RELATIONS BETWEEN TECTONIC UNITS AND OIL FIELDS IN TURKEY *)

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I. General:

a) Tectonics of Turkey: The genеneral tectonic aspect of Turkey is represented by the orogenic Alpine zone with its two main wings; the Anatolides and the Taurides separated from each other by ancient massives. The orogenic zone observed in Turkey is situated between the Russian platform in the north and the Arabian block in the south, which platform and block constitute the forelands of the Alpine geosyncline.

The Pontides and the Aegean - Iranides together with the Border Folds form the Northern and Southern foredeeps of the same geosyncline. We have also distinguished on the inner borders of the main wings folded belts encircling more or less ancient massives. These belts (the İçilides and the Ortailides) no doubt exist around the Arabian block, but we could not outline them in our map.

b) Oil Shows in Tukey : Oil shows exist throughout Turkey in various forms. Liquid oil seepages at Van and Sinop, liquid oil in limestone vacuoles at Mersin and Siirt, petroliferous sandstones at Hazro, Diyarbakır, İskenderun, asphalts in limestones at Ankara, Harbol-Siirt and bituminous sandstones at İnegol-Bursa are the most common ones. Gas seepages have also been known in Thrace and Seyhan.

These shows are seen in the formations of all ages from the Paleozoic (Devonian at Hazro) up to Miocene (Tortonian at Seyhan).

II. Tectonic Control on oil deposits :

a) Distribution of Oil Shows:

Oil Shows reported on the tectonic map of Turkey indicate some very remarkable groups (see map) but no shows is -visible on the main wings of the orogenic zone. On the contrary, these shows are grouped in the foredeeps of the geosyncline or in folded belts around the rigid massives.

All these shows are, with the exception of certain gas seepage found in serpentines at the margin of said basins (İskenderun, Antalya), evidently related to faults affecting the sedimentary formations in the neighbourhood and sometimes lying below.

b) Sedimentary Tectonic Basins :

Sedimentary basins favorable for oil deposits so far as source-rocks and reservoir rocks having favorable structures are concerned have been lined along and at the margin of large tectonic units described above, i. e., Pontides, Ortailides, İçilides, Aegean-Iranides and the Border Folds. Going outward of the two main wings of the geosyncline are found foredeep zones and epicontinental basins which have rather resulted from calm sedimetation and which have undergone weak toe-tonic movements.

These zones and basins have, unfortunately, been split up into small basins under transversal tectonic, in default of which one third of Turkey would have been constituted by petroliferous basins. The elevated transversals are not marked on the map, as these have not been established definitely yet.

III.Typical Stratigraphic Section of Sedimentary Basins :

a) Diyarbakır, Siirt Basin (at the 'Border Folds)

This basin is the most widespread basin throughout Turkey and in it are situated the oil fields of Raman and Garzan where oil deposits have been found suitable for commercial exploitation. Also, in this basin some 20 anticlinal structures are known to exist up to the present.

Age	Description	Thickness in meters	Oil Possibilities
Recent Pleiostocene	Alluvium, terrace Basalt flows Unconformity	—	
Pliocene	Sand, clay Conglamerate Unconformity	600	
Upper Miocene	Grey and red shale, shaly clay	200	
Middle Miocene	Red shaly clay, gypsum with thin limestone alternation	300	
Lower Miocene Oligocene	Equivalent of Asmari limestone, Often lacking Unconformity		
Upper Eocene	Chalky Limestone Upper Midyat	200	First Horizon
Middle Eocene	Massive limestone Lower Midyat	200	
	Red Gercüş Formation	300	
Lower Eocene	Grey shales of Upper Kermav	450	

