HYCALOG, INC.
CORE ANALYSIS REPORT

Unit

Date 2-6-63

COMPANY Thomas & Brewer WELL Collingwood #1 FIELD

SEC. 21 T. 32 R. 30W COUNTY Meade STATE Kansas

CORE NO. 5 FROM 5994 TO 6024 FORMATION St Louis

Sample No.	Depth Feet	Permeability Millidarcys		Porosity Percent	Residual Liquid Saturations % of Pore Space		Probable Production	REMARKS
		Horizontal	Vertical		Oil	Total Water		
1	5996.5	TR		4.9	Tr	70.0	Nil	Hd dnse tite frac lm
2	97.5	TR		3.9	0	66.5	"	
3	6001.5	.45		9.0	Tr	52.0	"	
4	02.5	24.4		7.6	3.3	57.0	Water	
5	03.5	26.4		7.0	Tr	61.5	"	
6	13.5	24.4		9.4	5.3	14.8	Gas-Oil	Lmst- Oolitic foss
7	14.5	148.0		9.8	5.1	22.2	" "	
8	15.5	65.0		16.6	3.0	28.8	" "	
9	16.5	110.0		16.7	9.0	20.0	Oil	
10	17.5	27.6		17.7	9.6	29.4	"	
11	18.5	1.23		12.0	12.5	25.0	"	
12	19.5	24.6		17.1	13.0	28.0	"	
13	20.5	24.2		13.9	13.6	21.8	"	
14	21.5	16.5		13.3	10.8	22.6	"	
15								
16								
17								
18								

8' as 6013.5 to 6021
9' tighter 35% higher
gas

HYCALOG, INC.

CORE ANALYSIS REPORT

Unit

Date 2-8-63

COMPANY Thomas & Brewer WELL Collingwood #1 FIELD

SEC. T. R. COUNTY Meade STATE Kansas

CORE NO. 6 FROM 6024 TO 6043 FORMATION St. Louis

Sample No.	Depth Feet	Permeability Millidarcys		Porosity Percent	Residual Liquid Saturations % of Pore Space		Probable Production	REMARKS
		Horizontal	Vertical		Oil	Total Water		
1	6024.5	31.0		6.3	0	20.6	Nil	Lime- Foss, Oolitic
2	25.5	2.18		10.2	Tr	35.2	Nil-Oil	
3	26.5	Tr		11.8	5.6	34.2	" "	
4	27.5	.53		12.4	10.5	35.4	" "	
5	28.5	Tr		10.8	11.1	29.2	" "	
6	29.5	62.8		5.3	18.8	49.0	Oil	
7	30.5	4.65		14.6	11.0	21.2	"	
8	31.5	1.58		7.4	17.5	35.0	"	
9	32.5	TR		13.0	15.4	28.4	Nil-Oil	Lime- Dense, Hd, foss, ool
10	33.5	.85		7.4	14.8	35.0	" "	
11	34.5	Tr		9.6	15.7	32.2	" "	
12	35.5	Tr		9.8	15.2	31.6	" "	
13	36.5	Tr		7.8	12.8	33.4	" "	
14	37.5	Tr		7.1	7.0	35.7	" "	
15	38.5	Tr		8.2	11.0	28.0	" "	

HYCALOG, INC.

CORE ANALYSIS REPORT

Unit

Date 2-10-63

COMPANY Thomas & Brewer WELL Collingwood #1 FIELD

SEC. T. R. COUNTY Meade STATE Kansas

CORE NO. 8 FROM 6072 TO 6102 FORMATION St. Louis

Sample No.	Depth Feet	Permeability Millidarcys		Porosity Percent	Residual Liquid Saturations % of Pore Space		Probable Production	REMARKS
		Horizontal	Vertical		Oil	Total Water		
1	6074.5	.21		16.0	0	62.5	Mil-Water	Lmst- Md, Dnse Cherty
2	76.5	.29		4.8	Tr	27.0	" "	
3	78.5	.40		4.1	0	51.2	" "	
4	82.5	1.8		21.1	0	90.5	" "	
5	85.5	.38		15.2	3.3	82.5	" "	
6	87.5	.86		5.8	0	54.6	" "	
7	88.5	Tr		4.7	0	68.0	" "	
8	89.5	12.2		5.2	10.2	24.5	Mil-Oil	Lmst- Foss., Oolitic
9	90.6	15.7		4.5	11.1	28.8	" "	
10	91.0	9.6		4.8	8.4	27.5	" "	

