PREPARED BY JOHNS HOPKINS UNIV. APPLIED PHYSICS LABORATORY FOR DOE, 1980, BW-T-1-79

(SEE GENERAL FILE "GEOTHERMAL VPI/DOE" FOR FULL REFERENCE)

THE JOHNS HOPKINS UNIVERSITY
APPLIED PHYSICS LABORATORY
LAUREL, MARYLAND

N.C.

III. STATE FUEL PRODUCTION (1973) (C-6)

Type	Number	Units	Trillion Btu
Coal mines	0	0 thousand tons	0
Natural gas (liq.)	0	0 thousand bbl	0
Natural gas wells	0	0 million cu. ft.	0
Crude oil wells	0	0 thousand bbl	0

IV. GEOLOGY

The surface of the basement complex to the north of Wilmington dips to the southeast attaining a maximum onshore depth of approximately 10,000 ft. in the vicinity of Cape Hatteras. Coastal plain sediments, which range in age from Cretaceous to Recent, form a southeasterly thickening wedge that overlies the Precretaceous basement complex. An onshore positive basement structure, trending northwest-southeast, is the dominant structural feature south of Wilmington. This feature, the Cape Fear Arch, is covered by a thin (about 1500 ft.) veneer of sedimentary rocks.

V. RESOURCE DATA

The DOE/DGE sponsored geothermal drilling program drilled eleven 1000 ft. gradient holes in the North Carolina coastal plain. The geothermal gradients varied from 22°C/km to 41°C/km (1.2°F/100 ft. to 2.2°F/100 ft.). Since the depth to basement is 2000 to 3000 ft. over much of the coastal plain, estimates of temperatures at basement are modest, i.e., 30°C to 44°C (86 to 112°F). However for several holes on the mainland, to the west of Cape Hatteras, and where the depth to basement is 4000 to 5000 ft., temperatures at basement are estimated to be as high as 85°C (185°F) (3).

VI. GEOTHERMAL ACTIVIES

The geothermal gradient test holes sponsored by the DOE/DGE drilling program have been completed and the results have been assessed by VPI&SU. APL/JHU has conducted and published a study of the energy markets in the northern coastal region of the state (6). APL has forwarded information to a utility (Carolina Power and Light) on the nature and prospects for geothermal energy.

VII. LEGAL ACTIVITIES

NCSL may conduct a workshop for state legislature to consider geothermal legislation.

10. Environmental Impact Assessments, Division of Budget Management, 116 W. Jones St., Raleigh, NC 27603, Crys Baggett, Clearinghouse Supervisor, (919) 733-7061.

11. State Coupled Reservoir Assessment Program, VPI&SU, Blacksburg, VA 24061, Prof. John Costain, Geothermal Program, (703) 961-5096.

REFERENCES AND LIST OF SIGNIFICANT REPORTS

(1) P. M. Brown, J. A. Miller, and F. M. Swain, "Structural and Stratigraphic Framework and Spatial Distribution of Permeability of the Atlantic Coastal Plain, North Carolina to New York," U.S.G.S. Professional Paper 796, 1972.

(2) "Evaluation and Targeting of Geothermal Energy Resources in the Southeastern United States, Progress Report Oct 1, 1978 - March 30, 1979," VPI&SU, Blacksburg, VA, DOE Report VPI-SU-5648-5.

(3) "Geothermal Resources of the Eastern United States," Gruy Federal, Inc., Arlington, VA, DOE Report DOE/ET/28373-T2.

(4) "Geothermal Energy Market Study in the Atlantic Coastal Plain, Definitions of Markets for Geothermal Energy in the Northern Atlantic Coastal Plain," APL/JHU GEM-002 (QM-80-075), May 1980.

COMMON REFERENCES

(C-1), (C-4), (C-5), (C-6), and (C-7).

