

L 3564-915 PF: 3633-3647 114 B0 + fr wtr.

DST 3614-65 30606060 2014' GCO (33')

SIP 1243-1243, FP 87-415, 459-761
HP 1804-1783*

conf: to #1 Elvin in NWSE 14-3-27W Sec. 24-35-27W

SE 1/4

Decatur Co.

Murfin Drlg. Co. #2 Elvin

spud 11/6/78 temp. compl. 12/18/78

2656 MB

conf. Gillespie SE

Orpad 3500

LANS 3574

TD 4009

E Or-Tor-LMC

Toronto 3559

BHC 3779

Arbuckle 3982
P-E 4008

DST 3481-3520 45 45 45 45 Rec 260' HOCM

SIP 1158/1111 FP 69-115

DST 3528-90 ↗ ↖ Rec 250' HO & GCM

1970' GCO, SIP 1251/1251 FP 138-295

✓ DST 3548-3627 ↗ ↖ Rec GTS/55,

2450 GOC, 42°, SIP 1251/1251 FP 230-925

DST 3619-3700 30/60/60/60 720' GIP + 270' Hot

GCM + 1014 fluid, 240' wtr SIP 1181/1158

FP 92-670

DST 3696-3760 30/30/30/30 60' M SIP 437/138

FP 92-92

PF: 3593-95 1/2 100 GA Swd 180 B0/9 hrs.

152 BOPD + 8 BW

MURFIN DRILLING COMPANY

CHEMICAL RESEARCH AND DEVELOPMENT DEPARTMENT

HALLIBURTON SERVICES
DUNCAN, OKLAHOMA

LABORATORY REPORT

No. F11-T213-78

Mr. Marvin Klein

Date December 15, 1978

Halliburton Services

Wichita, Kansas

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below results of our examination of the submitted core samples.

d by Murfin Drilling Company

Well: Elvin No. 2

Location: Sec. 14, T3S, R27W

<u>Formation</u>	<u>Depth</u>
Toronto	3,561 feet
Kansas City "A"	3,575 and 3,579 feet
Kansas City "B"	3,595 feet

Purpose

These formation cores were submitted for the following tests: x-ray diffraction, acid solubility, rock properties, scanning electron microscope (SEM), petrographic, regained permeability, and immersion.

Conclusions

The requested laboratory tests were performed and the results are presented in the Data Section of this report.

ICE:

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DataCore Analysis

<u>Sample No.</u>	<u>Depth (feet)</u>	<u>Porosity (%)</u>	<u>Air Permeability (md)</u>	<u>Solubility* (%)</u>
1	3,561	7.12	2.55	91.8
2	3,575	5.35	0.58	79.5
3	3,579	10.24	15.79	96.5
4	3,595	14.81	434.67	96.8

* This is solubility in dilute hydrochloric acid as calcium carbonate only.

Immersion Tests

Effects of immersion under vacuum at 110°F (est. BHT) for one hour in the following:

<u>Sample No.</u>	<u>Depth (feet)</u>	<u>Fresh Water</u>	<u>2% KCl</u>	<u>2% KCl*</u>	<u>7 1/2% MCA</u>	<u>6% HF</u>	<u>Kerosene</u>
1	3,561	V-SAF	NFR	NFR	**	**	NFR
2	3,575	MAF	SAF	NFR	**	**	NFR
4	3,595	NFR	NFR	NFR	**	**	NFR

NFR = No fines released.

V-SAF = Very small amount fines.

SAF = Small amount fines.

MAF = Moderate amount fines.

* 0.5 gal. CLA-STA II compound per 1,000 gallons.

** Tests were not conducted in acid base fluids due to the high solubility of the submitted sample.

Data (Cont'd)Qualitative X-ray Diffraction

Sample No.	<u>1</u>	<u>2</u>	<u>3</u>
Depth (ft)	3,561	3,575	3,579
Quartz	SM	SM	VS
Feldspar	VS	SM	TR
Calcite	MJ	MJ	MJ
Dolomite	SM	--	TR
Kaolinite	--	--	--
Illite	--	--	--
Smectite	--	--	--
Mixed Layer Clay	TR	VS	--
Chlorite	--	--	--

Sample No.	<u>4</u>	<u>Blue Shale</u>
Depth (ft)	3,595	3,575
Quartz	VS	MJ
Feldspar	VS	SM-MD
Calcite	MJ	SM
Dolomite	TR	--
Kaolinite	--	SM
Illite	--	SM-MD
Smectite	--	--
Mixed Layer Clay	--	MD-LG
Chlorite	--	SM

<u>Coding</u>	<u>Reported Amount</u>	<u>Approximate Percentage Range</u>
TR	Trace	0.1 to 1.0
VS	Very Small	1.0 to 3.0
SM	Small	3.0 to 10.0
MD	Moderate	10.0 to 20.0
LG	Large	15.0 to 40.0
MJ	Major	40.0 to 100.0

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Data (Cont'd)Petrographic Examination

<u>Sample No.</u>	<u>Depth (feet)</u>	<u>Description</u>
1	3,561 (Toronto)	<u>FORAMINIFERID LIMESTONE</u> - Variety of fusulinids and other fossils in a medium to fine grained carbonate matrix; trace of mixed layer clay coating localized areas of carbonate cement; stylolitic seam observed; some visible porosity.
2	3,575 (Kansas City "A")	<u>FORAMINIFERID LIMESTONE</u> - Large, prolific fusulinids in a very fine grained carbonate matrix; stylolitic seam observed.
3	3,579 (Kansas City "A")	<u>SLIGHTLY FOSSILIFEROUS LIMESTONE</u> - Interlayered fine and coarse grained carbonate matrix interspersed with foraminifera and brachiopods; naturally fractured.
4	3,595 (Kansas City "B")	<u>FORAMINIFERID LIMESTONE</u> - Similar to Sample No. 1 with no visible clays.

