

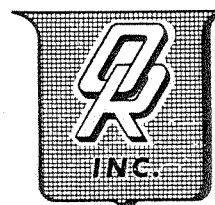
039 2210?
Newburg
Rocky Fork

PENNZOIL COMPANY

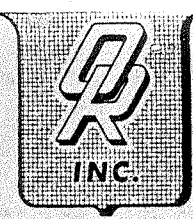
WHOLE CORE ANALYSIS REPORT

WALLACE LEASE WELL NO. 1

KANAWHA COUNTY, WEST VIRGINIA



C O R E A N A L Y S I S





OILFIELD RESEARCH, INC.

COMPANY PENNZOIL COMPANY ELEVATION 661 GL 679 KB FILE NO. 68E5064
 LEASE WALLACE WELL 1 FORMATION NEWBURGH DATE CORED 4/12&13/68
 FIELD ROCKY FORK DRIG. FLUID SALT BASE GEL DATE REPORT 5/16/68
 COUNTY KANAWHA STATE W. VA. TYPE OF CORE DIAMOND PERMIT NO. _____
 LOCATION UNION DISTRICT REMARKS SAMPLED BY CLIENT

WHOLE CORE ANALYSIS REPORT

SANDSTONE  DOLOMITE   
   

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 Oilfield Research, Inc. (all errors and opinions excepted) but Oilfield Research, Inc. and its officers and employees, assume no responsibility and make no warranty or representations as to the productivity, proper operation, or profitability of any oil, gas or other mineral well or stand in connection with which such report is used or relied upon.

PERMEABILITY (Max.) MILLIDARCYS 
 60 50 40 30 20 10 0
 TOTAL WATER PERCENT PORE SPACE 
 100 75 50 25

SAMPLE NUMBER	DEPTH FEET	PERMEABILITY		POROSITY %	RESIDUAL LIQUID SATURATION % PORE SPACE		POROSITY x---x					OIL SATURATION x-								
		HORIZONTAL MAX.	VERTICAL 90°		OIL	TOTAL WATER	PERCENT					PERCENT PORE SPACE								
							25	20	15	10	5	0	0	25	50	75	100			
1A	5558	*7.2		*9.3																
1	5564.0-65.0	44.	33.	10.9																
2	5565.0-66.0	60.	48.	11.3																
3	5566.0-67.2	<0.10	<0.10	1.3																
4	5567.2-68.3	0.30	0.30	4.5																
5	5568.3-69.2	<0.10	<0.10	2.4																
6	5569.2-70.3	<0.10	<0.10	4.4																
7	5570.3-71.1	<0.10	<0.10	3.2																
8	5571.1-72.0	<0.10	<0.10	7.4																
9	5572.0-73.2	<0.10	<0.10	6.8																
10	5573.2-74.3	<0.10	<0.10	7.4																

* Conventional core analysis.

CORE SUMMARY

FORMATION	DEPTH, FEET	FEET CORE ANALYZED	AVERAGE PERMEABILITY		AVERAGE POROSITY %	AVERAGE LIQUID SATURATION, %	
			HORIZONTAL MAX.	VERTICAL 90°		OIL	WATER
NEWBURGH	5564.0 - 5566.0	2 samples	52.	41.	11.1		

PENNZOIL COMPANY

Kenneth R. Middleton

April 19,

68

Malcolm H. O'Brien

Preliminary Core Report, Wallace Unit #1

5550	- ?	7.2 permeability.....	2.56
5553.9	- 65	44. permeability turned around 33...	10.56
5555	- 66	60. permeability - 48 turned over...	11.56
5556	- 67.2	.1 permeability	1.56
5557.2	- 68.3	permeability .3 turned over .3..	4.56
5558.3	- 69.5	no permeability, less than .1 ..	2.56
		all less than .1	
5559.5	- 70.3	no permeability	4.56
5570.3	- 71.0	no permeability	3.56
5571	- 72	no permeability.....	7.56
5572	- 73.2	no permeability	6.56
5573.2	- 74.3	no permeability.....	7.56

etc

cc Patrick J. Burns
Ralph Campbell
Dennis Wise

COPY

JAS

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OILFIELD RESEARCH, INC.