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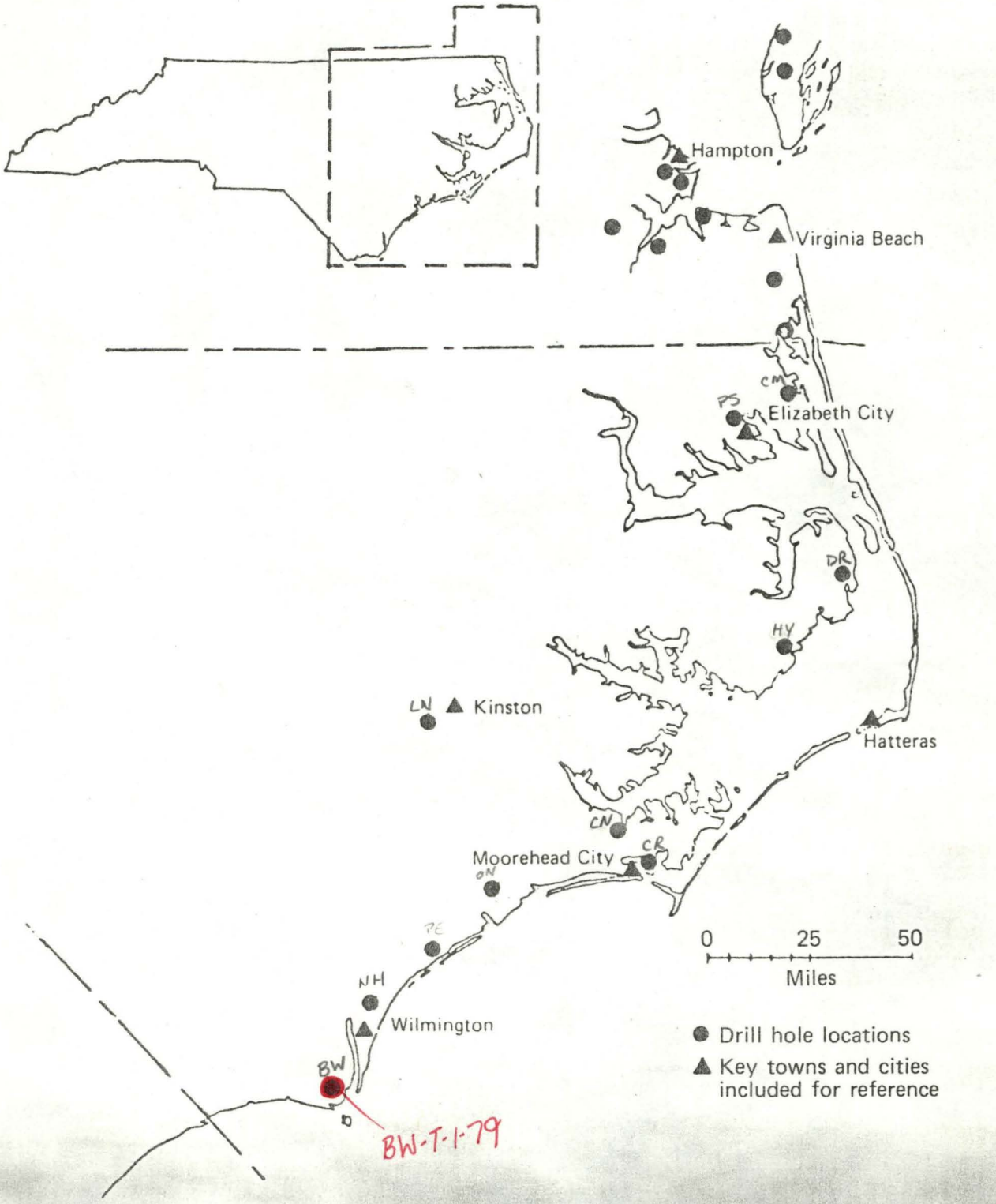


Locations of gradient test holes — Eastern North Carolina.