Age	Description	Thickness in meters	Oil Possibilities
Upper Gretaceous	Grey marls of Lower Kermav	200	
	Orbitoid limestones	100	
	Unconformity		
Turonian	Dolomitic Massive limestone	250	Second producing Horizon
Cenomanian	Grey limestone	150	
Lower Cretaceous	Massive limestone	150	
Jurassic	Blackish marl Limonitic limestone	250	Third Horizon
Upper and Middle Triassic	Dark grey limestone (Tanintanin Formation)	500	
Lower Triassic	Alternation of grey limestone and brown marl	250	
	Quartzites of Giri	300	
Permo-Carboniferous	Harbol black massive limestone	500	Fourth Horizon
	Unconformity		
Devonian	Marl and sandstone	150	Fifth Horizon
	Unconformity		
Substratum Cambro - Ordonician	Sandstone, schist, limestone, etc.		

b) Seyhan Basin (Adana) in the Aegean-Iranides:
A dozen of faulted anticlinal structures are known here.

Age	Description	Thickness in meters	Oil Possibilities
Recent	Alluvium and terrace	—	
	Unconformity		
Pliocene	Conglomerate, sand, shaly clay, gypsiferous series	500	
	Unconformity		
	Yellowish sandstone	800	
Tortonian	Red transition beds	200	
	Upper shale	1500	
Helvetian	Flysh series	1500	First Horizon
	Lower shale	400	
	Unconformity		
Burdigalian	Reef limestone Equivalent of Asmari	200	Second Horizon
	Unconformity		
Cretaceous	Limestone, ophiolithic rocks	300	

Age	Description	Thickness in meters	Oil Possibilities
	Unconformity		
Carboniferous	Greyish-black marl, Calcareous sandstone (Düzağaç series)	400	Third Horizon
	Unconformity		
Substruatum Lower Paleozoic	Limestone, quartzite, schist, etc.		

c) Tekirdağ (Thrace) Basin (Ortailides)

Ten strongly faulted anticlinal structures have been known here up to the present :

Age	Description	Thickness in meters	Oil Possibilities
Recent	Alluvium and terrace	—	
	Unconformity		
Pleistocene	Conglomerate and sand	100	
	Unconformity		
Sarmatian	Shaly clays limestone, sandstone	200	
Tortonian	Palatinos sandstone	300	
Helvetian	Clay, sandstone	300	First Horizon
	Unconformity		
Lower Miocene	Hard sandstone	100	
	Unconformity		
Oligocene	Flysch series	1200	Second Horizon
	Unconformity		
Upper Eocene	Sandy limestone, Conglomerate	150	
Lutetian	Limestone with sandstone intercalations	500	Third Horizon
Ypresian	Shale and sandstone Conglomerate	200	
	Unconformity		
Substruatum Prepaleozoic	Chlorite and sericite schist, etc.		

d) Boyabat - Sinop Basin (Pontides) :

A single faulted anticlinal structure has been so far known.

Age	Description	Thickness in meters	Oil Possibilities
Recent Pleistocene	Alluvium, terrace Basalt flows		
	Unconformity		
Oligocene	Clay, sand and conglomerate	200	

Age	Description	Thickness in meters	Oil Possibilities
Eocene	Shale, limestone Sandstone, conglomerate	2000	First Horizon
	Unconformity		
Upper Cretaceous	Marl, sandstone, limestone	200	
Lower Cretaceous	Sandy marl Marly clay Sandstone, limestone	800	Second Horizon
	Unconformity		
Substrautum Paleozoic	Schists, etc.		

IV. Conclusions :

1 — Oil deposits so far discovered in Turkey as well as all other oil shows known in this country are grouped in structural units constituting the borders of the two main wings of the Alpine geosyncline.

Folded belts encircling the ancient rigid massives are also the locality of a part of such shows. The structural units involved (from the North to the south) are as follows :

— Pontides
— Ortailides
— Içilides
— Aegean - Iranides
— Border Folds

2 — Along the above mentioned units are sedimentary rocks which were subjected to more or less horizontal and vertical movements, thus giving way to faulted anticlinal structures.

3 — The sedimentary tectonic basins are outlined by elevated transversals resulting from tectonic transversals.

4 — All these basins show the particulars of subsidence basins provided with very thick sedimentation.