REGISTERED ENGINEERS

1006 DIAMOND AVENUE • EVANSVILLE, INDIANA 47717 • PHONE 424-2907 (DAY OR NIGHT)

ROBINSON, ILLINOIS

PAINTSVILLE, KENTUCKY

WALDO, OHIO

May 16, 1968

Pennzoil Company
P. O. Box 1588
Parkersburg, West Virginia

RE: Wallace Lease
Well No. 1
Kanawha County, West Virginia

Gentlemen:

The attached coregraph gives the results of the whole core horizontal permeability and porosity tests for the Newburgh formation of the subject well. Included is a description of the formation cored and analyzed. Table I gives the results of six sand grain density tests performed on selected samples of core.

CAPILLARY PRESSURE TESTS

LABORATORY PROCEDURES

In preparation for the tests, 3/4" cylindrical plugs were drilled from the selected intervals. The samples were then leached and dried. Following this procedure the plugs were evacuated and saturated with a brine solution at 1200 psig. Capillary pressure tests were performed in the conventional restored state method which involves the displacement of the contained brine (18,000 ppm) with water saturated air through a semi-permeable plate. The maximum pressure used was 40 psig. The irreducible water saturation conditions that were achieved by this displacement method were determined by periodic gravimetric weighing of the samples at each of the pressure increments. By this method equilibrium brine saturations were measured at each of the pressure levels.

RESULTS

Table II presents the individual data for the three samples tested. The results for samples 1A and 2 provide typical capillary pressure curves. These two samples had fair permeability and thus, gave good test data. The resulting irreducible water saturation for these two samples were relatively low.



Pennzoil Company

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May 16, 1968

Sample No. 9 has very low permeability with low porosity. Because of the low permeability, the test data indicates a high irreducible water saturation. In our opinion the irreducible water saturation for such a tight sample with low porosity would be high; however, the true irreducible water saturation may be lower than the final answer given by the tests.

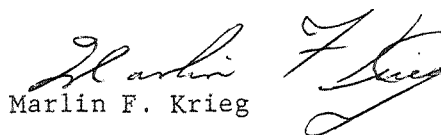
We will be glad to discuss these results with you at your convenience.

Very truly yours,

OILFIELD RESEARCH, INC.



Robert Alexander



Marlin F. Krieg

RA:csr

6C: Addressee

FORMATION CORED

Following is the description of the formation cored:

<u>Depth Interval</u> <u>Feet</u>	<u>Description</u>
NEWBURGH	
5558 [±]	Sandstone, greenish-gray, very fine grained, well sorted, clean, sub-angular to sub-rounded, some frosting of grains.
5564.0 - 5565.9	- Sandstone, light, very fine grained, well sorted, clean, sub-angular to sub-rounded, considerable frosting.
5565.9 - 5567.3	- Dolomite, medium gray, very finely crystalline, some irregular bedding.
5567.3 - 5568.3	- Sandstone, white, very fine grained, well sorted, sub-rounded, frosted, cementation evident (clay and carbonate?)
5568.3 - 5569.5	- Sandstone, gray, very fine grained, moderate sorting, sub-rounded, "dirty", interbedded with light colored sand; occasional shale laminations.
5569.5 - 5570.3	- Sandstone, white, very fine grained, well sorted, sub-angular to sub-rounded, fairly clean.
5570.3 - 5570.7	- Dolomite, dark gray, microcrystalline, very dense, argillaceous.
5570.7 - 5572.0	- Sandstone, light to gray, silt, excellent sorting, cementation evident (siliceous and clay).
5572.0 - 5574.3	- Sandstone, white, very fine grained, well sorted, sub-rounded to sub-angular, almost 100% frosted, cementation evident.

