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Robert E. Kuenne

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## **RESOURCES AND GEOGRAPHY OF THE MEDITERRANEAN BASIN**

A lecture delivered  
at the Naval War College  
on 19 November 1956 by  
*Professor Robert E. Kuenne*

1. *Introduction.* In the interests of giving this lecture some focus in the brief time available, I have taken two liberties with the title. First, I shall concentrate attention upon the eastern Mediterranean Basin, both those nations bordering on it — Turkey, Syria, Lebanon, Israel, and Egypt — and those with important economic and political interests in it — Jordan, Saudi Arabia, Iraq, and Iran. These are the nations of major importance most often included in that vague area, “the Middle East”; by using this group of states, of course, we do not mean to imply that having a littoral position on the Mediterranean, or close proximity to it, is the major criterion of our interest in these states. Second, my interests in this area’s geography and resources shall not be primarily by virtue of their importance to the nations themselves, but rather because of their contribution, actually or potentially, to the national objectives, policies, and interests of the Western bloc and the Soviet Union.

2. *The Area in General.* It has often been remarked that the interest taken in the Middle East by major world powers — an interest that has both blessed and plagued the region — is almost exclusively the result of geology and geography. The existence of petroleum and strategic location have combined to write the chapters of history concerned with big power struggles in the Middle East. But before turning to spend the major portion of our time on these two aspects of geography and resources, let us devote a minimal amount to the exposition of the area’s less internationally-relevant data.

The basic geographical fact of the area — reflected in every aspect of the existence of its people — is its aridity. Geographers normally list a region with less than 10 inches of rainfall per year as arid, and between 10 to 20 semi-arid, with the 20-inch rainfall line the margin of ability to grow crops. However, these data of necessity vary with such factors as the amount of evaporation resultant from temperature. As a result, one of the leading geographers states that break between aridity and semi-aridity should be located at 15 inches of annual rainfall, because of the prevalent temperatures in the Middle East. \*1 Since the prevailing winds are westerlies, and the greater part of the area is far from rather small bodies of water, air masses reaching most regions have lost a good deal of their moisture; indeed, as a first approximation it might be said that the amount of rainfall varies proportionately with the length of westward-facing coastline, after adjustment for topography has been made.\*2 Westward-facing slopes of mountain ranges benefit at the expense of eastern slopes. On both the counts of westward-facing coastline and a spine of mountains, the Levant region receives an abundant rainfall of up to 30 inches per year or even more; however, this is crowded into a six-month period — a characteristic of the rainfall throughout the area is a summer of drought and a winter with some rain. But a very little distance inland from the mountains and the sea one encounters the steppe areas, with rainfall of between 10 to 17 inches. Beyond these intensively cultivated areas lie the true desert regimes as illustrated by interior Syria.

These conditions of aridity are relieved by the major river systems which provide basins in which farming by irrigation can be engaged in: the Nile Valley, the Tigris-Euphrates Basin, and the Jordan River with its Orontes and Yarmuk tributaries,

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\*1 W. B. Fisher, *The Middle East*, London, 1950, p. 353

\*2 W. B. Fisher, *The Middle East*, London, 1950, pp. 47-52.

to mention the major systems. But both precipitation and irrigation make only a small portion of the total land area cultivable:

*Table 1 \*3*

*Cultivable Land Area of the Middle East*

<i>Country</i>	<i>Per Cent Cultivable</i>	<i>Per Cent Cultivated</i>
Turkey	30	15
Syria and Lebanon	30	8
Israel	44	33
Egypt	5	4
Jordan	5	4
Iraq	20	3
Iran	10	2
Saudi Arabia	not available	not available

When it is recalled that the Middle East is primarily an agricultural region, and it is also remembered that a good portion of the land listed as cultivated is allowed to lie fallow each year (a third to half), these are meager indeed. As would be expected, the greatest potentials lie in Anatolia and the Levant, with Iraq an exception to the general rule due to the unexploited possibilities of the Tigris-Euphrates system.