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Data (Cont'd)Scanning Electron Microscope Examination

Fig. 1; Neg. No. 21805-2675; Sample No. 1; Depth: 3,561 ft; 200X.
General view of fine-grained limestone and clean pore space.



Fig. 2; Neg. No. 21805-2676; Sample No. 1; Depth: 3,561 ft; 1,000X.
Closer view of carbonate matrix.

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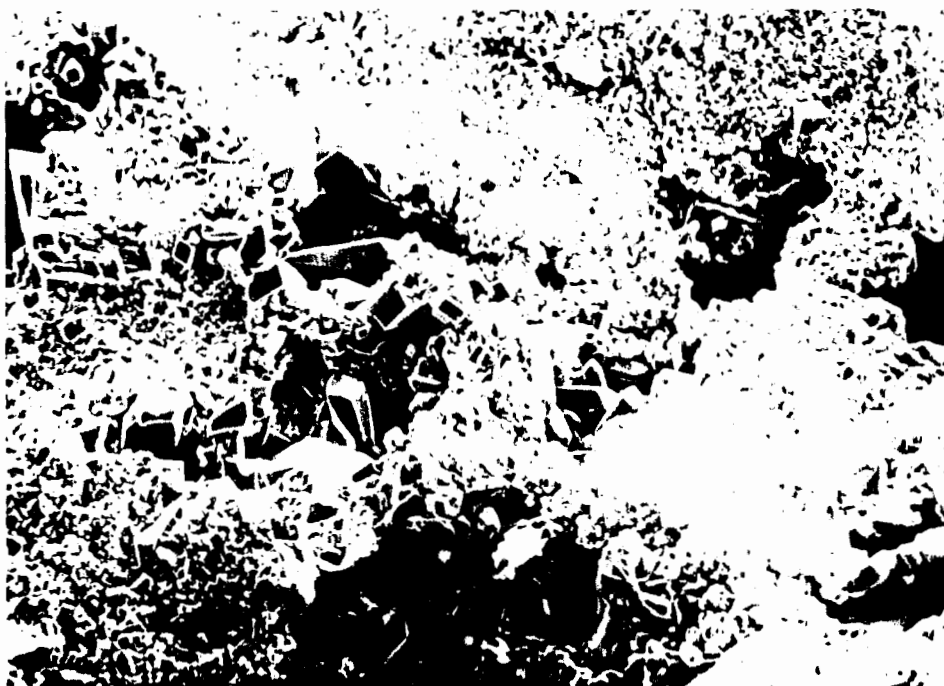
Data (Cont'd)Scanning Electron Microscope Examination

Fig. 1; Neg. No. 21805-2675; Sample No. 1; Depth: 3,561 ft; 200X.
General view of fine-grained limestone and clean pore space.



Fig. 2; Neg. No. 21805-2676; Sample No. 1; Depth: 3,561 ft; 1,000X.
Closer view of carbonate matrix.

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Data (Cont'd)SEM (Cont'd)

Fig. 3; Neg. No. 21805-2677; Sample No. 2; Depth: 3,575 ft; 50X. General view of Foraminiferid Limestone (structure in center is a fusulinid).

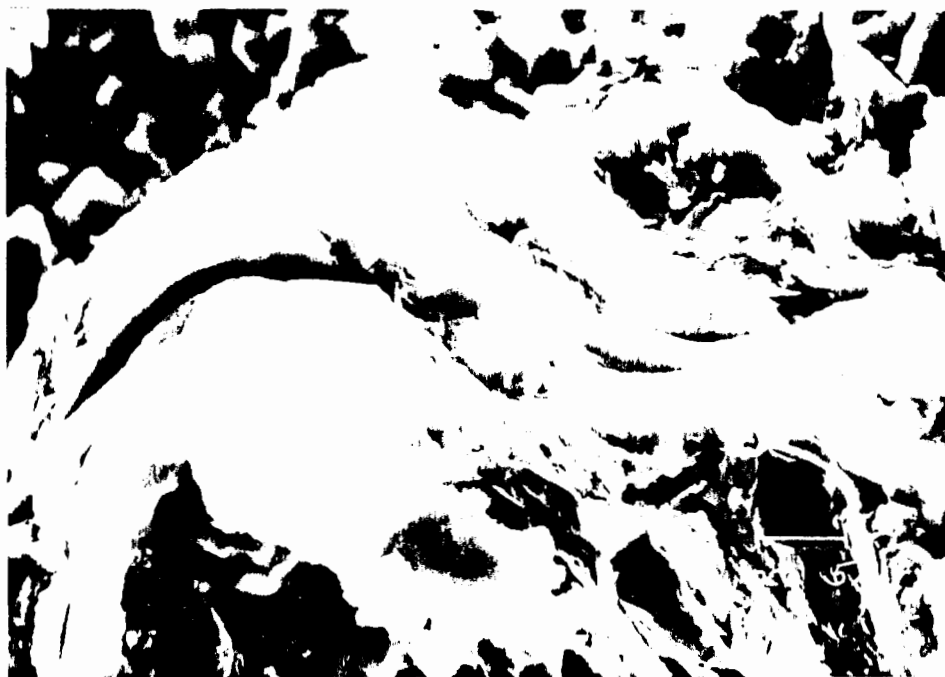


Fig. 4; Neg. No. 21805-2678; Sample No. 2; Depth: 3,575 ft; 2,000X. Close-up view of mixed layer clay coating a quartz grain.