TABLE 1

SAND GRAIN DENSITY

<u>Sample Number</u>	<u>Depth, Feet</u>	<u>Sand Grain Density</u>
1A	5558 ⁺	2.64
2	5565.0 - 5566.0	2.62
4	5567.2 - 5568.3	2.64
6	5569.2 - 5570.3	2.63
8	5571.1 - 5572.0	2.68
10	5573.2 - 5574.3	2.65

TABLE II

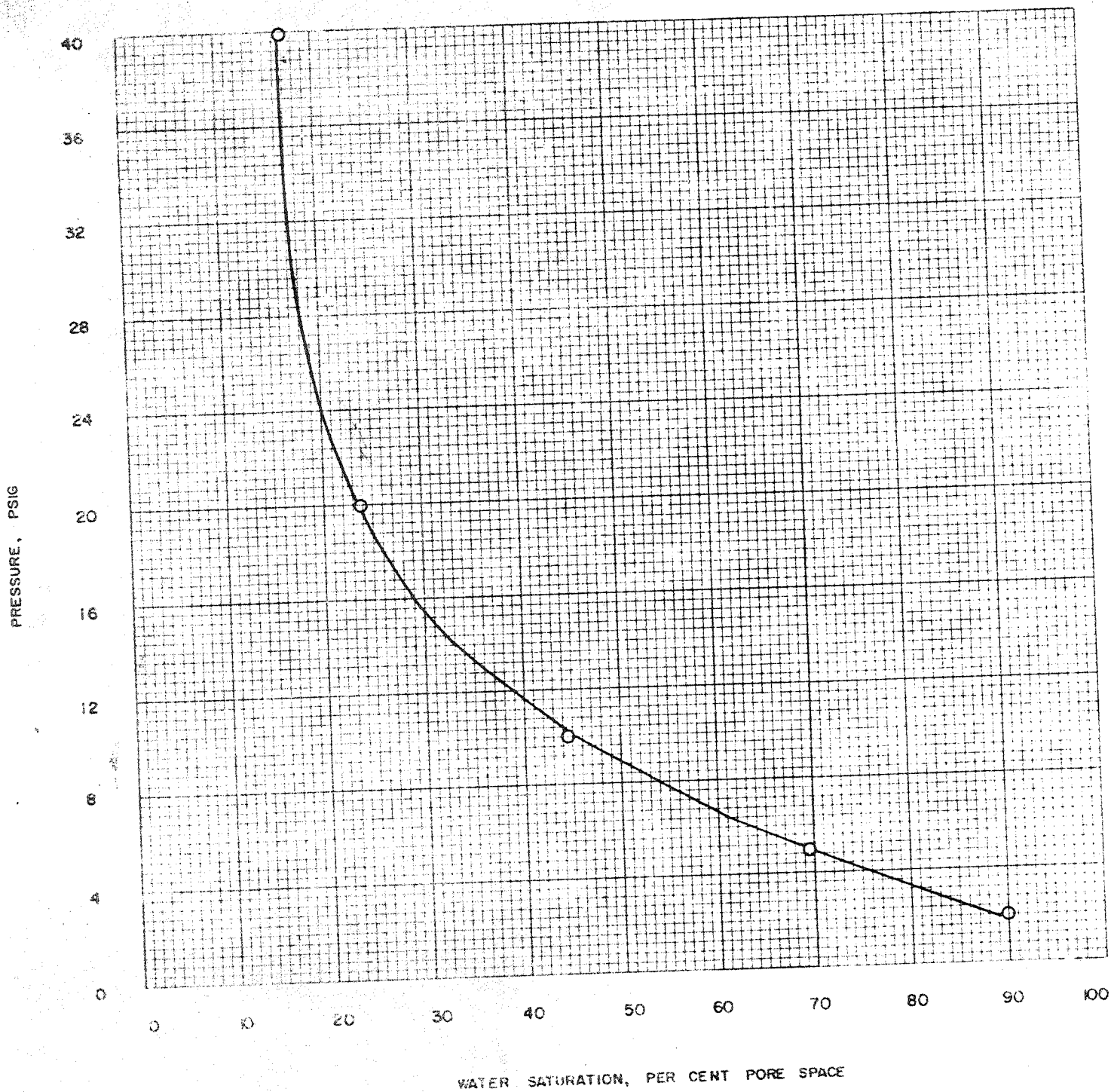
IRREDUCIBLE BRINE SATURATIONS @ VARIOUS PRESSURES

Sample Number	Depth	Permeability, Md.	Porosity %	Pressure, PSI:				
				2	5	10	20	40
				<u>Brine Saturation, Percent Pore Space</u>				
1A	5558 ⁺	27.	9.1	90.0	69.5	44.2	23.6	16.7
2	5565.1	33.	10.3	96.0	59.0	43.7	24.4	14.8
9	5572.8	0.60	8.8	92.3	91.6	89.6	84.4	70.2

