

Supplementary Table 1

Permeability and porosity properties of Lower Devonian carbonate reservoir rocks
Lekkeyaga field, wells 41, 42, 47.

№ samples.	Interval, m	Coring point, m	Porosity %		Gas permeability in 3 directions, mD			Lithology
			open	effective	I	II	III	
Well. 41								
5109	3162-3169	5.2	6.4	-	0,001	4,5	4,3	Micro-grained dolomite, fractured
5061	3200-3207	0,25	24,7	21,3	26,7	35,2	34,0	Calcareous dolomite with relicts of ostracods and corals
5069	3200-3207	1,6	26,0	22,7	15,5	20,4	21,1	Calcareous dolomite with ostracod relicts
5070	3200-3207	1,9	27,1	24,2	27,1	27,2	27,5	Calcareous dolomite with ostracod relicts
5071	3200-3207	2,05	26,2	22,7	33,9	45,4	44,9	Biomorphic calcareous dolomite
5078	3200-3207	3,4	26,8	22,9	14,6	23,2	20,1	Dolomitized limestone, algal with organic matter
5095	3207-3212	2,2	2,6	-	0,55	0,40	7,5	Biomorphic dolomitized limestone
5096	3207-3212	2,5	1,9	-	0,038	0,39	0,027	Limestone with ostracods and irregularly distributed grumous – pelletal

Well 42								
5830	3230-3249	2,0	9,3	-	0,07	0,1	0,08	Calcareous dolomite, fine-micro-grained, porous
5837	3268-3272	0,3	11,0	6,6	0,13	6,1	2,7	Calcareous dolomite with fine-voids and small fractures
5841	3295-3301	1,7	7,6	5,3	0,1	0,3	0,3	Calcareous dolomite fine-micro-grained with vugs
5844	3310-3314	0,8	7,7	5,5	0,1	0,6	0,8	Calcareous dolomite, fine-micro-grained oil saturated






5845	3310-3314	1,0	9,2	6,9	2,1	2,2	1,6	Calcareous dolomite fine-micro-grained, fractured
Well 47								
7478	3135,9-3144,9	4,4	11,8	9,6	0,15	0,57	0,57	Dolomitized limestone fine- medium-grained, oil saturated
7979	3135,9-3144,9	4,5	10,2	7,2	0,59	6,2	2,1	Dolomitized limestone fine- medium-grained, oil saturated with relicts of organic matter
7481	3135,9-3144,9	4,85	9,7	7,3	3,6	8,6	7,7	Dolomitized limestone porous-fractured, oil saturated
7483	3144,9-3151,7	H.K.	8,2	6,7	0,4	38,9	17,4	Dolomitized limestone fine-grained, oil saturated
7483	3144,9-3151,7	1,4	5,8	3,8	0,34	3,1	3,2	Dolomitized limestone fine- medium-grained.

Supplementary Table 2

Parameters of Lower Devonian fractured carbonate rocks
Lekkeyaga field, wells 41, 47

№	Coring point, m	Fracture capacity, %	Gas permeability in 3 directions, mD			Surface fracture density by faces, cm/cm ²							Fracture openness, μm			Fractures' orientation
			I	II	III	I	II	III	IV	V	VI	average	min	max	average	
Well 41																
5110	2845,0	0,33	0,01	4,5	4,3	0	0,44	0,6	0,76	0,66	0,18	0,61	12	15	12	→
5102	3162,25	2,6	0,016	0,4	0,25	0,3	0,82	0,92	0,98	0,14	0,28	0,71	7	30	20	→
5104	3164,6	1,8	0,023	2,2	0,71	0,52	1,88	1,72	2,08	1,38	0,14	1,27	15	40	25	→
5094	3208,6	1,3	0,014	0,018	0,012	0,8	0,6	0,48	1,1	0,88	0	0,77	10	12	10	→
5095	3209,2	1,4	0,55	0,40	7,5	0,32	0,92	0,66	0,28	0,76	1,16	0,68	12	40	25	↗
5096	3209,5	1,9	0,038	0,39	0,027	0,88	1,12	0,96	0,68	0,8	0,48	0,82	5	100	30	↗
5097	3210,15	1,8	0,03	0,9	<0.001	0,48	1,24	1,4	0,76	1,38	0,08	0,89	7	50	25	↗

Well 47

Well 47																
7466	2390,25	4,6	0,001	0,11	2,2	0,56	1,76	1,56	1,96	2,56	0,77	1,53	5	42	20	
7468	3021,2	1,5	0,001	38,4	3,3	0,1	1,53	1,12	1,28	1,4	0,22	0,94	7	84	27	
7470	3027,2	1,4	0,001	0,54	4,0	0,56	1,20	0,95	1,36	1,69	1,32	1,18	5	105	23	
7483	3144,9	8,2	0,4	38,9	17,4	0,43	1,12	1,23	0,66	0,82	0,84	0,85	7	21	25	
7483a	3146,3	5,8	0,34	3,1	3,2	1,21	0,65	0,80	0,86	0,41	0,40	0,72	5	42	21	

