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Shimer, G. (UAF) 2011, Porosity, permeability, and capillary pressure core analysis results (2,124'-2,193') from the U.S. Navy Umiat Test #11 well

Three spreadsheets available for download.

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All data reports may be downloaded free of charge from the [DGGs website](#).

From: Vasil Godabrelidze, 2010, Characterization and fluid flow properties of frozen rock systems of Umiat Oil Field, Alaska: UAF M.S. thesis

3.4 Core Samples

Conventional core samples from Umiat well #11 were collected by Grant Shimer (G. Shimer, personal communication). After approval of his sample request form by Kenneth Papp, the director of GMC in Eagle River, Grant selected the sample sites that were not previously sampled. Having an intention to find samples from high quality reservoir sands, core samples with potentially high porosity and permeability were selected based only on visual observations of grain size and sorting due to the absence of engineering tools on site. Overall eight core samples were selected representing Ninuluk, Chandler, Upper Grandstand and Lower Grandstand formations present in Umiat well #11. Figure 15 shows the lithology log of the well #11 and the core samples taken from each formation.

Four samples were slabbed and the rest were cylindrical in shape. Some of them had visually observable fractures. All cores had the diameter equal to 7.78 cm and their lengths were in the range of 8.18-13.49 cm. Depth of the samples ranges between 2124 and 2993 feet. Based on the data presented in table 1, we can conclude that none of these samples are cut from the permafrost, because the depth to the permafrost base in well #11 is 770 feet.

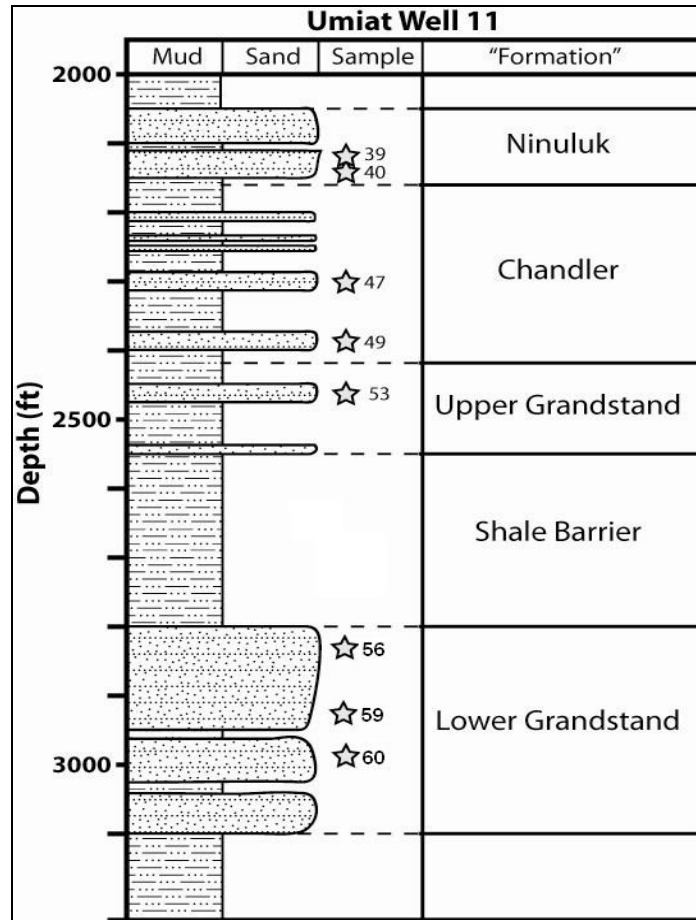


Figure 15: Lithology log of the Umiat well 11 (G. Shimer, personal communication)

The following steps were performed in order to prepare core plugs for flooding experiments:

Step 1: Log sheet was prepared for all conventional core samples, see Table 4.

Step 2: Horizontal and vertical air permeability measurements were made for all the samples using the probe permeameter. Figure 16 shows the probe permeameter in the process of permeability measurements. The device does not measure Klinkenberg corrected permeabilities but the manufacturer claims that the Klinkenberg effect is minimized by keeping the test pressure at a low level (UPP-200™ probe permeameter operating manual). Results are presented in Table 4.