OILFIELD RESEARCH, INC.
Petroleum Reservoir Engineering
EVANSVILLE, INDIANA

Company Pennzoil Company Formation Newburgh Depth 5558[±]
Well Wallace No. 1 County Kanawha
Location Union District State West Virginia
Perm. 2.7 md.
Por. 9.1 %

SAMPLE NO. 1A



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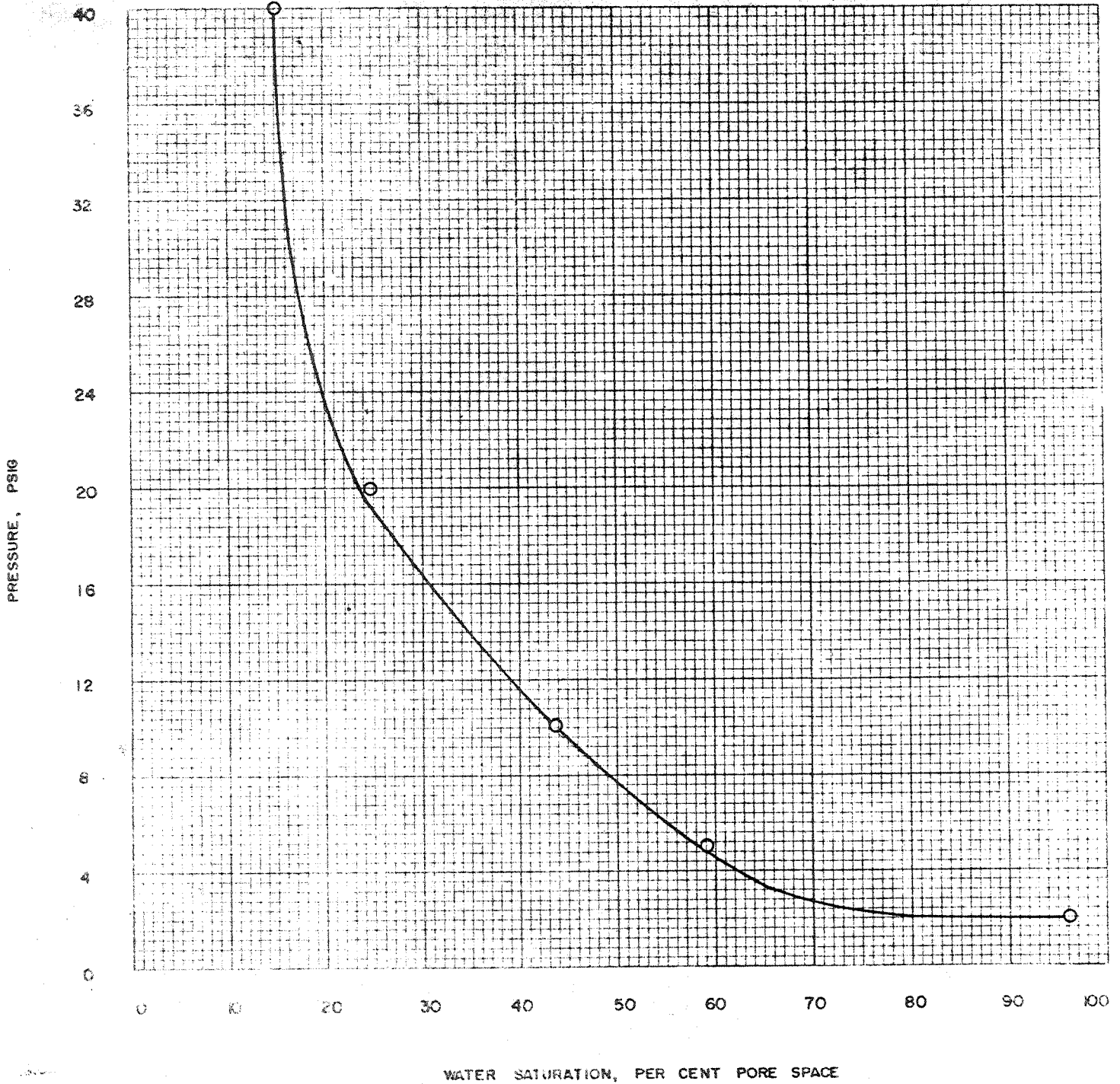
Petroleum Reservoir Engineering