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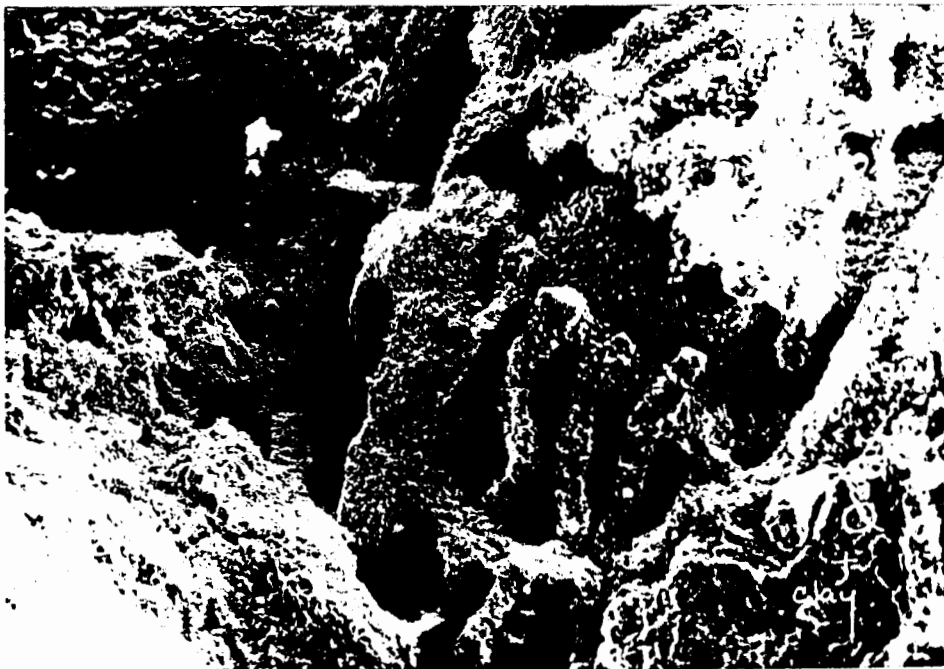
Data (Cont'd)SEM (Cont'd)

Fig. 3; Neg. No. 21805-2677; Sample No. 2; Depth: 3,575 ft; 50X. General view of Foraminiferid Limestone (structure in center is a fusulinid).

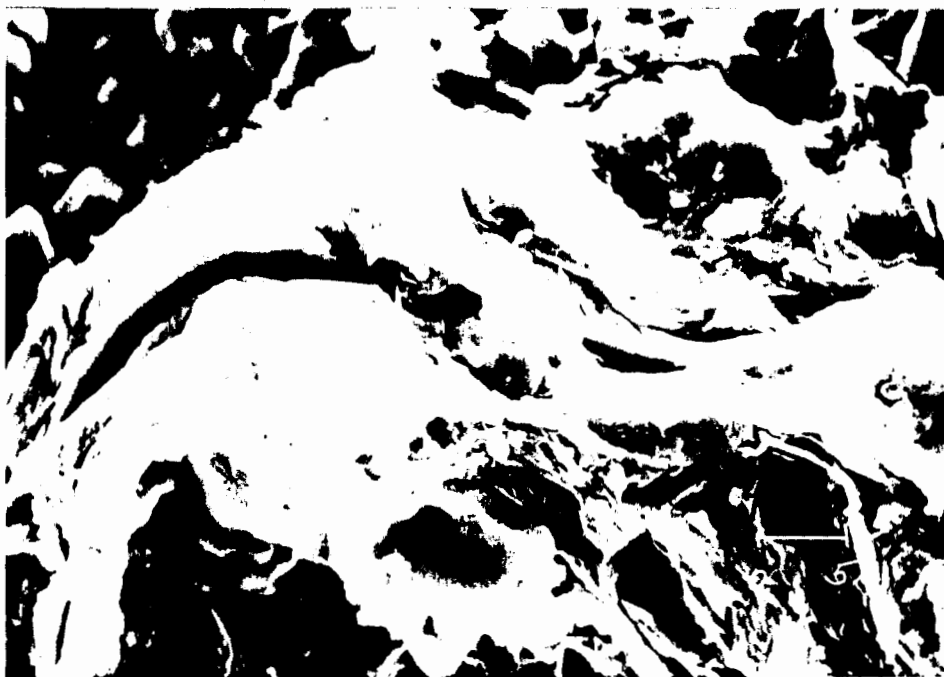


Fig. 4; Neg. No. 21805-2678; Sample No. 2; Depth: 3,575 ft; 2,000X. Close-up view of mixed layer clay coating a quartz grain.

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Data (Cont'd)SEM (Cont'd)

Fig. 5; Neg. No. 21805-2679; Sample No. 3; Depth: 3,579 ft; 2,000X. Close-up view of a tight interlayered fine and coarse grained limestone.

