Plate C

This high magnification photomicrograph shows the area of tight cementation (M7) and areas of good intercrystalline porosity (G4). The moderate amounts of intercrystalline porosity present may be created by the sample recovery method and preparation. (250x, plane polarized light)

Plate D

This high magnification view shows the manner in which local anhydrite cementation (I5) can completly eliminate porosity in a similar fashion to dolomite. (250x, plane polarized light)

SAMPLE NUMBER 66 (SEM)
DEPTH 1486.00 metres

Plate A

This photomicrograph shows a overview of a very fine, dolomitic sandstone. This sample as a whole has been poorly preserved, possibly due to recovery methods.

Plate B

Photomicrograph B shows unfractured columnar halite (K4, L11), which is prevalent throughout the sample. The columnar nature of this halite may indicate that this is primary nature but may also have been introduced through fluid invasion.

Plate C

This high magnification view shows a quartz grain (J8) within a finely crystalline dolomite (A7) along with abundant halite (D5, M7, K11).

Plate D

This high magnification view shows moderate amounts of intercrystalline porosity within the less densely packed portions of the sample. The poorly preserved nature of the sample and the presence of halite may indicate that porosity was artificially created.

BÉLUGA 0-23 (1486 00) CLC

400µ

BÉLUGA 0-23 (1486 00) CLC

SAMPLE TREATMENT

X-Ray Diffraction Analysis: A sample representing the interval indicated is disaggregated and subjected to a five step analysis: bulk (greater than 5 microns), clay size fraction (less than 5 microns) at room humidity, clay size fraction glycolated, clay size fraction heat treated and, where necessary, clay size fraction acidized. The clay fraction is prepared by dispersion in sodium hexametaphosphate solution and flocculation in magnesium chloride solution. This also stabilizes the ionic state of some clays. The glycolation treatment is used to identify swelling clays such as smectites and vermiculites. These clays expand on glycolation to different degrees when the available cation sites are magnesium saturated. The heat treatment aids in identification of chlorite type and also differentiates between some chlorites and kaolinite. Where further identification of clay type in a chlorite-kaolinite mix is necessary, the sample is treated with warm dilute hydrochloric acid, which decomposes the chlorite.

Thin Section Analysis: A typical sample for the interval indicated is taken, and after cleaning is impregnated under vacuum and then pressure (1000 psi - nitrogen driven) with a low viscosity epoxy resin. This epoxy resin is typically mixed with a blue dye in order to discern porosity. The sample is then cut, mounted onto a glass slide, and ground to 30 micrometres. Carbonate mineral staining techniques where required are then applied before a cover glass is finally put on. The completed thin section is examined using a polarizing microscope, and photomicrographs of areas of interest are produced.

Scanning Electron Microscopy: A typical sample for the interval indicated is taken from the centre of the core, providing a clean freshly broken surface for viewing. The pieces, approximately one centimetre square, are mounted on aluminum stubs using colloidal silver as the adhesive and then coated under high vacuum with a fine coating of gold. A Cambridge Stereoscan 604 with a Kevex Energy Dispersive X-Ray Analyzer is used to examine the specimen and produce photographs beginning with low magnification overviews and progressing to high magnification representative views of areas of interest.

LIST OF ABBREVIATIONS

ROCK CONSTITUENTS

A	Apatite
AF	Authigenic Feldspar
AN	Anhydrite
AQ	Authigenic Quartz
B	Bitumen
C	Clay Minerals
CA	Calcite
CH	Chert
CL	Chlorite
CM	Carbonaceous Material
CO	Collophane
D	Dolomite
F	Feldspar
FO	Fossil
G	Glauconite
I	Illite
IN	Intraclast
K	Kaolinite
M	Mica
MD	Mud Damage
O	Opal
OO	Ooid
P	Pore Space
PE	Peloid
PI	Pyrite
Q	Quartz
RF	Rock Fragment
S	Siderite
SM	Smectite

POROSITY TYPE

MI	Microporosity
IG	Intergranular Porosity
S	Secondary Porosity
F	Fracture Porosity
V	Vugular Porosity
MO	Moldic Porosity
IA	Intragranular Porosity
IC	Intercrystalline Porosity

ROCK NAMES

QA	Quartzarenite
SA	Subarkose
SL	Sublitharenite
AR	Arkose
LA	Lithic Arkose
FL	Feldspathic Litharenite
LI	Litharenite
CO	Conglomerate
SI	Siltstone
SH	Shale
LS	Limestone
DO	Dolomite
AN	Anhydrite

OTHER

N	Nil
T	Trace
VP	Very Poor
P	Poor
M	Moderate
G	Good
VG	Very Good
W	Well
VW	Very Well
PPL	Plane Polarized Light
XPL	Crossed Polarized Light

ABBREVIATIONS FOR DATA SHEETS

M	Medium
F	Fine
VF	Very Fine

THIN SECTION PHOTOMICROGRAPH SCALE

The following bar lengths may be used to determine scale for ranges of magnifications.

Magnification	Bar Length
x25	2000µm (2 mm)
x100	500µm (0.5 mm)
x250	200µm (0.2 mm)
x400	100µm (0.1 mm)
x630	100µm (0.1 mm)

SCANNING ELECTRON MICROSCOPE PHOTOMICROGRAPH SCALE

Scale for each photomicrograph is indicated by the insert at the lower left corner of each print. This scale measurement corresponds with the width of the black bar at the base of the photomicrograph.

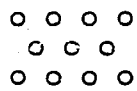
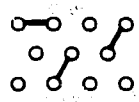
Scale Width	Approximate Magnification
1 mm	x20
400 µm	x50
200 µm	x100
100 µm	x200
40 µm	x500
20 µm	x1000
10 µm	x2000
4 µm	x5000
2 µm	x10000
1 µm	x20000
0.4 µm	x50000

DESCRIPTIVE TERMS OF POROSITY AND PORE "INTERCONNECTEDNESS"

Porosity

Term	Range Percent
Very Good	24
Good	12 - 24
Moderate	6 - 12
Poor	3 - 6
Very Poor	1 - 3
Tite	No Visible Porosity

Pore "Interconnectedness" (≃ Permeability)

Representation	Term	Description
	Very Poor	Pore spaces are isolated
	Poor	Pore spaces are locally interconnected in pairs.
	Moderate	Local pore groups are interconnected.
	Good	Most pore spaces are simply interconnected.
	Very Good	Most pores are interconnected with complex pore interconnections.

The measurement error for porosity determinations based on thin-sections increases with decreasing grain size and is especially serious when the grains are fine sand size or smaller (ibid. Harrel, J. 1981 JSP V51: Halley, R.B., 1978 JSP V48).

CANTERRA ENERGY LTD.

TRILLIUM SOQUIP ONEXCO ET AL BELUGA 0-23

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8710-C55-1-1

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RESERVOIR QUALITY STUDY

FOR

CANTERRA ENERGY LTD.

TRILLIUM SOQUIP ONEXCO ET AL BELUGA O-23

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CANADA OIL AND GAS LANDS ADMINISTRATION
ADMINISTRATION DU PÉTROLE ET DU GAZ DES TERRES DU CANADA
NOV 12 1985
ENGINEERING AND CONTROL BRANCH
TECHNIQUE ET DU CONTROLE

Our File: 70687-85-452

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Petrographic Services

CORE

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INTRODUCTION

Twenty-three samples from the subject well were selected in order to characterize lithology and reservoir quality. Work on a further twenty-eight samples from the subject well is currently in progress. All twenty-three samples were analyzed by thin section petrography, while four were analyzed by X-ray diffraction and scanning electron microscopy. Table 1 presents a basic summary of rock types, while Table 2 tabulates the X-ray diffraction data. Sample locations and types of analyses are presented below.

Depth (m)	Analysis
631.5	TS
636.0	TS
743.0	TS
751.0	TS
774.0	TS
1051.5	TS
1063.5	TS
1065.5	TS, XRD, SEM
1068.0	TS
1069.0	TS
1070.0	TS, XRD, SEM
1073.0	TS
1074.5	TS, XRD, SEM
1078.0	TS
1096.0	TS, XRD, SEM

INTRODUCTION (CONTINUED)

Depth (m)	Analysis
1201.5	TS
1260.0	TS
1439.0	TS
1457.0	TS
1465.0	TS
1473.5	TS
1479.0	TS
1481.0	TS

SUMMARY AND DISCUSSION

SUMMARY

The samples are mainly dolomites and limestones with lesser amounts of sandstones and siltstones also present. The limestones occur mainly betwenn 1061.5 and 1073.0 metres. The dolomites are present at shallower depths, and also can occur elsewhere. The sandstones and siltstones occur primarily at the base of the sampled interval (see Table 1).

Dolomites

The dolomites consist predominantly of aphanocrystalline to finely crystalline, anhedral to euhedral dolomite crytals which typically form an interlocking mosaic. These dolomites occasionally contain micritic limestone and shale laminae. Calcite occurs in varying amounts throughout as sparry calcite crystals, and also as recrystallized fossil fragments. Gypsum laths were reported occasionally, as was anhydrite. Some of the gypsum laths may actually be anhydrite that was ground too thin in thin section preparations. Quartz grains and possible halite crystals also occur occasionally.

Intercrystalline porosity generally persists throughout, as indicated by thin section petrography, and especially scanning electron microscopy. The intercrytalline pores result mainly from the partially interlocking of the dolomite crystals. These pores are typically quite small, and appear tortuously interconnected. As indicated in thin section petrography, porosity development was considered to be mainly poor to moderate. Reservoir quality

SUMMARY (CONTINUED)

is reduced mainly by the small crystal size, in addition to the presence of calcite and occasionally anhydrite.

Limestones

The sampled limestones include mainly sparites with a local biosparite also present. The sparites are very finely to medium crystalline, and are composed mainly of an interlocking mosaic of calcite crystals. These sparites are often dolomitic, and can contain varying amounts of recrystallized fossil fragments. Occasional anhydrite, pyrite, halite and gypsum can occur also.

Porosity types include intercrystalline, moldic and vugular porosity. Intercrystalline pores, as noted in scanning electron microscopy, are present due to the partial interlocking of calcite crystals. These pores are quite small with tortuosity apparent. Moldic pores and vugs are occasionally present. The moldic pores likely result from the dissolution of fossil fragments. Vugs are lined and partially infilled by dolomite. Reservoir quality is mainly reduced by the tight interlocking of calcite crystals, by occasional anhydrite cementation, and by the dolomite cementation. Porosity development is generally moderate.

Sandstones

The sandstones are medium silt sized to upper fine grained, poorly to well sorted, and are composed mainly of monocrystalline quartz. These sandstones also contain feldspars, rock fragments,

SUMMARY (CONTINUED)

mica, detrital clays, dolomite, calcite and anhydrite. The last three constituents occur as pore-filling cements.

Reservoir quality is controlled by the presence of detrital clays and pore-filling cements. Porosity is mainly intergranular, and is considered to be poorly and well developed.

Siltstones

The siltstones are similar in composition to the sandstones. One of the siltstone samples contain laminations that are matrix-rich.

Porosity is variable and poor to moderately developed. Intergranular pores are most common. Reservoir quality is largely controlled by grain size and the presence of detrital clay and mineral cements.

TABLE 1
SUMMARY OF ROCK TYPES

Depth (m)	Rock Type
631.5	Dolomite
636.0	Dolomite
743.0	Dolomite
751.0	Dolomite
774.0	Limestone
1061.5	Limestone
1063.5	Limestone
1065.5	Limestone
1068.0	Limestone
1069.0	Limestone
1070.0	Limestone
1073.0	Limestone
1074.5	Dolomite
1078.0	Dolomite
1096.0	Dolomite
1201.5	Dolomite
1260.0	Dolomite
1439.0	Dolomite
1457.0	Siltstone
1465.0	Sandstone
1473.5	Siltstone
1479.0	Sandstone
1481.0	Sandstone

TABLE 2
BULK XRD MINERALOGY

Sample Number	Depth (m)	Quartz	Feldspar	Calcite	Dolomite	Siderite	Pyrite	Kaolinite	Illite	Chlorite	Smectite	Mixed Layer Clays	Anhydrite	% <5 µm
17	1096.0	T	N	T	100	T	N	N	N	N	N	N	T	30.0
22	1074.5	T	N	T	49	T	N	T	5	N	N	T	46	31.0
25	1070.0	T	N	32	68	T	N	N	N	N	N	N	T	21.3
31	1065.5	T	N	86	14	T	N	N	N	N	N	N	T	29.0

X-RAY DIFFRACTION ANALYSIS

Sample Number: 17
Depth: 1096.00 metres

	Material Less than 5 Microns	Material Greater than 5 Microns	Calculated Bulk Composition
Quartz	Trace	Trace	Trace
Feldspar	Nil	Nil	Nil
Calcite	Trace	Trace	Trace
Dolomite	100	100	100
Siderite	Nil	Trace	Trace
Pyrite	Nil	Nil	Nil
Kaolinite	Nil	Nil	Nil
Illite	Nil	Nil	Nil
Chlorite	Nil	Nil	Nil
Smectite	Nil	Nil	Nil
Mixed Layer Clays (Swelling)	Nil	Nil	Nil
Anhydrite	Trace	Trace	Trace

CLAY SEPARATION BY FLOATATION

Material Less Than 5 Microns: 30.0%

Material Greater Than 5 Microns: 70.0%

X-RAY DIFFRACTION ANALYSIS

Sample Number: 22
Depth: 1074.50 metres

	Material Less than 5 Microns	Material Greater than 5 Microns	Calculated Bulk Composition
Quartz	Trace	Trace	Trace
Feldspar	Nil	Nil	Nil
Calcite	Trace	Trace	Trace
Dolomite	76	37	49
Siderite	Trace	Trace	Trace
Pyrite	Nil	Nil	Nil
Kaolinite	Trace	Trace	Trace
Illite	9	3	5
Chlorite	Nil	Nil	Nil
Smectite	Nil	Nil	Nil
Mixed Layer Clays (Swelling)	Trace	Nil	Trace
Anhydrite	15	60	46

CLAY SEPARATION BY FLOATATION

Material Less Than 5 Microns: 31.0%

Material Greater Than 5 Microns: 69.0%

X-RAY DIFFRACTION ANALYSIS

Sample Number: 25
Depth: 1070.00 metres

	Material Less than 5 Microns	Material Greater than 5 Microns	Calculated Bulk Composition
Quartz	Trace	Trace	Trace
Feldspar	Nil	Nil	Nil
Calcite	42	29	32
Dolomite	58	71	68
Siderite	Trace	Trace	Trace
Pyrite	Nil	Nil	Nil
Kaolinite	Nil	Nil	Nil
Illite	Nil	Nil	Nil
Chlorite	Nil	Nil	Nil
Smectite	Nil	Nil	Nil
Mixed Layer Clays (Swelling)	Nil	Nil	Nil
Anhydrite	Trace	Nil	Trace

CLAY SEPARATION BY FLOATATION

Material Less Than 5 Microns: 21.3%

Material Greater Than 5 Microns: 78.7%

X-RAY DIFFRACTION ANALYSIS

Sample Number: 31
Depth: 1065.50 metres

	Material Less than 5 Microns	Material Greater than 5 Microns	Calculated Bulk Composition
Quartz	Trace	Trace	Trace
Feldspar	Nil	Nil	Nil
Calcite	90	85	86
Dolomite	10	15	14
Siderite	Trace	Nil	Trace
Pyrite	Nil	Nil	Nil
Kaolinite	Nil	Nil	Nil
Illite	Nil	Nil	Nil
Chlorite	Nil	Nil	Nil
Smectite	Nil	Nil	Nil
Mixed Layer Clays (Swelling)	Nil	Nil	Nil
Anhydrite	Nil	Trace	Trace

CLAY SEPARATION BY FLOATATION

Material Less Than 5 Microns: 29.0%

Material Greater Than 5 Microns: 71.0%

THIN-SECTION DESCRIPTIONS

Depth: 631.5 Meters

Very finely crystalline dolomite: Anhedral to euhedral rhombs form a patchy mosaic. Certain areas contain significant amounts of intercrystalline porosity, while other patches are comprised of tightly interlocking grains where no porosity is present.

Porosity development is considered poor to moderate due to its variability.

Depth: 636.0 Meters

Very fine- to finely crystalline dolomite: Dolomite rhombs are mostly subhedral and form an interlocking mosaic. Some micritic dolomite is scattered among the rhombs and forms isolated patches. Trace amounts of gypsum laths are also present. Echinoderm fossil fragments occur in small amounts and may be partially dissolved.

Porosity development is poor to moderate for this sample. Patches of intercrystalline porosity are present, as are some moldic pores.

Depth: 743.0 Meters

Laminated fine- to medium-crystalline calcitic dolomite: Dolomite is present in all laminae, although in varying amounts. Laminae comprised exclusively of dolomite are common. Micritic limestone laminae contain small amounts of rhombs scattered throughout. These micritic laminae also contain gypsum laths, which are oriented parallel to bedding. These laths appear to be authigenic precipitates. The presence of gypsum indicates an arid depositional environment. Sparry calcite laminate are present as well, but do not contain dolomite.

Porosity development is variable in this sample. Porosity is best developed in the dolomite-rich laminae where intercrystalline porosity is dominant. Both types of calcitic laminae lack porosity.

Depth: 751.0 Meters

Finely crystalline dolomite: Rhombs are all of similar size, and form a tightly interlocking mosaic. Small patches of sparry calcite cement are scattered throughout the sample. Fossil fragments are common, and although most are unidentifiable, some fragments appear to be brachiopods. Most fossils have been recrystallized by calcite or dolomite; however, a few are not recrystallized. Minor amounts of pyrite were observed throughout the dolomite mosaic.

No porosity was observed in this sample.

Depth: 774.0 Meters

Very finely crystalline dolomitic sparite: Sample quality was poor; therefore, it was difficult to examine the texture. Sparry calcite appears to be the most abundant constituent. Finely crystalline dolomite rhombs are scattered throughout the calcite.

No porosity was observed by thin-section analyses.

Depth: 1,061.5 Meters

Fine- to medium-crystalline sparite: The calcite crystals, which exhibit both planar and irregular boundaries form an interlocking mosaic. Dolomite is present as "floating" rhombs within the calcite, and as scattered patches. The dolomite is more finely crystalline than the calcite. Recrystallized fossils are present within the calcite patches.

Porosity development was difficult to assess because the sample is highly shattered due to sidewall coring percussion. However, some intercrystalline porosity appears to be associated with dolomite rhombs, while some moldic pores have resulted from the dissolution of fossil grains.

Depth: 1,063.5 Meters

Dolomitic sparite: Most of the sample is comprised of very finely crystalline sparry calcite; however, small amounts of dolomite rhombs are also present. The calcite crystals appear to be neomorphic due to their irregular boundaries. Dolomite rhombs are scattered throughout, and concentrated in small patches. Many rhombs appear corroded and partially replaced by calcite.

Porosity development is believed to be poor to moderate. Much of the porosity appears to be artificial, and a result of sidewall coring and/or sample preparation. Real formation porosity is believed to be concentrated where dolomite rhombs are present. Dissolution of dolomite rhombs appears to have resulted in the formation of vuggy porosity. No porosity was observed where the sample is composed completely of calcite.

Depth: 1,065.5 Meters

Biosparite: Very fine- to medium-sized calcite crystals, and a small amount of scattered dolomite rhombs comprise the framework. Most calcite crystals exhibit irregular grain boundaries, indicating their neomorphic origin. Micritized fossils and pellets are common throughout the sample. The cement which fills fossil voids tends to be finer grained than the surrounding crystals. Dolomite and gypsum are other cements present, but both were observed only in small amounts. The dolomite occurs as isolated, finely crystalline rhombs, while the gypsum is present in small isolated patches. Some crystalline-shaped white "holes" were observed in plane-light. These are believed to be indicative of the presence of halite that was most likely dissolved during sample preparation.

Porosity development for this sample appears to be poor to moderate. Vugs of varying sizes were observed, it was impossible to determine actual formation porosity because of the presence of pores which appear to have been generated by sidewall coring.

Depth: 1,068.0 Meters

Coarse silt-sized to fine-grained, moderately sorted, angular to subrounded sandstone: Monocrystalline quartz is the most abundant framework grain mineral, although minor amounts of plagioclase and potassium feldspars are also present. Some detrital clays are concentrated in isolated laminae, but are not abundant. Cements are common in this sample and include dolomite, calcite, and anhydrite. Dolomite, which is the most abundant, is present as scattered euhedral rhombs as well as concentrated in patches. Minor amounts of finely crystalline sparry calcite are scattered throughout the sample. Anhydrite is present as laths forming irregular laminae. All the cements present appear to be pore-filling type cements. Detrital quartz grains appear to "float" within the anhydrite.

Porosity is considered to be relatively well developed. Intergranular porosity is the dominant porosity type and is most abundant in the "cleaner" laminae which lack abundant matrix and cements.

Depth: 1,069.0 Meters

Finely crystalline sparite containing a small amount of dolomite rhombs: The calcite crystals vary from poorly to well crystalline. Many crystals are rhomb shaped, and appear to have replaced dolomite rhombs. Some dolomite rhombs are scattered as isolated crystals throughout the sparry calcite; however, most are concentrated in vugs.

Porosity is moderately well developed in this carbonate. Most is intercrystalline porosity within the calcite. Vuggy porosity is also present, but in some areas is partially occluded by the formation of dolomite rhombs.

Depth: 1,070.0 Meters

Finely crystalline dolomitic sparite: Although calcite is the most common constituent, some irregular laminae (red stain) contain concentrations of dolomite (white). The sparry calcite crystals form an interlocking mosaic and have irregular boundaries. The presence of these irregular boundaries indicates that this cement in neomorphic, and a replacement of a previous texture. Dolomite rhombs, which are scattered throughout the sample, exhibit subhedral to euhedral crystal morphologies. Many dolomite rhombs appear to have been partially corroded by calcite cement.

Visual porosity is absent in this sample due to the highly cemented nature and interlocking mosaic texture.

Depth: 1,073.0 Meters

Dolomitic sparite: Carbonates are comprised of micrite and very finely crystalline sparry calcite, with very fine to finely crystalline dolomite rhombs scattered throughout. Both the calcite and dolomite exhibit poorly to moderately developed crystal faces. Small isolated patches of anhydrite are present within this carbonate.

Porosity development for this carbonate appears to be moderate. Some is believed to be artificial and a result of sidewall coring and sample preparation. However, other localities appear to be real porosity. Moldic pores are present, although not abundant. Vuggy type porosity, which also occurs, is believed to be due to the dissolution of carbonate.