Total national incomes and per capita national incomes, springing primarily from agricultural pursuits carried on in Malthusian contexts, are some of the lowest in the world:

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\*3 W. B. Fisher, *The Middle East*, London, 1950, p. 179

Table 2 \*4

*National Incomes and Populations, Middle East*

<i>Country</i>	<i>Per Capita Incomes</i> (1949)	<i>Populations</i> (1954)
Turkey	\$125	24.110 million
Lebanon	125	1.425
Syria	100	3.906
Israel	389	1.748
Egypt	100	23.240
Jordan	not available	1.500
Iraq	85	5.200
Iran	85	21.146
Saudi Arabia	40	2.000

These compare with a United States' per capita income of about \$1,450 in 1949 and British levels of about \$770. The low levels reflect the paucity of cultivable land, the low productivity per man, and the very high population densities in the cultivable areas. For example, the densities of some of the nations' rural populations per acre of cultivable land are given for 1951: Egypt — 1,410; Iraq — 450; Israel — 344; Lebanon — 810; Turkey — 266; Jordan — 160. Yields per acre of crops such as wheat, barley, and corn are lower in most nations than in the United States, in spite of the fact that the land is used much more intensively in these nations.\*5

In short, then, we shall have to consider the struggle of the major world powers for strategic positions and control of oil concessions against the background of a group of extremely poor agricultural nations, over-populated, with rather poor potentialities for agricultural expansion, struggling to keep food production ahead of the high rates of population growth ruling. One road open to many economies in the past and the present was that of industrialization, but the prospects on the whole seem poor in

\*4 United Nations data quoted in Royal Institute of International Affairs, *The Middle East*, 1954, London, Appendix III, p. 560.

\*5 United Nations data quoted in Royal Institute of International Affairs, *The Middle East*, 1954, London, Appendix III, p. 561.

this regard. Mineral resources — especially such requirements as energy sources, iron ore, and other basic minerals — are few, although the area has not been entirely surveyed. Entrepreneurial classes, trained to carry on the managerial and technological function needed for establishment of a strong industry, are non-existent, such functions being carried on by governments largely. Lastly, domestic capital has, over the centuries, failed to provide the wherewithal for industrialization, as opposed to the use of working capital to finance relatively riskless, quick-turnover types of activities as trading.

In view of these considerations most of the planning for the economic future, with the notable exception of Turkey and Israel, has been to concentrate upon irrigation schemes and other methods of keeping the food supply increasing at least *pari passu* with prospective population growth. In the past, the struggle of the Middle East nations to maintain their standards of living has been complicated by the active interest taken in them by Western powers. These powers impressed upon the countries certain of their standards whose net effect was to interfere with progress; the popularization of non-technical education, which has led to an often-acknowledged plethora of humanists, lawyers, and other professions, with a scarcity of engineers and architects, is a good example. The rise in survival rates concomitant upon the introduction of sanitation practices and modern medical procedures is another example of a not-unmixed blessing of Western culture. But for the foreseeable future the development of the area will have to take place within a changing but still fundamental framework of Western concern for oil and strategic position. To these two "resources" of the area and their effects upon the current and foreseeable power struggle we now turn.

3. *Petroleum.* Present geological theories concerning the formation of oil from organic material require a peculiar coincidence of historical and geological accidents to produce an oilfield which is commercially exploitable. First, a sea or estuary capable

of sustaining large amounts of plankton and other marine life is required. As this life died and sank to the bottom it was covered with deposits of fine sediment, until air was excluded and the process of decay prevented. Certain bacteria in the absence of air brought about a partial decomposition of the matter into globules of petroleum. At this stage in the process, then, globules of oil were scattered throughout a thick sedimentation, together with natural gas — another product of the partial sedimentation — and sea water.