EVANSVILLE, INDIANA

Company Pennzoil Company Formation Newburgh Depth 5565.1
Well Wallace No. 1 County Kanawha
Location Union District State West Virginia

SAMPLE NO. 2

Perm. 33. md.
Por. 10.3 %



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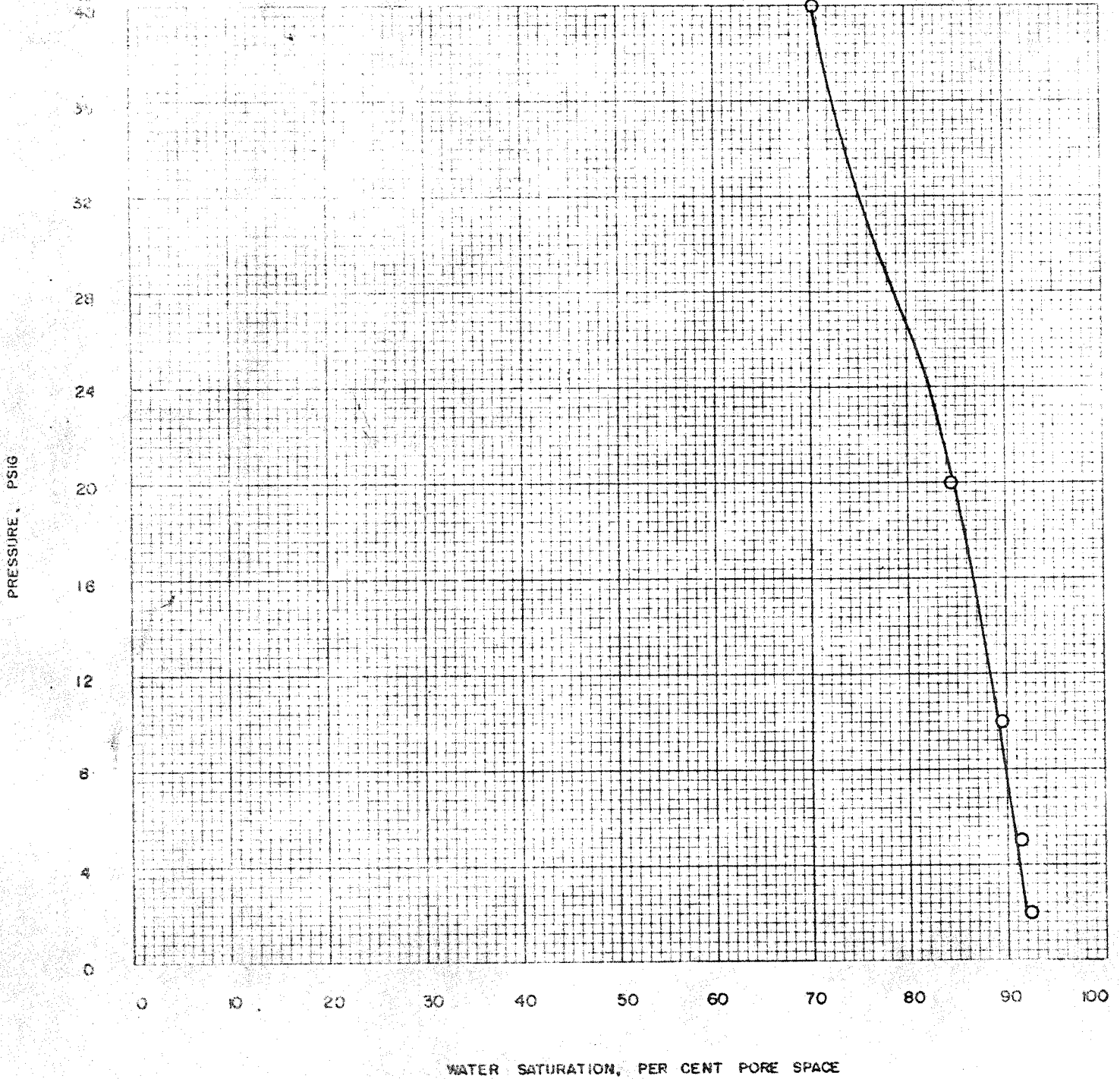
Petroleum Reservoir Engineering