Supplementary Table 3











Permeability and porosity properties of Lower Devonian carbonate reservoir rocks
Severo-Saremboy field, wells 15,16

№ Sample s.	Interval, m	Coring point, m	Porosity %	Gas permeability in 3 directions, mD			Lithology
				I	II	III	
Well 15							
4650	3003-3006	1,3	14,0	7,7	9,2	8,1	Calcareous dolomite, fine-grained oil saturated with vugs
4652	3012-3018	0,1	9,4	4,6	3,8	12,7	Calcareous dolomite, fine-grained oil saturated
4653	3012-3018	0,6	9,4	5,5	4,6	11,7	Calcareous dolomite fine-grained oil saturated
4655	3012-3018	1,6	8,0	0,6	1,3	0,6	Calcareous dolomite, fine-grained, oil saturated
4662	3018-3022	2,4	7,8	0,2	7,8	9,3	Calcareous dolomite, oil saturated, fine-grained with vugs
4663	3018-3022	2,9	6,9	0,3	0,6	0,7	Calcareous dolomite, fine-grained, oil saturated with small vugs
4664	3022-3027	0,4	8,0	0,9	6,0	3,3	Calcareous dolomite, fine-grained and porous, oil saturated
4665	3022-3027	2,0	6,2	2,2	1,2	0,6	Dolomite, porous with vugs, fine-grained, oil saturated
Well 16							
5386	3022,5-3024,8	0,6	6,6	0,3	19,5	7,3	Silica dolomite, fine-micro-grained, dense, with rare vugs and fractures
5394	3031,6-3038,6	0,6	4,2	0,06	0,2	0,2	Dolomite, micro-grained with small vugs, oil saturated
5401	3031,6-3038,6	2,8	5,1	14,7	20,2	3,8	Dolomite, micro-grained with small vus, fractured
5417	3038,6-3044,6	0,8	5,3	2,8	25,6	34,7	Dolomite, micro-grained with small vugs, fractured

5419	3044,6-3047,6 D ₁ l	0,15	6,8	0,9	12,3	0,6	Dolomite, micro-grained with of small vugs, fractured
5425	3049,6-3052,6 D ₁ l	1,0	2,6	0,8	1,6	28,7	Dolomite, micro-grained with a lot of small vugs, fractured
5444	3072,2-3083,4 D ₁ l	1,8	7,1	0,04	1,0	0,6	Limestone, porous, irregular argillaceous
5446	3072,2-3083,4 D ₁ l	2,2	3,4	0,02	4,1	8,1	Calcareous dolomite, dense, fractured
5457	3096,6-3104,6 D ₁ l	1,3	5,4	0,009	0,2	0,4	Limestone, micro-grained, porous, oil saturated with small fractures

Supplementary Table 4

**Parameters of Lower Devonian fractured carbonate rocks
Severo-Saremboy field, well 16**

№	Interval, m	Coring point, m	Fracture capacity, %	Gas permeability in 3 directions, mD			Surface fracture density by faces, cm/cm ²							Openness of fractures, µm			Fra- ctures' orient- ation
				I	II	III	I	II	III	IV	V	VI	Ave- rage	min	max	ave- rage	
5386	3022,5-3024,8	0,6	6,6	0,3	19,5	7,3	0,80	0,29	0,54	0,67	0,26	0,21	0,46	8	112	36	
5394	3031,6-3038,6	0,6	4,2	0,06	0,17	0,19	1,12	0,92	1,38	1,10	0,79	0,49	0,97	8	114	36	
5397	3031,6-3038,6	2,0	7,4	-	2,6	-	0,89	0,96	0,85	0,72	0,89	0,39	0,70	9	200	20	
5401	3031,6-3038,6	2,8	5,1	14,7	20,2	3,8	0,21	0,37	0,56	0,69	0,58	0,58	0,5	8	48	17	
5409	3038,6-3044,6	0,9	5,6	0,9	0,20	0,14	0,42	0,38	0,81	0,40	0,30	0,40	0,45	8	208	21	
5417	3038,6-3044,6	0,8	5,3	2,8	25,6	34,7	0,65	0,54	0,70	0,70	1,24	1,10	0,82	12	125	36	
5419	3044,6-3047,6	0,15	6,8	0,9	12,3	0,6	0,44	0,29	0,24	0,82	0,58	1,28	0,61	6	234	50	
5425	3049,6-3052,6	1,0	2,6	0,8	1,6	28,7	0,71	1,06	1,08	0,76	1,12	0,81	0,92	6	270	33	
5428	3049,6-3052,6	1,5	2,5	1,9	1,0	15,2	0,62	1,10	1,20	1,20	1,35	1,22	1,12	6	360	28	
5446	3072,2-3083,4	2,2	3,4	0,02	4,1	8,1	0	0,22	0,56	0,69	0,59	0	0,51	6	90	34	

Supplementary Table 5

Permeability and porosity properties of Lower Permian carbonate reservoir rocks
Sedyaga field, well 10