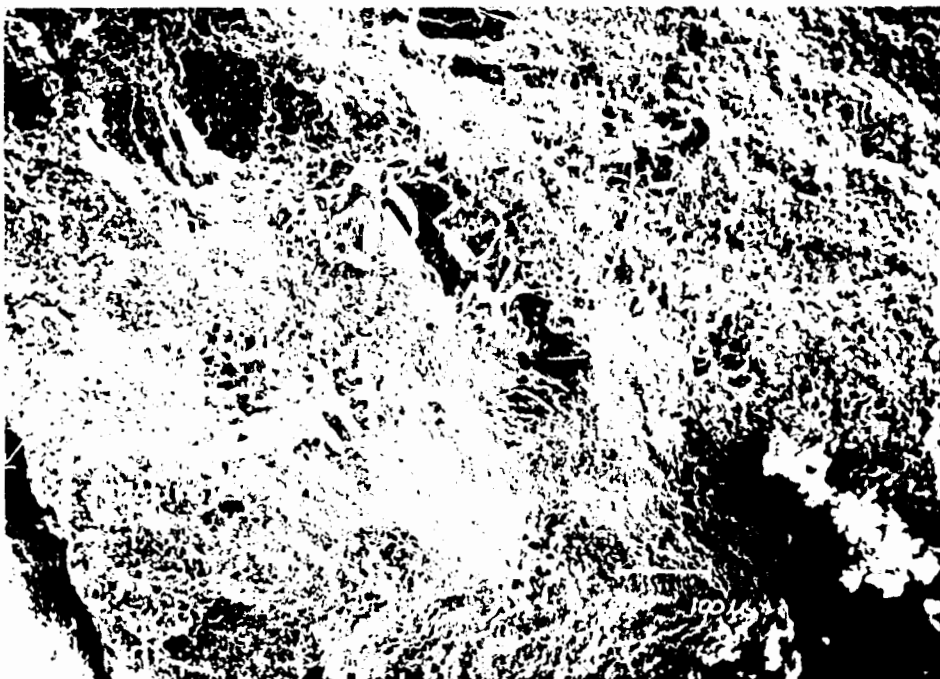


Fig. 6; Neg. No. 21805-2680; Sample No. 4; Depth: 3,595 ft; 100X. General view of fine grained limestone; note natural fracture in lower left hand corner and clean pore in lower right hand corner.

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Data (Cont'd)SEM (Cont'd)

Fig. 5; Neg. No. 21805-2679; Sample No. 3; Depth: 3,579 ft; 2,000X. Close-up view of a tight interlayered fine and coarse grained limestone.



Fig. 6; Neg. No. 21805-2680; Sample No. 4; Depth: 3,595 ft; 100X. General view of fine grained limestone; note natural fracture in lower left hand corner and clean pore in lower right hand corner.

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Data (Cont'd)

SEM (Cont'd)

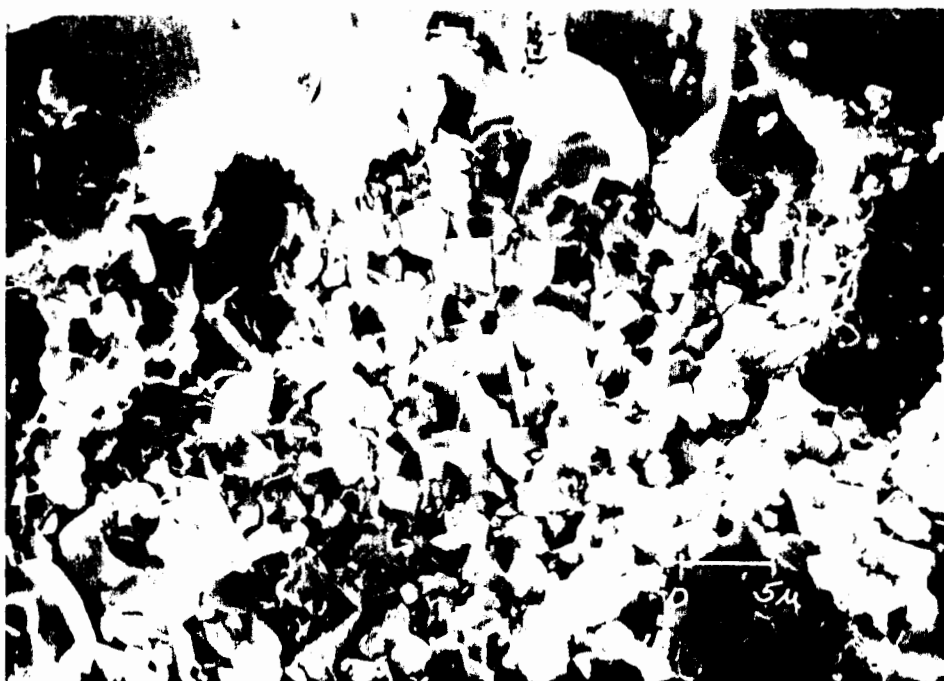


Fig. 7; Neg. No. 21805-2681; Sample No. 4; Depth: 3,595 ft; 2,000X.
Close-up view of fine grained carbonate matrix.

