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

NH-T-1-79

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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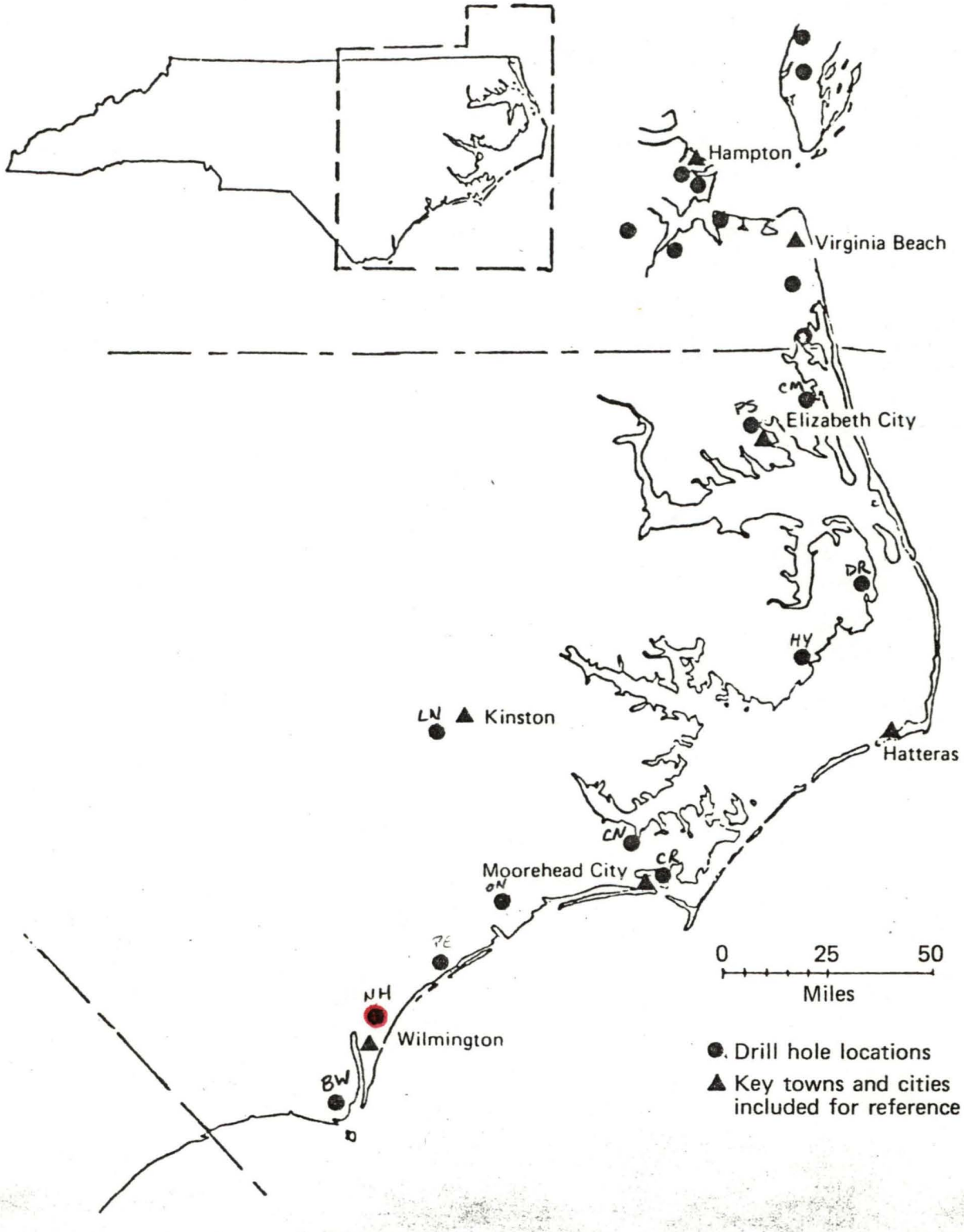

Locations of gradient test holes – Eastern North Carolina.

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)	ESTIMATED BASEMENT SURFACE TEMPERATURE ('C)
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. [VPI & SU-5648-5] — PROGRESS REPORT 10/1/78 — 3/30/79.