Depth: 1,074.5 Meters

Dolomicrite: Discontinuous anhydrite and pyrite laminae are present throughout. Aphanocrystalline to very finely crystalline dolomite rhombs are present throughout, while some areas contain concentrations of rhombs. Anhydrite laminae are common and are composed of parallel oriented anhydrite laths and small euhedral dolomite rhombs. Pyrite is also quite common. It forms thin, irregular laminae and is associated with both the dolomitic mudstone and the anhydrite laminae.

Porosity development is considered to be poor. Small amounts of fracture and intercrystalline porosities were observed; however, most porosity of the porosity observed is believed to be due to sidewall coring and/or thin-section preparation.

Depth: 1,078.0 Meters

Very finely crystalline dolomite, containing a small amount of sparry calcite cement: A few irregular, shaley laminae, which contain lesser amount of dolomite rhombs are scattered through the sample. The dolomite rhombs are mostly very finely crystalline in size, although some larger rhombs, up to lower medium crystalline in size, are also present. The rhombs have irregular boundaries and form an interlocking mosaic.

Porosity development is variable, but where present appears to be fairly well developed. Intercrystalline porosity, associated with the dolomite rhombs is abundant. Fracture porosity appears to be a result of sidewall coring and sample preparation.

Depth: 1,096.0 Meters

Dolomicrite: Localized patches within this dolomite are comprised of concentrations of dolomite rhombs and only a small amount of micrite. Crystallinity of the rhombs varies from moderate to well developed.

Porosity development for this sample is believed to be poor to moderate. Some moldic porosity, which is probably due to fossil fragment dissolution, is visible; however, these pores appear to be isolated and ineffective. Intercrystalline microporosity is present in between the dolomite rhombs and within the micrite matrix. However, it is not possible to determine if this type of porosity is real or due to sidewall coring and thin-section preparation.

Depth: 1,201.5 Meters

Very finely crystalline dolomite: The interlocking dolomite rhombs have patches of calcite cement scattered throughout. These patches of calcite cement, which are both micritic and sparry, have dolomite rhombs scattered within. The dolomite appears massive, exhibiting no distinctive textural or depositional features. No porosity was observed by thin-section analysis.

Depth: 1,260.0 Meters

Very finely crystalline dolomite: Contains a small amount of microcrystalline limestone. Rhombs exhibit a massive, interlocking texture. The sample appears to have been highly shattered during sidewall coring; therefore, the fractures observed are believed to be artificial. Some intercrystalline porosity is present, but it is not possible to ascertain if it is real or artificial because of the extremely fine texture of the carbonate.

Depth: 1,439.0 Meters

Very finely crystalline dolomite: A small amount of microcrystalline limestone and very fine- to fine- silt-sized detrital quartz grains are present throughout the sample. Square "holes" in the dolomite may indicate the original presence of halite that most likely was dissolved during sample preparation.

Porosity development for this carbonate is considered poor. Although some porosity is present, it appears to be a result of sidewall coring and thin-section preparation.

Depth: 1,457.0 Meters

Very fine- to lower fine-grained sand grains are present in this coarse siltstone: The angular to subrounded detrital framework of this siltstone is comprised largely of monocrystalline quartz, although some plagioclase and potassium feldspars are also present. Detrital muscovite laths are present in trace amounts, as are pyrite and organic material which are scattered throughout the sample. The silt grains are cemented with calcite and dolomite. Calcite cement, which is micritic, is present throughout. The dolomite occurs as isolated rhombs and also as concentrations of rhombs which form patches. Both these carbonate cements have partially corroded many of the detrital grains.

Porosity development for this sample is considered poor to moderate. Intergranular porosity is most common. Much porosity appears to have been destroyed by extensive carbonate cementation. However, a later, minor carbonate dissolution event may have created some of the porosity now visible in thin-section analyses.

Depth: 1,465.0 Meters

Medium silt-sized to upper very fine-grained poorly sorted, angular to subrounded sandstone: Detrital grains are mostly monocrystalline quartz, but some plagioclase and potassium feldspars are also present. Muscovite laths and organic material are scattered throughout the sample. The detrital grains in this sandstone are cemented by dolomite and anhydrite. Dolomite is present as finely crystalline rhombs which have resulted in the partial corrosion of some framework grain boundaries. Patches of anhydrite cement are common. The anhydrite occurs as oriented laths. Some isolated dolomite rhombs are present within these anhydrite patches. Small amounts of gypsum appear to be intergrown with anhydrite in these patches.

Porosity development appears to be poor. Most porosity visible in these samples is believed to be artificial and a result of sidewall coring and thin-section preparation. However, a small amount of the intergranular porosity is believed to be real.

Depth: 1,473.5 Meters

Very fine- to coarse-sized siltstone: Silt grains are concentrated in irregular laminae and present in small amounts in detrital matrix-rich laminae. The grains appear to be oriented parallel to the direction of the laminae. The silt-sized framework grains, which are mostly angular, are largely monocrystalline quartz. Detrital muscovite laths are common throughout, while trace amounts of zircon were observed in the "cleaner" laminae. Cements noted in this siltstone include dolomite, anhydrite, and pyrite. Dolomite although not abundant, most commonly occurs as finely crystalline rhombs which are concentrated in patches. Most of the rhombs exhibit poor crystal development; however, some larger, well-crystalline rhombs are also present. Small isolated patches of anhydrite which follow the orientation of the laminae, are present within the sample. Pyrite is present in small amounts in both the "cleaner" and shaley laminae.

Porosity was observed throughout the sample. Most is microporosity is associated with the detrital matrix. Some intergranular porosity was observed between the silt grains as well. Some fractures are present, but these are believed to have resulted from sidewall coring, and therefore, are artificial.

Depth: 1,479.0 Meters

Vuggy sparite containing scattered dolomite rhombs: Sparry calcite crystals are very fine grained and exhibit interlocking, irregular grain boundaries. These types of calcite crystals are indicative of neomorphic spar. Finely crystalline dolomite rhombs are scattered throughout the sample. Many rhombs have corroded boundaries which indicate replacement of the dolomite by calcite. Small patches of gypsum are also present. These patches often contain dolomite rhombs.

Porosity appears to be moderately developed in this carbonate. Porosity types present include intercrystalline and vuggy porosity. Intercrystalline porosity is present between the calcite crystals and dolomite rhombs. Vugs, which are present but not abundant, are often lined with well crystallized sparry calcite. Although porosity is present in these samples, some is believed to be artificial; therefore, it is not possible to ascertain a reliable porosity value.

Depth: 1,481.0 Meters

Coarse silt-sized to upper fine-grained, well sorted, angular to subrounded sandstone: Monocrystalline quartz is the most abundant framework grain. Small amounts of plagioclase, potassium feldspar, and metamorphic rock fragments are also present. Cements are absent in many areas, but are present as isolated patches in certain locations. Cements present include dolomite and calcite. The dolomite cement is observed as scattered individual rhombs and as patches of rhombs. The calcite cement is sparry and occurs in patches. No clays were observed by thin-section analyses.

Porosity is well developed in this sandstone. It is mostly intergranular, which is evidenced by the presence of well developed, interconnected pores and pore throats. Floating grains and point contacts between grains are common due to the well developed porosity. The black material which is present in many pores and pore throats is believed to be corundum used during sample preparation, and therefore not natural.

Trillium SOQUIP Onexo
Beluga 0-23 Well

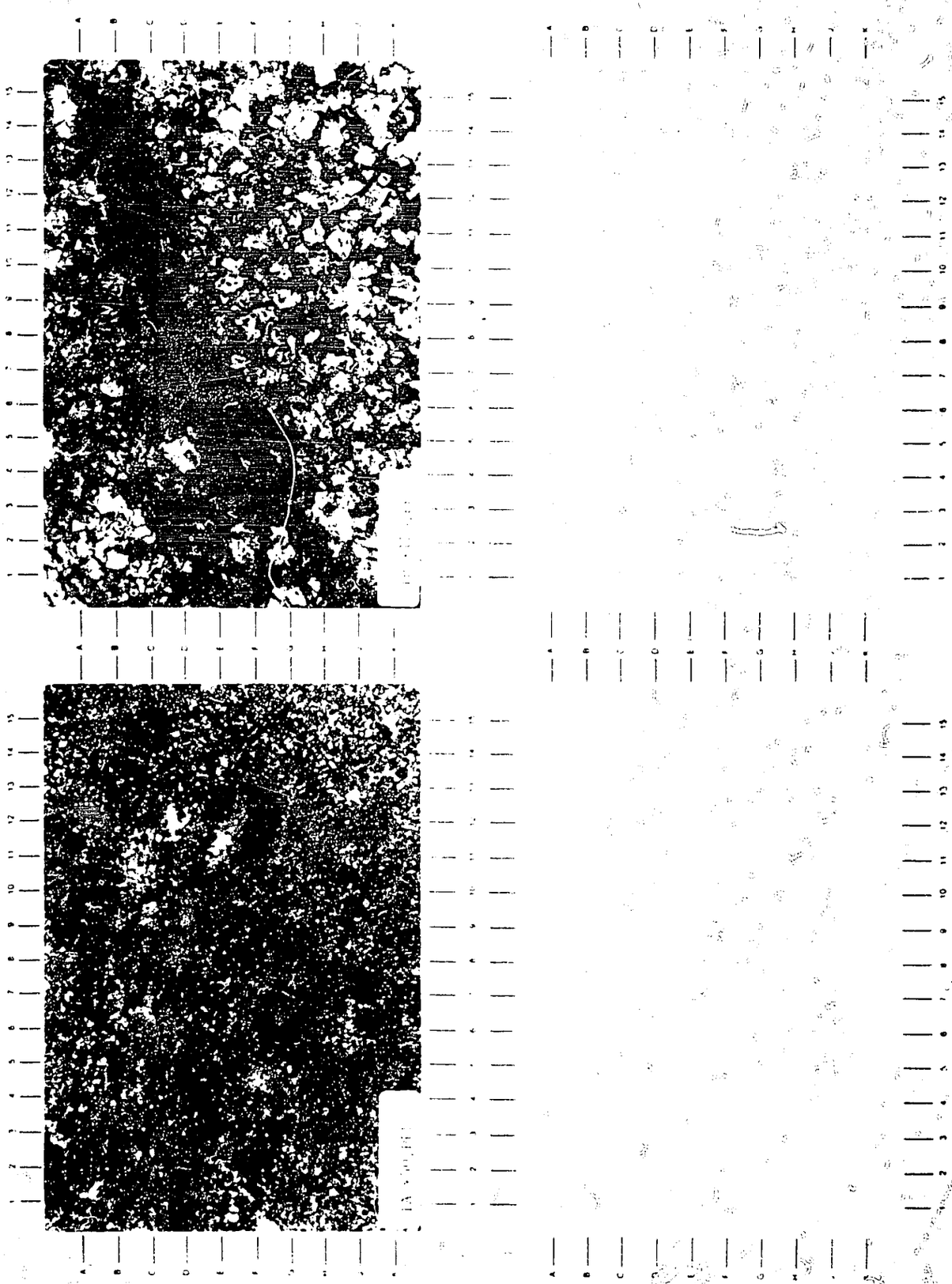
Depth: 631.5 Meters

Photograph 1A

This low-magnification photomicrograph shows the very finely crystalline texture typical of this dolomite. The rhombs form an interlocking mosaic which contains scattered patches of porosity (B1-F1, B14). Because porosity development is variable throughout the sample, it is considered to be poor to moderate. (Plane-polarized light: 50X)

Photograph 1B

Higher magnification of a more porous zone, reveals that the rhombs are typically anhedral to subhedral in shape. Most rhombs are approximately the same size, (F3, E14) although some larger rhombs (D5, G14) are scattered throughout. Note the abundance of intercrystalline porosity present in this view. (Plane-polarized light: 125X)



Trillium SOQUIP Onexo
Beluga 0-23 Well

Depth: 636.0 Meters

Photograph 2A

Thin-section observations indicate that this sample is somewhat more coarsely crystalline than Sample 631.5 meters. Low-magnification indicates that this is a very fine- to finely crystalline dolomite. Much of the sample, as seen here, is a tightly interlocking mosaic of dolomite rhombs. A few shaley laminations (B10-A15, D11-D15) are also present in this view. (Plane-polarized light: 50X)

Photograph 2B

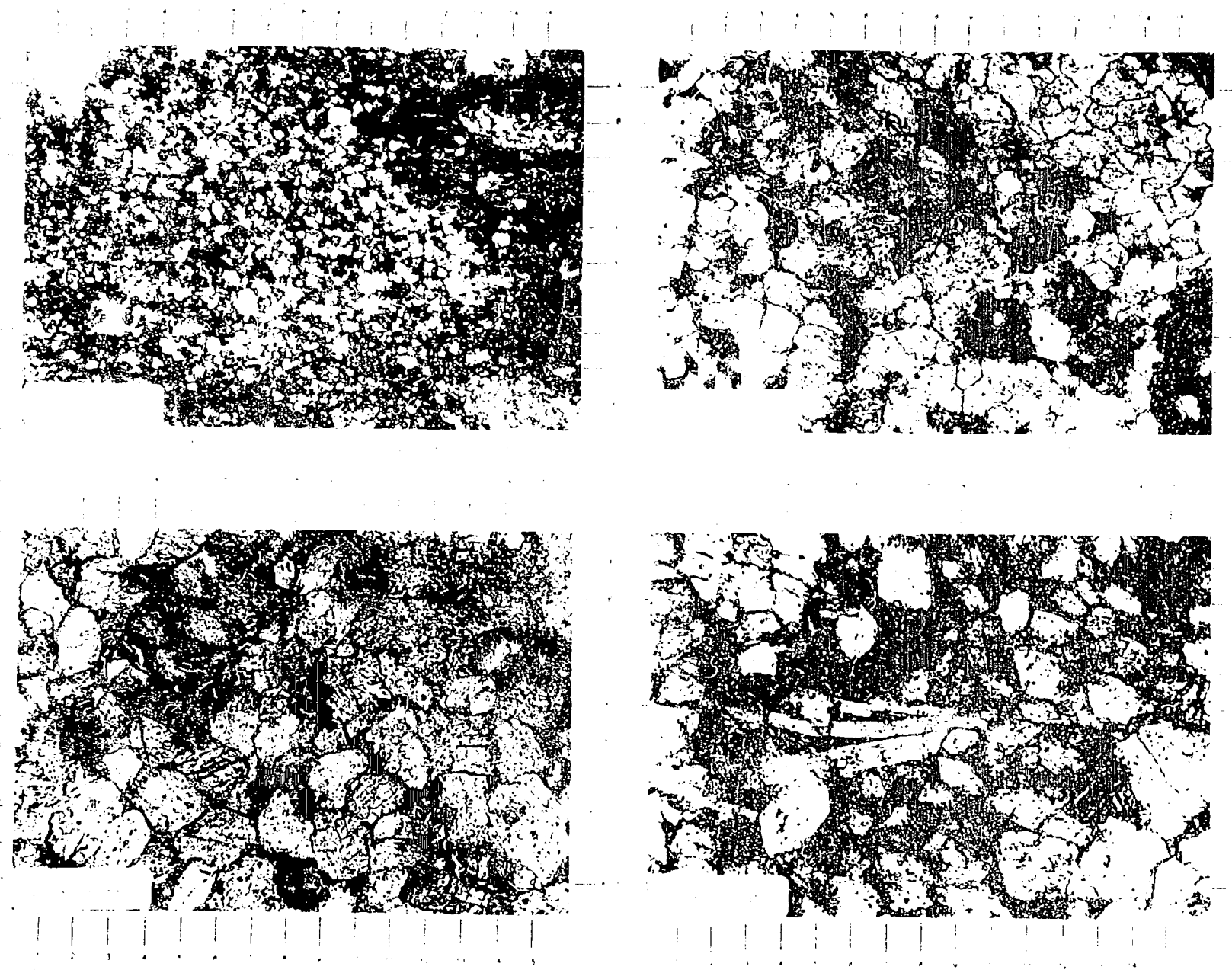
Higher magnification reveals the subhedral to anhedral shape of these dolomite rhombs (B6.5, E2, F8, H11). Although the rhombs in some areas form tightly interlocking mosaics (i.e. C13, F9), certain areas are more loosely "packed" and contain significant amounts of inter-crystalline porosity (B3.5, C2, E4, F2, G1, K3.5). (Plane-polarized light: 125X)

Photograph 2C

Intercrystalline porosity (A10, C4.5, C15, E8.5, H8.5, K2) appears to be well developed within more "loosely packed" areas. However, these patches are isolated, and therefore, most likely do not result in the presence of significant amounts of effective porosity. (Plane-polarized light: 200X)

Photograph 2D

Small amounts of gypsum laths (E3-E9) were observed in the more porous areas. The gypsum has been partially replaced by dolomite (E4.5, F9, F10) and appears to be have been partially dissolved. Note the variability in dolomite rhomb size throughout this view. (Plane-polarized light: 200X)



Depth: 743.0 Meters

Photograph 3A

Low-magnification shows the laminated texture typical of this fine- to medium-crystalline dolomite. Porosity is best developed in areas that contain only dolomite (A10, C2, C14). The laminae visible here (E1-E15, H1-H15) are comprised of microcrystalline calcite matrix and "floating" dolomite rhombs (F12, H12, J2, K14). These micritic laminae contain gypsum laths (i.e. G9). (Plane-polarized light: 50X)

Photograph 3B

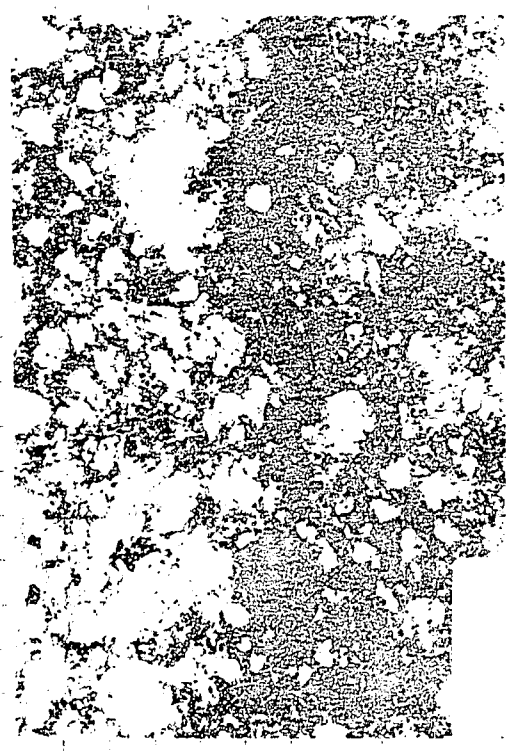
This higher magnification photomicrograph shows the contact between a calcitic lamination (lower half) and a dolomitic lamination (upper half). The calcite lamination is comprised of sparry calcite (G7, J4, J8, K12) and micrite (F3.5, G14-K14). The dolomitic lamination contains dolomite rhombs (B2.5, B14, D8), dolomite mud (C7, D14), and a small amount of calcite (C4, C10). (Plane-polarized light: 125X)

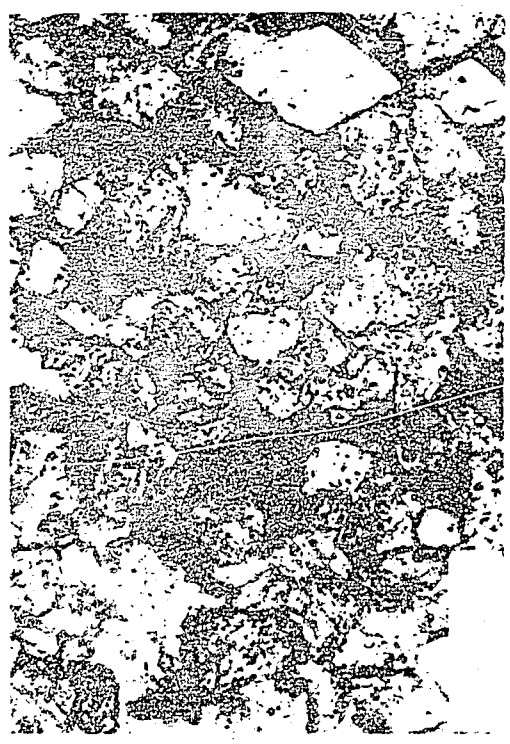
Photograph 3C

Higher magnification of a micritic laminations shows the presence of gypsum laths (B3-A7, G6-F11) and dolomite rhombs (A9, B14, E3, F12, J7), which are scattered throughout the micrite. Small amounts of porosity, seen as blue epoxy, are present within the micrite (i.e. F7, H10, J2). (Plane-polarized light: 125X)

Photograph 3D

High-magnification of a dolomite lamination reveals the abundance of intercrystalline porosity (A9.5, B6, D4, F6, G12, K4) located there. The rhombs are subhedral (A3, A10, J10) to euhedral (G15, J1) in shape and vary significantly in size. (Plane-polarized light: 200X)





Trillium SOQUIP Onexo
Beluga 0-23 Well

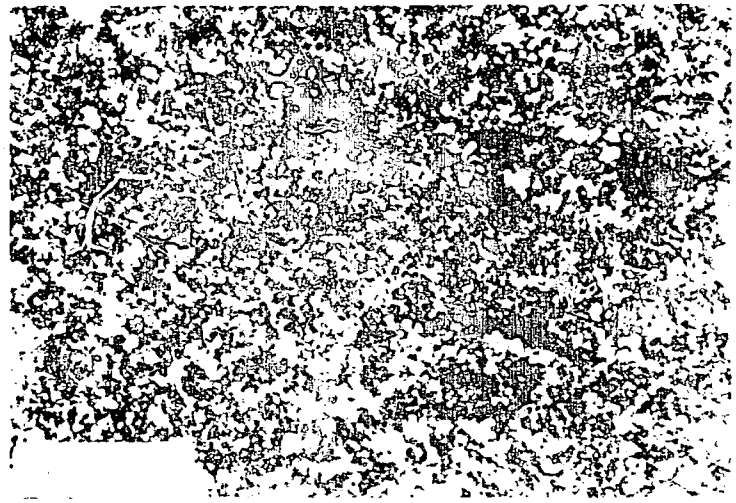
Depth: 751.0 Meters

Photograph 4A

This low-magnification photomicrograph shows the interlocking mosaic texture, typical of this finely crystalline limestone. Small patches of sparry calcite cement (C7, H7, H12) and a few fossil fragments (D14, G11) are scattered throughout the sample. No porosity was observed in the limestone. (Plane-polarized light: 50X)

Photograph 4B

Higher magnification reveals the anhedral crystal shape of the dolomite rhombs (A3, D4, E7, H6, K14). The tight mosaic has not allowed the formation of porosity. Note the presence of recrystallized fossil fragments (A1-A12, E9-E15). These fossil have been replaced by calcite; however, a few show replacement by dolomite. (Plane-polarized light: 125X)