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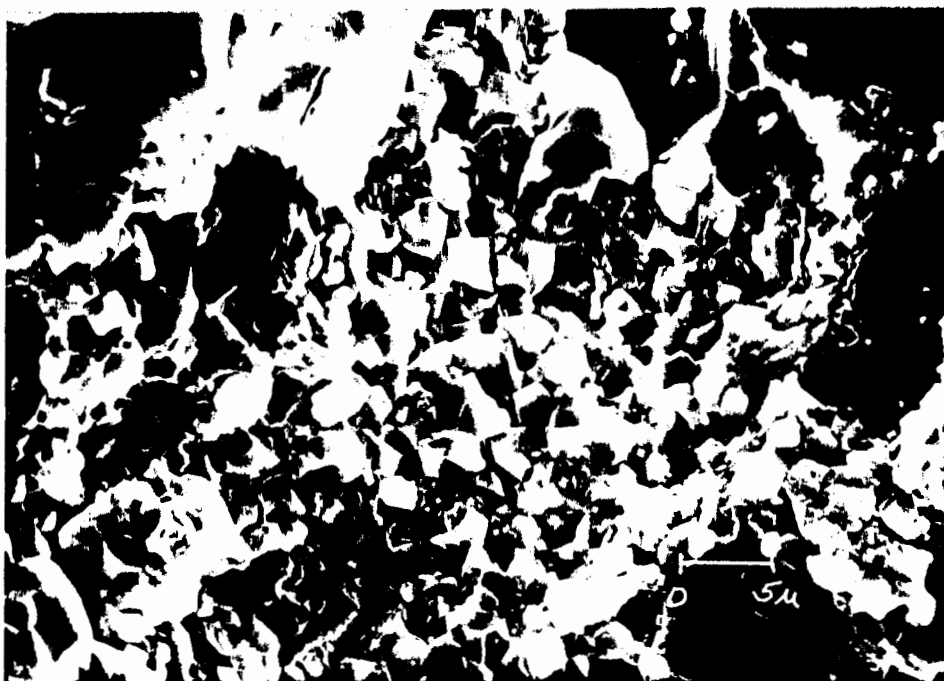
Data (Cont'd)SEM (Cont'd)

Fig. 7; Neg. No. 21805-2681; Sample No. 4; Depth: 3,595 ft; 2,000X.
Close-up view of fine grained carbonate matrix.

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Murfin Drilling Co. #2 Elvin