GEOTHERMAL HOLES

ADJUSTED LAT/LONG's.

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	3619 35	760332	80 - 970 W	BELLCROSS, N.C
CR-T-1-79	17	344618	763842	0 - 960 W	BEAUFORT, N.C
CR-T-2-79	16	34 5442	76 5318	0 - 960 W	CHERRY POINT, N.C
DR-T-1-79	19	35457	75 4739	0 - 950 W	STUMPY POINT, N
HY-T-1-79	18	353112	75 59.16	0 - 980 W	ENGLEHARD, N.C
LN-T-1-79	16A	351542	773518	0 - 750 W	KINSTON, N.C.
NH-T-1-79	14	341200	77 5324	0 - 1250 W	WILMINGTON, N.C
ON-T-1-79	15	3439.00	7719.00	0 - 960 W	JACKSONVILLE, N
PS-T-1-79	20	361649	76 1235	0 - 1000 u	ELIZABETH CITY

Subject: Re: FW: VPI Test Well
From: <glaucony@ec.rr.com>
Date: Wed, 1 Aug 2007 17:21:58 -0400
To: kathleen.farrell@ncmail.net

Kathleen:

Thanks for all your effort; do not spend anymore time on it. The approximate lat and long for the test well is 34o13'56" and 72o52'05". As mentioned earlier I have photos of the drill site and remember its location fairly well, but thought the survey would have the exact location.

Bill

> W.B. Harris
>
> -----Original Message-----
> From: Kathleen M. Farrell [mailto:kathleen.farrell@ncmail.net]
> Sent: Wed 8/1/2007 1:33 PM
> To: Harris, William B.
> Subject: Re: VPI Test Well
>
> Bill,
>
> I spoke to John Nickerson this morning about the MainData base that included the VPI test wells and their coordinates. John built the data base. He said that there was a potential problem with the VPI Test Well data, in that possibly only generalized point data coordinates were provided to NC because of a grid set up by groundwater agencies in NC. It is possible that only rounded point data will be available for the VPI data set.
>
> I pulled the hard paper folder on NH-T-1-79 and discovered the following. In a progress report (10/1/78-3/30/79) coordinates for NH-T-1-79, called Wilmington, NC Hole, were provided as follows: Latitude 34 12.00 and Longitude 77 53.40 (note decimal data for minutes and seconds). Now I am not sure if the 1979 convention of 53.40 refers to 53 minutes and 0.4 minutes (40/100ths of a minute) or 53 minutes and 40 seconds (40/60 minutes). According to John these were interpreted (by CPO) as meaning degrees and deciminutes. In any case, I suspect that these coordinates are the source data. I have a reference for this data listed as: Costain, J.<., Glover, L. III, and Sinha, A.K., 1979, Evaluation and Targeting of Geothermal Energy Resources in the Southeastern U.S. Progress Report, VPI&SU-5648-5). I don't have a copy of the complete report. There is also a handwritten sheet in the folder for that well (sources CPO staff) that is called Geothermal Holes, Adjusted Lat/Long: The coordinates listed for NH-T-1-79 are: LAT: 341200; LONG: 775324).
>
> I don't know what else to tell you. If you remember where the hole was drilled, you might be able to generate better coordinate data than what is available. It may be that the original field notes are necessary to determine more exact numbers. I do not know if such archives would exist because they probably were the intellectual property of the Chief Intestigators. I don't think I can find better numbers, if the progress report is the source, and I have a copy of the page from that report (Table C-3.1). Its amazing that people didn't think ahead regarding future uses of the well, and the need for exact coordinate info.
>
> I have also reprovided you with the coordinate data. My preveious export from a .dbf file deleted the last two rows which include the decimal degrees for the point. John has confirmed by redoing math that these values are correct, assuming the input was in degrees and deci minutes (e.g. 34 12.00 and 77 53.40).
>
> Kathleen
>
> Harris, William B. wrote:
>
> > I tried playing with the values given assuming that they may not be lat and long; it didn't work.
> >
> > Bill
> >
> > W. Burleigh Harris, Professor of Geology

University of North Carolina Wilmington

Department of Geography & Geology

601 S. College Road

Wilmington, NC 28403

Phone: 910-962-3492

Fax: 910-962-7077

E-mail: harrisw@uncw.edu

From: Kathleen M. Farrell [mailto:kathleen.farrell@ncmail.net]
Sent: Tuesday, July 31, 2007 12:55 PM
To: Harris, William B.
Subject: Re: VPI Test Well

Bill,

could you possibly be experiencing a projection problem? I'll try to check this out too. But there is not another well as far as I know classed as a VPI well.