Trillium SOQUIP Onexo
Beluga 0-23 Well

Depth: 774.0 Meters

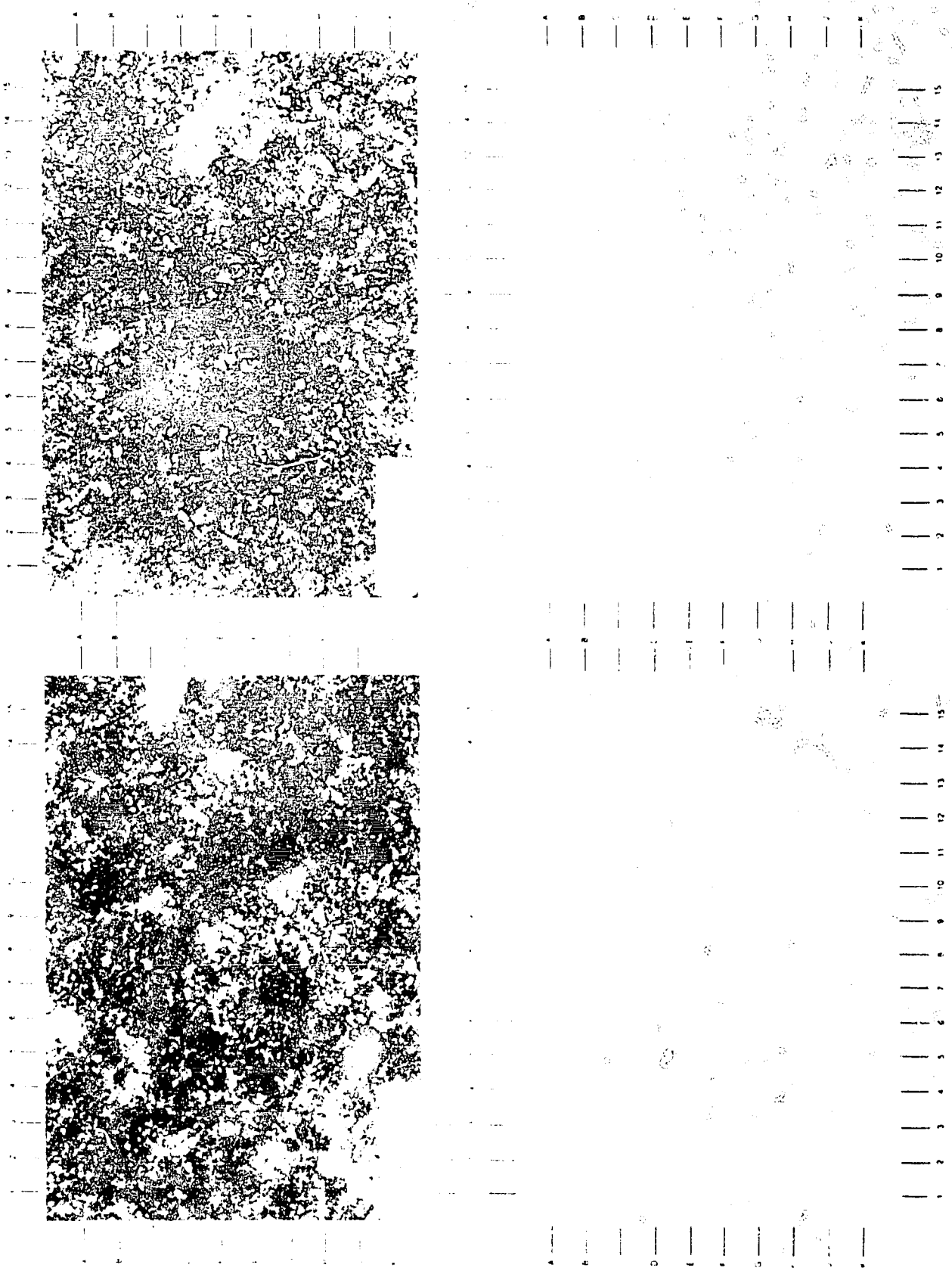
Photograph 5A

Low-magnification indicates that this is a very finely crystalline limestone. Very finely crystalline rhombs are disseminated throughout the sparry calcite cement. No porosity is present due to the highly cemented nature of this sample. The white patches (A5.5, C4, C9, J1) are areas which were ground off during thin-section preparation. (Plane-polarized light: 50X)

Photograph 5B

Higher magnification shows the abundance of very finely crystalline dolomite rhombs (B6, C3, D14, K4, K5.5) which are scattered throughout. Some sparry calcite crystals (D3, E2.5, H1.5, K8) are rhomb shaped, indicating that the calcite cement may have replaced dolomite rhombs. The white area (E13) is a result of thin-section preparation. (Plane-polarized light: 125X)

CANTERRA ENERGY LTD.
TRILLIUM SOQUIP (NEXCO ET AL) BELUGA O 23



Depth: 1,061.5 Meters

Photograph 6A

Low-magnification indicates that this highly shattered sample is a fine- to medium-crystalline sparite. Dolomite occurs as finely crystalline patches (B12, C1, J2.5). Porosity development was difficult to assess due to the sample quality, but it appears that some intercrystalline porosity is present. (Plane-polarized light: 50X)

Photograph 6B

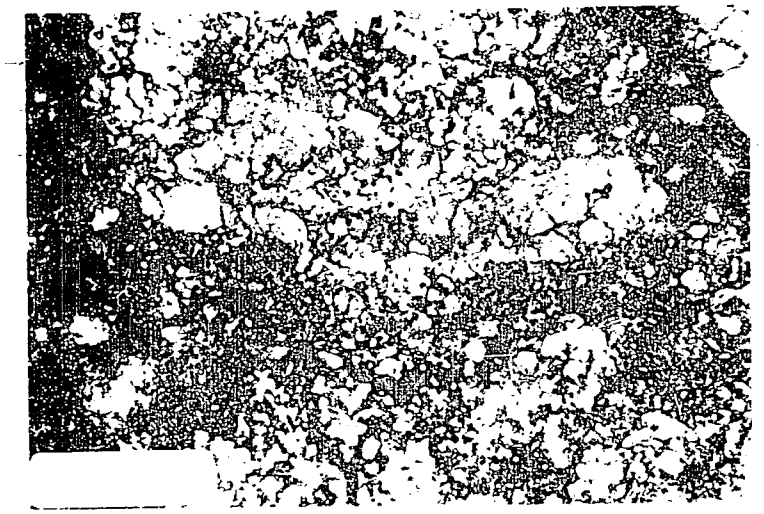
Higher magnification indicates that intercrystalline porosity (B8, C10, J6, K12) appears to be associated with the dolomite patches. Note the variation in size between the sparry calcite crystals and the dolomite rhombs. (Plane-polarized light: 125X)

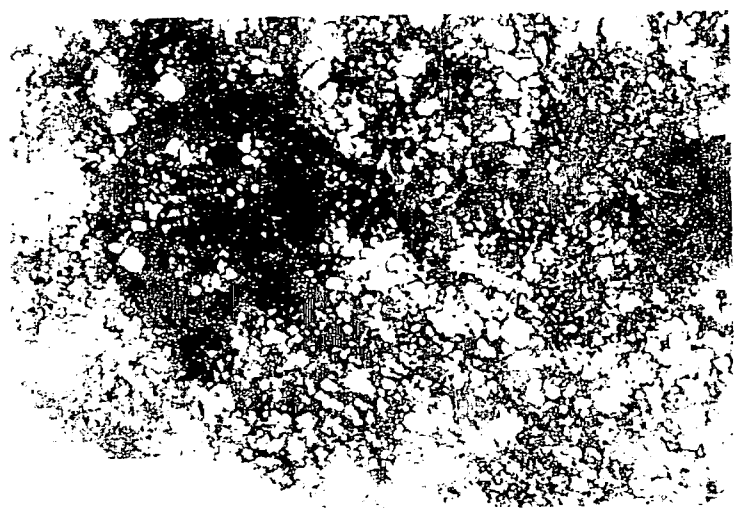
Photograph 6C

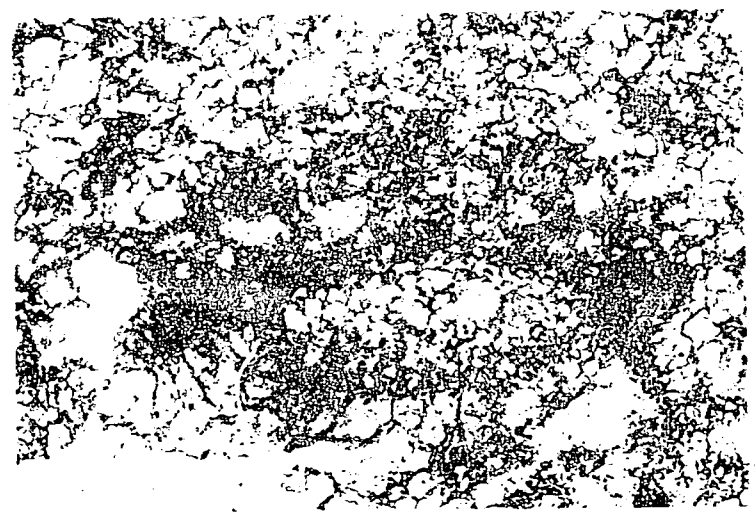
Micritized fossil fragments (D6, D15) are scattered throughout the sparry calcite. Intercrystalline porosity (A1, D8, J8) is present within the dolomite patches, and moldic porosity (D4) has occurred due to fossil dissolution. (Plane-polarized light: 50X)

Photograph 6D

This photomicrograph shows the ghost of a fossil fragment which has been replaced by sparry calcite (G3-J14.5). A patch of dolomite (G5-G11) is present beneath the fossil, indicating that this space may have originally been shelter porosity, which was then filled with dolomite rhombs (G6, G9, G10). The irregular boundaries of the sparry calcite crystals (E7.5, F3, J8) indicate that they are neomorphic, and have replaced the original sediment texture. (Plane-polarized light: 125X)







Trillium SOQUIP Onexo
Beluga 0-23 Well

Depth: 1,063.5 Meters

Photograph 7A

Low-magnification reveals the very finely crystalline texture typical of this dolomitic sparite. Sparry calcite (red stain) is the most abundant constituent, but very finely crystalline and microcrystalline dolomite rhombs are also present. Porosity development is considered poor due to the extent of carbonate cementation. (Plane-polarized light: 50X)

Photograph 7B

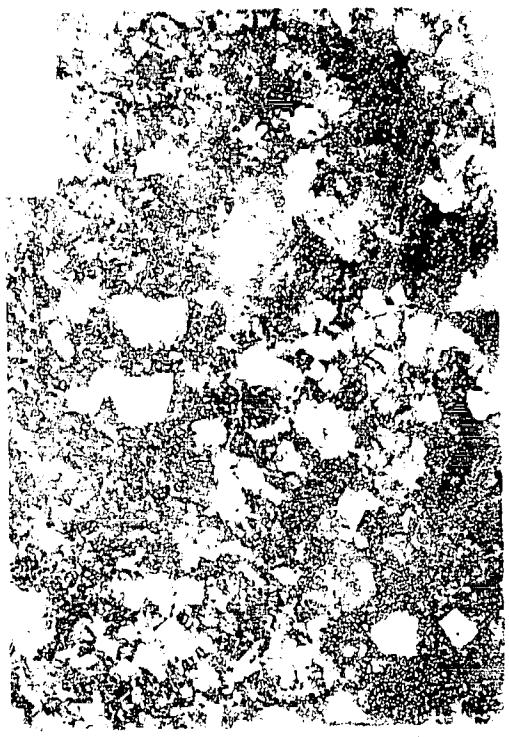
Higher magnification reveals the irregular crystal boundaries of the calcite crystals (A2, D10.5, H9, K2) typical of neomorphic spar. Finely crystalline dolomite rhombs (D10, F9, F14, G13, K8) are present among the sparry calcite crystals. Intercrystalline porosity (F9.5, H4.5) tends to be associated with these dolomite rhombs. (Plane-polarized light: 125X)

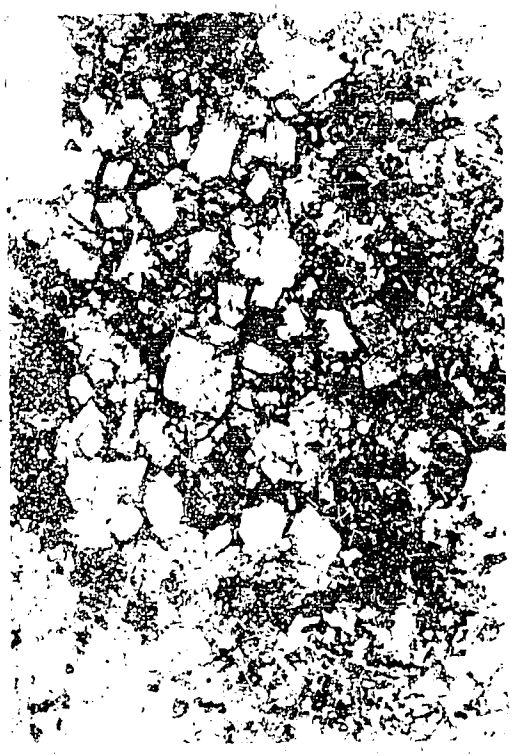
Photograph 7C

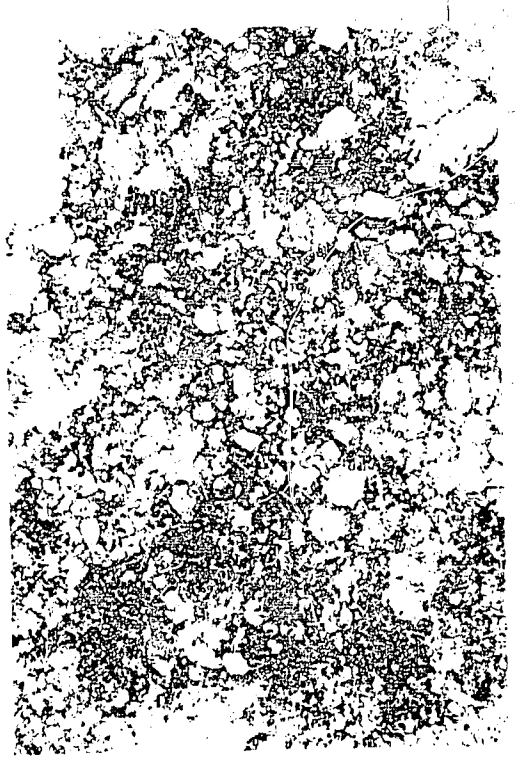
The corrosion of dolomite by calcite (C11, C13, G9, H7, H9) is evidenced in this high-magnification view. Some calcite crystals are rhombohedral in shape (E15, G11, K6) and are believed to be calcite pseudomrophs after dolomite. The irregular boundaries on many of the calcite crystals indicates their replacive nature (Plane-polarized light: 200X)

Photograph 7D

Vugs, such as the one located in the center of this photomicrograph, are scattered throughout the sample. These vugs are often partially filled with dolomite rhombs (D12, E5.5, F11.5, G8, J10) and contain significant porosity (D6, E11, H8, J5, J9.5). It is hypothesized that these vugs were originally grains which were dissolved and paritally replaced by dolomite. It now appears that the dolomite rhombs have been partially dissolved (D7, G8, H5). (Plane-polarized light: 200X)







Trillium SOQUIP Onexo
Beluga 0-23 Well

Depth: 1,065.5 Meters

Photograph 8A

Low-magnification reveals the very fine- to medium-crystalline texture typical of this biosparite. Micritized fossil fragments (C11, H6, H9) and pellets (C2.5, D3, J4, K14) are common. Porosity (A10, A15, G2) is visible, but is believed to be mostly artificial because of the sample quality. (Plane-polarized light: 50X)

Photograph 8B

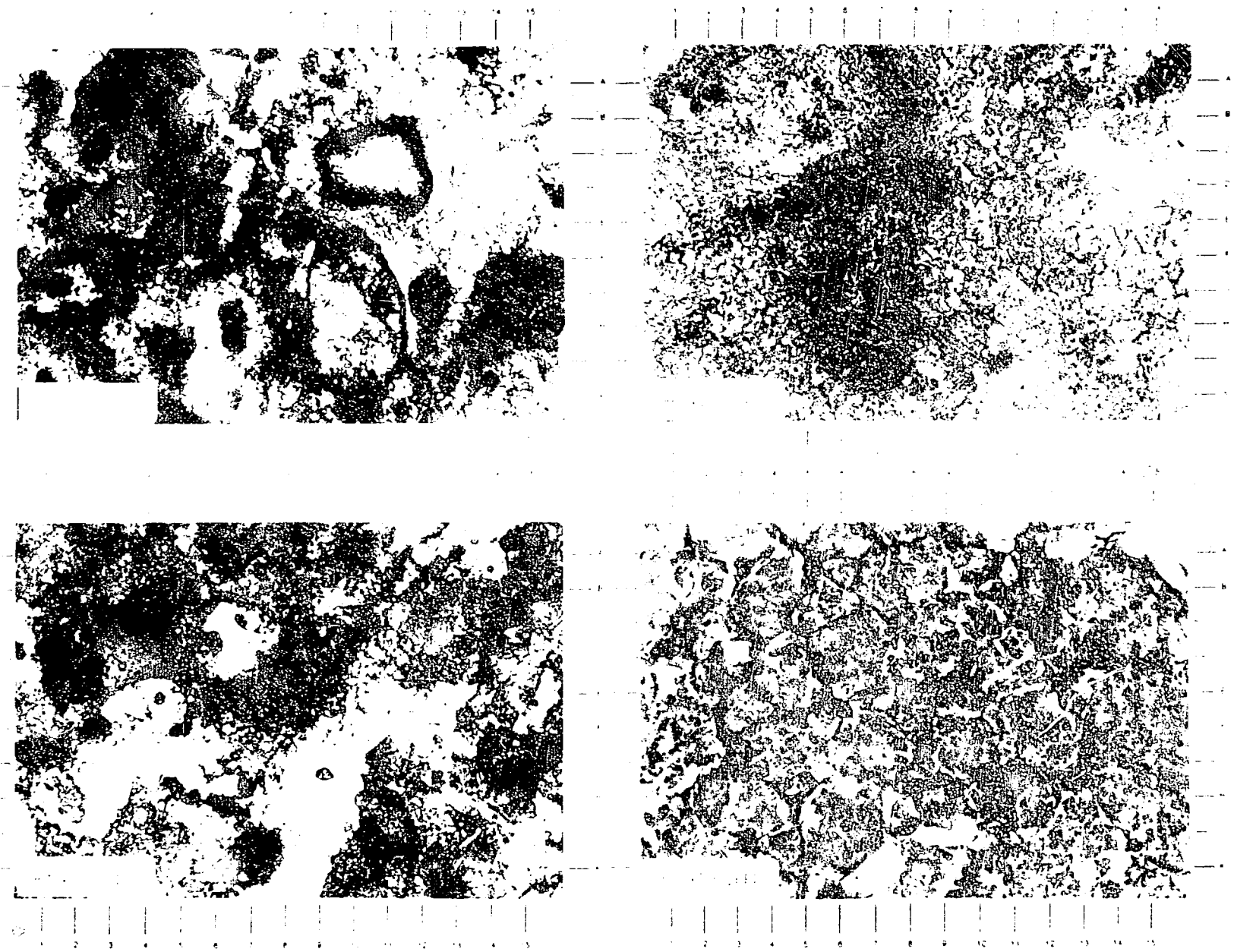
Minor amounts of dolomite rhombs (B1, B10, F1.5) are dispersed throughout the sample. As indicated here, by Alizarin Red S stain, the carbonate is almost exclusively comprised of calcite. The white patch (C14) is believed to be indicative of the presence of halite. (Plane-polarized light: 125X)

Photograph 8C

Observation of more porous zones within the sample,reveals the presence of moldic pores (B11.5, C6, E4, E15) which appear to have resulted from fossil dissolution. Rhomb shaped calcite crystals (G10.5, H3.5, H14), indicative of the replacement of dolomite, are common in this view. Note the abundance of micritized grains (A6, A10, C1, C4, D2, J7, J11.5). (Plane-polarized light: 50X)

Photograph 8D

This high-magnification view shows the interlocking, mosaic texture typical of neomorphic spar. This mosaic has not allowed for the development of porosity within these zones. (Plane-polarized light: 500X)



CORE

Trillium SOQUIP Onexo
Beluga 0-23 Well

Depth: 1068.0 metres

Photograph 9A

This low-magnification view shows the very fine-grained texture typical of this vuggy sparite. Alizarin Red S stain confirms that the carbonate is calcite. Porosity is moderately developed due to the presence of vugs (H13, K15) and intercrystalline pores (A13, G9-H12). (Plane-polarized light: 50X)

Photograph 9B

Higher magnification reveals that the calcite crystals have irregular boundaries. These irregular boundaries aare indicative of neomorphic spar which has replaced the original texture. Vugs (C13-F13, D1, F6) are present throughout the sample. (Plane-polarized light: 125X)

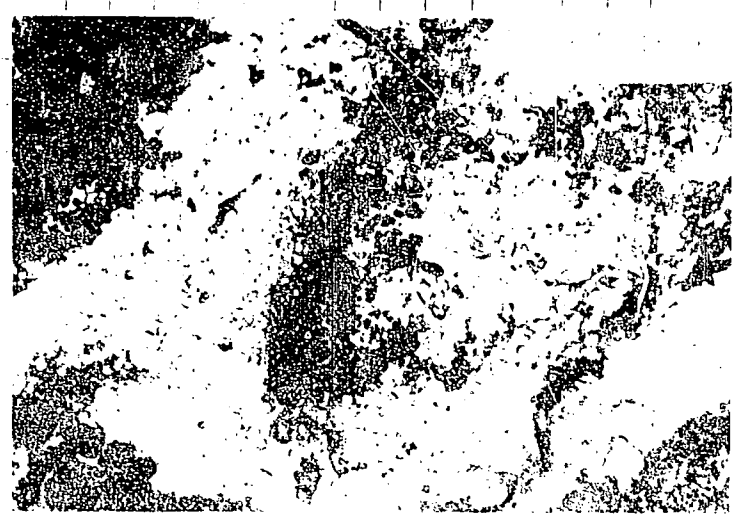
Photograph 9C

This photomicrograph shows sparry calcite crystals (D5.5, D9, D14, F7.5, H8) which have grown into a vug. These crystals, which grew into a void, are much coarser grained than the crystals within the calcite mosaic (B2.5, C2, C9, H4, K5). (Plane-polarized light: 200X)