Page 1

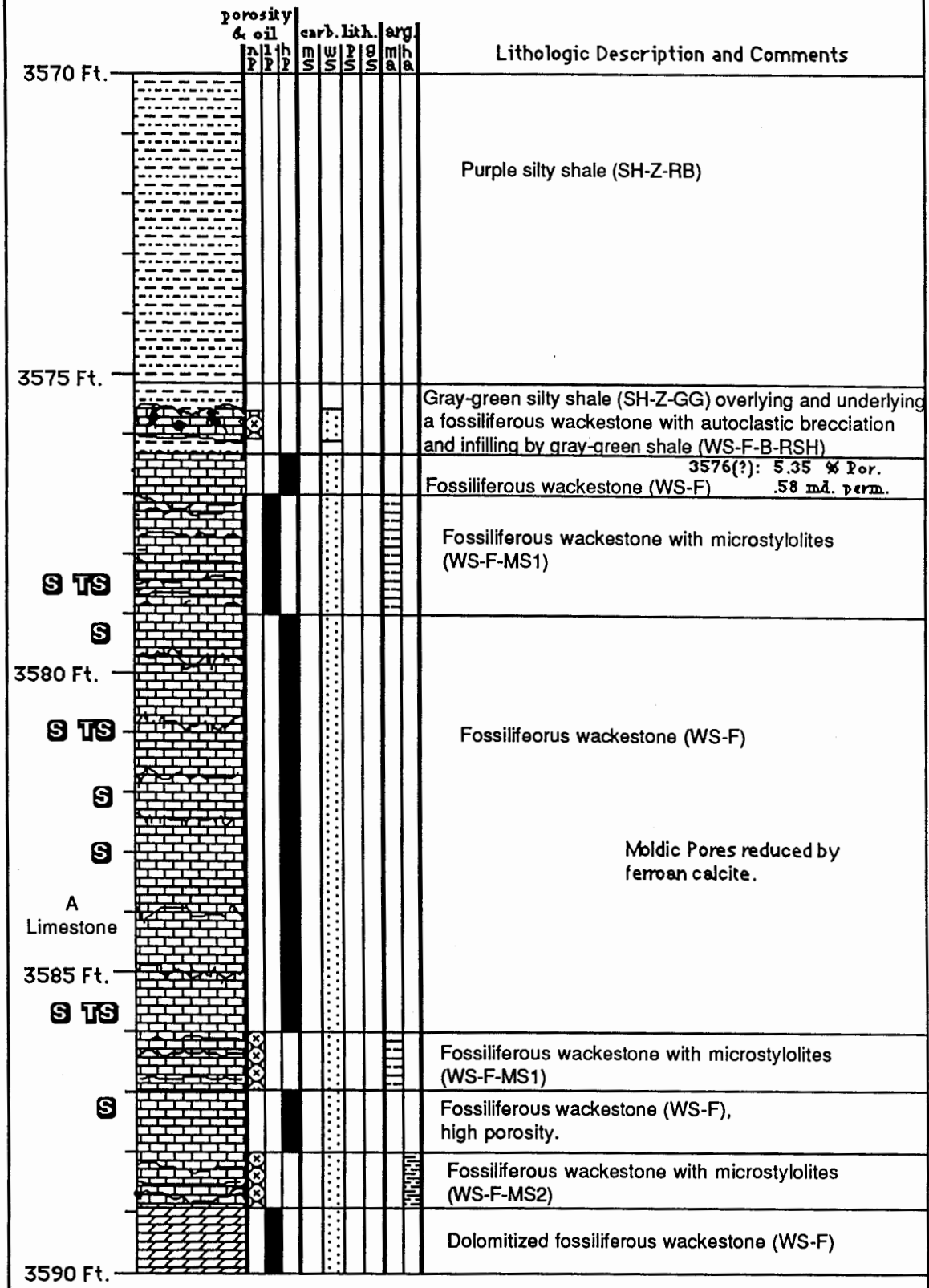
SE NW SE 14-3S-27W, Decatur Co., Kansas

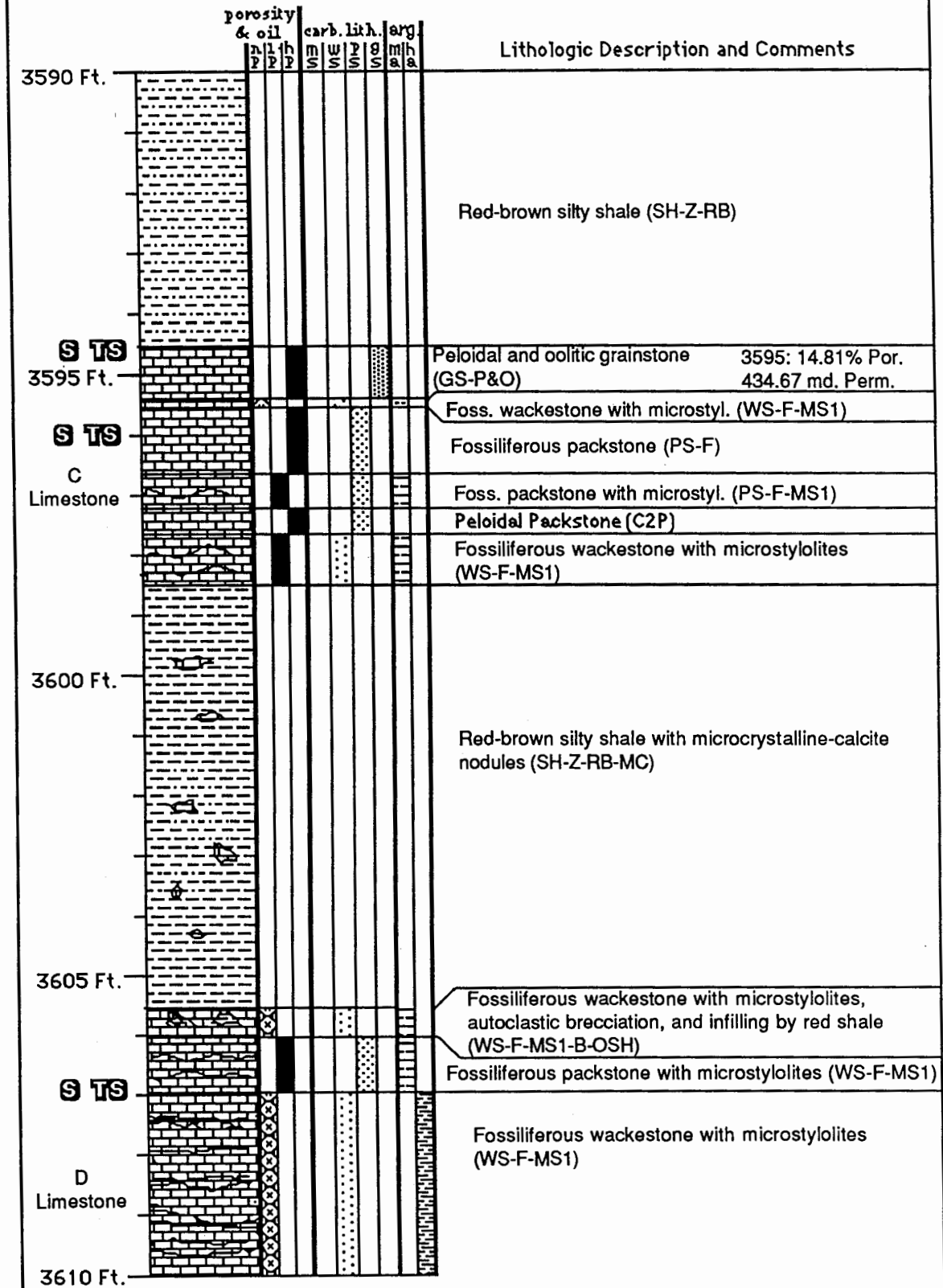
Drilled and completed for oil prod. in 1978.

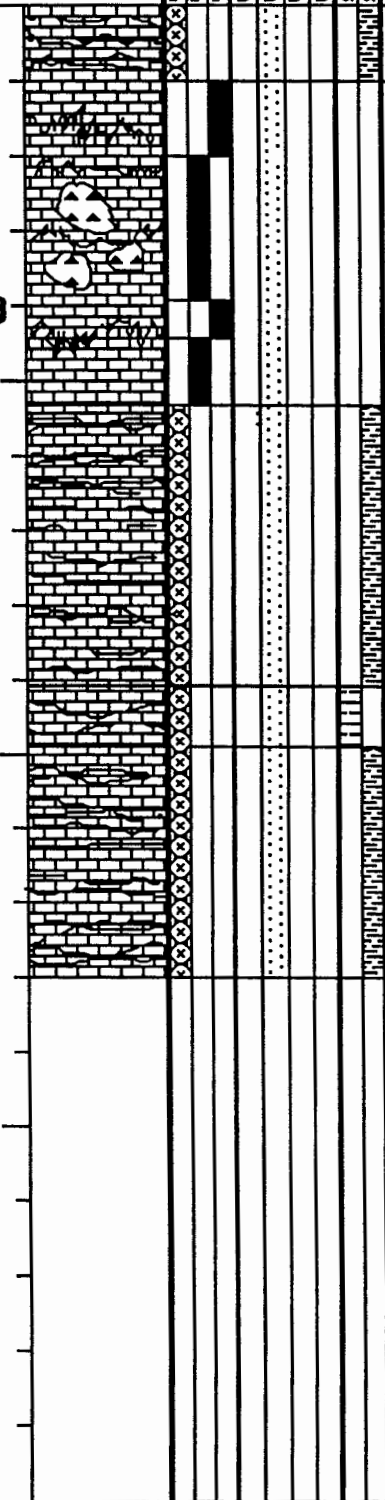
Perf. 3593-95.5 (3594.5-97 in Core Descr.),

IPP 152 BOPD + 8 BWPD.