Hycalog, Inc.
P. O. BOX 7197
505 AERO DRIVE
SHREVEPORT, LOUISIANA
TELEPHONE 425-7791

February 15, 1963

Thomas & Brewer
111 East Eleventh Street
Liberal, Kansas

Attention: Mr. Glen Thomas

Subject: Core Analysis Report on
Collingwood No. 1 well
Meade County, Kansas
NW SE Sec. 21-32-30

Gentlemen:

We have performed core analysis on diamond core samples taken from this well between the depths of 5,996.0 and 6,091.5 feet. The results of the analysis and a summary sheet of the calculations are attached.

6,013.5 - 6,015.5 - Gas

The zone contains 3.0 net feet of permeable and porous limestone which is interpreted to be gas productive. Since it is in immediate contact and contiguous with the underlying oil zone, this gas is interpreted to be the gas cap of the oil reservoir.

6,016.5 - 6,021.5 - Oil
6,029.5 - 6,031.5 - Oil

These two zones, which are separated by low or impermeable streaks, contain a total of 9.0 net feet of permeable and porous limestone and the predicted production is oil.

6,089.5 - 6,091.5 - Possibly Oil

This section is overlain by a low permeability waterbearing section of dense, cherty lime and will possibly offer some problems in making a successful commercial completion. The zone contains 3.0 net feet of permeable and porous limestone, but the porosity is extremely low and the resulting primary recovery is marginal.

Hycalog, Inc.
P. O. BOX 7197
505 AERO DRIVE
SHREVEPORT, LOUISIANA
TELEPHONE 425-7791

We sincerely appreciate the opportunity to be of service and trust that these results will be of value to you in making a successful well.

Yours very truly,

HYCALOG, INC.

James A. Latham
Reservoir Consultant

STATE OF LOUISIANA
JAMES ARTHUR LATHAM
REG. No. 7406
REGISTERED
PROFESSIONAL ENGINEER
IN
PETROLEUM ENGINEERING

JAL:cm
Attachments

Hycalog, Inc.
P. O BOX 7197 505 AERO DRIVE
Shreveport, Louisiana

SUMMARY OF CORE ANALYSIS & CALCULATIONS

Company: Thomas and Brewer

Well: Collingwood No. 1

Permeable Section Depths	6013.5 - 6015.5	6016.5 - 6021.5	6029.5 - 6031.5	6089.5 - 6091.5
Permeable Thickness Net Feet	3.0	6.0	3.0	3.0
Permeability Average Millidarcys	79.1	34.0	23.0	12.5
Productivity Capacity Millidarcy-Feet*	237.3	204.0	69.0	37.5
Porosity Average Percent	11.9	15.1	9.1	4.8
Reservoir Pore Space Total Average Barrels/Acre Foot	(1)	1171	706	372
Residual Oil Average % of Pore Space	4.5	11.4	15.8	9.9
Total Water Average % of Pore Space	21.9	24.5	35.1	27.6

OIL RECOVERY CALCULATIONS

By Gas Expansion Barrels/Acre Foot (to zero pressure)	(1)	113	52	28
By Complete Water Drive Barrels/Acre Foot (to 100% Water Cut)	(1)	574	241	176

(1) Gas

*Note: Fractures present or successful use of acidization may increase the productive capacity materially.

HYCALOG, INC.

