

Company : Apache Corporation
Well : Hawk No. A-13
Location : Lea County, New Mexico



CL File No.: HOU-020656
Date: July 15, 2002
Analyst(s): ML-JH-LA

CMS-300 CONVENTIONAL PLUG ANALYSIS

Sample Number	Depth ft	Net Confining Stress psig	Porosity %	Permeability		b(He) psi	Beta ft(-1)	Alpha microns	Grain Density g/cm ³	Description	Footnote
				Klinkenberg mD	Kair mD						
1	3811.00	800	10.70	1.95	2.12	5.15	3.08E+11	1.93E+03	2.859	Dol It tan vf xln pp vug	
1	3811.00	1200	10.45	1.90	2.07	5.52	2.97E+11	1.82E+03	2.859		
2	3821.00	800	6.60	.004	.009	113.14	3.72E+16	4.79E+05	2.805	Sst It gry vf gr scalc	
2	3821.00	1200	6.39	.003	.007	122.40	3.32E+16	3.10E+05	2.805		
3	3829.00	800	7.99	.005	.010	110.63	1.96E+16	2.76E+05	2.792	Sst It gry vf gr scalc	
3	3829.00	1200	7.68	.003	.008	118.68	1.51E+16	1.60E+05	2.792		
4	3835.00	800	8.36	.010	.021	90.89	5.61E+15	1.76E+05	2.836	Dol It gry vfg ssdy	
4	3835.00	1200	8.15	.008	.016	95.78	4.35E+15	1.10E+05	2.836		
5	3849.00	800	3.72	.001	.002	176.07	1.85E+16	3.94E+04	2.787	Dol It gry vf xln slmy	
6	3870.00	800	13.42	.093	.152	46.49	8.35E+12	2.39E+03	2.806	Dol It tan vf xln ssdy	
6	3870.00	1200	12.21	.080	.136	50.48	6.40E+12	1.64E+03	2.806		
7	3881.00	800	10.01	.010	.021	91.49	1.70E+15	5.19E+04	2.821	Dol It gry vfg ssdy	
7	3881.00	1200	8.92	.008	.017	94.24	1.68E+15	4.55E+04	2.821		
8	3901.00	800	13.89	.147	.239	44.31	2.75E+12	1.28E+03	2.731	Sst It tan vfg	
8	3901.00	1200	13.62	.135	.224	46.36	2.17E+12	9.41E+02	2.731		
9	3908.00	800	10.55	.044	.074	53.37	1.31E+14	1.81E+04	2.787	Sst It tan vfg scalc	
9	3908.00	1200	10.27	.033	.064	71.29	4.75E+13	4.97E+03	2.787		
10	3946.00	800	11.22	.054	.095	58.27	4.90E+13	8.26E+03	2.848	Dol It tan vf xln	
10	3946.00	1200	10.99	.043	.086	73.44	1.49E+13	2.04E+03	2.848		
11	3959.00	Ambient	14.42						2.837	Dol It tan vf xln	
12	3970.00	800	15.32	1.24	1.60	18.27	1.57E+11	6.21E+02	2.841	Dol wh vf xln svug	(1)
12	3970.00	1200	14.66	1.12	1.48	19.61	1.47E+11	5.28E+02	2.841		
13	3996.00	800	7.35	.013	.023	69.38	8.52E+14	3.39E+04	2.786	Sst It gry-wh vfg lam scalc	
13	3996.00	1200	7.06	.008	.017	96.37	6.74E+14	1.66E+04	2.786		
14	4015.00	800	10.05	1.09	1.25	8.94	2.23E+11	7.79E+02	2.851	Dol It tan vf xln styl	
14	4015.00	1200	9.84	1.09	1.25	8.84	2.21E+11	7.73E+02	2.851		

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				Klinkenberg mD	Kair mD						
15	4047.00	Ambient	11.32						2.845	DoI It tan v f xln	(1)
16	4053.00	800	14.57	.578	.763	20.60	4.02E+11	7.40E+02	2.845	DoI It tan v f xln vug	
16	4053.00	1200	13.62	.536	.703	20.20	4.49E+11	7.70E+02	2.845		

(1) : Sample unsuitable for permeability measurement. Ambient porosity reported.

Note : For samples where data is reported at 800 psig and not at 1200 psig NCS-

The permeability at 1200 psig NCS was below 0.001 md and the measurement of porosity was aborted.