Photograph 9D

Patches of gypsum, as seen here, are present within this sample. Pyrite (C6, C9-D7, G2, J3), dolomite rhombs (E12, F5, H1), and calcite cement (F1, F7, G7, G11, J6) all occur within these patches of dolomite. (Plane-polarized light: 125X)

CORE



Trillium SOQUIP Onexo
Beluga 0-23 Well

Depth: 1,069.0 Meters

Photograph 10A

Low-magnification reveals the finely crystalline texture of this sparite. Porosity development, which is patchy, occurs as intercrystalline (A1.5, B9, G4.5, H14) and vugy porosity (C1.5, D5.5, E4). Although most of the sample is crystalline, certain areas are micritic, as can be seen in the lower portion of this photomicrograph. (Plane-polarized light: 50X)

Photograph 10B

Higher magnification shows the variations in crystal size for the calcite. Note the finely crystalline dolomite rhombs (A3, B9, F3, J14) disseminated throughout the sample. (Plane-polarized light: 125X)

Photograph 10C

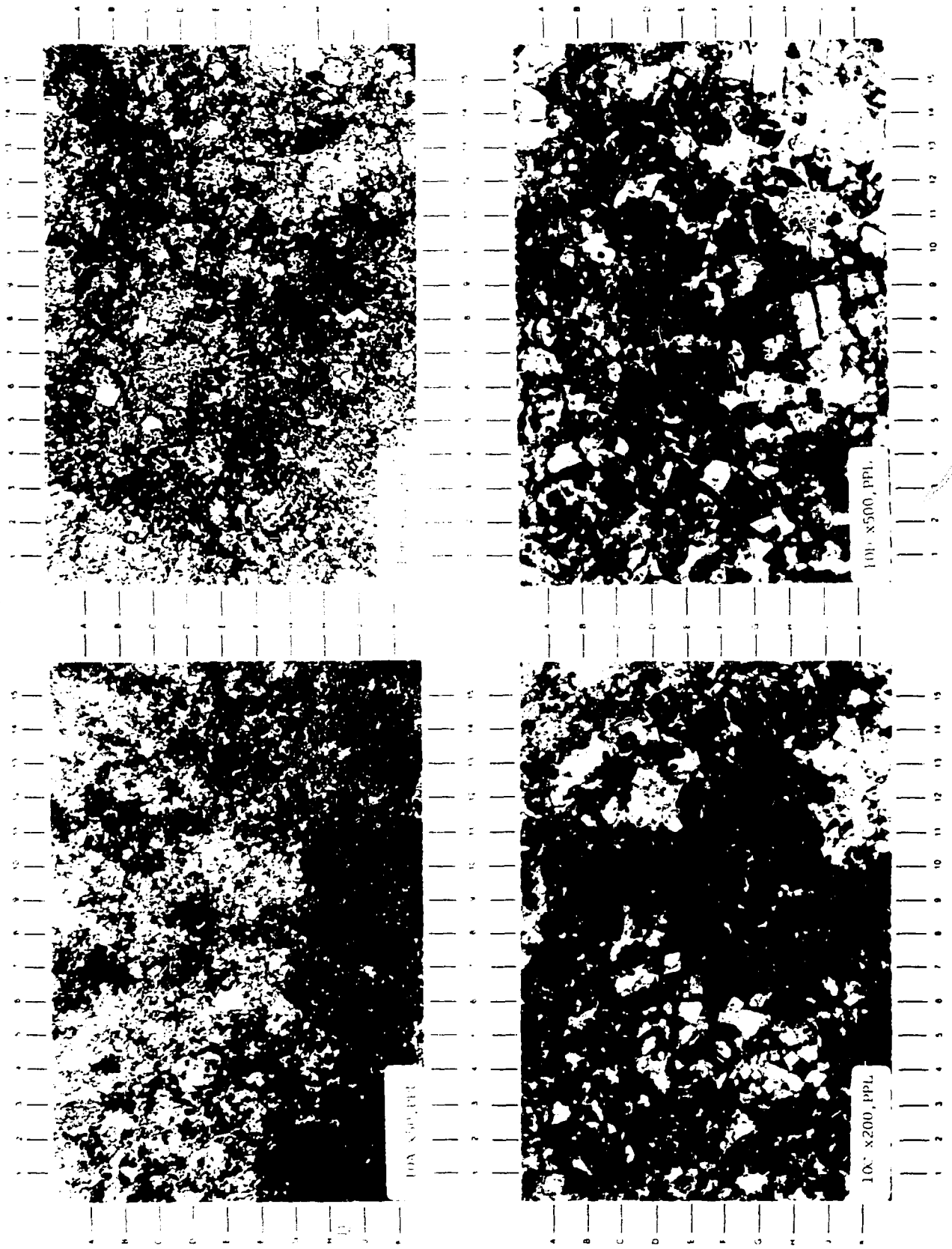
Although dolomite rhombs are scattered throughout the calcite mosaic, most rhombs are concentrated in vugs, as seen here. The rhombs found in the vugs (D7.5, E5.5, G5, J13) tend to be coarser and more euhedral than those scattered through the calcite. (Plane-polarized light: 200X)

Photograph 10D

High-magnification of the calcite and dolomite indicates that some dolomite rhombs appear to be partially or completely replaced by calcite. This is evidenced by dolomite rhombs which are partially stained red (D12, F10.5, G11, J12). (Plane-polarized light: 500X)

CANTERRA ENERGY LTD.
TRILLIUM SOQUIP NEXCO ET AL BELUGA O-23

CORE



Trillium SOQUIP Onexo
Beluga 0-23 Well

Depth: 1,070.0 Meters

Photograph 11A

Low-magnification reveals the finely crystalline texture of this dolomitic sparite. Dolomite rhombs (white) are dispersed throughout the sparry calcite crystals (red stain). No porosity development was observed anywhere in the sample. (Plane-polarized light: 50X)

Photograph 11B

Higher magnification reveals the interlocking mosaic texture of this carbonate. The sparry calcite crystals have irregular boundaries, indicating that they are neomorphic, or replacements of a previous texture. (Plane-polarized light: 125X)

Photograph 11C

Higher magnification shows the irregular boundaries on many of the dolomite rhombs (B10.5, C4, G10, J14). These irregular boundaries are most likely the result of replacement of the dolomite by calcite. The tightly interlocking calcite mosaic has not allowed for the formation of porosity. (Plane-polarized light: 200X)

Photograph 11D

Examination of the dolomite rhombs under high magnification reveals the presence of calcite inclusions within the dolomite rhombs (D11.5, F6.5, F13, G12.5). These calcite inclusions most likely aid in the replacement of dolomite by calcite under the proper conditions. (Plane-polarized light: 1300X)

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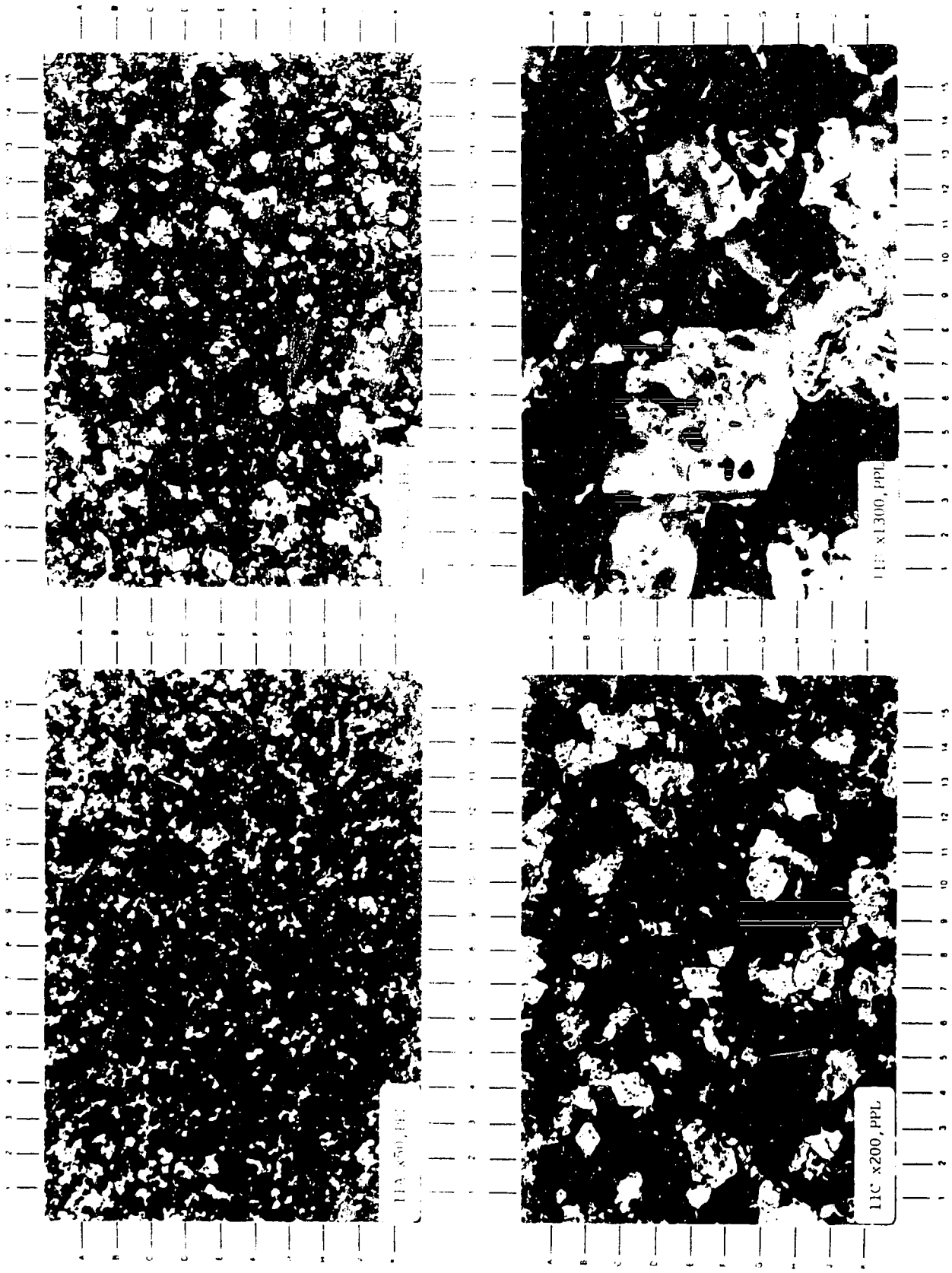
TRILLIUM SOQUIP ONEXCO ET AL BELUGA O-29

CORE



Depth: 1,073.0 Meters

Photograph 12A

This sample is a dolomitic limestone which is comprised of micrite, finely crystalline sparry calcite, and dolomite rhombs. Porosity is moderately developed, and evidenced by the presence of moldic (A4.5, H0.5) and vuggy (D14, E10-J10, G3) pores. (Plane-polarized light: 50X)

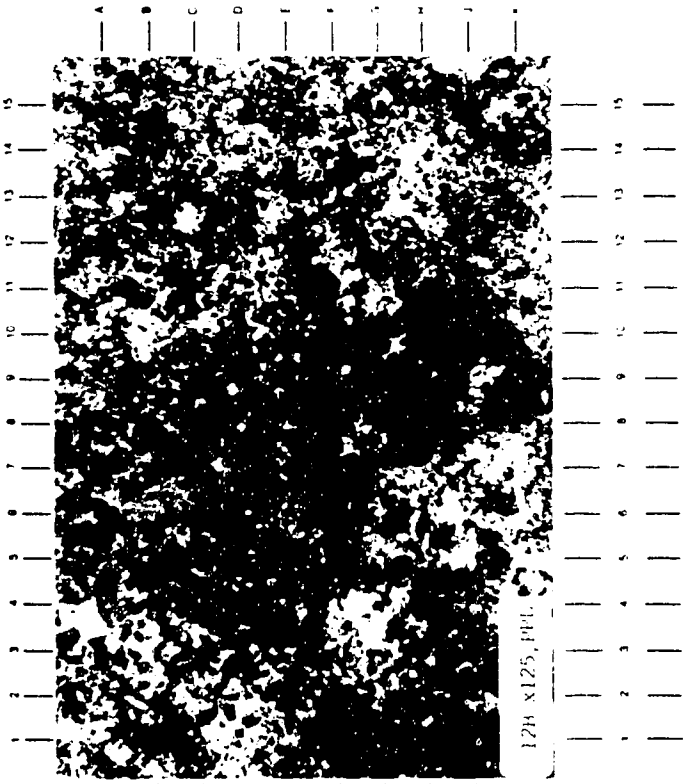
Photograph 12B

Staining with Alizarin Red S shows the distribution of calcite (red) and dolomite (white). All the carbonate types present tend to be poorly crystalline, and form an interlocking mosaic. Note the lack of porosity within the mosaic texture. (Plane-polarized light: 125X)

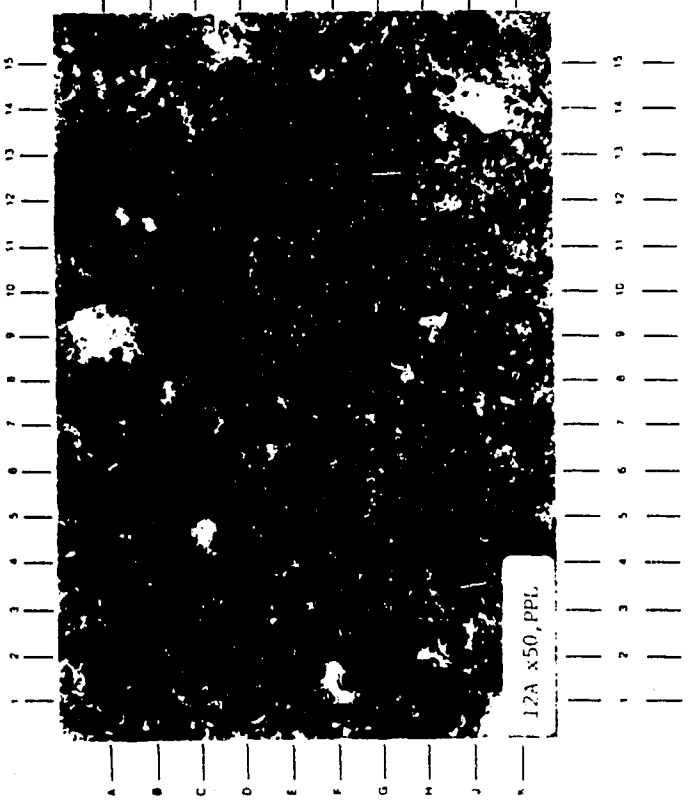
CANTERRA ENERGY LTD.

TRILLIUM SOQUIP ONEXCO ET AL BELUGA O-23

CORE



12H x125, PPL



12A x50, PPL

Trillium SOQUIP Onexo
Beluga 0-23 Well

Depth: 1,074.5 Meters

Photograph 13A

Thin-section analyses show that this is a dolomicrite. Finely crystalline dolomite rhombs are scattered throughout the micritic matrix. Irregular anhydrite laminae (B1-B13) and pyrite (C14, F13, K15) are common. Porosity development is poor due to the dense, massive texture of this carbonate. (Plane-polarized light: 50X)

Photograph 13B

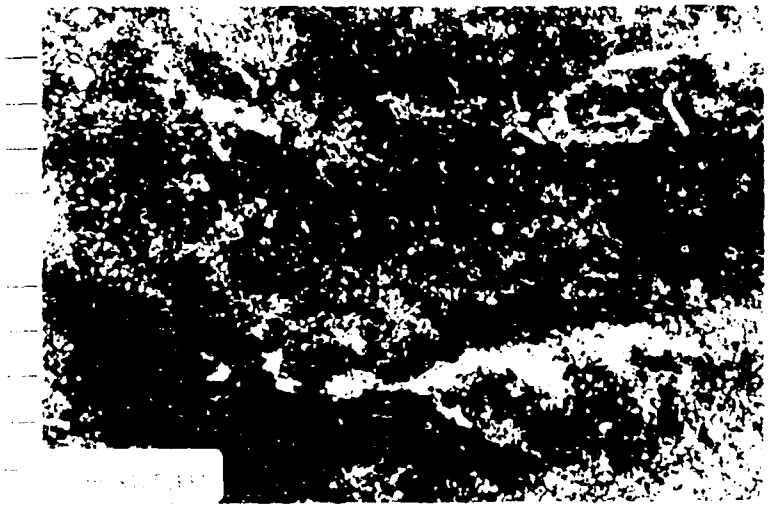
Anhydrite patches (B3-C5, C12, H5-H14) form discontinuous laminae throughout the sample. Pyrite which is also present as irregular laminae (J3-J9) and isolated crystals (B3, C5, K10) was often observed adjacent to the anhydrite. Certain areas, as seen here (E2, K15), contain concentrations of dolomite rhombs. These patches of dolomite are often finely crystalline and form a dense interlocking mosaic. (Plane-polarized light: 125X)

Photograph 13C

Intercrystalline porosity (evidenced by blue epoxy) is most abundant within the zones of dolomite concentration. However, these zones are patchy and isolated, and therefore, not believed to yield significant effective porosity. (Plane-polarized light: 500X)

Photograph 13D

Anhydrite forms some rather large, irregular laminae within this carbonate. These laminae often contain very finely crystalline dolomite rhombs (A1, E6, F13, J5, J15) disseminated throughout. (Plane-polarized light: 125X)



CORE

Trillium SOQUIP Onexo
Beluga 0-23 Well

Depth: 1,078.0 Meters

Photograph 14A

This low-magnification photomicrograph shows the very finely crystalline texture typical of this dolomite. Isolated patches of calcite cement are scatterd throughout the sample, but comprise only a very small amount of the carbonate. Porosity development is patchy, but overall is believed to be moderately developed. (Plane-polarized light: 50X)

Photograph 14B

Higher magnification shows the subhedral to euhedral rhombs and their interlocking mosaic texture. Although most rhombs are the same size (i.e. B14, H11) a few larger more limpid rhombs (B8, E2.5, H9) are scattered throughout. The small flecks of red stain (A4, B5, G3.5) indicate the presence of calcite cement. (Plane-polarized light: 125X)

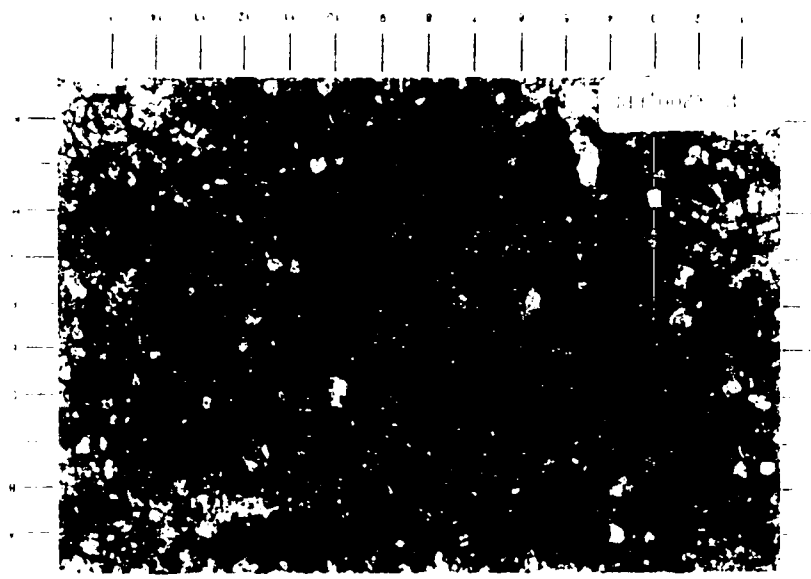
Photograph 14C

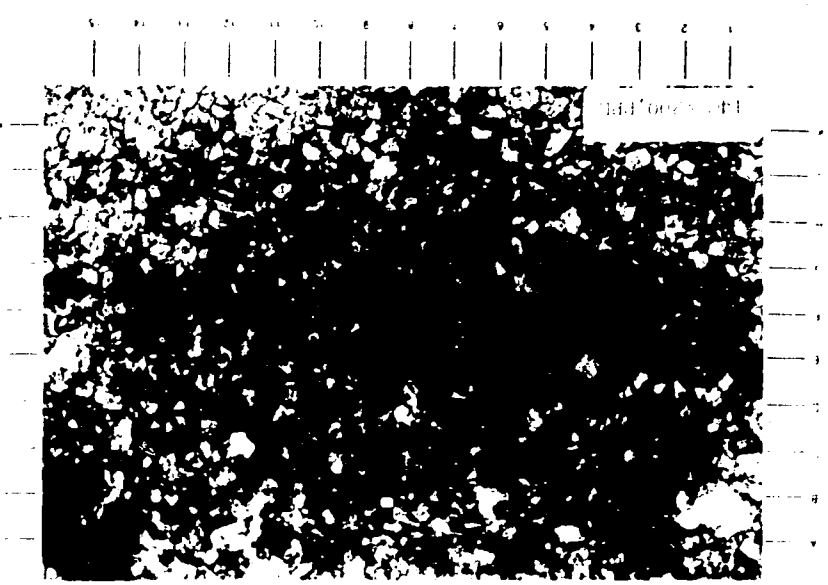
Intercrystalline porosity (A3, B8.5, D5.5, F13) associated with the dolomite rhombs is common, although patchy in its occurrence. Small amounts of sparry calcite cement (B5, E1, F7, F10) are scattered among the dolomite rhombs. (Plane-polarized light: 200X)

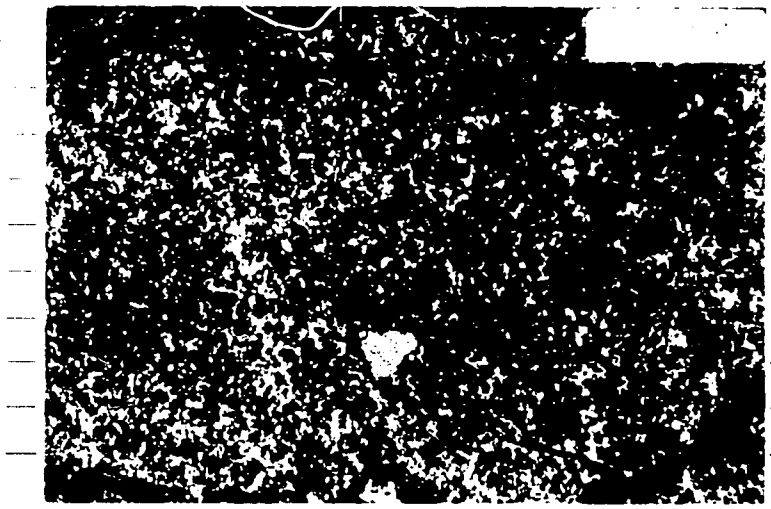
Photograph 14D

Shaley laminae, which contain significantly fewer dolomite rhombs (C8, D10, F6, G11) are present in this sample. These laminae are dense and contain no porosity except for some minor fractures (C2-G3). However, these fractures are believed to be due to sidewall coring, and are not representative of the true porosity of the sample. (Plane-polarized light: 200X)