EVANSVILLE, INDIANA

Company Pennzoil Company Formation Newburgh Depth 5572.8
Well Wallace No. 1 County Kanawha
Location Union District State West Virginia

SAMPLE NO. 9

Perm. 0.60 md.
Por. 8.8 %



42

10

20

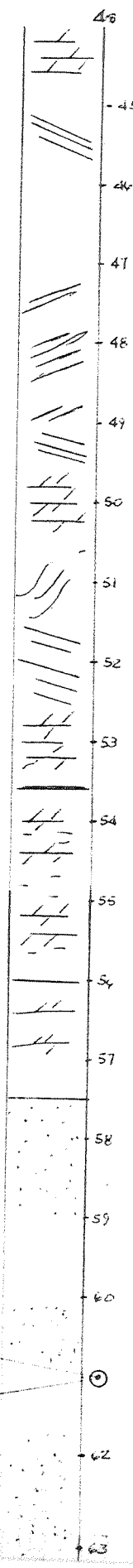
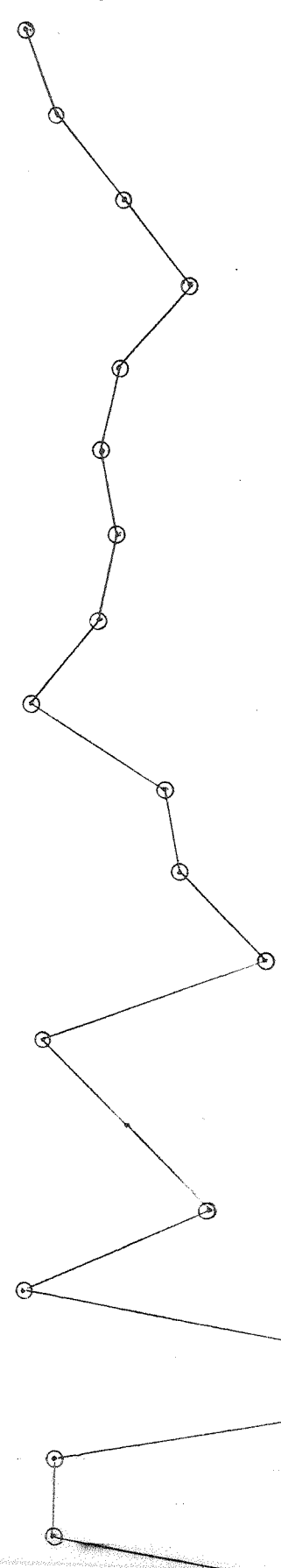
30

40

50

60

coreing time



dk gr-br to br-bl dense dol

white banded

dk gr-br to br-bl dense dol

Above w/ abd white filled bands any.