NN	Interval, m	Coring point, m	Porosity open %	Gas permeability in 3 directions, mD			Lithology
				I	II	III	
4721	996-1012	14,7	15,9	1,9	3,9	5,3	Silica limestone, fine-micro-grained with spicules of sponges
4725	1012-1026	0,4	13,0	-	1,2	1,2	Shaly-calcareous dolomite, micro-bedded fractured with relicts of organic matter. There are some silica rocks.
4740	1028-1044	6,9	22,4	-	1,0	0,12	Silica dolomite, irregular oil saturated, fractured
4747	1044-1060	5,4	20,2	7,8	1,6	4,4	Calcareous dolomite, irregular oil saturated
4749	1060-1067	0.	20,3	78,8	16,2	21,0	Calcareous dolomite, irregular oil saturated, with silica interbeds, fractured.
4754	1067-1083	1,0	18,0	6,7	9,6	1,9	Secondary dolomitized limestone. Dolomite is silica and irregular oil saturated
4759	1083-1096	1,15	21,2	0,7	49,7	14,9	Dolomitized silica limestone, irregular oil saturated and fractured
4762	1083-1096	4,42	21,6	0,6	31,4	21,1	Silica dolomite, organic, irregular oil saturated and fractured
4774	1122-1128	5,85	16,2	0,13	0,01	1,8	Fine-micro-grained limestone with spicules of sponges. There are few oil saturated vugs.
4806	1144-1160	11,5	17,0	0,7	1,5	7,7	Dolomitized limestone, clayey and silica, micro-grained, irregular oil saturated
4813	1160-1176	4,65	19,6	-	16,3	23,0	Carbonate-silica rock, irregular oil saturated and fractured

Supplementary Table 6

Permeability and porosity properties of Lower Permian carbonate reservoir rocks
Labogan field, wells 71, 75

N samples	Interval, m	Coring point, m	Porosity open, %	Residual water, as % pore volume	Gas permeability in 3 directions, mD			Lithology
					I	II	III	
Well 71								
5641	1409-1410	0	24,1		2,9	4,3	4,4	Organogenic – detrital limestone, fine-porous, fractures with oil in fractures.
5643	1428-1433	1,15	16,4	38,4	0,2	1,0	0,7	Organogenic – detrital limestone, siliceous, oil saturated
5644	1428-1433	2,1	19,8	36,1	0,8	1,3	1,2	Organogenic – clastic limestone, siliceous, oil saturated
5646	1428-1433	3,8	16,4	40,0	0,001	0,4	0,4	Organogenic – clastic limestone, silty, porous, oil saturated
5648	1433-1440	1,7	16,1	41,2	0,1	0,7	1,1	Organogenic limestone, silty, oil saturated
5650	1440-1447	0,6	13,0	52,2	-	2,3	2,4	Fine-micro-grained limestone with relicts of organic matter, oil saturated
5651	1440-1447	1,25	18,2	49,1	0,3	4,9	3,0	Silty limestone with relicts of organic matter, silty, oil saturated.
5652	1440-1447	1,25	19,4	41,4	1,2	0,2	1,8	Silty fine-grained limestone with relicts of organic matter, oil saturated.
Well 75								
5590	1443-1458	2,1	9,9	48,8	0,06	0,4	0,6	Organogenic – clastic limestone, silty, massive, oil saturated
5591	1458-1469	2,4	12,5	-	6,4	4,0	25,8	Silty limestone, fine-grained, dense, fractured

Supplementary Table 7

Permeability and porosity properties of Lower Permian carbonate reservoir rocks
Naul field, wells 55, 57

№	Interval, m	Coring point	Porosity open, %	Gas permeability in 3 directions, mD			Lithology
				I	II	III	
Well 55							
5577	1540-1545	0,6	17,7	0,2	29,7	8,1	Silty limestone with siliceous inclusions. Fine grains of quartz are cemented by calcite. Oil saturated limestone
5581	1545-1553	0,3	11,8	0,17	0,28	0,22	Siliceous rock with relicts of organogenic detrital limestone, irregular oil saturated
5583	1545-1553	3,7	0,7	0,02	0,02	0,02	Siliceous rock with relicts of organogenic detrital limestone, with vugs and fractures, irregular oil saturated
5586	1545-1553	4,5	25,2	3,2	3,7	3,6	Organogenic detrital limestone, siliceous, fractured, oil saturated
Well 57							
5540	1285-1300	1,1	27,2	-	45,9	-	Organogenic detrital limestone, siliceous, fractured, oil saturated
5541	1285-1300	2,0	28,5	-	15,3	-	Organogenic detrital limestone, siliceous, fractured, oil saturated
5542	1465-1478	1,1	15,3	-	0,9	-	Secondary siliceous rock with relicts of spiculas, sponges, bryozoans and brachiopods. The rock is massive and porous
5543	1465-1478	6,5	19,6	-	0,6	-	Silty limestone, siliceous massive, oil saturated