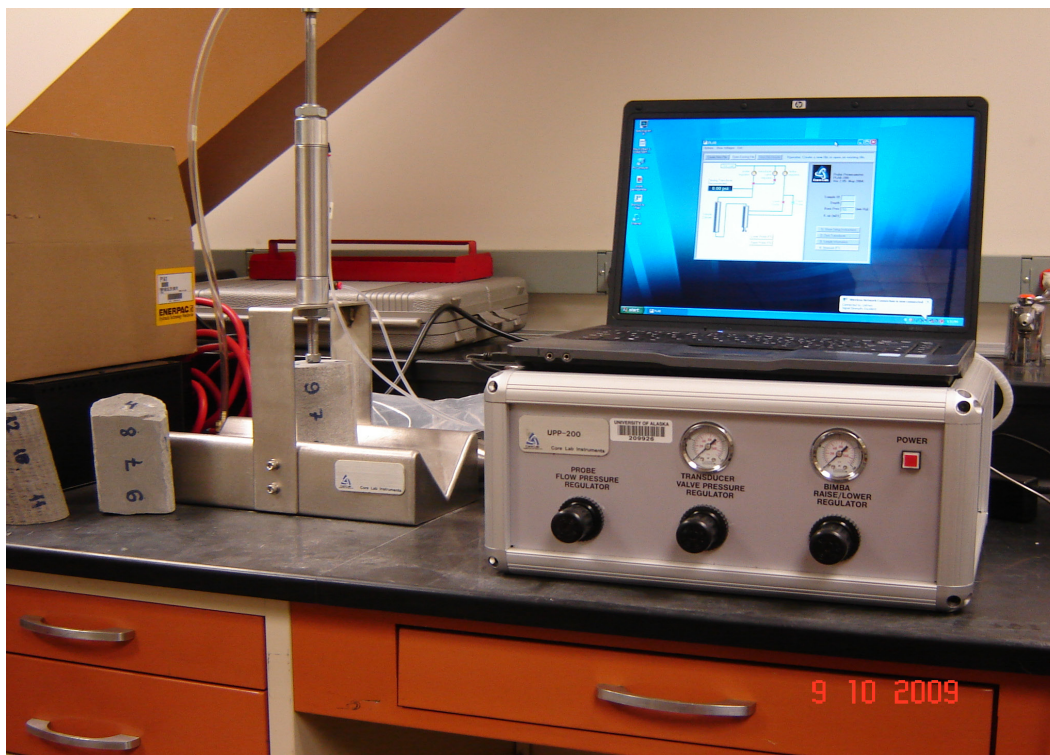


Figure 16: Picture of probe permeameter

The first six permeability measurements in Table 4, K1-K6, express the vertical permeability and the last nine measurements, K7-K15, describe the horizontal permeability. For the slabbed samples, the angle between the horizontal measurements is 180° . Otherwise the angle is equal to 120° . Figure 17 shows the schematic of a core sample and all the spots from which the permeability measurements were taken. It was practically impossible to take the measurements from some spots of the cores because of their shape and length. This explains some of the omitted values in Table 4.

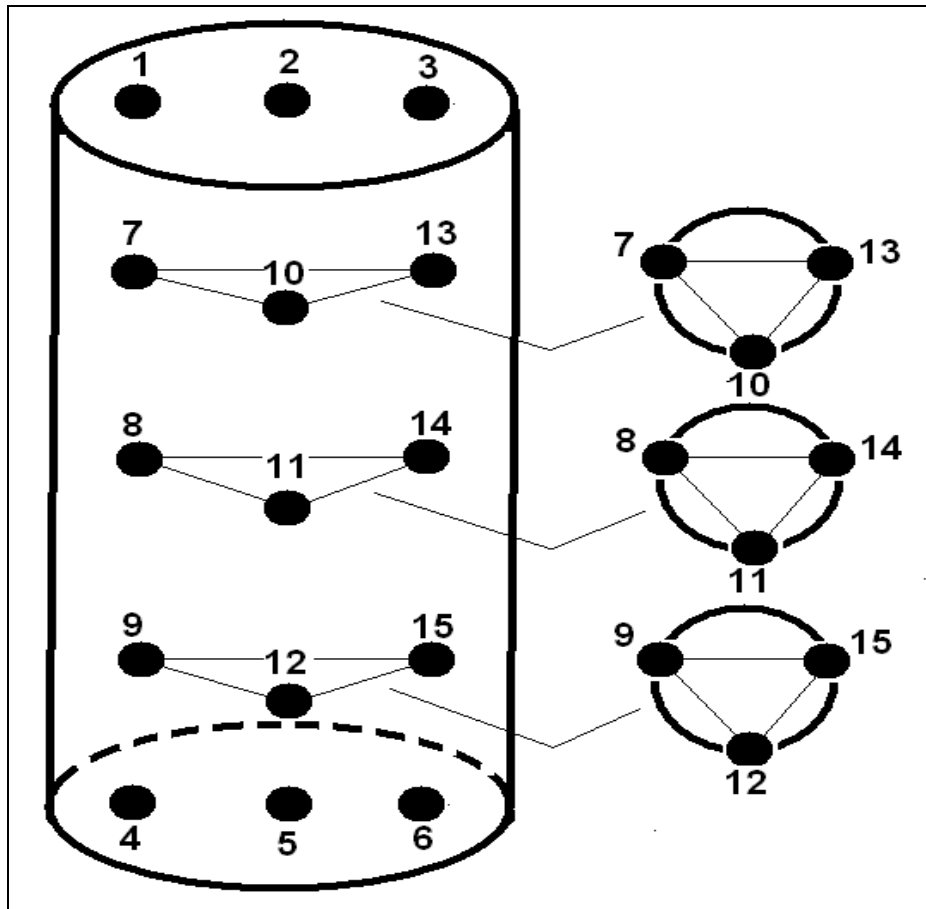


Figure 17: Schematic of a core sample and reference points for permeability measurements