A second stage occurred when the pressure upon the silt compressed it into rocks of various types, forcing the oil globules, natural gas, and water to migrate out of its parent material to form pools with natural gas above and dissolve in the petroleum, which in turn floated on pools of water. But in order for it to gather into such pools the geological structure must allow the formation of a basin, which implies a disturbance of the underlying material; but if too much disturbance is present the retaining structure might be broken and allow the oil to seep away and become too dissipated for commercial exploitation. Lastly, to prevent this same seepage, there must be an impermeable rock layer lying above the oil-bearing rock. Given all these conditions, fields of oil can develop and be exploited under present-day technology.

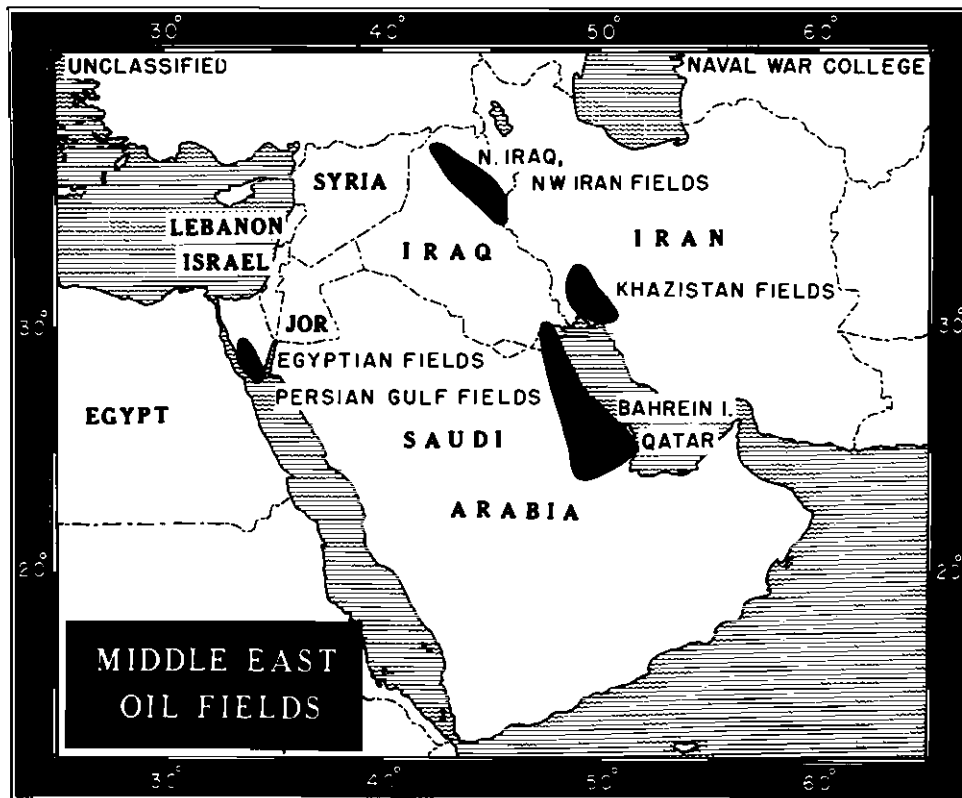
These conditions are present to a remarkable degree in the Middle East. In long geological ages past a large, warm-water sea stretched from the Atlantic to the Persian Gulf, covering Spain, Italy, Turkey, parts of Arabia, and North Africa — the Tethys, of which the Mediterranean is a remnant.\*6 The rich marine life which flourished, gentle fold movements which occurred, and the existence of both porous and impervious rock, resulted in the creation of a rich oil basin extending from Egypt and Saudi Arabia up through the Caucasus and Rumania.

(SEE PLATE ONE)

As presently exploited, there are four major groups of oil fields in the Middle East: (1) the Khuzistan fields of southwest

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\*6 *Encyclopedia Britannica*, Volume 17, p. 537, and Volume 4, p. 842.