Above to gr-gr-br dense dol.

distorted dk gr-br to br-bl dol with bands of white any. with secondary bands of dk black?

gr to gr-br dol w/ sl banding & parting planes

Very dark dk bl to br-bl arg. Dol. Broken

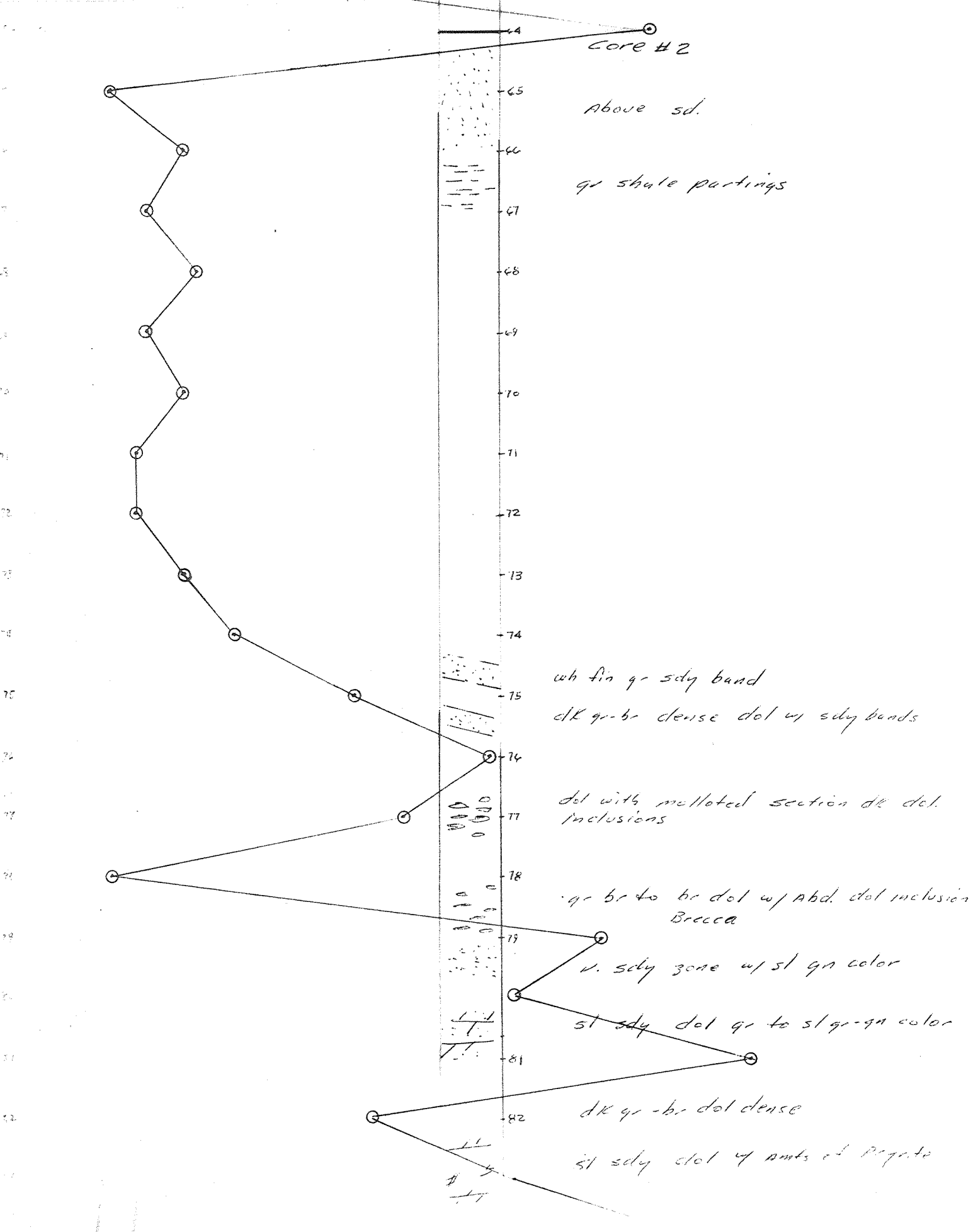
med gr to gr-br dol

grades into wh fine grained very clean well sorted sandstone w/ slight dol cement sub frag. friable with apparent vertical fractures

Lost core to 64

one piece above sand 4" to 8" long.

63



Core #2

Above sd.

gr shale partings

wh fin gr sdy band

dk gr-br dense dol w/ sdy bands

dol with mottled section dk dol. inclusions

gr br to br dol w/ Abd. dol inclusion Brecca

v. sdy zone w/ sl gn color

sl sdy dol gr to sl gr-gn color

dk gr-br dol dense

sl sdy dol w/ amts of Pyrite