CLASS VI CONFINING ZONE PROPERTIES

INJECTION WELL 357-7R
40 CFR 146.82(c)(4),(7) and 146.87(b)-(d)

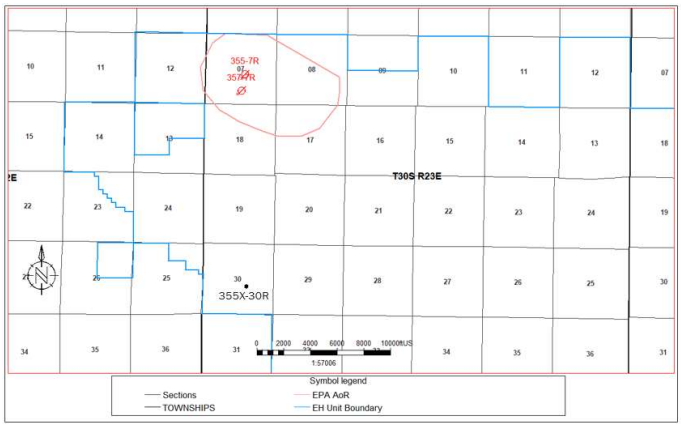
ELK HILLS A1-A2 PROJECT

Confining Zone Chemical and Physical Characteristics

Core Analysis

Given the marine depositional environemnt and continuity of the Reef Ridge shale the 355X-30R well core analysis is used to characterize the Reef Ridge Shale in the AoR.

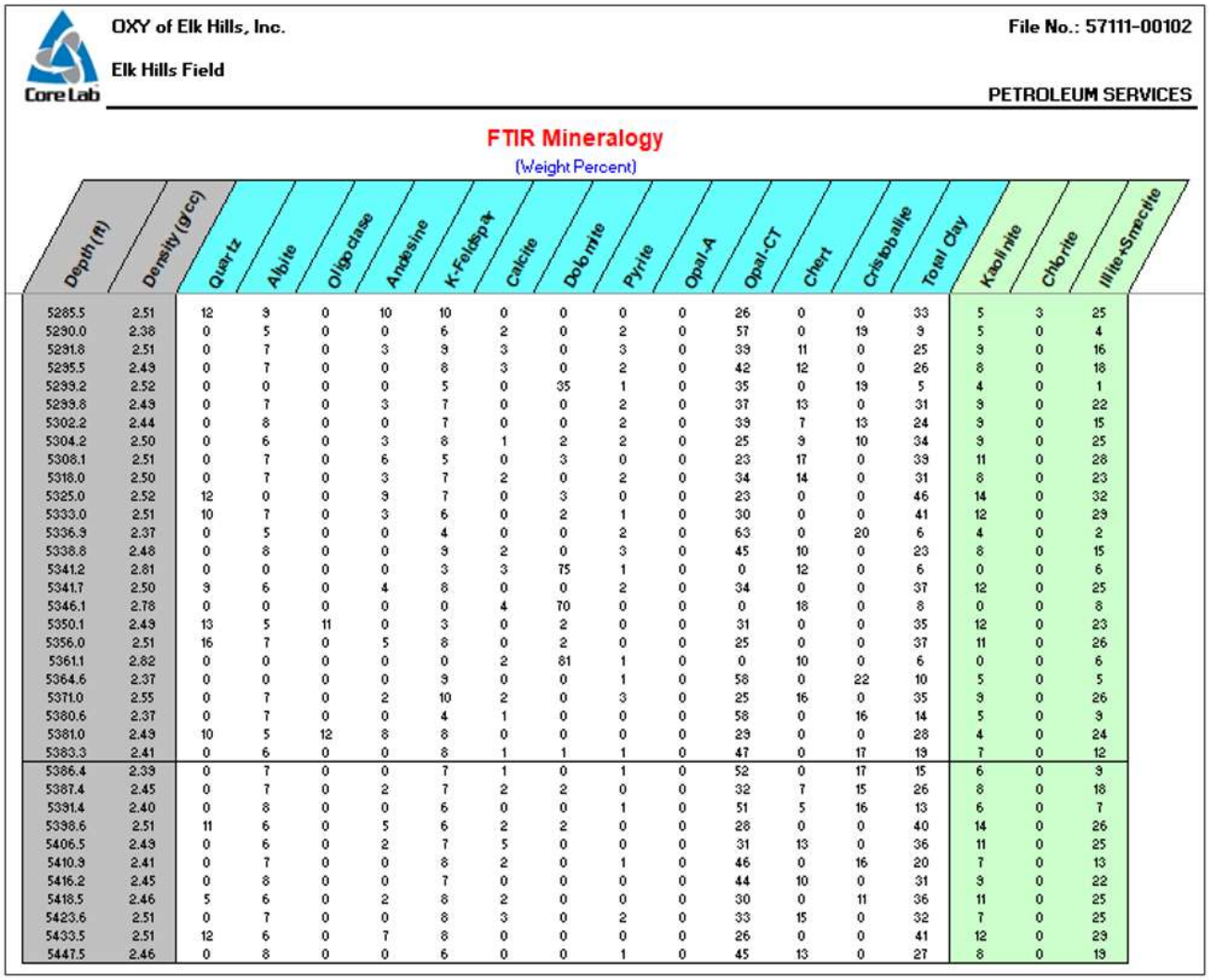
Figure 1: Location of Reef Ridge core well 355X-30R.