TABLE C-3.1

HOLE	LATITUDE LONGITUDE	INTERVAL(M)	GRADIENT SIGMA(REGR, N) ('C/KM)	COND SIGMA(N)	HEAT FLOW	ESTIMATED BASEMENT SURFACE DEPTH (KM)	TEMPERATURE ('C)
BW-T-1-79							
SOUTHPORT, N.C.							
C14A	33 58.00 77 58.20	60-463	32 *			.465	32
WILMINGTON, N.C.							
C14	34 12.00 77 53.40	45-380	29 *			.385	28
SNEADS FERRY, N.C.							
C15A	34 31.60 77 27.30	30-475	31 *			.495	31
JACKSONVILLE, N.C.							
C15	34 39.00 77 19.00	50-500	30 *			.505	31
KINSTON, N.C.							
C16A	35 15.70 77 35.30	69-217	23 *			.210	21
CHERRY POINT, N.C.							
C16	34 54.70 76 53.30	80-308	22 *			.84	36
BEAUFORT, N.C.							
C17	34 46.30 76 38.70	45-302	25 *			1.36	51
ENGLEHARD, N.C.							
C18	35 31.20 75 59.26	49-304	36 *			1.84	81
STUMPY POINT, N.C.							
C19	35 45.12 75 47.65	53-269	40 *		1.94	1.78	85
		187.1-221.7	57.05±0.77(0.988, 68)1	3.3±0.18(14)	1.9±0.1		
		196.7-205.8	60.01±6.71(0.842, 17)2	3.3±0.18(14)	2.0±0.3		
		248.1-296.3	54.14±1.38(0.966, 56)3	3.9±0.91(15)	2.1±0.6		
ELIZABETH CITY, N.C.							
C20	36 16.81 76 12.58	50-313	31 *			.95	44
BELLCROSS, N.C.							
C21	36 19.59 76 03.54	23-308	33 *			1.22	55
CREEDS, VA.							
C22	36 36.38 76 00.43	89-307	34 *			1.08	50
OCEANA, VA.							
C23	36 48.09 76 02.62	75-296	38 *			.94	49
NORFOLK, VA.							
C24	36 57.40 76 16.20	17-316	37 *		1.34		
		152.4-173.3	44.14±0.57(0.994, 41)2	3.4±0.45(25)	1.5±0.2		
		161.7-174.3	49.00±1.64(0.975, 25)2	3.4±0.45(25)	1.7±0.3		
		252.8-316.7	24.75±0.04(1.000,124)1	3.7±0.96(12)	0.9±0.2		
		303.2-308.5	29.13±2.17(0.957, 10)2	3.7±0.96(12)	1.1±0.4		
SUFFOLK, VA.							
C25	36 51.01 76 28.83	21-307	43 *		1.44	.557	39
		295.8-309.9	26.85±0.39(0.996, 23)1	5.0±1.04(24)	1.4±0.3		

COSTAIN, J.K., GLOVER, L. III, and SINHA, A.K., 1979.

FROM: EVALUATION AND TARGETING OF GEOTHERMAL ENERGY RESOURCES IN THE SOUTHEASTERN UNITED STATES.

PROGRESS REPORT 10/1/78 - 3/30/79

[VPI & SU-5648-5]

GEOTHERMAL HOLES VPI / DOE

ADJUSTED LAT/LONGS.

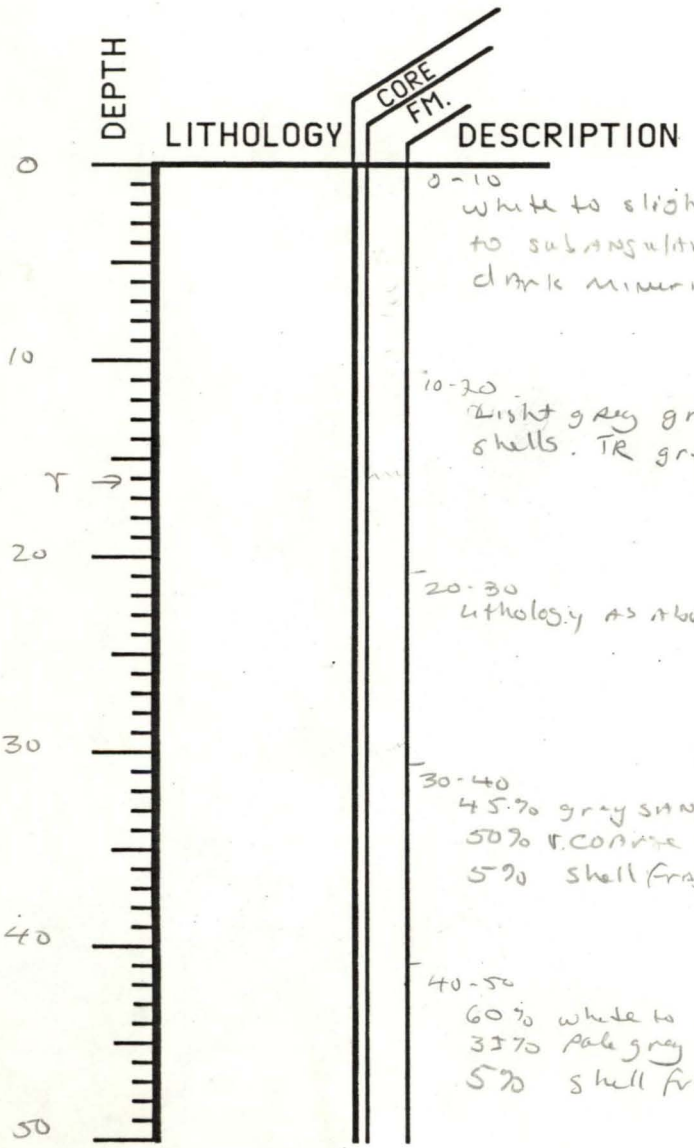
WELL CODE	SEQUENCE #	LAT	LONG	SAMPLES FROM W TO	COMMENTS
BW-T-1-79	✓ 14A	3358.00	775812	0 - 1340	SouthPort, N.C
CM-T-1-79	✓ 21	361935	760232	80 - 970 W	BELLCROSS, N.C
CR-T-1-79	✓ 17	344618	763842	0 - 960 W	BEAUFORT, N.C
CN-T-4-79	✓ 16	345442	765318	0 - 960 W	CHERRY POINT, N.C.
DR-T-1-79	✓ 19	354507	754739	0 - 950 W	STUMPY POINT, N.C.
HY-T-1-79	✓ 18	353112	755916	0 - 980 W	ENGELHARD, N.C.
LN-T-1-79	✓ 16A	351542	773518	0 - 750 W	KINSTON, N.C.
NH-T-1-79	✓ 14	341200	775324	0 - 1250 W	WILMINGTON, N.C.
ON-T-1-79	15	343900	771900	0 - 960 W	JACKSONVILLE, N.C.
PS-T-1-79	20	361649	761235	0 - 1000 W	ELIZABETH CITY
ON-T-2-79	15A	343136	772718	0 - 310 W	SNEADS FERRY "