Kathleen

Harris, William B. wrote:

Kathleen, is there another well location? If not the lat and long are incorrect as the location does plot on campus. I was here when the well was drilled and know about where it was placed based on buildings as several of my students worked on the rig as roughnecks.

Bill

W. Burleigh Harris, Professor of Geology
University of North Carolina Wilmington
Department of Geography & Geology
601 S. College Road
Wilmington, NC 28403
Phone: 910-962-3492
Fax: 910-962-7077
E-mail: harrisw@uncw.edu

-----Original Message-----
From: Kathleen M. Farrell [mailto:kathleen.farrell@ncmail.net]
Sent: Tuesday, July 31, 2007 10:19 AM
To: Harris, William B.
Subject: VPI Test Well

Bill,

Attached is location for a VPI Test well in New Hanover Co. I did not plot this to see if it lands on UNCW campus. Let me know if there is a problem.

Kathleen

Harris, William B. wrote:

Kathleen:

I'll get the sampling sheet in to you this afternoon; sorry I'm slow.

Question in the late 70's VPI drilled a series of geothermal test wells
in the coastal plain; one was drilled on the UNCW campus. Do you

have a
list of the well sites that shows lat and long? I'm looking for
the
exact location of the well on our campus.

Thanks,

See you next week,

Bill

W. Burleigh Harris, Professor of Geology
University of North Carolina Wilmington
Department of Geography & Geology
601 S. College Road
Wilmington, NC 28403
Phone: 910-962-3492
Fax: 910-962-7077
E-mail: harrisw@uncw.edu

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Kathleen M. Farrell, PhD, P.G.
Senior Geologist
Stratigraphy-Geomorphology

North Carolina Geological Survey
Raleigh Field Office
1620 Mail Service Center
Raleigh, N.C., 27699-1620

919-733-7353, ext. 29
919-715-3181 Fax
email: Kathleen.Farrell@ncmail.net

Shipping Address:

North Carolina Geological Survey
Raleigh Field Office
4100A Reedy Creek Road
Raleigh, NC 27607

GEOTHERMAL HOLES VPI / DOE

ADJUSTED LAT/LONGS.

WELL CODE	SEQUENCE #	LAT	LONG	SAMPLES FROM W TO	COMMENTS
BW-T-1-79	✓ 14A	3353..	775812	0 - [illegible]	SouthPort, N.C
CM-T-1-79	✓ 21	361935	760832	80 - 970 W	BELLCROSS, [illegible]
CR-T-1-79	✓ 17	344618	763542	0 - 960 W	BEAUFORT, N.C
CN-T-4-79	✓ 16	345442	765318	0 - 960 W	CHERRY POINT, N.
DR-T-1-79	✓ 19	354507	754739	0 - 950 W	STUMPY POINT, N.
HY-T-1-79 ✓	✓ 18	353112	755916	0 - 980 W	[illegible]HARD, N.C
LN-T-1-79 ✓	✓ 16A	351542	775518	0 - 750 W	KINSTON, N.C.
NH-T-1-79	✓ 14	341200	770824	0 - 1250 W	WILMINGTON, N.C
ON-T-1-79	15	343900	771900	[illegible]	JACKSONVILLE, [illegible]
PS-T-1-79	20	361649	761255	0 - 1000 u	ELIZABETH CITY
ON-T-2-79	15A	343136	772718	0 - 310 u	SNEADS FERRY