5 — Turkey can be well developped as a country rich in oil.

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Chamoson Demir Madenine ait magnetik saha şiddetinin ufkî kompozant ölçüleri cetveli (Valais-İsviçre)

(Les resultats des mesures magnétometriques pour la composante horizontale de la Mine de Fer de Chamoson, Valais-Suisse)

Stations Magnétometriques No.	Altidudes	Stations Topographiques correspondant	Hauteur de l'appareil	Lectures en millimètres sur la reglette		Moyennes des lectures en mm.	Les anomalies exprimées en		$(r+d_1 =$ en m/m$)$	$H = \frac{0,2(129)^3}{(r+d_1)^3} =$ en gauss	$\triangle H$ en gammas
				N. Tilev	M. Topkaya		m/m	1/10 mm.			
1	1900 m.	56	1,15 m.	75,5	75,5	75,5	2,5	+25	75,5+51	0,21209	+1209
2	1906	181 A	1,26	76,8	76,9	76,8	1,2	+12	76,8+51	0,20568	+568
3	—	80	1,10	77,0	77,1	77,0	1,0	+10	77,0+51	0,20472	+472
4	—	84	1,10	78,2	78,4	78,3	0,3	−3	78,3+51	0,19861	−139
5	—	85	1,20	78,2	78,3	78,25	0,2	−2	78,2+51	0,19884	−116
6	—	87	1,18	78,4	78,3	78,3	0,3	−3	78,3+51	0,19861	−139
7	1930	88	1,15	78,7	—	78,7	0,7	−7	78,7+51	0,19678	−322
8	1930	90	1,20	78,6	—	78,6	0,6	−6	78,6+51	0,19703	−297
9	1870	17	1,00	78,5	78,5	78,5	0,5	−5	78,5+51	0,19769	−231
10	1880	46	1,25	77,9	78,0	77,9	0,1	+1	77,9+51	0,20023	+23
11	1890	51	1,10	77,2	77,3	77,2	0,8	+8	77,2+51	0,20352	+352
12	1934	117	1,10	78,7	78,8	78,75	0,7	−7	78,7+51	0,19655	−345
13	1940	197	1,15	78,4	78,4	78,4	0,4	−4	78,4+51	0,19815	−185
14	1946	120	0,90	77,7	77,8	77,75	0,3	+3	77,7+51	0,20116	+116
15	1950	121	1,15	86,8	86,9	86,85	8,85	−88,5	86,8+51	0,16390	−3610
16	1954	122	1,14	76,5	76,7	76,6	1,4	+14	76,6+51	0,20665	+665
17	—	356	0,96	78,7	78,3	78,5	0,5	−5	78,5+51	0,19769	−231
18	1958	123	1,08	77,1	77,6	77,35	0,7	+7	77,3+51	0,20305	+305
19	1960	124	1,10	78,1	78,2	78,15	0,15	−1,5	78,1+51	0,19930	−70
20	1970	225	1,12	78,5	—	78,5	0,5	−5	78,5+51	0,19769	−231
21	1970	333	1,16	79,1	—	79,1	1,1	−11	79,1+51	0,19497	−503
22	1970	334	1,24	78,8	—	78,8	0,8	−8	78,8+51	0,19632	−368
23	1970	335	—	79,0	—	79,0	1,0	−10	79,0+51	0,19542	−458
24	1970	336	1,25	78,6	—	78,6	0,6	−6	78,6+51	0,19723	−277
25	1970	337	1,10	78,4	—	78,4	0,4	−4	78,4+51	0,19815	−185
26	1970	338	1,10	78,1	—	78,1	0,1	−1	78,1+51	0,19953	−57
27	1990	325	1,00	78,6	—	78,6	0,6	−6	78,6+51	0,19723	−227
28	1990	326	1,10	78,2	—	78,2	0,2	−2	78,2+51	0,19907	−93