Mineralogy

Fourier Transform Infrared Spectroscopy (FTIR) is used to determine mineralogy of the confining zone from 36 points in one well (Figure 2). In the high clay intervals, the confining zone has an average of 29.5% total clay, 3.7% quartz, 14.5% potassium feldspar, albite and oligoclase as well as 47.1% silica polymorphs (Opal-CT, chert and Cristobalite).

Figure 2: FTIR mineralogy for the Reef Ridge Shale in the 355X-30R well.



OXY of Elk Hills, Inc.

Elk Hills Field

File No.: 57111-00102

PETROLEUM SERVICES

FTIR Mineralogy

(Weight Percent)

Depth (ft)	Density (g/cc)	Quartz	Albite	Oligoclase	Andesine	K-Feldspar	Calcite	Dolomite	Pyrite	Opal-A	Opal-CT	Chert	Cristobalite	Total Clay	Kaolinite	Chlorite	Illite+Smectite
5285.5	2.51	12	9	0	10	10	0	0	0	0	26	0	0	33	5	3	25
5290.0	2.38	0	5	0	0	6	2	0	2	0	57	0	19	9	5	0	4
5291.8	2.51	0	7	0	3	9	3	0	3	0	39	11	0	25	9	0	16
5295.5	2.49	0	7	0	0	8	3	0	2	0	42	12	0	26	8	0	18
5299.2	2.52	0	0	0	0	5	0	35	1	0	35	0	19	5	4	0	1
5299.8	2.49	0	7	0	3	7	0	0	2	0	37	13	0	31	9	0	22
5302.2	2.44	0	8	0	0	7	0	0	2	0	39	7	13	24	9	0	15
5304.2	2.50	0	6	0	3	8	1	2	2	0	25	9	10	34	9	0	25
5308.1	2.51	0	7	0	6	5	0	3	0	0	23	17	0	39	11	0	28
5318.0	2.50	0	7	0	3	7	2	0	2	0	34	14	0	31	8	0	23
5325.0	2.52	12	0	0	9	7	0	3	0	0	23	0	0	46	14	0	32
5333.0	2.51	10	7	0	3	6	0	2	1	0	30	0	0	41	12	0	29
5336.9	2.37	0	5	0	0	4	0	0	2	0	63	0	20	6	4	0	2
5338.8	2.48	0	8	0	0	9	2	0	3	0	45	10	0	23	8	0	15
5341.2	2.81	0	0	0	0	3	3	75	1	0	0	12	0	6	0	0	6
5341.7	2.50	9	6	0	4	8	0	0	2	0	34	0	0	37	12	0	25
5346.1	2.78	0	0	0	0	0	4	70	0	0	0	18	0	8	0	0	8
5350.1	2.49	13	5	11	0	3	0	2	0	0	31	0	0	35	12	0	23
5356.0	2.51	16	7	0	5	8	0	2	0	0	25	0	0	37	11	0	26
5361.1	2.82	0	0	0	0	0	2	81	1	0	0	10	0	6	0	0	6
5364.6	2.37	0	0	0	0	9	0	0	1	0	58	0	22	10	5	0	5
5371.0	2.55	0	7	0	2	10	2	0	3	0	25	16	0	35	9	0	26
5380.6	2.37	0	7	0	0	4	1	0	0	0	58	0	16	14	5	0	9
5381.0	2.49	10	5	12	8	8	0	0	0	0	29	0	0	28	4	0	24
5383.3	2.41	0	6	0	0	8	1	1	1	0	47	0	17	19	7	0	12
5386.4	2.39	0	7	0	0	7	1	0	1	0	52	0	17	15	6	0	9
5387.4	2.45	0	7	0	2	7	2	2	0	0	32	7	15	26	8	0	18
5391.4	2.40	0	8	0	0	6	0	0	1	0	51	5	16	13	6	0	7