degrees, minutes, seconds
K Farrell 9/1/07
w/ confirmation from John Nickerson

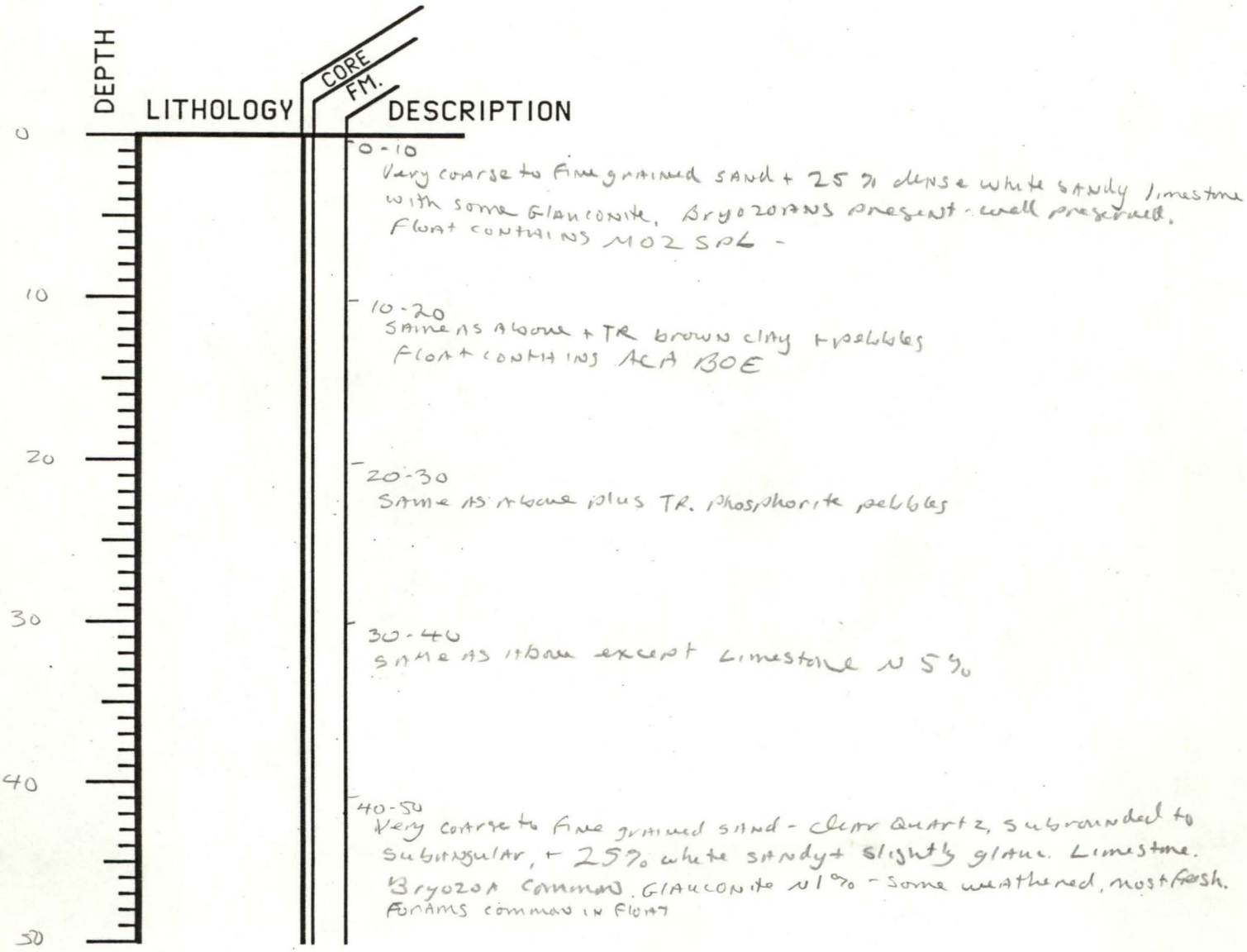
WELL CODE NH-T-1-79
(VPI/DOE geothermal #14

