Applied Petroleum Geology Homework 1/13/14

1. Given Rw = 0.05 Ωm; ϕ = 20%; Rt = 30 Ωm; calculate Sw.

2. Define, Rw, Ro, F, Rt, m, n as used in log calculations:

3. A well is drilled to 8500 ft. The KB is 5350. Formation X is encountered at 6700 ft. Calculate the elevation of Formation X. Formation Y is found at 3700 ft. Calculate the elevation of Formation Y.

4. A drill stem test has a final shut-in pressure of 4185 psi at 9000 ft. Calculate the pressure gradient.

5. A drill stem test has a final shut-in pressure of 5573 psi at 8575 ft. Calculate the pressure gradient.

6. What causes abnormal pressure?

7. Define and describe reservoir heterogeneity:

8. Discuss the significance of the following TOC and Rock Eval pyrolysis information:

Table 1. Rooney Road, Graneros Shale Section; organic geochemistry analyses (from Pietraszek-Mattner, 1995).

Sample	Location (ft.)	Tmax Deg C	TOC wt%	S1 mg/g	S2 mg/g	S3 mg/g	HI	OI	Reactive Carbon	Transformation Ratio	Facies
AMC 20	70	426	4.61	0.3	24.13	0.5	523	11	53	0.01	
AMC 18	68	428	5.26	0.41	28.92	0.14	550	3	55.8	0.01	C
AMC 15	61	419	4.62	0.2	11.75	1.13	254	24	25.9	0.02	
AMC 13	53	429	3.36	0.12	8.46	1.82	252	54	25.5	0.01	
AMC 12	50	428	2.81	0.08	6.29	1.02	22	36	22.7	0.01	B
AMC 8	39	423	2.84	0.11	4.82	0.61	170	21	17.4	0.02	
AMC 6	24	429	1.53	0.05	0.35	1.1	23	72	2.6	0.13	
AMC 3	9	424	0.95	0.05	0.25	0.92	26	97	3.2	0.17	A
AMC 1	0	428	2.13	0.08	1.44	1.07	68	50	7.1	0.05	

From Pietraszek-Mattner, 1995.

TOC = Total Organic (wt%); S1 = Free Hydrocarbons (mg/g); S2 = Pyrolyzable Hydrocarbons (mg/g);
S3 = CO2 released during pyrolysis (mg/g); HI = Hydrogen index = [(S2/%TOC) x 100]; OI = Oxygen Index = [(S3/%TOC) x 100];
Reactive Carbon = [10 x (S1+S2)/%TOC]; Transformation Ratio = S1/(S1+S2)

Table 2. Bass Box Elder Farm 6-32 Graneros core (SW SE Sec. 6, T. 3 S., R. 65 W.; organic geochemistry analyses (from Pietraszek-Mattner, 1995).

Sample	Core Depth	Log Depth	Tmax Deg. C	TOC wt%	S1 mg/g	S2 mg/g	S3 mg/g	HI	OI	Reactive Carbon	Transformation Ratio	Facies
BEF 13	8285	8277	445	4.42	2.7	10.46	0.15	237	3	29.8	0.21	C
BEF 11	8288	8280	441	3.77	2.44	8.99	0.15	238	4	30.3	0.21	
BEF 7	8296	8288	447	2.93	1.74	5.61	0.19	191	6	25.1	0.24	
BEF 6	8299.5	8291.5	447	3.13	1.94	6.68	0.15	213	5	27.5	0.23	B
BEF 5	8302	8294	448	2.05	1.06	3.08	0.06	150	3	20.2	0.26	
BEF 2	8309.5	8301.5	451	1.28	0.3	1.82	0.09	64	7	8.8	0.14	A

From Pietraszek-Mattner, 1995.

TOC = Total Organic (wt%); S1 = Free Hydrocarbons (mg/g); S2 = Pyrolyzable Hydrocarbons (mg/g);
S3 = CO2 released during pyrolysis (mg/g); HI = Hydrogen index = [(S2/%TOC) x 100]; OI = Oxygen Index = [(S3/%TOC) x 100];
Reactive Carbon = [10 x (S1+S2)/%TOC]; Transformation Ratio = S1/(S1+S2)

SS_SOONER FIELD - Weld Co, CO