5398.6	2.51	11	6	0	5	6	2	2	0	0	28	0	0	40	14	0	26
5406.5	2.49	0	6	0	2	7	5	0	0	0	31	13	0	36	11	0	25
5410.9	2.41	0	7	0	0	8	2	0	1	0	46	0	16	20	7	0	13
5416.2	2.45	0	8	0	0	7	0	0	0	0	44	10	0	31	9	0	22
5418.5	2.46	5	6	0	2	8	2	0	0	0	30	0	11	36	11	0	25
5423.6	2.51	0	7	0	0	8	3	0	2	0	33	15	0	32	7	0	25
5433.5	2.51	12	6	0	7	8	0	0	0	0	26	0	0	41	12	0	29
5447.5	2.46	0	8	0	0	6	0	0	1	0	45	13	0	27	8	0	19

Permeability

Table 1 shows the Reef Ridge Shale permeability for the 355X-30R well.

Table 1: Permeability and porosity for the Reef Ridge Shale in the 355X-30R well from mercury injection capillary pressure data.

Sample	Depth (ft)	Porosity (dec)	Permeability (mD)
TEST1	5290	0.0586	0.00007
TEST2	5299.2	0.0351	0.00003
TEST3	5338.8	0.0922	0.0002
TEST4	5361.1	0.137	0.0917
TEST5	5364.4	0.0536	0.00006
TEST6	5380.6	0.0611	0.00007
TEST7	5383.3	0.0794	0.00012
TEST8	5386.4	0.0541	0.00006
TEST9	5391.4	0.102	0.0002
TEST10	5416.2	0.0894	0.0002
TEST11	5447.5	0.0806	0.00011
Average	5368.99	0.07665	0.00844

The average porosity of the confining zone is 7.7% based on 11 mercury injection capillary pressure core data points in one well.

The average permeability of the confining zone is 0.0084mD based on 11 mercury injection capillary pressure core data points in one well.

Capillary pressure is the difference across the interface of two immiscible fluids. Capillary entry pressure is the minimum pressure required for the CO_2 to overcome capillary and interfacial forces and enter the pore space containing the water.

The capillary pressure of the confining zone is 4,220 PSI in a CO_2-brine system based on 11 mercury injection capillary pressure core data points in one well (Figure 3). The capillary pressure was determined by applying CO_2-brine corrections to the air-mercury data. An interfacial tension of 480 dynes/cm was used for air-mercury and 30 dynes/cm was used to convert to CO_2-brine. A cosine of contact angle of 0.766 and 0.866 were also used for air-mercury and CO_2-brine respectively.

Figure 3: Capillary pressure graph for the 355X-30R well.