CORE ANALYSIS REPORT

Company: Thomas & Brewer — Location: — File: 3594

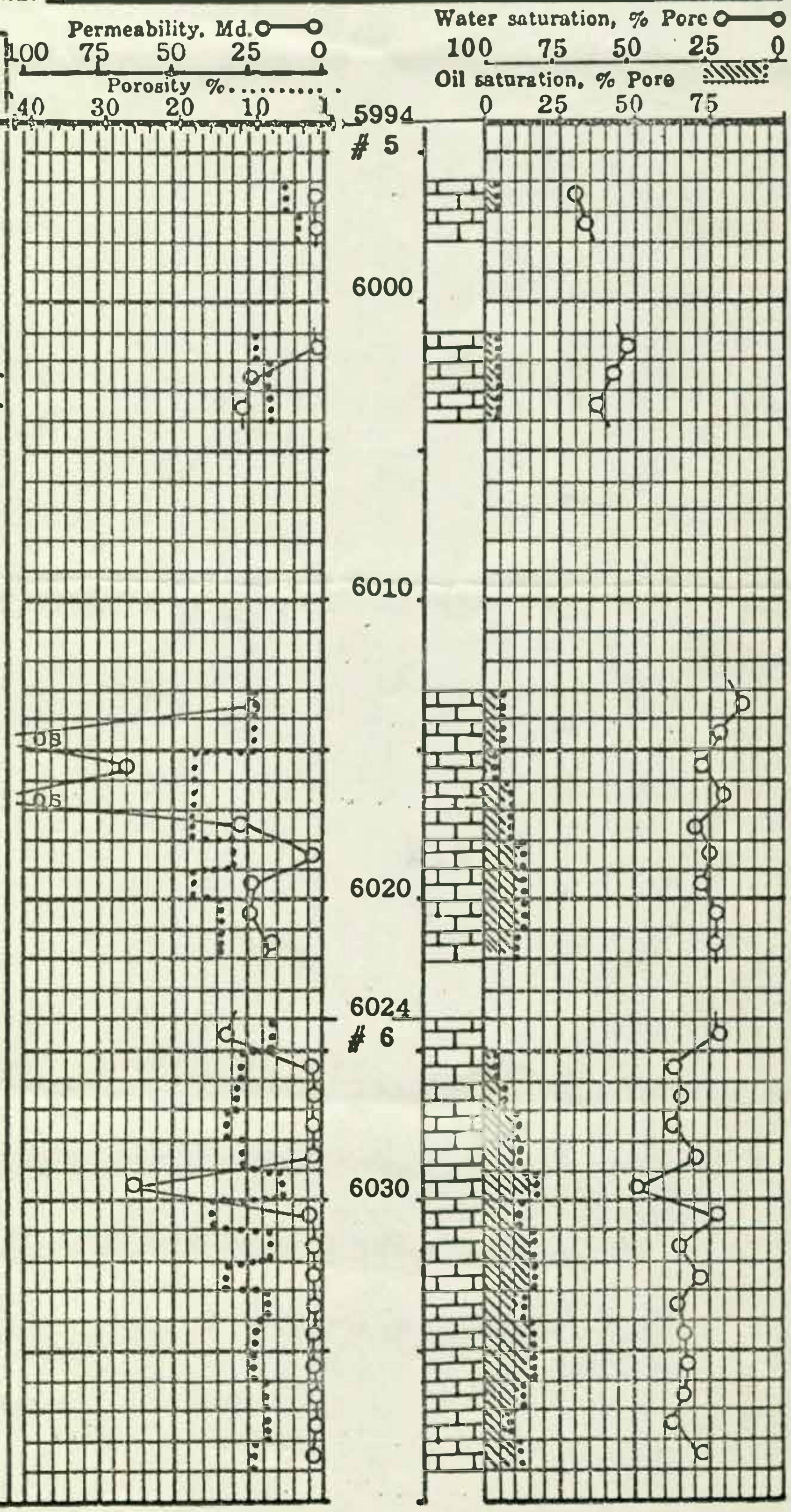
Well: Collingwood # 1 — Legend: Sand…… / Shale…… / Lime…… — Eng. Wilcox