WELL CODE BW-T-1-79

ELEVATION 25'

T.D. 1532'

8 Los ok
19 more samples 0'-150'



WELL CODE BW-T-1-79

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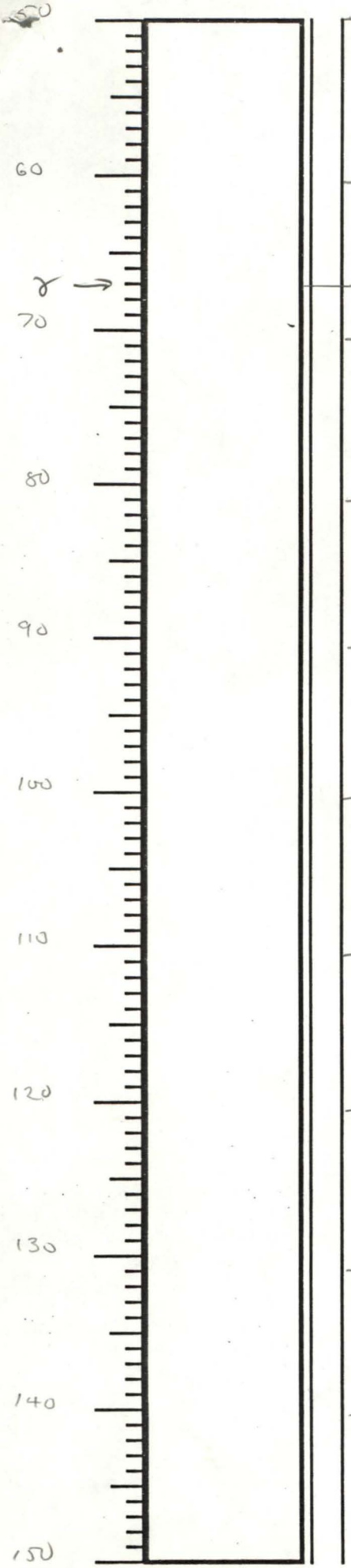


50-60
coarse to fine grained orange/brown subrounded sand + 1% dk brown sandy clay. also found cemented lith. (reduced sample size + log + lith suggest a sandy clay here.

60-70
Medium to fine grained N5 90 coarse yellow/white subrounded to subang. sand + TR shells + dark mineral grains (looks just like 0-10' sample)

70-80
Lithology as above

80-90
Lithology as above except NO coarse grained sand

90-100
Lithology as above

100-110
Lithology as above plus 4% frosted weathered glauconite 1% grey clay. - LNT SP. observed Z.