CORE







Trillium SOQUIP Onexo
Beluga 0-23 Well

Depth: 1,096.0 Meters

Photograph 15A

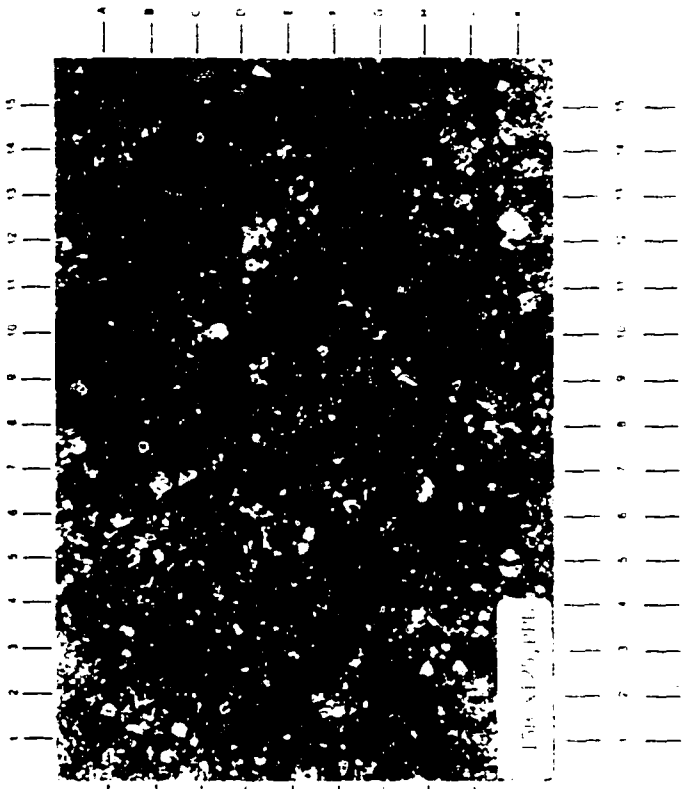
This sample is a dolomicrite which contains scattered, finely crystalline dolomite rhombs. Porosity appears to be poorly to moderately developed, and is believed to be mostly moldic (F12, H1, H7, K3). Some intercrystalline porosity is present (D6, J9, J15) but this does not seem to be as significant. (Plane-polarized light: 50X)

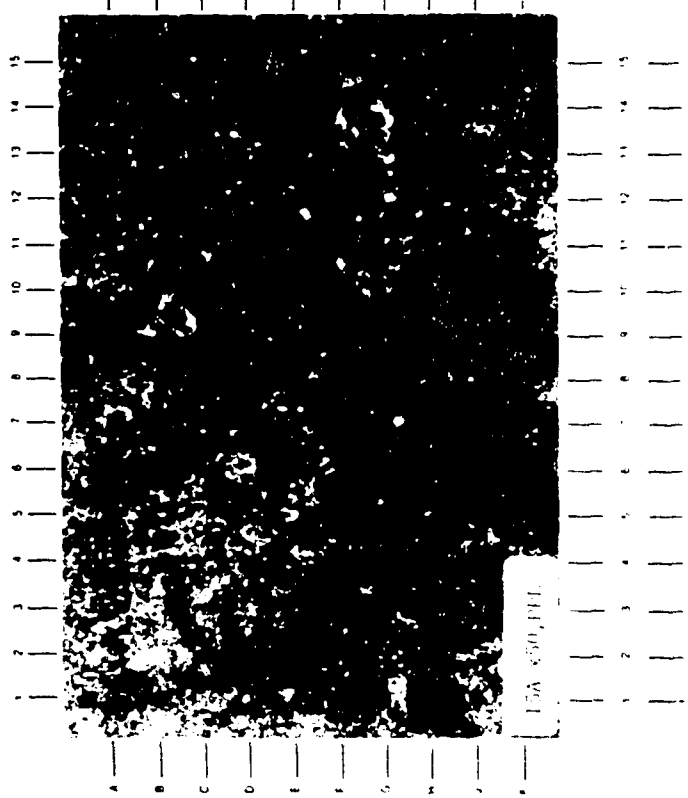
Photograph 15B

Higher magnification shows the abundance of finely crystalline dolomite rhombs (C1, C7, D2, H3.5). These rhombs form an interlocking mosaic which has resulted in overall low porosity. The fracture (E1-J12) is believed to be artifical. (Plane-polarized light: 125X)

CANTERRA ENERGY LTD.

TRILLIUM SOQUIP ONEXCO ET AL BELUGA O-24





Trillium SOQUIP Onexo
Beluga 0-23 Well

Depth: 1,201.5 Meters

Photograph 16A

Low-magnification indicates that this is a very finely calcitic crystalline dolomite. The red stained patches (B3.5, C14, E1, F11) are calcite, while the unstained areas (B1.5, E8, J4) are dolomite. Porosity development is believed to be poor due to the interlocking nature of the rhombs and calcite cement. Note what appears to be a recrystallized fossil fragment (G10.5-K12). (Plane-polarized light: 50X)

Photograph 16B

Higher magnification shows the basically euhedral crystal morphology of the rhombs (B7.5, D11, E2.5, J10). Recrystallized fossil fragments (i.e. D4.5-F4.5) are scattered throughout the sample. Note the absence of porosity in this dolomite. (Plane-polarized light: 125X)

Photograph 16C

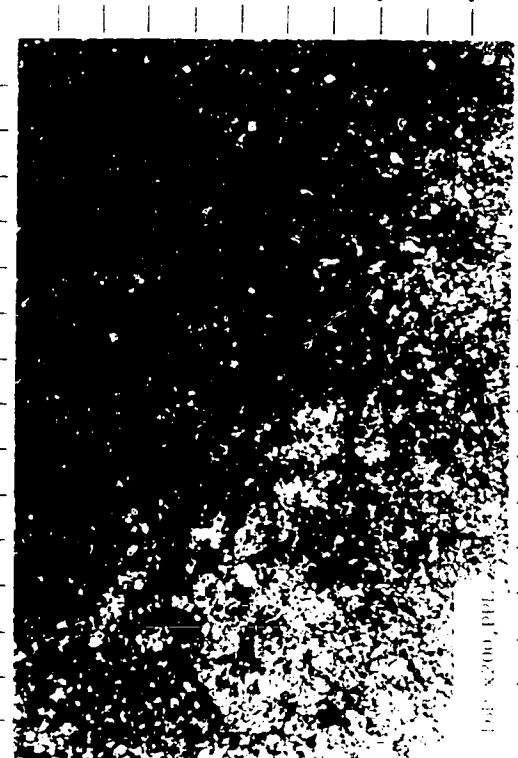
High magnification of this sample shows in more detail the interlocking mosaic texture the calcite (red stain) and dolomite (white). No porosity is present within this carbonate texture. (Plane-polarized light: 500X)

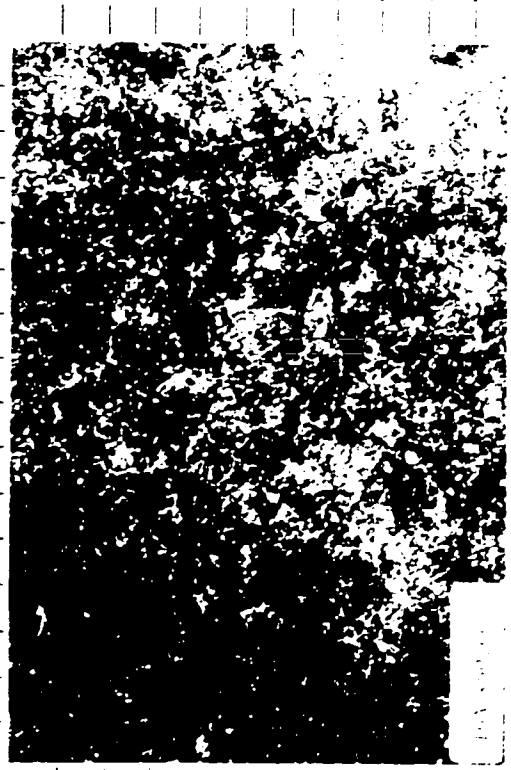
Photograph 16D

The carbonates in this sample have completely recrystallized fossil fragments (i.e. E2-H15). However, ghosts of many of the grains are still present, as seen here. (Plane-polarized light: 200X)

CANTERRA ENERGY LTD.

TRILLIUM [illegible]





Trillium SOQUIP Onexo
Beluga 0-23 Well

Depth: 1,260.0 Meters

Photograph 17A

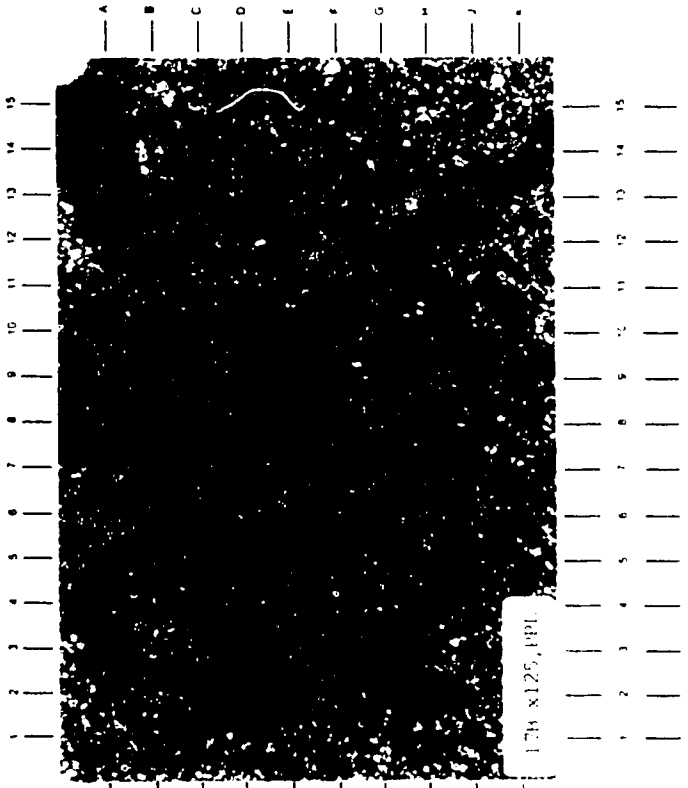
This sample is similar to Sample 1,439.0 meters, although slightly coarser grained. This low-magnification view shows that this is a very finely crystalline dolomite which contains trace amounts of microcrystalline calcite. This dolomite is highly shattered, resulting in the presence of artificial fracture porosity (B12, G15-J9). (Plane-polarized light: 50X)

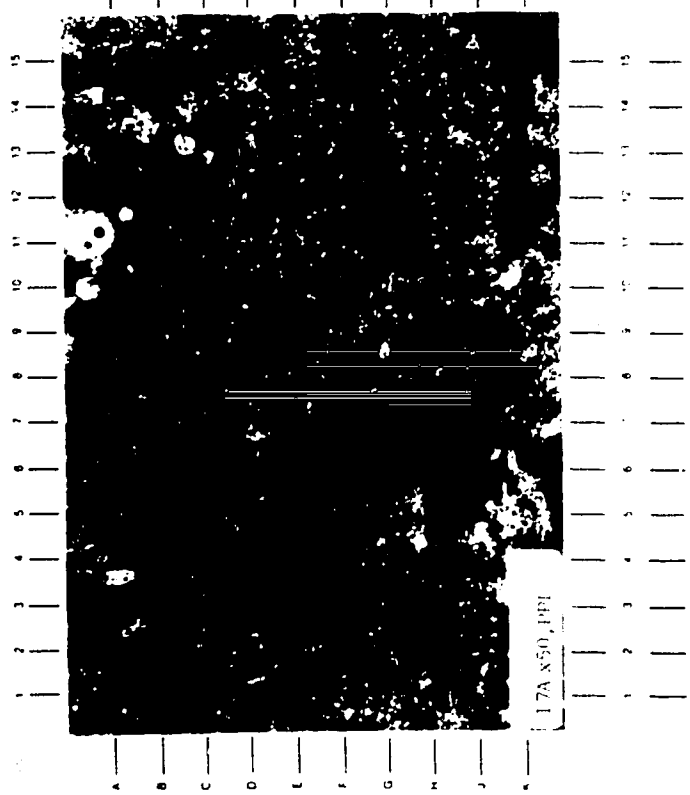
Photograph 17B

Higher magnification reveals the interlocking mosaic texture of these finely crystalline dolomite rhombs. Some intercrystalline porosity (blue epoxy, i.e. A1-A5, H9) is present between the dolomite rhombs. The fracture (A8-K13) is believed to be artificial. (Plane-polarized light: 125X)

CANTERRA ENERGY LTD.

TRILLIUM SOQUIP ONEXCO ET AL BELUGA O-23





Depth: 1,439.0 Meters

Photograph 18A

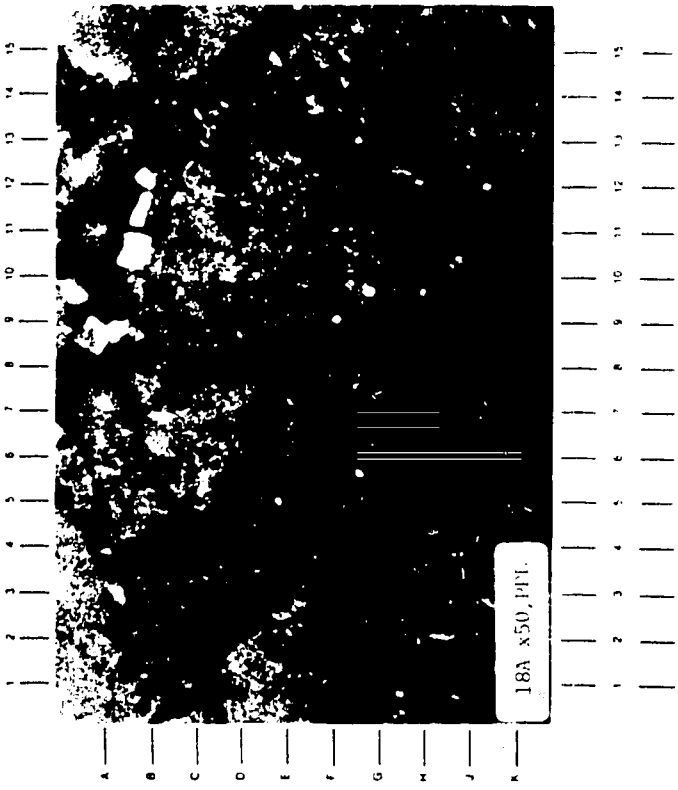
Low-magnification reveals the extremely fine crystalline texture of this dolomite. This sample appears to be highly shattered, and any porosity visibile in this photomicrograph is believed to be due to sidewall core shattering. The squaare holes (A8.5, B10-B12.5) are believed to indicate the presence of halite, which most likely dissolved during sample preparation. (Plane-polarized light: 50X)

Photograph 18B

Higher magnification confirms the fine texture of the sample. Although most dolomite rhombs are very fine, some coarser crystals (F14.5, G7) are also present. Even under higher magnification, porosity appears to be artificial. (Plane-polarized light: 125X)

CANTERRA ENERGY LTD.

TRILLIUM SOQUIP GLEXCO ET AL BELUGA O-23



Trillium SOQUIP Onexo
Beluga 0-23 Well

Depth: 1,457.0 Meters

Photograph 19A

This siltstone is poorly sorted; however, although dolomite cement is present, calcite cement is most abundant. Porosity development is considered poor to moderate. Some of the intergranular porosity is believed to be real, but much appears to be due to sample quality and preparation. (Plane-polarized light: 50X)

Photograph 19B

Higher magnification reveals that the angular to subrounded framework grains are dominantly quartz (B10, C8, E4, J7), with lesser amounts of plagioclase (F14, G11) and potassium feldspars also present. Accessory minerals include muscovite laths (A12.5, F11). Dolomite rhombs (B11.5, C4, J4, K13.5) are concentrated in localized patches, as seen here. (Plane-polarized light: 125X)

Photograph 19C

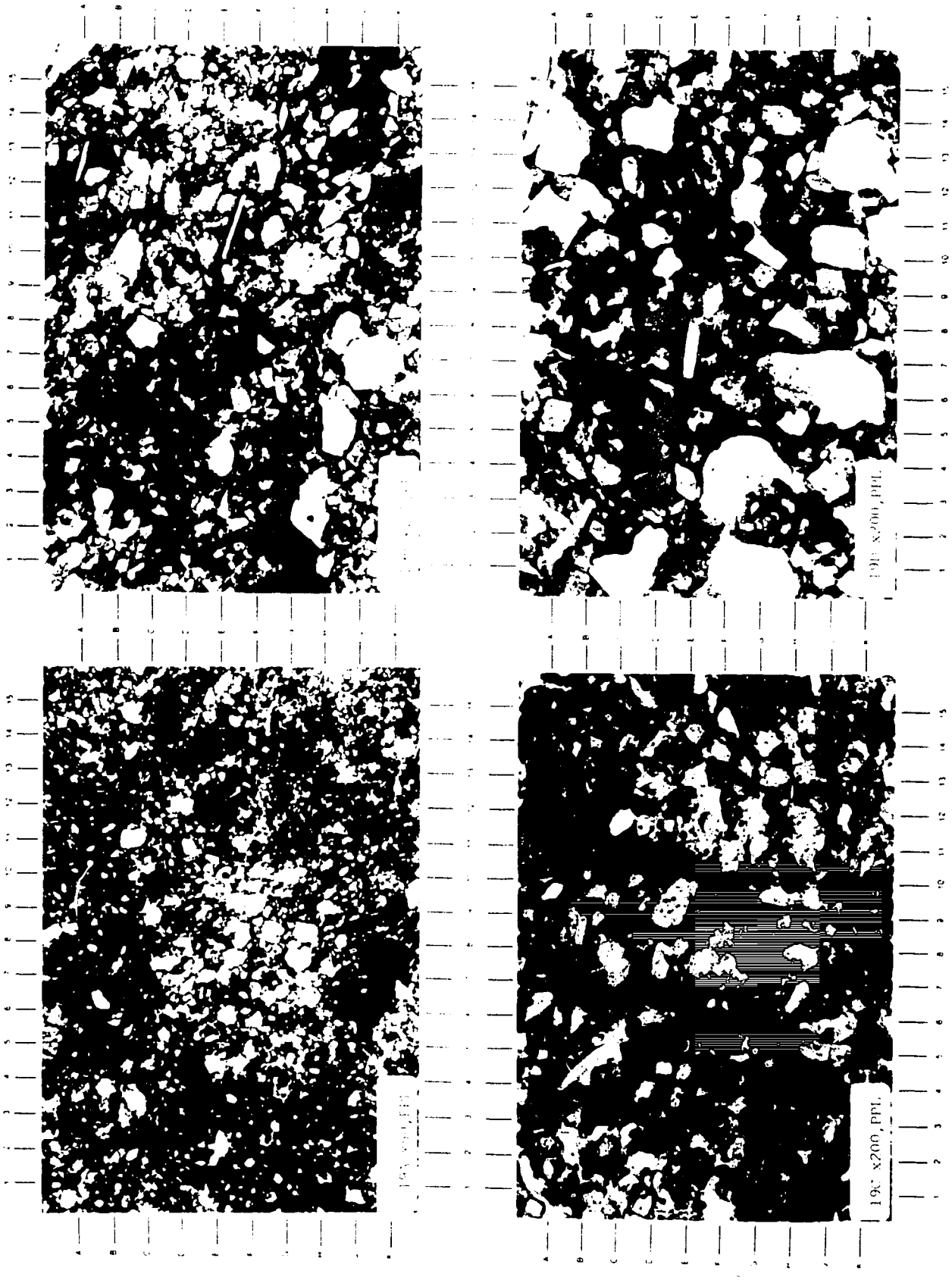
Higher magnification of the carbonate cemented areas of this siltstone shows the abundance of dolomite rhombs (A12.5, C4, E14, F5, J6). The rhombs are finely crystalline and are subhedral to euhedral in shape. Many detrital grains are partially corroded by the dolomite rhombs (C5, C7.5, E12, H9.5, J5). (Plane-polarized light: 200X)

Photograph 19D

Intergranular porosity (B12.5, C10, E10, H9.5, J11) is present in isolated patches, and therefore, is not believed to be very effective. However, where present, as in this view, the porosity is well developed. Although dolomite is the most common cement (A9, D8, G8, H11), minor amounts of calcite (C8, D6, H2) are also present. (Plane-polarized light: 200X)

CANTERRA ENERGY LTD.