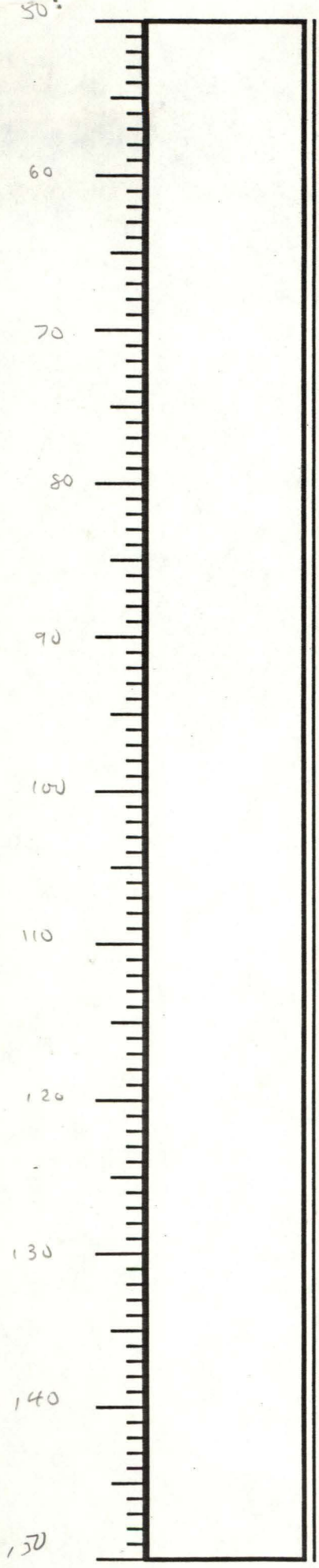
ELEVATION 40'

T.D. 1270'

note; samples above 140' with good CASTLE Itty Ne FAUNAS IN FLOAT.

ANOMALOUS TOPS - MAY BE POOR SAMPLING





50-60
Lithology as above plus 3% glauconite.

60-70
Lithology as above plus TR phosphorite

70-80
Lithology as above with 1% glauconite

80-90
Lithology as above.

90-100
Lithology as above + TR Lt. brown clay

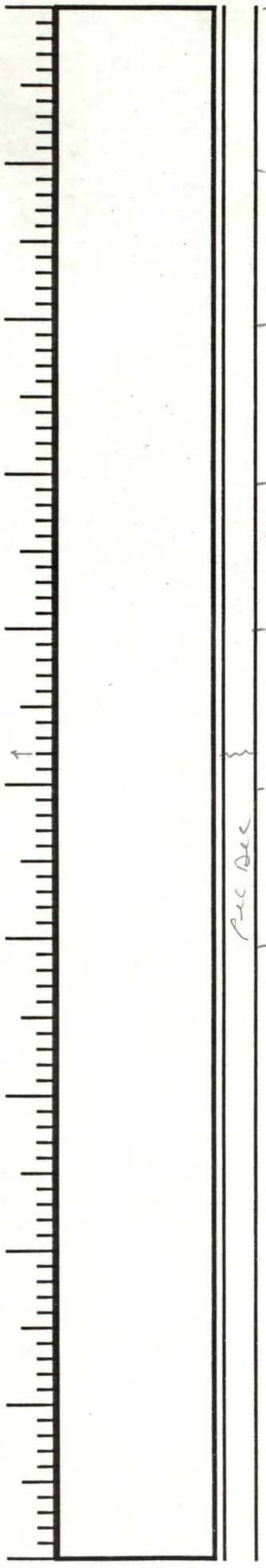
100-110
Lithology as above with 2% glauconite

110-120
Lithology as above plus trace Lt brn glauconitic siltstone

120-130
Lithology as above

130-140
Lithology as above

140-150
Coarse to very fine quartz sand - subrounded, plus ~5% limestone + 1% glauconite from above. Also, TR pebbles



150-160
Lithology as above

160-170
Lithology as above

170-180
Lithology as above

180-190
Lithology as above plus 5% glauconite, and TR Lt brown glauconitic siltstone

190-200
Light grey fine grained sandstone - some slightly glauconitic + TR sandy + glauconitic Lt. brown claystone. Also abund sand caved from above - Abraded shell fragments ...
FLOAT CONTAINS CRETACEOUS FAUNA: H HX GBS, GTR BLD, GLO VLT + GUMBERT

200-210
Lithology as above

210-220
Similar to above, finer grained sands