Field: — Unit: Liberal ~~lab.~~

County: Meade — State: Kansas — Remarks: Complete core description not available

Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space: Oil	Residual Saturation Percent Pore Space: Water	Probable Production
5996.5	Trace	4.9	Trace	70.0	Nil
5997.5	Trace	3.9	0.0	66.5	Nil
6001.5	0.5	9.0	Trace	52.0	Nil
6002.5	24.4	7.6	3.3	57.0	Water
6003.5	26.4	7.0	Trace	61.5	Water
6013.5	24.4	9.4	5.3	14.8	Gas
6014.5	148.0	9.8	5.1	22.2	Gas
6015.5	65.0	16.6	3.0	28.8	Gas
6016.5	110.0	16.7	9.0	20.0	Oil
6017.5	27.6	17.7	9.6	29.4	Oil
6018.5	1.2	12.0	12.5	25.0	Oil
6019.5	24.6	17.1	13.0	28.0	Oil
6020.5	24.2	13.9	13.6	21.8	Oil
6021.5	16.5	13.3	10.8	22.6	Oil
22.5 / 23.5	Samples from this interval appeared same as above. Were sent in to be analyzed but must have been lost or mislabeled.				
6024.5	31.0	6.3	0.0	20.6	Nil
6025.5	2.2	10.2	Trace	35.2	Nil
6026.5	Trace	11.8	5.6	34.2	Nil
6027.5	0.5	12.4	10.5	35.4	Nil
6028.5	Trace	10.8	11.1	29.2	Nil
6029.5	62.8	5.3	18.8	49.0	Oil
6030.5	4.7	14.6	11.0	21.2	Oil
6031.5	1.6	7.4	17.5	35.0	Oil
6032.5	Trace	13.0	15.4	28.4	Nil
6033.5	0.9	7.4	14.8	35.0	Nil
6034.5	Trace	9.6	16.7	32.2	Nil
6035.5	Trace	9.8	15.2	31.6	Nil
6036.5	Trace	7.8	12.8	33.4	Nil
6037.5	Trace	7.1	7.0	35.7	Nil
6038.5	Trace	8.2	11.0	28.0	Nil

6016' adjusted to Log Depth



HYCALOG, INC.

CORE ANALYSIS REPORT

Company Thomas & Brewer Location _____ File _____

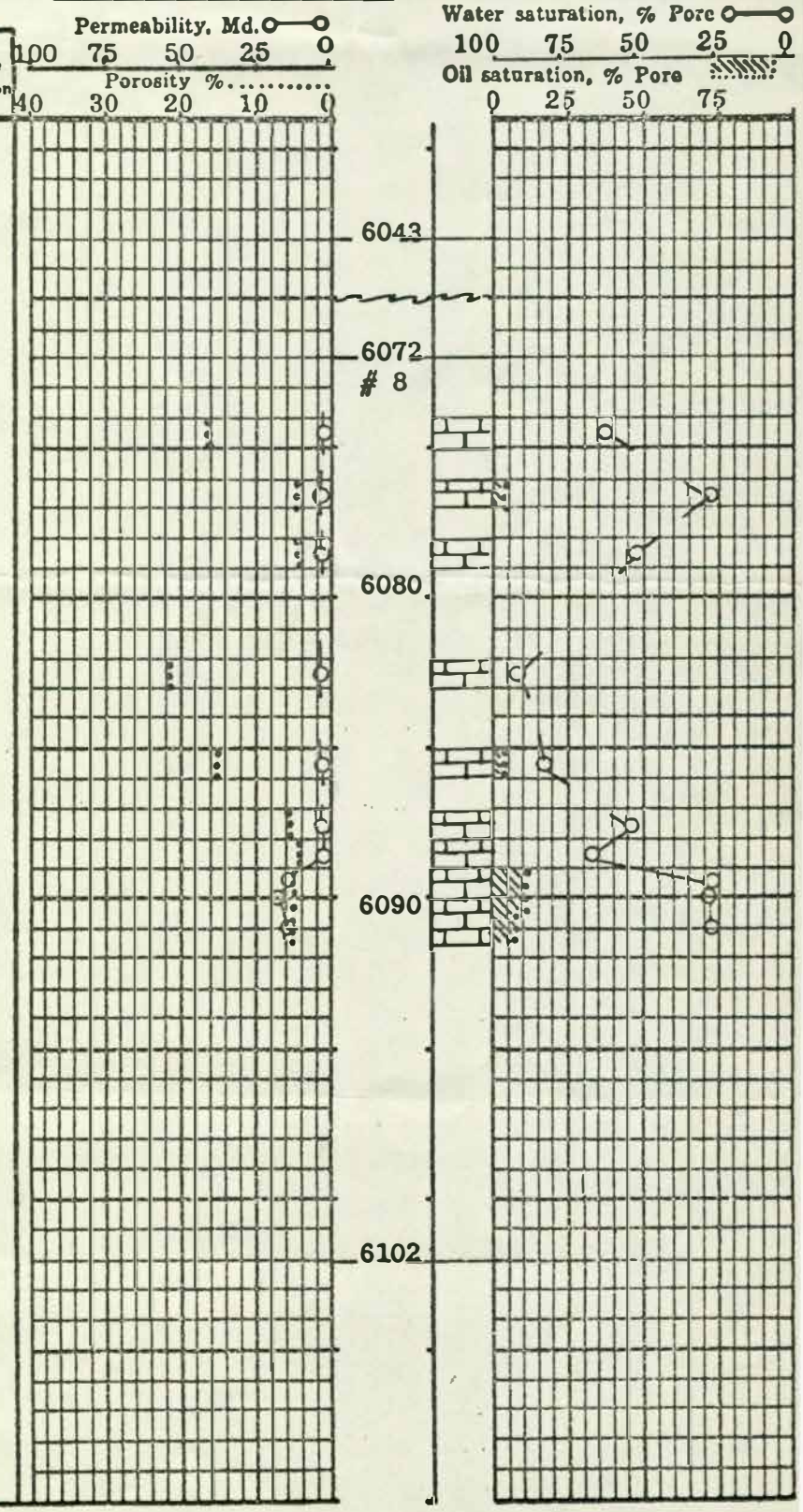
Well Collingwood # 1 Legend: Sand..... Shale..... Lime..... Eng. _____