TRILLIUM SOQUIP ONEXCO ET AL BELUGA 0-23



Trillium SOQUIP Onexo
Beluga 0-23 Well

Depth: 1,465.0 Meters

Photograph 20A

This low-magnification view indicates the poorly sorted texture typical of this medium silt-sized to upper very fine-grained sandstone. Cements in this sandstone include dolomite (B2, E2.5, F9, J4) and anhydrite (A11-A15, B7). Porosity development is believed to be poor due to the abundance of these cements. Much of the porosity (blue epoxy) observed in thin-section appears to be due to sidewall coring and sample preparation. (Plane-polarized light: 50X)

Photograph 20B

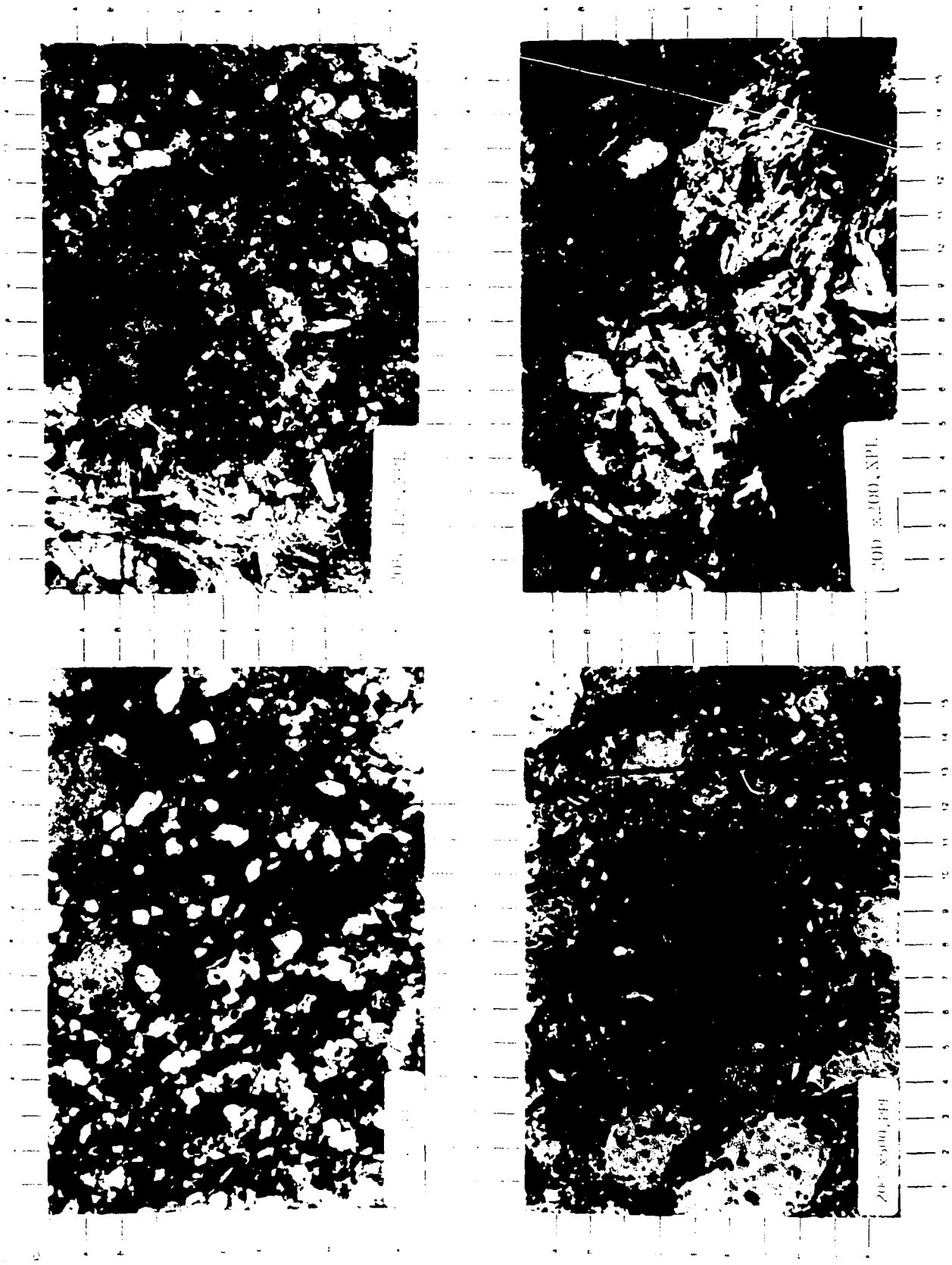
This crossed nicols photomicrograph shows the abundance of dolomite cement (C13, E11, G5-G10, J9) and anhydrite (A3-K1). Note the variation in framework grain size present in this view. The dolomite rhomb size also varies (C13, H9.5). (Crossed nicols: 125X)

Photograph 20C

High magnification reveals the presence of trace amounts of quartz overgrowths (D11-F11.5). Further observations of these detrital grains shows that many have been partially corroded by dolomite rhombs (D11.5, F11, H13). Pyrite occurs in trace amounts as pore-filling precipitates (B7, F15.5-H15.5, H3) throughout the sample. (Plane-polarized light: 500X)

Photograph 20D

Anhydrite laths (D6, G9, H7, H12) form small patches and discontinuous laminae. Dolomite (B4, B6, D3, F14) is often associated with the anhydrite and appears to have partially replaced some of the anhydrite. (Crossed nicols: 200X)



Trillium SOQUIP Onexo
Beluga 0-23 Well

Depth: 1,473.5 Meters

Photograph 21A

Low-magnification reveals the poorly laminated texture of this siltstone. "Cleaner" more porous laminae, (A1-A11, F9-F15) alternate with carbonate cements (B12-B15, H1-H5) or matrix-rich laminae. Although porosity is present throughout the sample, the "cleaner" laminae exhibit the best porosity development. (Plane-polarized light: 50X)

Photograph 21B

The framework grains, which are mostly angular, are almost exclusively detrital quartz. Dolomite cement (C5, B10, D13, E7) is common in certain laminae, and can significantly reduce porosity. Note the small pyrite (A13, D12, J2) crystals scattered though the sample. (Plane-polarized light: 125X)

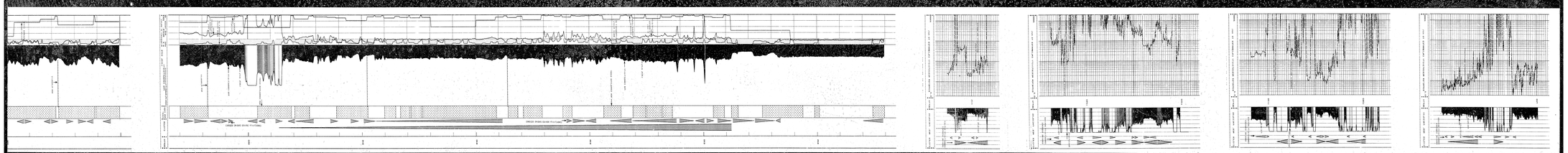
Photograph 21C

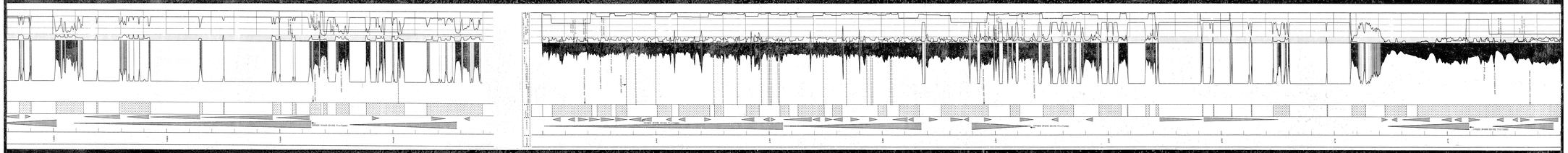
This photomicrograph shows the texture typical of the shaley laminations. Silt grains (B3.5, E8, G10) are present, but not as common as in the "cleaner" laminae. Pyrite crystals (A6.5, B1, J2.5, J12.5) are disseminated throughout these laminae. (Plane-polarized light: 125X)

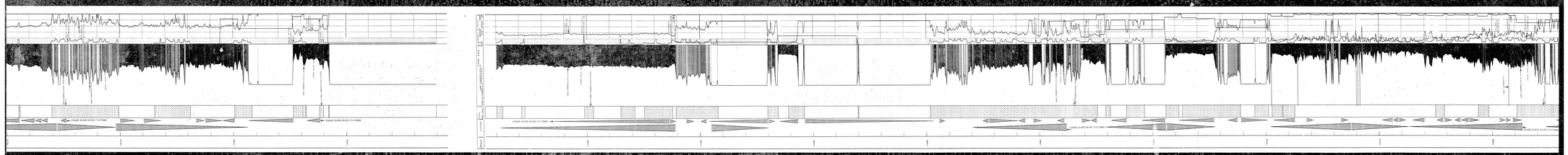
Photograph 21D

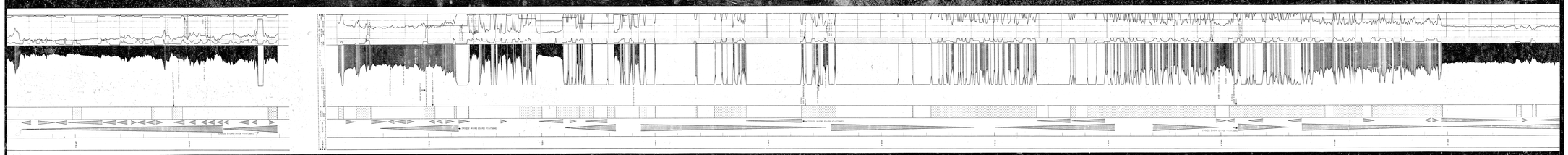
Anhydrite cement (D4-C8, D9, H4-K15) forms irregular laminae in this sample. The laminae are discontinuous and appear to be partially corroded by dolomite rhombs (J7.5, J11, J13). Porosity visible within the shaley lamina (A15-E15, G10) is believed to be artificial and a result of sample preparation. (Plane-polarized light: 125X)

CORE









Trillium SOQUIP Onexo
Beluga 0-23 Well

Depth: 1479.0 meters

Photograph 22A

This low-magnification photomicrograph shows the moderately sorted texture typical of this coarse silt-sized to fine-grained sandstone. The sand is comprised of irregular laminae. Intergranular porosity is well developed in the "cleaner" laminae which lack abundant clays and cements. (Plane-polarized light: 50X)

Photograph 22B

The angular to subrounded framework grains are comprised largely of quartz (A7, B2, D3, F15, J12); however, minor amounts of plagioclase (B7.5, C14) and potassium feldspar (D12) grains are also present. Dolomite cement (B4, D1, G10, J1, J14), which is concentrated in certain laminae, is often present as irregular rhombs. The fine, black crystals (B7, E9.5, J9) present here, are believed to have been introduced during sample preparation, and therefore, not part of the sandstone. (Plane-polarized light: 125X)

Photograph 22C

Irregular anhydrite laminae, such as the one in this view, are present throughout the sample. These laminae are comprised of short anhydrite laths (B10.5, E7, H3.5), which are oriented roughly parallel to each other. Occasional detrital quartz grains (H8, J11) appear to "float" within the anhydrite laminae. (Plane-polarized light: 125X)

Photograph 22D

This cross nicols view shows the abundance of dolomite cement (C6, D11.5, F12, H8, J6.5) within the carbonate cemented laminae. The rhombs vary from anhedral (C5.5, F9, H4) to euhedral (F11.5, K6), and have partially corroded some detrital quartz grains (H6.5, K8). (Crossed nicols: 200X)

CYBERLOOK

CSU

COMPANY:	CANADIAN ENERGY LTD.
WELL:	TRILLIUM SOUTH-CHURCHILL D-23
FIELD:	HUDSON BAY
PROV.:	MANITOBA
COUNTRY:	CANADA
LOCATION:	
SEC:	
LATITUDE:	59 10' 54.47" N
LONGITUDE:	94 24' 54.47" W
TWP:	
RGE:	
PERMANENT DATUM:	M.S.L.
ELEV. OF PERM. DATUM:	0.0
LOG MEASURED FROM:	KELLY BUSHING
DRILLING MEASURED FROM:	KELLY BUSHING
DATE:	15 SEP 90
RUN NO:	
DEPTH-DRILLER:	2015.0 M
DEPTH-LOGGER:	2017.0 M
TYPE FLUID IN HOLE:	CHEMICAL
TOP LOG INTERVAL:	1470.0 M
CASING-DRILLER:	1470 M
CASING-LOGGER:	1470.0 M
CASING:	BIT SIZE: 200.7 MM
TYPE FLUID:	CHEMICAL DENS: 1.04
BIT SIZE:	200.7 MM VISC: 0.0

OTHER SERVICES:
DIL-SP-GR
DNL-LS-CNL
BHC
DIPL
VSP / CST

OCT 11 1990
Department of Energy, Mines and Resources
Office of Petroleum Resources

PROGRAM NAME: DIL
VERSION: 1.0
DRILL MODE: LOGGING

FULL ELEVATION ABV. MSL/MWD
KB: 0.0 M
DF: 0.0 M
GL: 0.0 M
DRILL BLOCK HEIGHT: 0.0 M
DRILL BLOCK WEIGHT: 0.0 KG
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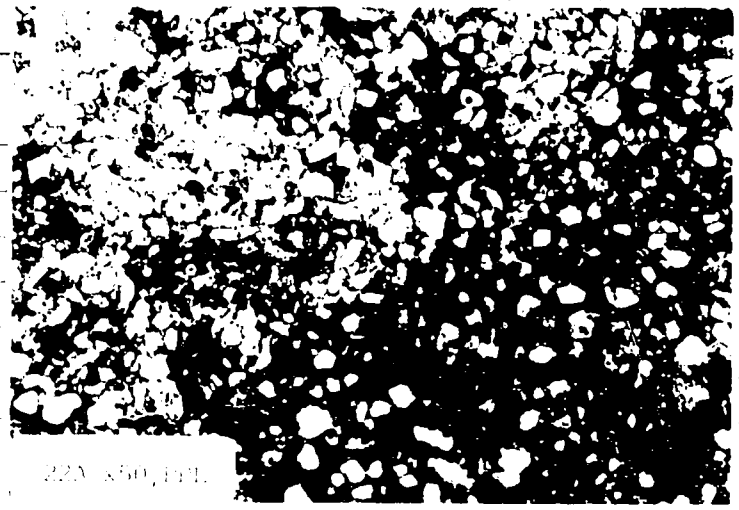

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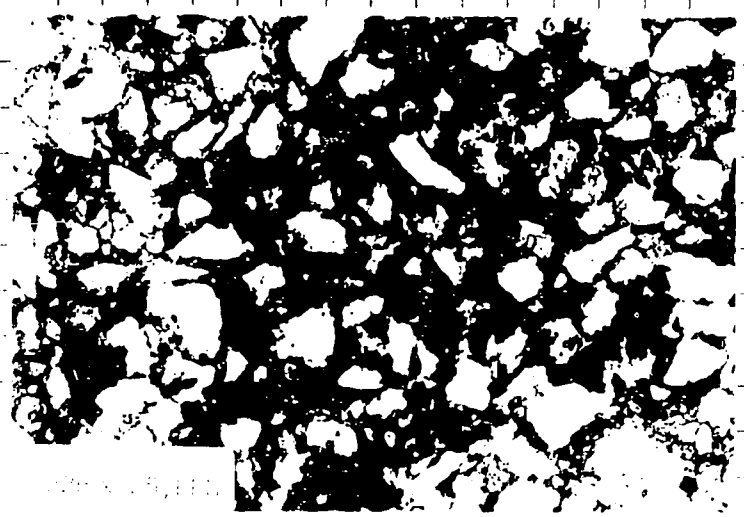
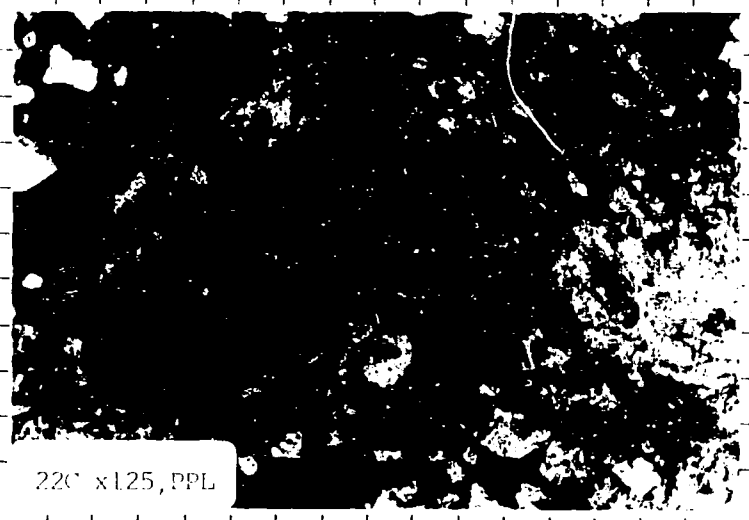
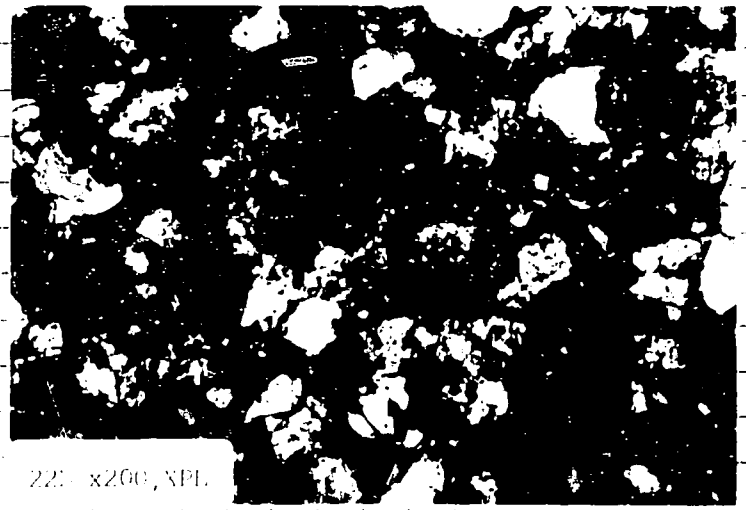




22C x125,PPL



22C x200,XPL

CORE

Trillium SOQUIP Onexo
Beluga 0-23 Well

Depth: 1,481.0 Meters

Photograph 23A

This low-magnification photomicrograph reveals the well sorted texture typical of this coarse silt-sized to upper fine-grained sandstone. Minor amounts of carbonate cements are present, but clays are absent. Porosity development is considered to be good, as evidenced by well developed pores (B8, C4.5, G2, J7, K12). The black material present in many pores is believed to be corundum, which was introduced during sample preparation. (Plane-polarized light: 50X)

Photograph 23B

The angular to subrounded grains which comprise the detrital framework are mostly quartz (A4, B15, D6, H13, J2), with lesser amounts of feldspars (B2.5, F4, J5) and rock fragments (B14, H11, J14). Enlarged pores (B8, C2, E7) and pore throats (G12.5, J6.5) are common throughout this sandstone. (Plane-polarized light: 125X)

Photograph 23C

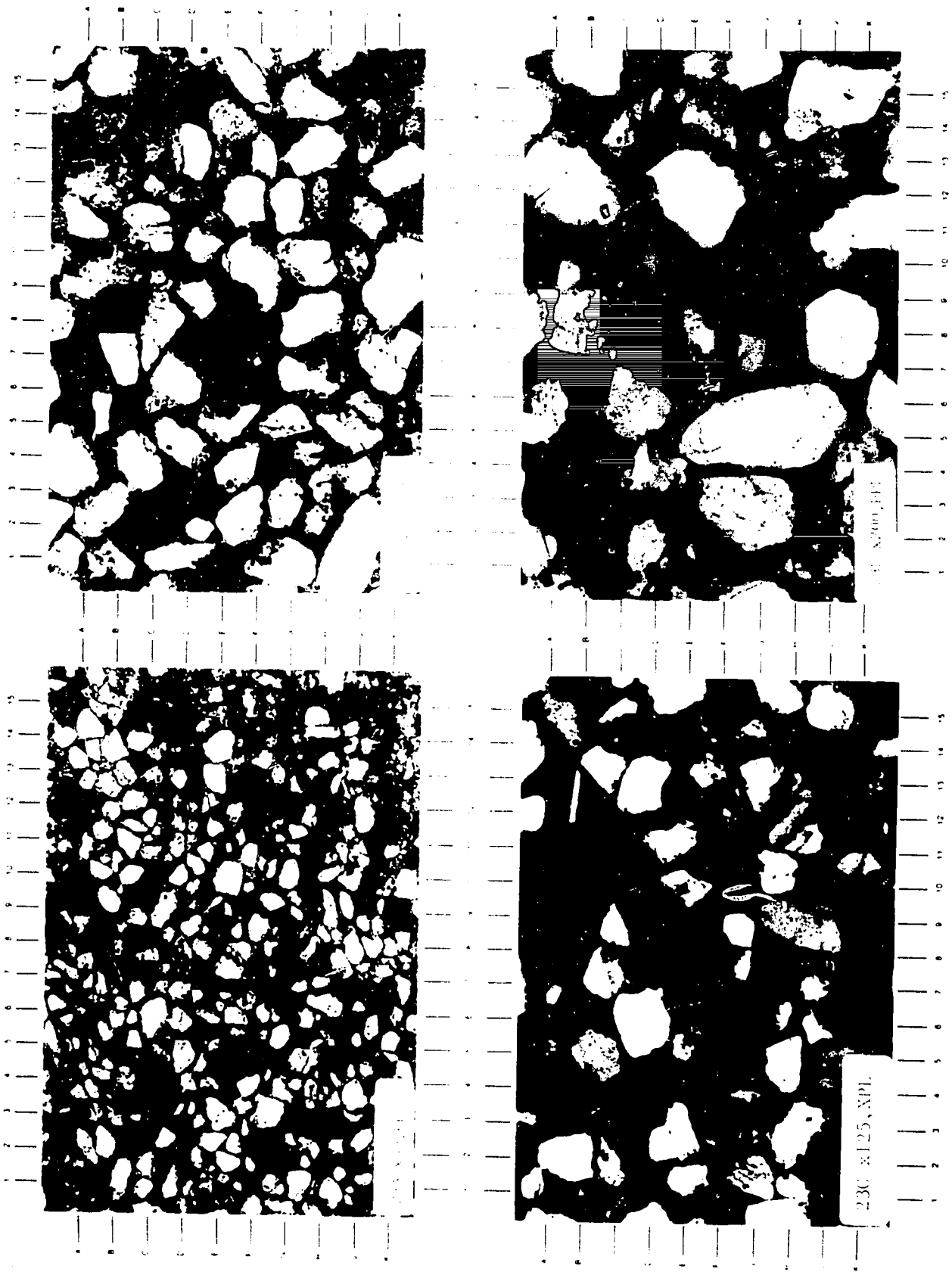
Cross nicols observation of this sample shows the variation of detrital constituents, which include quartz (B2, D6, H5, J9), plagioclase (A13, B3.5, C7), potassium feldspar (G2, H7.5), and metamorphic rock fragments (F13). Much of the black area (A4, D14.5, F5, H14) is porosity, thus indicating the paucity of cements, except for a few dolomite rhombs (E5.5, G2.5, J7.5). (Cross nicols: 125X)

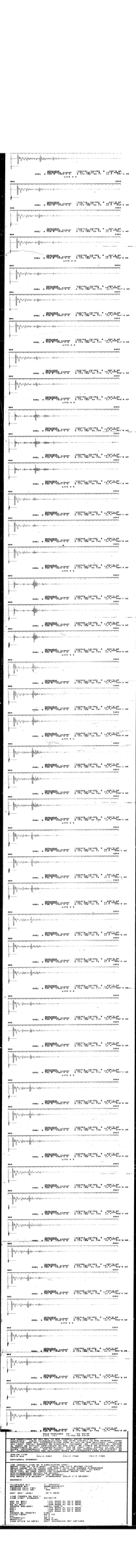
Photograph 23D

This higher-magnification photomicrograph illustrates the porosity development for this sample. Pores (B13.5, G12, H7, K9.5) and pore throats (B10.5, E5, J6.5, J9.5) are well developed, indicating the likelihood of good permeability. Some dolomite cement (F8-F10, K3) is present, but only in minor amounts. The black crystals (B1.5, C9.5, D8.5, G14) are believed to be corundum which was used during sample preparation, and therefore artificial. (Plane-polarized light: 200X)