Iran; (2) the fields of northern Iraq-northwestern Iran; (3) the Saudi Arabian-Persian Gulf fields; and (4) the fields of northeast Egypt. These major fields are given brief consideration below:

a. *The Khuzistan Fields.* These consist of six fields lying very close to the head of the Persian Gulf in Iran, all of which are connected by pipeline to the now famous refinery at Abadan on the Karun River near its mouth in the Persian Gulf. The first field in this area was opened in 1908, a second in 1928, and the remainder during or after World War II. This area contains the major holdings of the Anglo-Iranian Oil Company's concession, whose stock is held to the extent of 52.55 per cent by the British government.\*7

Crude oil output of the Anglo-Iranian Oil Company is given below:

Table 3 \*8

<i>Crude Oil Output of Anglo-Iranian</i>	
<i>Year</i>	<i>Long Tons</i>
1946	19.190 million
1947	20.195
1948	24.871
1949	26.807
1950	31.750
1953	1.456
1954	3.360
1955	17.920
1956 (estimated)	26.051

b. *The Northern Iraq-Northwest Iran Fields.* One major and two minor developed oil fields comprise this group, the most important being that of Kirkuk in Iraq, a minor one in Iraq, and another in Iran. The latter two are used almost exclusively to service

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\*7 W. E. Pratt and D. Good, *World Geography of Petroleum*, Princeton, 1950 p. 178

\*8 *Statesman's Yearbook*, 1956, p. 1284.

local needs and do not supply appreciable amounts for export. The location of Kirkuk, about midway between the Persian Gulf and the Mediterranean, led very early to the decision to market its products by pipeline to the Mediterranean. By 1934, lines of 12-inch diameter led from Kirkuk to Haditha on the Euphrates and split there into a northern section crossing the Syrian desert to terminate at Tripoli in Lebanon, and a southern branch crossing Jordan to end in Haifa in Israel. The northern branch was supplemented by a 16-inch line to Tripoli in 1949, and a 26-inch to 32-inch line terminating at Baniyas in Syria. The southern branch was also meant to be supplemented by a 16-inch line, largely completed, but which never reached Haifa because of the Arab-Israeli difficulties.

In 1952 a field was opened at Mosul, near the Turkish border, by linking its output into the Kirkuk system. This concession is held by the Mosul Petroleum Company, a subsidiary of the Iraq Petroleum Company.

The production of oil is given below for all of Iraq. With exception of a small field in the south near the Gulf, which will be discussed under the next group of fields, all of this output represents the production of the northern fields;

*Table 4 \*9*

*Crude Oil Output of Iraq*

<i>Year</i>	<i>Long Tons</i>
1949	4.067 million
1950	6.457
1951	8.349
1952	18.851 (includes Basra, 2.238 million)
1953	27.716
1954	30.145
1955	37.080

\*9 *Statesman's Yearbook*, 1956, p. 1123.

The Kirkuk field is operated by the Iraq Petroleum Company, and other fields in Iraq are operated by its subsidiaries. The northwestern Iranian field is an operation of the Anglo-Iranian Company.

c. *The Saudi Arabian-Persian Gulf Fields.* These fields along the western shore of the Persian Gulf include the Basra field in Iraq, owned by a subsidiary of the Iraq Petroleum Company, the Kuwait fields, the Saudian fields, Bahrain, and the Qatar fields. The Saudi Arabian and Bahrain fields are linked by pipelines which flow to a refinery at Ras Tanura and another at Bahrain, as well as connecting up with the Trans-Arabian Pipeline system connecting Sidon, Lebanon through Jordan and Saudi Arabia.

The Kuwait fields are exploited by a company owned equally by Anglo-Iranian and Gulf, the Saudi Arabian fields by Arabian-American Oil Company (Standard of California, Standard of New Jersey, Texas Company, and Socony-Vacuum), Bahrain by a company owned equally by Standard of California and Texas Company, and Qatar by a company with some ownership as the Iraq Petroleum Company.