Field _____ Unit _____

County _____ State _____ Remarks _____

Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production
6074.5	0.2	16.0	0.0	62.5	Nil
6076.5	0.3	4.8	Trace	27.0	Nil
6078.5	0.4	4.1	0.0	51.2	Nil
6082.5	1.8	21.1	0.0	90.5	Nil
6085.5	0.4	15.2	3.3	82.5	Nil
6087.5	0.9	5.9	0.0	54.6	Nil
6088.5	Trace	4.7	0.0	68.0	Nil
6089.5	12.2	5.2	10.2	26.5	Oil*
6090.0	15.7	4.5	11.1	28.8	Oil*
6091.0	9.6	4.8	8.4	27.5	Oil*

* Possible Oil



THOMAS & BREWER
#1 COLLINGWOOD
NW SE Sec. 21-32S-30W
MEADE COUNTY, KANSAS

CORE DESCRIPTIONS

Core #1	5900 - 14-1/2	Rec. 9' cut 14-1/2'
	5900-08	med. - dk. gry. vy. fn. xln to vy dns. lm. few vert fractures, few fossils
	08-09	(recovered only pieces) med. xln. ool. fossilif lt. gry-tanish lm. & dk. gry-blk-brn. subtranslucent fossilif cht.
Core #2	5914.5 -34	Rec. 14' Cut 19.5'
	5914.5-16	dk. gry; dns., sli. shy. lm.
	16 -18	lt. & dk. gry dns to fn sln lm w/wavey diagonal sh. partings.
	18 -28	wh-lt. gry. fn xln. tight lm. wh sm ool. sli odor on fresh break. horizontal & vertical tight fractures (bottom foot recovered only pieces)
Core #3	5934-64	Rec. 27' Cut 30'
	5934-36	med. gry. fn xln. lm w/few vert. fracs., vy. thin wavey bedded gry sh. partings.
	36-45	lt. tanish-gry., vy fn. xln. lm sli. crser xln below 40, diagonal bedding planes, vert. fracs. from 44-45.
	45-47	lm. as above, med xln.
	47-50	vy. fn. xln. lm. as above
	50-59	med. to dk. tanish gry fn to med. xln.-dns. fossilif lm. thin diagonal sh parting at top. Fracturing & 1" layer of gry-blk. cht. between 50 & 51 - 53 & 54 vy. dns. in spots.
	59-61	lt. gryish-tan srs. xln. fossilif-sli ool. lm. 2" diagonal layer of cht. as above at 60.
Core #4	5964-94	Rec. 30' Cut 30'
	5964-75	gry. to blk. fn. xln. to vy. dns. fossilif lm. med xln streaks between 72 & 73 - 73 & 74. lg. inclusion of gry-blk cht between 74 & 75.
	75.75-78.5	wh. lt. gry. sm. oolites, rough textured well cmt'd w/calcite, no p. or p. vert. frac. 78-78.5 no odor "F" or cut. lg. lt. tan fossils then dk gry. - blk. sh. parting at top.
	78.5 -79.5	lt. tan med. xln. vy. ool. -fossilif lm. no p. or p.
	79.5 -81.5	lt. gry. oolites as above sh. parting at 81.5 as at top
	81.5 - 84	med. gry. med. xln. lm. w/lg. fossils fn-med oolites 83 to 84 fractured.