CANTERRA ENERGY LTD.
TRILLIUM SOQUIP [illegible] 0-23

CORE

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EVENT 1 RECORD 1 LINE 2 TRACE 1 ZERO 1 TIME
EVENT 1 RECORD 1 LINE 3 TRACE 1 ZERO 1 TIME
EVENT 1 RECORD 1 LINE

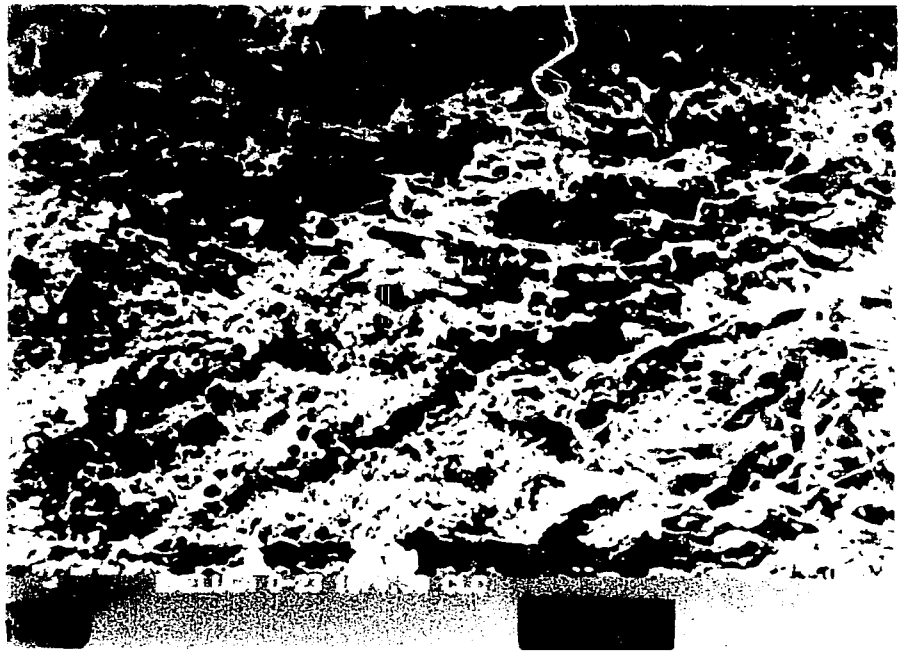
SEM DESCRIPTION

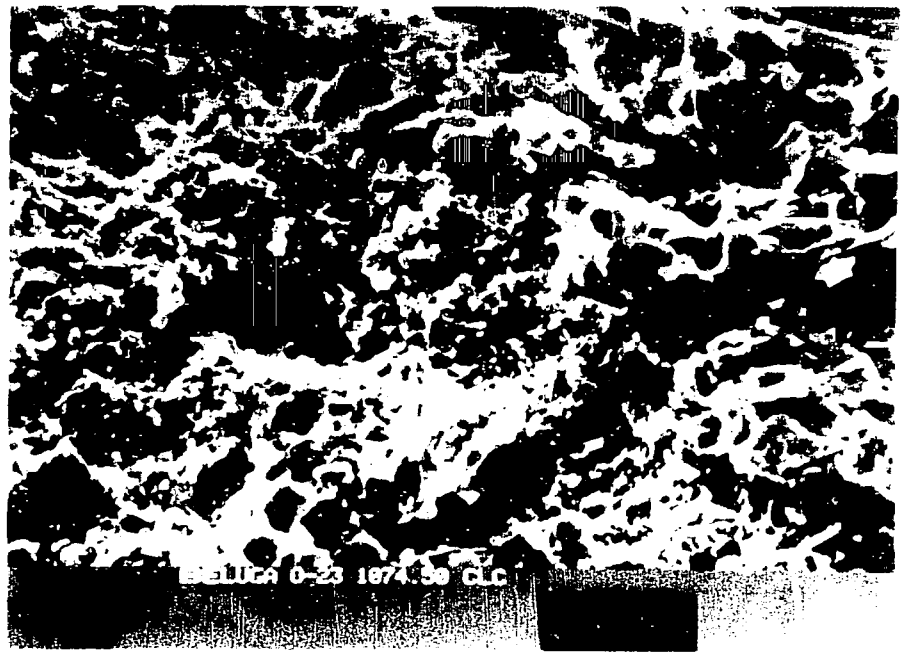
Sample Number: 17
Depth: 1096.00 metres

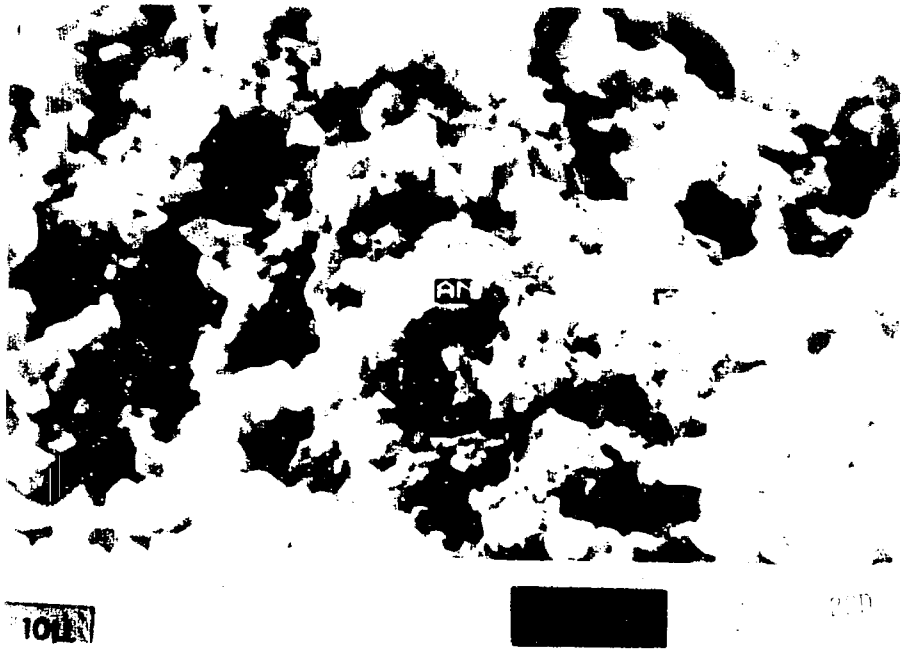
The sample is of a very finely crystalline, well lithified dolomite with overall moderate porosity and very poor to poor pore interconnectedness (Photographs 17A to 17D). Porosity is intercrystalline porosity associated with partially interlocked dolomite crystals.

The sample is comprised entirely of dolomite which occurs as very finely crystalline, subhedral to euhedral crystals. Such crystals partially to completely interlock throughout the sample. The partial interlocking of these dolomite crystals results in intercrystalline porosity.

Porosity is mainly intercrystalline porosity, with no evidence of vugular porosity present. The intercrystalline pores are quite small, and are very poorly to poorly interconnected. The resulting intercrystalline pores are commonly polyhedral.







CORE LAB

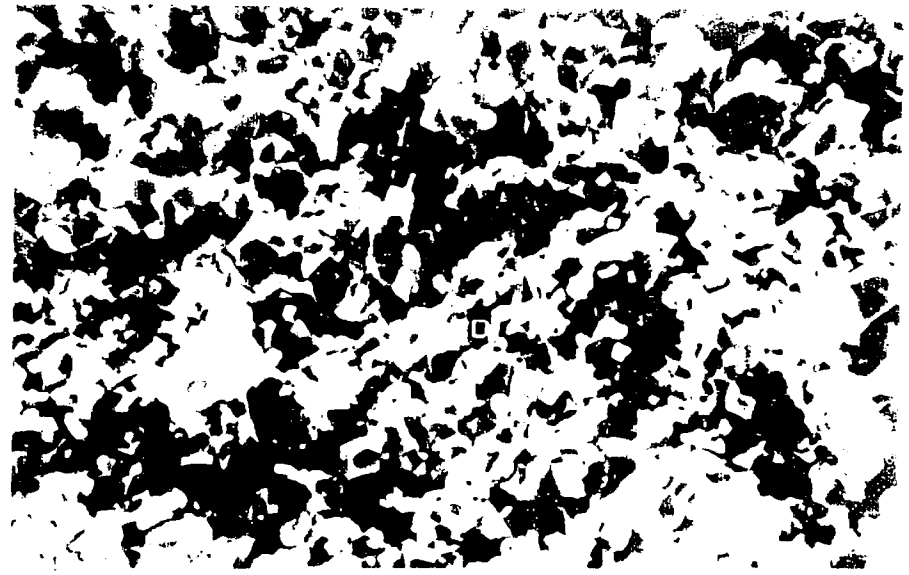
SEM DESCRIPTION

Sample Number: 22
Depth: 1074.50 metres

The sample is of a very finely crystalline to aphanocrystalline, anhydritic dolomite with overall poor porosity and very poor pore interconnectedness (Photographs 22A to 22D). Porosity is mainly intercrystalline porosity associated with the dolomite mainly.

Dolomite occurs predominantly as aphanocrystalline to very finely crystalline, subhedral to euhedral crystals which completely to partially interlock. Where such crystals are partially interlocked, intercrystalline porosity is evident. Anhydrite which occurs throughout the section in abundance, is present as bladed to blocky crystals. The sample contains major amounts of anhydrite which have very fine crystal size.

Porosity is mainly intercrystalline porosity associated with dolomite. The presence of significant amounts of anhydrite reduces reservoir quality.



40LL

CORE LAB

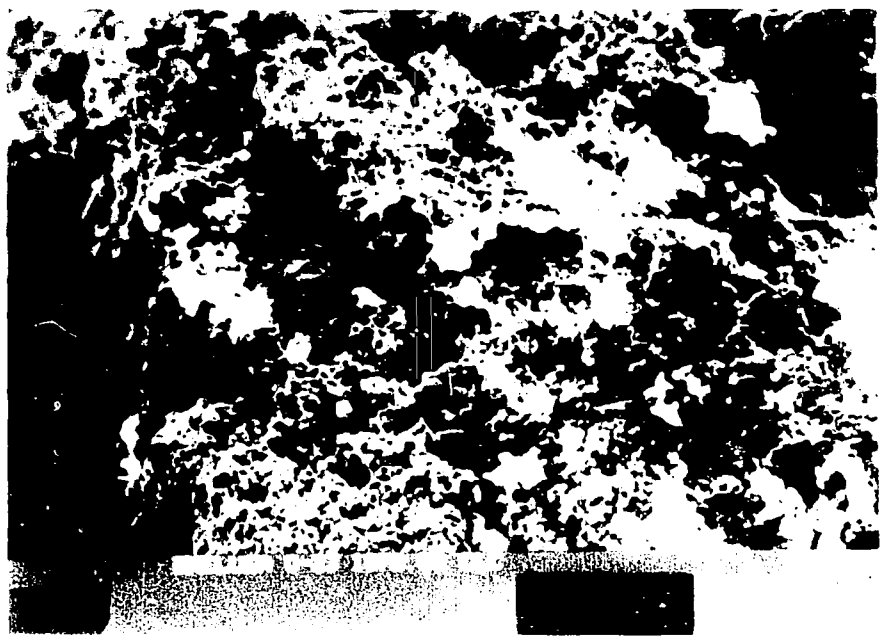
SEM DESCRIPTION

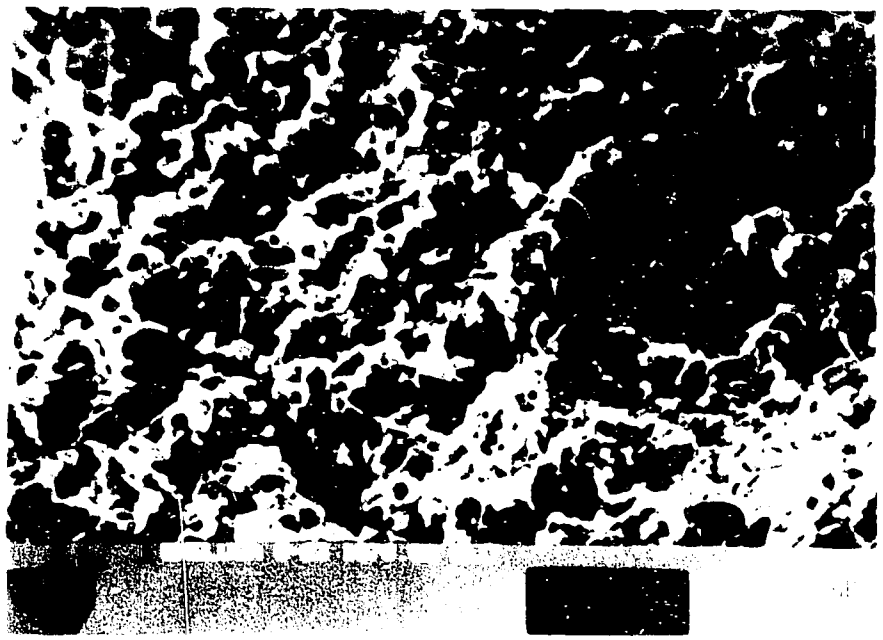
Sample Number: 25
Depth: 1070.00 metres

The sample is of a very finely to finely crystalline, well lithified, calcareous dolomite with overall moderate porosity and very poor to poor pore interconnectedness (Photographs 25A to 25D). The sample is highly calcareous, as indicated by X-ray diffraction. Porosity is intercrystalline porosity associated with the partial interlocking nature of the dolomite crystals.

Dolomite comprises the bulk of the sample, and occurs as very finely to finely crystalline, subhedral crystals which partially to completely interlock. Calcite was not readily observed within the sample. The sample has a foliated appearance indicating that it is laminated. The laminations appear to be subtle, and differentiation between individual laminae was not readily discerned.

Porosity is mainly intercrystalline porosity associated with the partial interlocking of dolomite crystals. This porosity is occasionally occluded by local clay minerals. The resulting intercrystalline pores are often quite small, and are mainly, very poorly interconnected.





(25C)

(25D)

CORE LAB

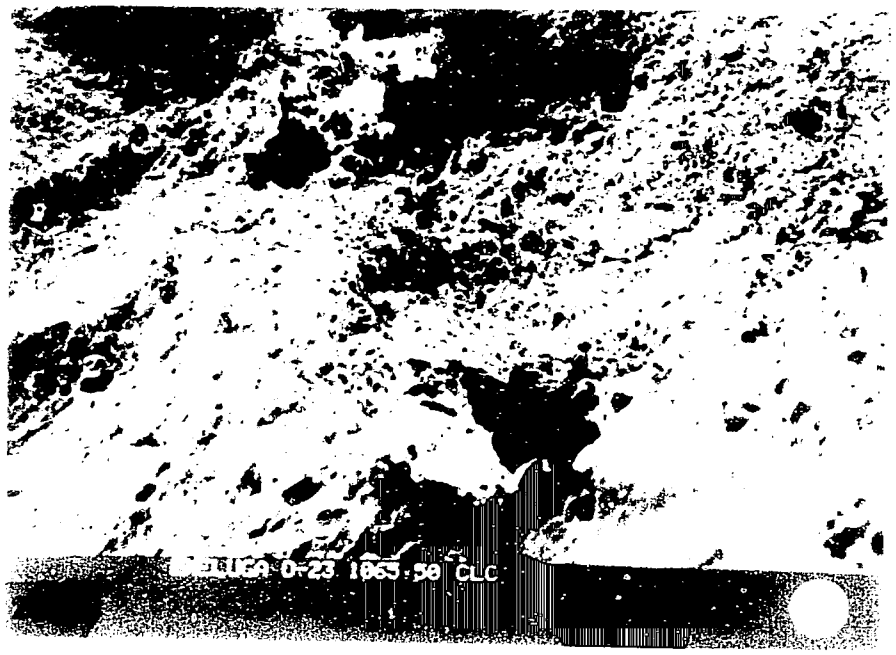
SEM DESCRIPTION

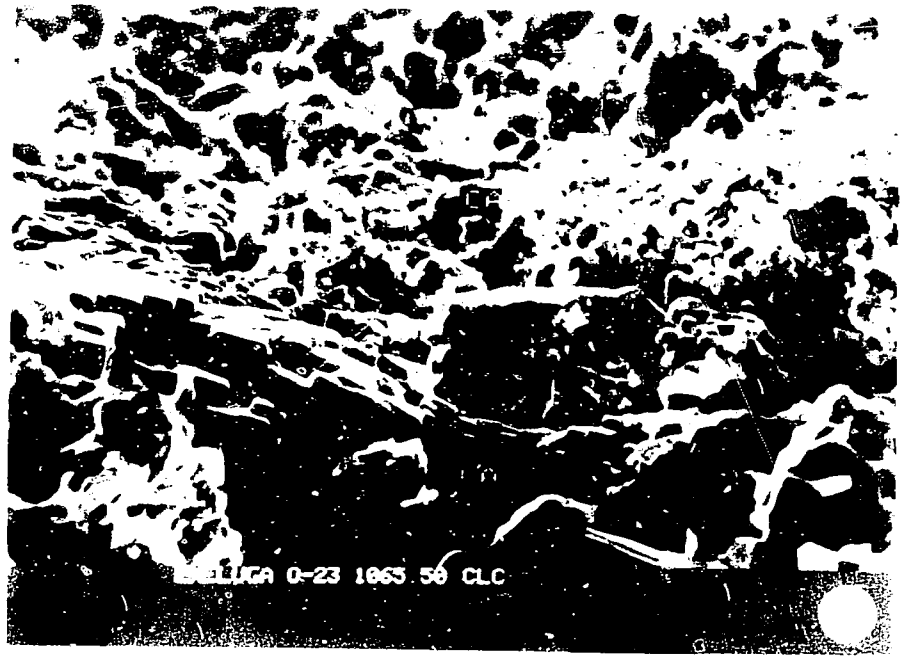
Sample Number: 31
Depth: 1065.50 metres

The sample is of a very finely crystalline, well lithified, moderately dolomitic limestone with overall moderate porosity and very poor pore interconnectedness (Photographs 31A to 31D). Porosity is mainly intercrystalline porosity associated with the partial interlocking of calcite crystals.

Calcite comprises the bulk of the sample, and occurs mainly as very finely crystalline, subhedral crystals. Such crystals partially to completely interlock within this sample. The partial interlocking of these crystals results in intercrystalline porosity. Coarser calcite crystals sparry calcite) are also present, but are observed only occasionally. Dolomite is observed rarely, and is coarser crystalline than the predominant aphanocrystalline to very finely crystalline calcite. Halite crystals are also evident, and are finely to medium crystalline in size. These crystals appear to be natural.

Porosity is mainly intercrystalline porosity associated with the partial interlocking of calcite crystals. The presence of dolomite and halite reduce reservoir quality within the sample.


BELUGA 0-23 1065.50 CLC


BELUGA 0-23 1065.50 CLC

BELUGA 0-23 1065.50 CLC

CORE LAB

SOQUIP ONEXCO ET AL BELUGA 0-23

TD: 2215m

WATER DEPTH 178m.

LITHOLOGIC DESCRIPTION	MICROPALE-ONTOLOGY	CASING DEPTH BELOW K.B.	LOGGING/ CORING PROGRAM
	SEA BOTTOM		
Glacial deposits Boulder beds		762 mm. at 229m.	NO LOGGING
Shale and siltstone Interbeds of limestone anhydrite and halite	GEMINSPORA SVALBARDIAE; VERRUCOSISPORITES GRANDISPASRA TOMENTOSA; CONTAGIS PORITES OPTIVUS; NOWACKIA SULCATA; ANGOCHITINA MILANENSIS		
Halite overlain by limestone and shale	ICRIDISNUS CORNIGER ANCESTRALIS; POLYGNATHUS KENDALLI; NOWACKIA SULCATA; NOWACKIA KARPINSKII	508mm. at 559m.	RUN1
Halite with anhydrite, dolomite and limestone	ICRIODUS FUSIFORMIS		
Halite overlain by anhydrite and limestone			
Dolomite and dolomitic limestone with interbeds of anhydrite, halite and siltstone	TENTACULITES SP STYLIOLINA SP.; COELERDONTUS SP.; POLYGNATHUS SP.	340mm. at 1478m.	RUN 2
Limestone and siltstone			
Siltstone and sandstone			
Limey siltstone, limestone, ud dolomite and anhydrite	PANDERODUS GRACILIS		
Dolomitic limestone	PLECTODINA ACULEATUS; DREPANOISTODUS SUBERCTUS; BELODINA COMPRESSA		
Limestone Sandstone			
Gneiss			

OTTAWA COPY

CONFIDENTIAL FOR EXAMIN LIMITE À:

8710-CSS-1-1
CANADA OIL AND GAS LANDS ADMINISTRATION
ADMINISTRATION DES TERRES PÉTROLIÈRES ET DU GAZ DES TERRES DU CANADA
JUIN JUNE 23 1986
ENGINEERING BRANCH
GÉNIE

Canterra Energy Ltd.

HUDSON BAY AREA

DRILLING PROGRAM

TRILLIUM SOQUIP ONEXCO ET AL BELUGA 0-23

SCALE		CONTOUR INTERVAL	
PREPARED BY	J.E. THORPE	DATE	MAY 1986
DRAWN BY	V. SCHLAGEL	FILE	3-A13-2

TRILLIUM SOQUIP ONEXCO

SEISMIC LINE: CO15 SP 2780

LOCATION: Lat. 59 12'54.4"N
Long. 88 33'26.6"W.

DEPTH BELOW K.B.	DEPTH BELOW SEA LEVEL	FORMATION		LITHOLOGY	LITHOLOGIC DESCRIPTION
				WATER	
192	178	PLEISTOCENE			Glacial deposits Boulder beds
304	290	MID DEVONIAN	MID BAY		Shale and siltstone Interbeds of limestone anhydrite and halite
727	713	EARLY DEVONIAN	WALRUS		Halite overlain by limestone and shale
1061	1047	EARLY DEVONIAN	POLAR BEAR		Halite with anhydrite, dolomite and limestone
1248	1234	EARLY DEVONIAN	PEN		Halite overlain by anhydrite and limestone
1452	1438	EARLY DEVONIAN	KENOGAMI		Dolomite and dolomitic limestone with interbeds of anhydrite, halite and siltstone
1776	1762	SILUR.	EKWAN RIVER		Limestone and siltstone
1849	1835	SILUR.	SEVERN RIVER		Siltstone and sandstone
1886	1872	ORDOVICIAN	RED HEAD RAPIDS		Limey siltstone, limestone, mud dolomite and anhydrite
2027	2013	ORDOVICIAN	CHURCHILL		Dolomitic limestone
2153	2139	ORDOVICIAN	BAD CACHE RAPIDS		Limestone
2189	2175		CAMBRIAN		Sandstone
2193	2179	T.D.	PRE-CAMBRIAN		Gneiss
2215	2201				

CANTERRA ENERGY LTD.