The annual outputs for these fields is given below:

Table 5 \*10

*Crude Oil Outputs of Persian Gulf Fields*  
(in tons)

<i>Year</i>	<i>Basra</i>	<i>Kuwait</i>	<i>Saudi Arabia</i>	<i>Bahrain</i>	<i>Qatar</i>
1951	.....	28.327 M	36.609 M	1.508 M	2.370 M
1952	2.238 M	37.631	39.870	1.510	3.296
1953	.....	42.654	40.888	1.506	4.003
1954	.....	46.969	46.174	1.570	4.704
1955	.....	55.000	47.000	.....	.....

\*10 From data in B. Shwadran. *The Middle East, Oil, and the Great Powers*, New York, 1955.

d. *The Egyptian Fields.* These include five sites close to the southern entrance to the Suez Canal, along the Red Sea. Production was about 2.4 million tons per year for 1951-1953, about 1.8 million tons in 1954. Ownership includes British, Dutch, American and Egyptian interests.

The spatial structure of this Middle East petroleum complex can best be studied by a consideration of its nodal points: refineries, seaports from which petroleum and its products are shipped, important points along pipelines, and markets. Let us turn to the location of refineries and their capacities:

(SEE PLATE 2)

Table 6 \*11

*Middle East Refineries*

<i>Country</i>	<i>Location</i>	<i>Capacity</i>	<i>Fields Serviced</i>
Iran	Abadan	24.075 M	Khuzistan
	Kermanshah	.118	N. W. Iran
Iraq	Kirkuk	.120	N. Iraq
	Alwand	.383	N. Iraq
	Haditha	.329	N. Iraq
	Basra	.193	Persian Gulf
	Doura	1.250	N. Iraq
Kuwait	Mina al-Ahmadi	1.479	Persian Gulf
Bahrain	Awali	10.269	Persian Gulf
Saudi Arabia	Ras Tanura	9.894	Persian Gulf
Aden	Little Aden	5.000	Persian Gulf
Lebanon	Tripoli	.479	N. Iraq
	Sidon	.363	Persian Gulf
Israel	Haifa	4.092	N. Iraq
Egypt	Suez (2)	3.300	Egypt

\*11 The most recent estimates available in B. Shwadran, *op. cit.*, Royal Institute of International Affairs, *op. cit.*, and S. H. Longrigg, *Oil in the Middle East*, London, 1954. Conversion factors for barrels per day into tons per year dependent upon the specific gravity of crude were taken from the latter book, Appendices III and VIII.