[illegible]



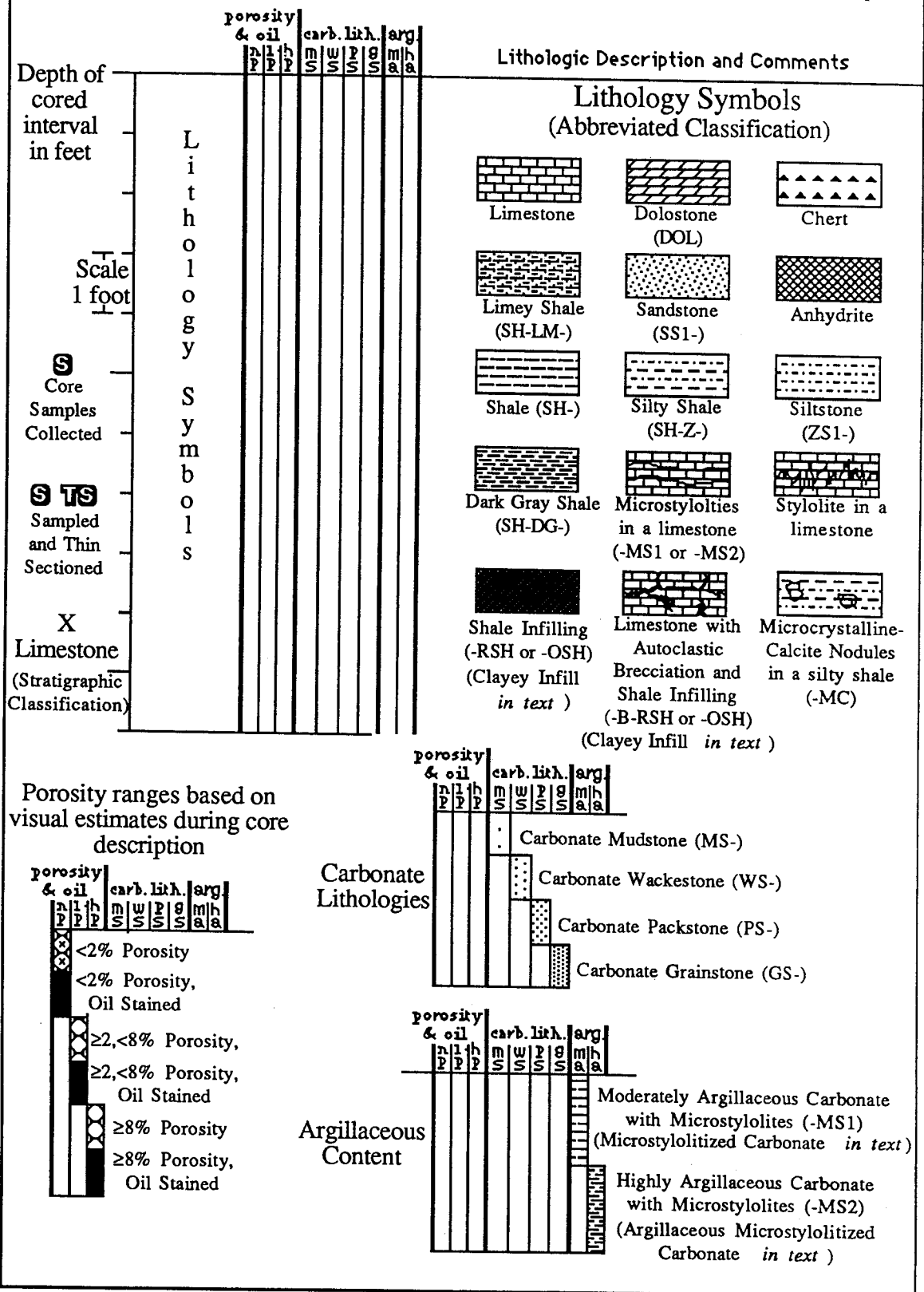


Murfen Drilling Co. #2 Elvin											Page 4
	porosity & oil			carb. lith.			arg.		Lithologic Description and Comments		
	n	l	p	m	w	p	g	m		h	a
3610 Ft.											Fossiliferous wackestone with microstylolites (WS-F-MS2)
S TS											Fossiliferous wackestone (WS-F)
											Chert nodules and possible post-stylolite dissolution are present.
3615 Ft.											Fossiliferous wackestone with microstylolites (WS-F-MS2)
3620 Ft.											Fossiliferous wackestone with microstylolites (WS-F-MS1)
											Fossiliferous wackestone with microstylolites (WS-F-MS2)
3623 Ft.											3623 Ft. to 3640 Ft. not cored

		porosity & oil	carb.	lith.	arg.	Lithologic Description and Comments
		n l p	m w s	p g m h a		
3640 Ft.						Red-brown silty shale (SH-Z-RB)
S TS		X				Oolitic grainstone (GS-O)
F Limestone		X				
3645 Ft.						Ooid and oncolite packstone (PS-O&ONC)
						Laminated mudstone with microstylolites (MS-L-MS1)
						Carbonate mudstone with microstylolites, autoclastic brecciation, and infilling by red shale (MS-MS1-B-OSH)
3650 Ft.						Red-brown silty shale (SH-Z-RB)
		X				Fossiliferous wackestone with autoclastic brecciation and infilling by green shale (WS-F-B-RSH)
3655 Ft.		X				Oolitic grainstone (GS-O)
S G Limestone						Fossiliferous packstone (PS-F) Baroque dolomite cement is common.
						Fossiliferous wackestone (WS-F) Partial recrystallization by dolomite; intercrystalline porosity is present.
3660 Ft.						