29	1990	324	1,05	78,2	—	78,2	0,2	−2	78,2+51	0,19907	−93
30	1990	320	1,12	78,5	—	78,5	0,5	−5	78,5+51	0,19769	−231
31	1990	231	1,05	78,2	—	78,2	0,2	−2	78,2+51	0,19907	−93
32	1990	232	1,10	78,6	—	76,6	1,4	+14	76,6+51	0,20378	+378
33	1980	229	1,00	—	78,5	78,5	0,5	−5	78,5+51	0,19769	−231
34	1980	230	0,95	—	78,8	78,8	0,8	−8	78,8+51	0,19632	−368
35	1970	226	1,10	78,9	79,0	78,9	0,9	−9	78,9+51	0,19587	−413
36	1950	216	0,90	77,5	77,8	77,6	0,4	+4	77,6+51	0,20187	+187
37	1950	217	1,00	—	77,5	77,5	0,5	+5	77,5+51	0,20234	+234
38	1940	344	1,10	—	78,5	78,5	0,5	−5	78,5+51	0,19769	−231
39	1940	203	1,01	—	78,7	78,7	0,7	−7	78,7+51	0,19678	−322
40	1950	207	1,02	—	78,5	78,5	0,5	−5	78,5+51	0,19769	−231
41	1970	307	1,10	—	79,0	79,0	1,0	−10	79,0+51	0,19542	−458
42	1980	389	0,87	—	79,1	79,1	1,1	−11	79,1+51	0,19447	−503
43	1990	281	0,96	78,7	—	78,7	0,7	−7	78,7+51	0,19678	−322
44	1992	280 A	1,10	78,6	—	78,6	0,6	−6	78,6+51	0,19723	−277
45	1990	280	1,05	78,3	—	78,3	0,3	−3	78,3+51	0,19861	−139
46	1988	284	1,10	78,6	—	78,6	0,6	−6	78,6+51	0,19723	−277
47	2000	147	1,20	—	78,5	78,5	0,5	−5	78,5+51	0,19769	−231
48	2000	144	1,10	—	78,6	78,6	0,6	−6	78,6+51	0,19723	−277
49	1990	233	1,10	78,4	78,6	78,5	0,5	−5	78,6+51	0,19769	−231
50	1940	212	0,90	77,5	—	77,5	0,5	+5	77,5+51	0,20234	+234
51	—	—	0,85	85,9	—	85,9	7,9	−79	85,9+51	0,16733	−3267
52	—	—	0,80	87,3	—	87,3	9,3	−93	87,3+51	0,16230	−3770
53	—	—	0,80	83,5	—	83,5	5,5	−55	83,5+51	0,17645	−2355
54	—	—	0,80	81,0	—	81,0	3,0	−30	81,0+51	0,18667	−1333
55	—	—	0,75	80,5	—	80,5	2,5	−25	80,5+51	0,18881	−1119
56	—	—	0,70	78,2	—	78,2	0,2	−2	78,2+51	0,19907	−93
57	—	—	0,75	76,2	—	76,2	1,8	+18	76,2+51	0,20861	+861
58	—	—	0,70	72,5	—	72,5	5,5	+55	72,5+51	0,22793	+2793
59	—	—	0,80	71,9	—	71,9	6,1	+61	71,9+51	0,23128	+3128
60	—	—	0,85	73,5	—	73,5	4,5	+45	73,5+51	0,22248	+2248
61	1940	215	0,80	79,1	—	79,1	1,1	−11	79,1+51	0,19497	−503
62	1940	214	0,70	77,7	—	77,7	0,3	+3	77,7+51	0,20140	+140
63	1942	339	0,80	78,2	—	78,2	0,2	−2	78,2+51	0,19907	−93
64	1943,5	342	0,95	78,0	—	78,0	0,0	0,0	78,0+51	0,20000	0,0

Note: r = distance sur lareglette
d_1 = rayon de la boussole
H = composante horizontale de l'intensité du champ magnétique
$\triangle H$ = variation dela composante horizontale

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