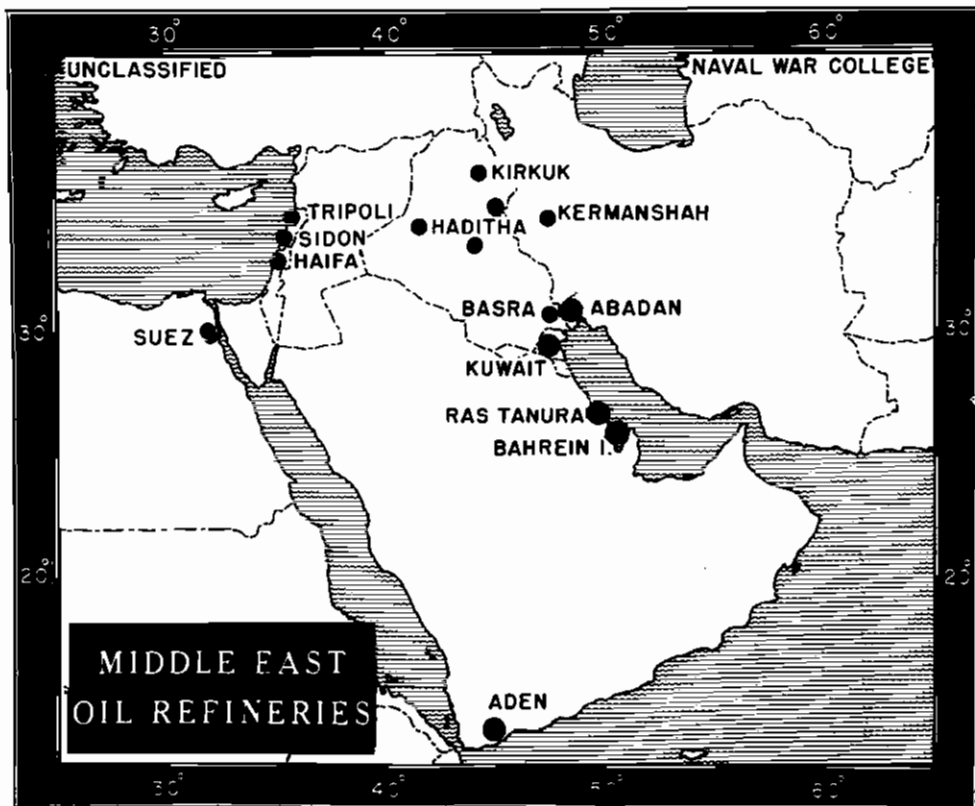


PLATE 2

This is a total of 61,344,000 tons of refining capacity per year located in the Middle East, or something less than 50 per cent of the 1954 output of about 142 million tons. The key points for United States and Western strategy are Abadan, Ras Tanura, Bahrain, and Aden in the Persian Gulf area, having, as they do, a refining capacity of 50 million tons per year, all on the far side of Suez.

The key pipelines in the Middle East are the northern branch of the Iraq Petroleum Company's line already mentioned, with its nodal points of Kirkuk, Haditha, Banais, and Tripoli; and Aramco's Tapline from Damman to Sidon.

(SEE PLATE 3)

The key Persian Gulf ports from which major shipments of petroleum and petroleum products leave are the following: the Abadan area in Iran, the Basra area in Iraq, Ras Tanura in Saudi Arabia, Bahrain, Umm Said in Qatar, Mina al Ahmadi in Kuwait. Aden port has become important as a nodal point. Lastly, of course, Banais in Syria and Tripoli in Lebanon are major dispensing ports in the Mediterranean.

(SEE PLATES 2 & 3)

Let us attempt to construct a picture of the major flows that occurs in this spatial structure by *first* estimating amounts shipped from the nodal points above:

Table 7 \*12

*Estimated Shipments, 1956*

<i>Port</i>	<i>Crude</i>	<i>Refined</i>	<i>Total</i>
Abadan area	12.0 M tons	3 M tons	15 M tons
Basra-Fao area	7.2 M tons	.....	7.2 M tons

(continued next page)

\*12 Sources for these estimates include the books listed in Footnote 11, as well as issues of the *London Economist*, *Aramco's Report on Operations, 1954*, and its *Handbooks for American Employees, Volume I*.