110-120
Medium to fine grained yellow/white subrounded - subang. sand + 1% dark mineral grains - as in float

120-130
Lithology as above

130-140
Lithology as above

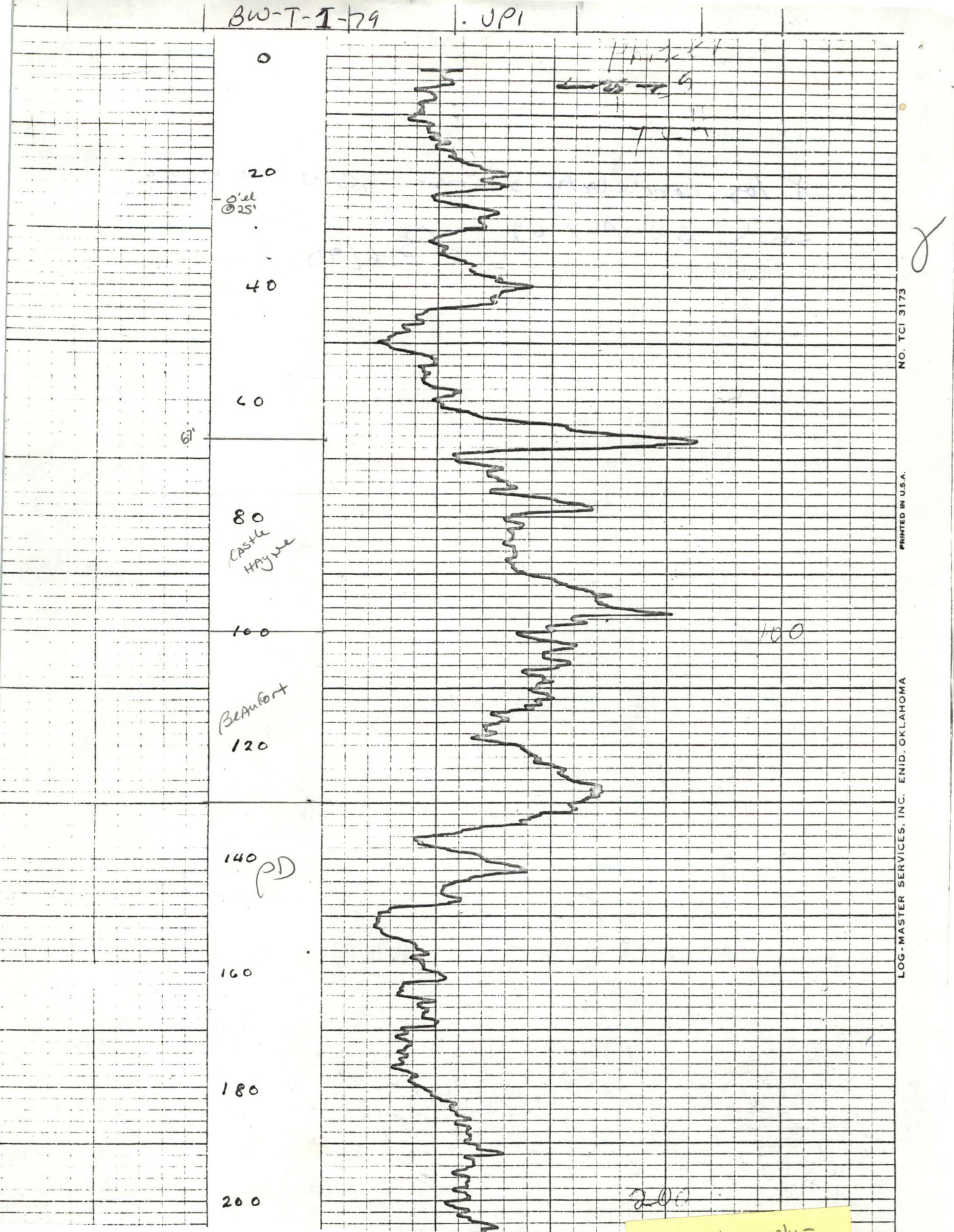
140-150
Lithology as above.

over

I have a hard time believing that samples returned from extrapolated from 50' to 150' are representative of formations drilled. Either there were hole problems while drilling, or samples are just not from the interval marked on the bags.

JJ 5/1/90

δ log correlations from BW-P-5-69 and BW-P-7-69. JB 6/90


BW-T-1-79
.UP1
0
20
40
60
80
100
120
140
160
180
200
8' oil @ 25'
61'
CASTLE HAYNE
BEAUFORT
PD
160
200
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Use log only-
SAMPS 50'-150'
are worthless