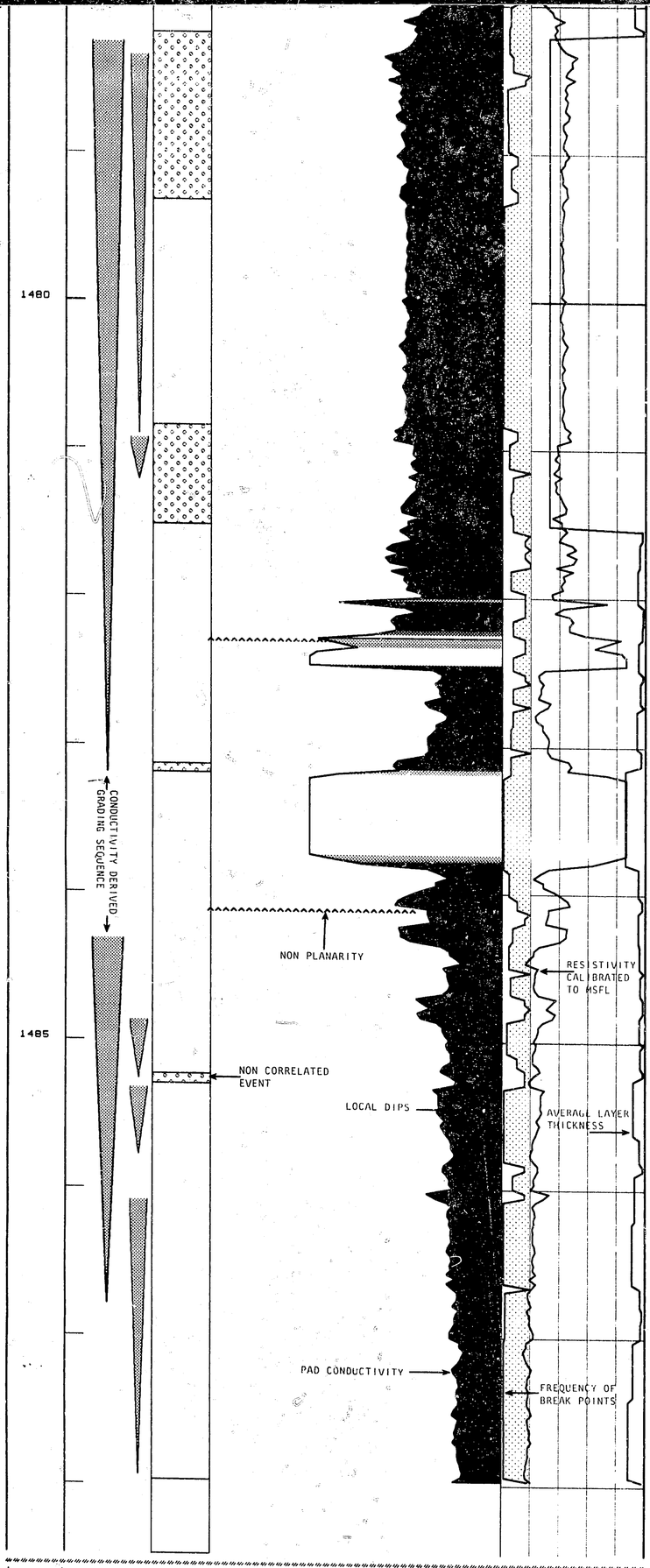
TRILLIUM SOQUIP ONEXCO ET AL BELUGA O-23

Report Prepared By:

David K. Norman
Manager
Petrographic Services

Steven Peter, P.Geol.
Senior Petrologist
Petrographic Services

These analyses, opinions or interpretations are based on observations and material supplied by the client to whom, and for whose exclusive and confidential use, this report is made. The interpretations or opinions expressed represent the best judgment of Core Laboratories - Canada Ltd. (all errors and omissions excepted); but Core Laboratories - Canada Ltd. and its officers and employees, assume no responsibility and make no warranty or representations as to the productivity, proper operation, or profitableness of any oil, gas or other mineral well or sand in connection with which such report is used or relied upon.



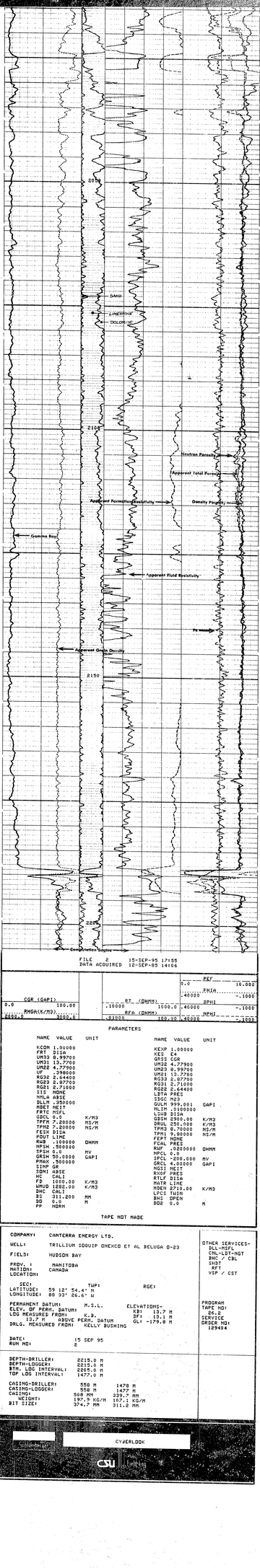
DEPTH | CYCLES | NON CORR. EVENT | NON-PLANARITY | PAD CONDUCTIVITY | LOCAL DIPS | 5M AVE.THICK 0 | .2 RESIS. 20K | FREQUENCY OF BREAKS

COMPANY CANTERRA ENERGY LTD.

WELL TRILLIUM SOQUIP ONEXCO BELUGA O-23

FIELD HUDSON BAY PROVINCE MANITOBA

Schlumberger



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DATA ACQUIRED 12-SEP-85 14:06

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		0.0	10.000
		FNLG	
		.40000	-.1000
	ST (DHMM)	DPHI	
CGR (GAPI)			
0.0	100.00	.10000	1000.0
		.40000	-.1000
RHGA(K/M3)	RFA (OHMM)	NPHI	
2000.0	3000.0	.01000	100.00
		.40000	-.1000

PARAMETERS

NAME	VALUE	UNIT	NAME	VALUE	UNIT
KCOM	1.00000		KEXP	1.00000	
FRT	DISA		KES	E4	
UM33	0.99700		GRSS	CGR	
UM31	13.7700		UM32	4.77900	
UM22	4.77900		UM23	0.99700	
UF	.398000		UM21	13.7700	
RG32	2.64400		RG33	2.87700	
RG23	2.87700		RG31	2.71000	
RG21	2.71000		RG22	2.64400	
SIS	NONE		LDTA	PRES	
MNLA	ABSC		ZGC	M23	
SLLM	.350000		GULM	999.001	GAPI
MDET	NEIT		HLIM	.3100000	
FRTC	MSFL		LSWB	DISA	
GDCL	0.0	K/M3	GRSH	2900.00	K/M3
TPFN	7.20000	MS/M	DRUL	250.000	K/M3
TPHS	7.20000	MS/M	TPM3	8.79000	MS/M
FESX	DISA		TPM1	9.00000	MS/M
PDUT	LIME		FEPT	NONE	
RWB	.100000	OHMM	FCAL	PRES	
MPSM	.500000		RWF	.0200000	OHMM
SPSH	0.0	MV	MPCL	0.0	
GRSM	50.0000	GAPI	SPCL	-200.000	MV
FMAX	.500000		GRCL	4.00000	GAPI
SIMP	GR		MGSI	NEIT	
SDMI	ABSC		RXOF	PRES	
FC	CALI		RTLF	DISA	
PS	1000.00	K/M3	MATR	LIME	
WMUD	1892.00	K/M3	MDEN	2710.00	K/M3
BHC	GAS		LPCS	THIN	
BS	311.200	MM	BHS	OPEN	
BD	0.0	M	BDB	0.0	M
PP	NORM				

TAPE NOT MADE

COMPANY: CANTERRA ENERGY LTD.

WELL: TRILLIUM SDDUIP ONEXCO ET AL BELUGA O-23

FIELD: HUDSON BAY

PROV. : MANITOBA
NATION: CANADA
LOCATION:

SEC: TWP: RGE:
LATITUDE: 59 12' 54.4" N
LONGITUDE: 88 33' 26.6" W

PERMANENT DATUM: M.S.L. ELEVATIONS-
ELEV. OF PERM. DATUM: KB: 13.7 M
LOG MEASURED FROM: K.B. DF: 13.1 M
13.7 M ABOVE PERM. DATUM GL: -179.8 M
DRLG. MEASURED FROM: KELLY BUSHING

DATE: 15 SEP 95
RUN NO: 2

DEPTH-DRILLER: 2215.0 M
DEPTH-LOGGER: 2215.0 M
BTM. LOG INTERVAL: 2205.0 M
TOP LOG INTERVAL: 1477.0 M

CASING-DRILLER: 558 M 1478 M
CASING-LOGGER: 558 M 1477 M
CASING: 508 MM 339.7 MM
WEIGHT: 197.9 KG/M 107.1 KG/M
BIT SIZE: 374.7 MM 311.2 MM

OTHER SERVICES-
DLL-MSFL
CNL-LDT-NGT
BHC / CBL
SHDT
RFT
VSP / CST

PROGRAM
TAPE NO:
PE-2
SERVICE
ORDER NO:
189404

CYBERLOOK

CSU

PROVINCE	MANITOBA
FIELD	HUDSON BAY
WELL	TRILLIUM SOUTH
	ONEXO ET AL REVISA D-12
COMPANY	CANADIAN ENERGY LTD.

PROVINCE	MANITOBA
FIELD	HUDSON BAY
WELL	TRILLIUM SOUTH ONEXO ET AL REVISA
COMPANY	CANADIAN ENERGY LTD.

LOCATION	
DATE	

OTTAWA COPY

Date Received	
Date Completed	
Date Released	
Date Expired	
Date Cancelled	

Schlumberger

WELL SEISMIC SURVEY (VSP)

CSU Field Log

CONFIDENTIAL

COMPANY: CANTERRA ENERGY LTD.

WELL: TRILLIUM SOQUIP ONEXCO ET AL BELUGA 0-23

FIELD: HUDSON BAY

PROV.: MANITOBA
NATION: CANADA
LOCATION:

SEC: TWP: RGE:
LATITUDE: 59 12' 54.4" N
LONGITUDE: 88 33' 26.6" W

CANADA OIL AND GAS LANDS ADMINISTRATION
ADMINISTRATION DU PÉTROLE ET DU GAZ DES TERRES DU CANADA
SEP 19 1985
ENGINEERING BRANCH
GÉNIE

OTHER SERVICES-
DLL-MSFL
RFT
CNL-LDT-NGT
SHDT
CST

PERMANENT DATUM: M.S.L.
ELEV. OF PERM. DATUM:
LOG MEASURED FROM: K.B.
13.7 M ABOVE PERM. DATUM
DRLG. MEASURED FROM: KELLY BUSHING

ELEVATIONS-
KB: 13.7 M
DF: 13.1 M
GL: -179.8 M

PROGRAM TAPE NO: 26.2
SERVICE ORDER NO: 129404

DATE: 13 SEP 85
RUN NO:

DEPTH-DRILLER: 1492.0 M
DEPTH-LOGGER: 1490.5 M
BTM. LOG INTERVAL: 2213.0 M
TOP LOG INTERVAL: 1250.0 M

CASING-DRILLER:	558 M	1478 M
CASING-LOGGER:	558 M	1477 M
CASING:	508 MM	339.7 MM
WEIGHT:	197.9 KG/M	107.1 KG/M
BIT SIZE:	374.7 MM	311.2 MM

300 3300

SHOT # 24.0 2080.0 M 9/13/85.19:47 TT 5 = 849.6 MS
REFERENCE SIGNAL .000110 CM/SEC @ 500.0 MS
GEOPHONE

300 3300

FILE 0 2

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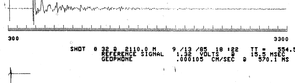

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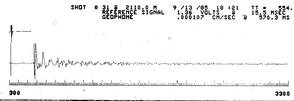

300 3300

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REFERENCE SIGNAL .000107 CM/SEC @ 570.3 MS
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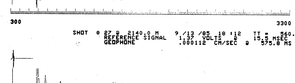

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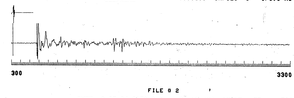

300 3300

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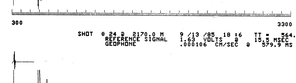
GEOPHONE



300 3300

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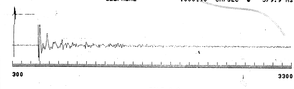
GEOPHONE



300 3300

FILE 0 2

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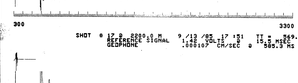

300 3300

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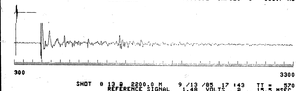
GEOPHONE



300 3300

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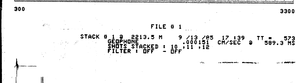
GEOPHONE



300 3300

FILE 0 2

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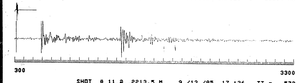
GEOPHONE



300 3300

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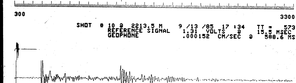

300 3300

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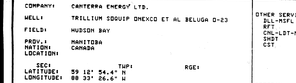

300 3300

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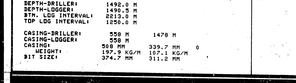
GEOPHONE



300 3300

FILE 0 1

STACK # 1.0 2213.5 M 9/13/85.20:23 TT 5 = 873.0 MS
REFERENCE SIGNAL CM/SEC @ 588.3 MS
GEOPHONE
FILTER : OFF

300 3300

SHOT # 26.0 2213.5 M 9/13/85.20:38 TT 5 = 870.8 MS
REFERENCE SIGNAL .000152 CM/SEC @ 588.4 MS
GEOPHONE

300 3300

SHOT # 11.0 2213.5 M 9/13/85.20:26 TT 5 = 870.9 MS
REFERENCE SIGNAL .000151 CM/SEC @ 588.5 MS
GEOPHONE

300 3300

SHOT # 10.0 2213.5 M 9/13/85.20:34 TT 5 = 869.1 MS
REFERENCE SIGNAL .000152 CM/SEC @ 588.4 MS
GEOPHONE

300 3300

COMPANY: CANTERRA ENERGY LTD.
WELL: TRILLIUM SOUVIP ONEXCO ET AL BELUGA D-23
FIELD: HUDSON BAY
PROV.: MANITOBA
NATION: CANADA
LOCATION:
SEC: TWP: RGE:
LATITUDE: 59 18' 54.4" N
LONGITUDE: 98 23' 26.4" W
PERMANENT DATUM: M.S.L. ELEVATIONS-
ELEV. OF PERM. DATUM: KB: 19.7 M
LOG MEASURED FROM: K.B. DF: 19.1 M
19.7 M ABOVE PERM. DATUM GL: -179.0 M
DRLG. MEASURED FROM: KELLY BUSHING

DATE: 19 SEP 85
RUN NO: 2

OTHER SERVICES-
DLL-MSFL
BFT
CNL-LDT-NGT
SHDT
CST

PROGRAM
TAPE NO: 6
SEQUENCE
ORDER NO: 129404

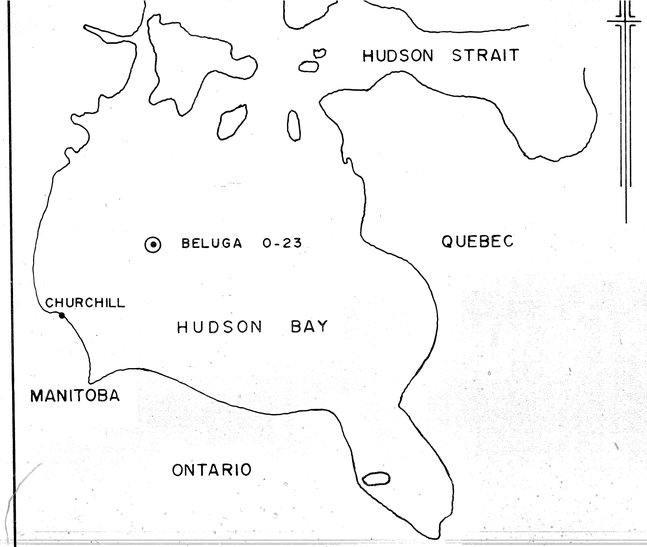
DEPTH-DRILLER: 1492.0 M
DEPTH-LOGGER: 1490.5 M
BTM. LOG INTERVAL: 2210.0 M
TOP LOG INTERVAL: 1250.0 M

CASING-DRILLER: 550 M 1470 M
CASING-LOGGER: 550 M
CASING: 508 MM 339.7 MM 0
WEIGHT: 197.9 KG/M 157.1 KG/M
BIT SIZE: 374.7 MM 311.2 MM

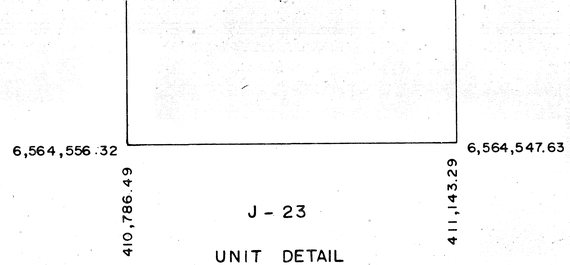
Checkmarks

WELL SEISMIC SURVEY (VSP)

CSU Field Log



HUDSON BAY
SCALE 1:12,500,000



UNIT DETAIL
SCALE 1:5000

HUDSON BAY

CANADA OIL AND GAS LAND REGULATIONS

FOR CANTERRA ENERGY LTD.
BY NORTECH SURVEYS (CANADA) INC.

WELL LOCATION CO-ORDINATES 1927 N.A.D.	
59° 12' 54.40" N. 88° 33' 26.60" W.	6 564 835.15 N. 411 084.92 E.

LEGEND

THE GEOGRAPHIC CO-ORDINATES SHOWN ARE REFERRED TO 1927 NORTH AMERICAN DATUM (N.A.D. 27)

THE U.T.M. CO-ORDINATES SHOWN ARE IN ZONE 16, CENTRAL MERIDIAN 87° W.

THE DISTANCES SHOWN ARE U.T.M. WITH A SCALE FACTOR OF 0.9996

THE WATER DEPTH OF THE LOCATION IS 180m

THE POSITIONING WILL BE CONDUCTED USING THE GLOBAL POSITIONING SYSTEM

CONFIRMATION OF POSITION WILL BE DONE BY DOPPLER SATELLITE

CANTERRA ENERGY LTD.

WITNESS

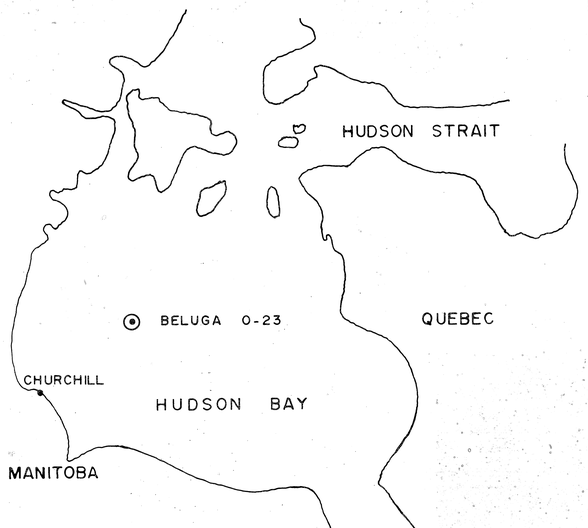
23 May 85
DATE

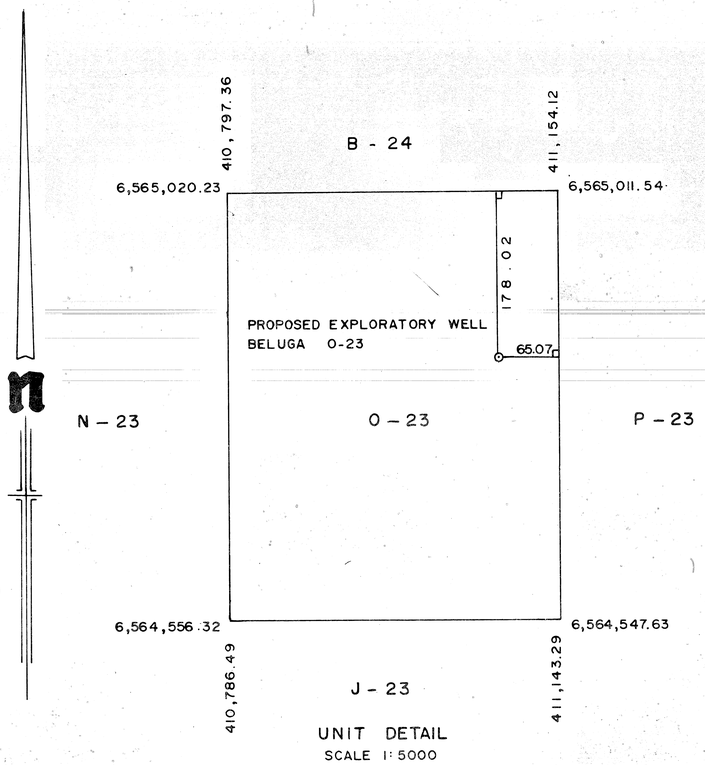
I, HEREBY CERTIFY THAT THIS TENTATIVE PLAN OF SURVEY WAS MADE UNDER MY PERSONAL SUPERVISION AND IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE.

C.L.S.

Ron Slade P. Eng.
WITNESS

May 16, 1985
DATE





TENTATIVE PLAN OF SURVEY OF PROPOSED EXPLORATORY WELL

TRILLIUM SOQUIP ONEXCO et al BELUGA 0-23

IN UNIT O , SECTION 23
GRID AREA 59°20', 88° 30'

HUDSON BAY

CANADA OIL AND GAS LAND REGULATIONS

FOR CANTERRA ENERGY LTD.
BY NORTECH SURVEYS (CANADA) INC.

LEGEND

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