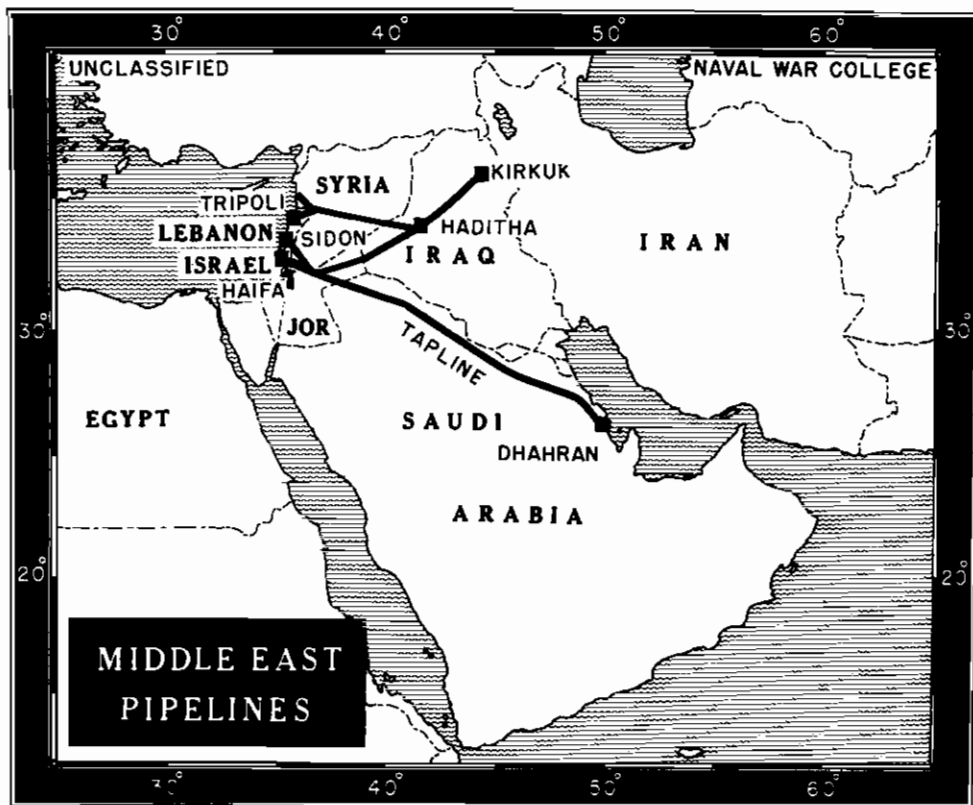


PLATE 3

<i>Port</i>	<i>Crude</i>	<i>Refined</i>	<i>Total</i>
Ras Tanura	12.0 M tons	11 M tons	23 M tons
Bahrain	.....	11 M tons	11 M tons
Qatar	5.0 M tons	.....	5 M tons
Kuwait	53.5 M tons	1.5 M tons	55 M tons
<i>Persian Gulf ....</i>	89.7 M tons	26.5 M tons	116.2 M tons
Aden — not a net addition		5 M tons	5 M tons
Sidon	15.4 M tons	.4 M tons	15.8 M tons
Tripoli-Banais	24 M tons	1 M tons	25 M tons
<i>Levant</i>	39.4 M tons	1.4 M tons	40.8 M tons
<i>Total</i>	129.1 M tons	27.9 M tons	157.0 M tons

To complete the spatial structure, we must attempt to distribute the petroleum, crude and refined, to its customers overseas. Table 8 shows the breakdown by destination of the 145 million tons of crude and refined petroleum listed as exported by the *Economist*:

Table 8 \*18

*Percentage Distribution of Middle East Oil, 1955*

<i>Destination</i>	<i>Proportion</i>
Western Europe	61.6%
Asia east of Suez	15.1
North America	9.6
East and South Africa	6.8
Australasia	3.4
North and West Africa	2.7
South America via Cape	.7

Applying the Western European proportion to our estimate of Middle East production in 1956, this would yield a tonnage of roughly 100 million tons taken by this area. This is about 75 per cent of total oil consumption in this region at the present time.

\*18 August 4, 1956, p. 420.



Britain is even more dependent on the Middle East supplies, obtaining almost 100 per cent of her consumption from Kuwait, Iran, and Iraq.,

Lastly, the breakdown of the outputs in the Persian Gulf and Khuzistan fields by percentages, going north through the Suez Canal or those going south of it, was about 64 and 36 per cent respectively. Applying this figure to our estimate of the outputs of these regions, we should expect about 75 million tons of the 116 million exported to move through the Canal. As can be seen from our estimates, if *all* of the Levant's output went to Western Europe, at least 60 million of the required 100 million tons would have to be drawn from the Persian Gulf area.

4. *Location and Other Strategic Considerations.* The Middle East lies squarely across all lines of movement between Western Europe, East Africa, and Asia, except that which goes around the Cape of Good Hope: therein lies the basic fact of its locational importance today. The lines of movement of oil reveal that there are two nodal points of political significance to the West where the threats to an interruption of the movement to petroleum to Europe are greatest: (1) the Suez Canal, and (2) Syria.