		porosity & oil							carb. lith.							arg.							Lithologic Description and Comments
		n							m							a							
3660 Ft.	S TS G Limestone																						Fossiliferous wackestone (WS-F) with partial recrystallization by dolomite.
																							Fossiliferous wackestone with microstylolites (WS-F-MS1)
																							Fossiliferous wackestone (WS-F)
3665 Ft.	S TS																						Fossiliferous wackestone with microstylolites (WS-F-MS1)
																							Fossiliferous wackestone (WS-F)
																							Both microstylolites and stylolites are present.
																							Dark green shale with brachiopods (SH-F-DG)
3670 Ft.	S TS G' Limestone																						Fossiliferous wackestone with microstylolites (WS-F-MS1)
																							Fusulinid grainstone (GS-F)
																							Gray silty shale (SH-Z-GG)
3675 Ft.																							Red-brown silty shale (SH-Z-RB)
3680 Ft.																							

		porosity & oil	n.l.h.	m.s.	w.s.	p.g.s.	arg. m.h.a.	Lithologic Description and Comments
3680 Ft.								Red-brown silty shale (SH-Z-RB)
3685 Ft.								Fossiliferous wackestone with microstylolites, autoclastic brecciation, and infilling by red shale (WS-F-MS1-B-OSH)
								Laminated mudstone with microstylolites (MS-L-MS1)
								Green silty shale (SH-Z-GG)
H Limestone								Fossiliferous wackestone with autoclastic brecciation and infilling by green shale (WS-F-B-RSH)
3690 Ft.								Oil staining, but no apparent porosity.
S TS								Fossiliferous wackestone (WS-F)
3695 Ft.								
								Fossiliferous wackestone with microstylolites (WS-F-MS2)
								Fossiliferous wackestone (WS-F)
								Fossiliferous wackestone with microstylolites (WS-F-MS1)
								Fossiliferous wackestone with microstylolites (WS-F-MS2)
3700 Ft.								Red-brown silty shale (SH-Z-RB)
	Bottom of Core							



	porosity & oil			carb. lith.				arg.	Lithologic Description and Comments		
	n	l	h	m	w	p	g	m		h	a
											<p align="center">LITHOLOGY CLASSIFICATION</p> <p>After the written description of each stratum, the lithology is classified by an abbreviated classification in parenthesis.</p> <p>Carbonate Lithologies</p> <p>(MS-) Carbonate Mudstone (PS-) Carbonate Packstone (WS-) Carbonate Wackestone (GS-) Carbonate Grainstone (DOL-) Dolostone (LM-SH-) Limey Shale (Highly argillaceous microstylolitized carbonate <i>in text</i>)</p> <p>Modifiers to Carbonate Lithologies</p> <p>(-F) Fossiliferous (-O) Oolitic (-P) Peloidal (-ONC) Oncolitic (-LM) Laminated (-FR) Fractured</p> <p>(-MS1) Microstylolites (less argillaceous) (microstylolitized carbonate <i>in text</i>) (-MS2) Microstylolites (more argillaceous) (argillaceous microstylolitized carbonate <i>in text</i>)</p> <p>(-B) Autoclastic Brecciation (-RSH) Infilling by Gray-Colored Shale (-OSH) Infilling by Red-Colored Shale</p> <p align="right">} Clayey infill <i>in text</i></p> <p align="center">Shales</p> <p>(SH-) Shale</p> <p align="center">Modifiers to Shales</p> <p>(-Z) Silty (-GG) Gray-Green (-F) Fossiliferous (-DG) Dark Gray (-RB) Red-Brown (-BL) Black (-MC) Contains Microcrystalline-Calcite Nodules</p> <p align="center">Other Lithologies</p> <p>(SS1-) Very-fine grained Sandstone (ZS-) Siltstone</p>

1970' 660
1251-1251

TORONTO
3555
(-899)

3551
(-915)

DST #3
45-45-45-45
OTS 55"
Rec 2450' 660
BHP 1251/1251

DST #4
3619-3700
30-60-60-60
Rec 720' 61P
270' HOCM
1014 FLUID
240' H₂O
BHP 1181/1181

DST #5
3696-3700
Rec 60' MUD
437/138

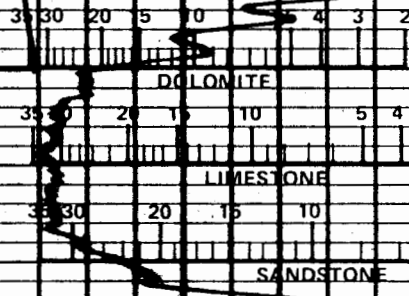
BKC

3700

3800

CORE

CORE



WEIGHT INDICATOR

GUARD

NEUTRON

GAMMA RAY

CALIPER