Step 3: Six core plugs with 1.5 inch diameters were cut from conventional core samples 40, 49, 53, 39, 47 and 60. Side labels 1, 2, 3, 5, 6 and 8 were made to the corresponding core plugs. Core 59 was collapsed during the drilling process and core 56 was useless for drilling because of high fracture density. After being used for relative permeability experiments, the cores 53, 47 and 60 were also used for capillary pressure measurements. Figure 18 and Figure 19 show the drill bit and the core plugs respectively.

Table 4: Log sheet for conventional core samples from Umiat well 11

Side label #	1	2	3		5	6		8
Core #	40	49	53	59	39	47	56	60
Length (cm)	9.86	10.89	13.49	10.23	9.34	11.41	8.18	9.86
Depth (ft)	2133	2381	2455	2933	2124	2299	2819	2993
Appearance	C,F	S	S	C	C	C	F,S	S
K1_{air}(md)	77	97		69	195		134	73
K2_{air}(md)	62			68	238		245	66
K3_{air}(md)	65			69	188		130	99
K4_{air}(md)	68	98		70	93		140	72
K5_{air}(md)	94			71	123		145	
K6_{air}(md)	69			72	85			
K7_{air}(md)	73	111	131	84	83	142	147	80
K8_{air}(md)	83	134	107	85	86	151	886	92
K9_{air}(md)	284	118	110	98	90	122	151	93
K10_{air}(md)	85	90	115	83	88	130	139	87
K11_{air}(md)	92	105	105	82	84	144	127	86
K12_{air}(md)	102	102	112	96	84	118	114	87
K13_{air}(md)	79			86	86	118		
K14_{air}(md)	92			80	85	112		
K15_{air}(md)	84			88	86	140		

F=Fractured, S=Slabbed, C=Cylindrical.



Figure 18: Picture of drill bit used in drilling core plugs

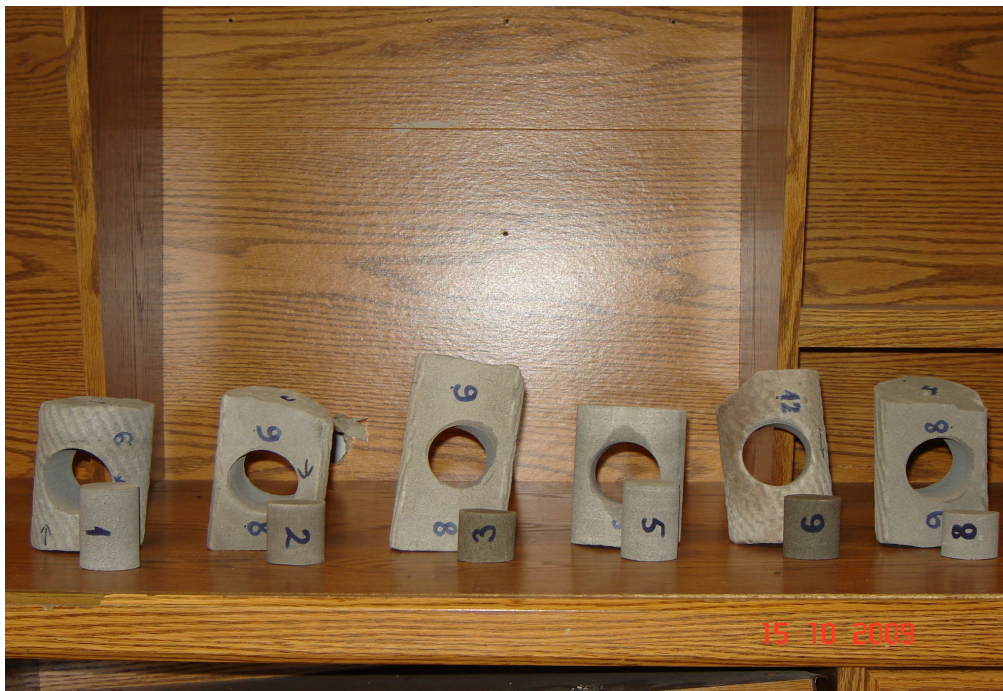


Figure 19: Picture of core plugs