Core #4	(Cont'd)	
	84 -94	lt. gry. vy. fn. xln. sli. sdy. sli. ool. lm. wavey diagonal bedding.
Core #5	5995-6024	Rec. 27.5' Cut 30'
	5994-6001	med. xln. gry. fossilif, lm. highly fractured gd. show & odor of oil in fractures
	6001-04	lm. as above w/streaks of oolite & fossil hash w/fair show, fair poro.
	04-13	fn. med xln. tight lm fossilif
	13-21.5	oolitic fossilif hash bld. oil. gd. sat. fr-gd. P & P gd. cut fr. "F" tight well cmt'd streaks
Core #6	6024-6043.5	Cut 19.5' Rec. 18.5'
	6024-32	ool & fossil hash, bld. oil. gd. sat. fair to good P & P
	32-39	as above, tighter than above poor show
	39-42.5	gry. med. xln. ool. -fossilif lm. tight, fractured, no show.
Core #7	6043-72	Cut 27', Rec. 28.5'
	6043-50	dk. gry dns. vy. hd. sli fossilif lm.
	50-56	lm. a.a.w/dk. gry-blk.cht. nodgules, lm. fossilif horizontal bedding.
	56-72	dk. gry. lm. a.a. few minor blk. sh. partings.
Core #8	6072-6102	Cut 30', Rec. 29.5'
	72-76	fn. gr. dns. lt. gry. lm. w/streaks med. gry. cht. 1" streak blg. sli. tr. oil between 73-74
	76-76.5	gry. med. xln. lm. bldg. O & G.
	76.5- 80	vy. fn. xln. dns. med-lt gry lm., tight
	80 - 87	lt. gry. lm. a.a. vy. chty lt. gry. cht.
	87 - 89	med. gry. dns. lm. one minor blk. sh. parting
	89 - 91	ool-fossil hash fr-gd P & P bldg. O & G fractured
	91 - 92.5	xln-fossilif ool. lm. a.a. tight no bldg. show
	92.5- 98	med. gry. fm. sln. sli. shy. lm. some lt. gry. cht.
	98 -6101	vy. fn-dns lt. gry. sli. tanish lm. lt gry. cht., lm. fractured vy. hrd-dns.

Note almost entire core bldg. O & G from hairline fracture in both lm. & cht. show became apparent after core was exposed to atmosphere for approximately 30 minutes.

#1 - COLLINGWOOD OWDD

DST #1:	5804-12	Op. 1 hr. 10 min. GTS 26 min. TSTM Rec. 90' GCM ISIP 2045/33' FP 15 - 33 FSIP 2029/30"
DST #2:	5993-6024	Plugged tool
DST #3:	5993-6024	Op. 55 min, wk. blow 10 min & died, bypassed tool; wk. blow 15 min & died. Rec. 120' mud tool was plugged. ISIP Not taken IFP 710 FFP FSIP 1700/30"
DST #4:	6078-6104	Op. 1 hr. 20 min. Shut-in 30 min. Reopened 30 min. Shut-in 20 min. Wk blow inc. to good. Rec. 720' salt water w/rainbow of oil on top. ISIP 1780/30" FP 73 - 258 FSIP 1681/20"