a. *Suez.* The nature of the Suez Canal as an important nodal point in the movement of oil to Europe has been peculiarly topical in the last few months. Before Nasser's action of premature nationalization a tonnage of about 135 million per year of all types moved through Suez, over twice the amount moved as recently as 1948. Tonnage and number of ships moving in both directions is roughly the same, since tankers return to the Gulf carrying ballast. More than 65 per cent of the ships using the Canal and about 70 per cent of the northbound tonnage are directly concerned with petroleum movement. Origins and destinations of cargo and ballasted ships in both directions is given in Table 9:

Table 9 \*14

*Direction of Suez Traffic, 1955*

<i>To and From</i>	<i>Percentage*</i>	<i>Amounts</i>
Persian Gulf, Red Sea, Aden	65%	87.75 M tons
India, Pakistan, Ceylon, Burma	11	14.85
Malaya, East Indies, Far East	14	18.90
East Africa	7	9.45
North America	12	16.20

\* Does not add to 100 because of duplication

The dominance of the oil traffic is brought out quite clearly here. It would be even greater if the traffic reflecting the indirect support of oil operations in other parts of the world were included.

Britain is most dependent upon the Canal for her oil. Of the 75 million tons of oil moved north through the Canal in 1955, Britain received about 23.5 million tons, or about one-third. But both France and Italy are substantial users of oil from the Persian Gulf area. As we have seen, our analysis of the last section would have led us to expect about 75 million tons of Persian Gulf and Khuzistan oil to move through the Canal, most of it bound for Western Europe.

Using London to the Persian Gulf as a representative trip for the Western European oil traffic, and assuming tanker speed of 14.5 knots with 4 days for loading and discharging:

1. A round trip over the 6,400 miles via Suez takes 37 days;
2. A round trip over the 11,300 miles via the Cape takes 65 days;
3. A tanker can make 9 trips a year via Suez;
4. A tanker can make 5.3 trips a year via the Cape.

Since the world's tanker fleet as of January 1, 1955 was 2,696

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\*14 *The Economist*, August 4, 1956, p. 420.

ocean-going vessels totalling 37,823,000 deadweight tons. The average tanker has a deadweight of about 14,000 tons. Using a coefficient to reduce to cargo deadweight, of .75, we obtain an effective carrying capacity per ship of 10,500 measurement tons. When we convert this to short tons we obtain a capacity of 11,760 short tons per ship.

The relationship between tonnage landed, number of ships used, average cargo deadweight, and length of haul is given below:

$$\text{Tonnage landed} = \text{Number of ships} \times \text{Average cargo deadweight} \times \text{Number of trips per year.}$$

Since about 65,000,000 tons of oil go through the Suez to Western Europe, we can solve for the number of tankers needed by substituting:

$$65,000,000 \text{ tons} = X \times 11,760 \times 9$$

$$X = 614 \text{ ships, or about } 22 \text{ per cent of world tanker capacity.}$$

This estimate is based upon the assumption that at least 35 million tons of petroleum and products can be based on the Levant's output from pipelines.

If, however, the Suez Canal were closed to Persian Gulf oil, and all of it bound for Europe had to be transported around the Cape, the reduction in the number of trips per year to 5.33 would increase the number of tankers needed to:

$$X = 1,036 \text{ ships, or about } 38 \text{ per cent of world tanker capacity.}$$

Thus, the closing of the Canal would be equivalent to reducing the world's tanker fleet by 422 ships, or by about 15 per cent.

On an emergency basis, substantial help could be rendered by the United States in substituting Western Hemisphere oil for Persian Gulf. A Middle East Emergency Committee of 13 oil companies in the United States was formed to pool tankers and storage in August, 1956, to meet any emergency which might

arise if the Canal were closed to European-bound oil. But the long-run solution could not very likely lie in this direction from the economic point of view: expansions in these lines would have tremendous effects upon the balance of payments of Europe, substantially undoing the progress made by the Europeans in reducing their dollar gap. The increased dollar payments would have to come from United States gifts and grants, and these would reverse the movements made since 1951. Moreover, although the Committee has plans to use tankers more efficiently in such emergencies, the increased need for tankers would not be averted.

It seems to the writer that the major effect upon the strategic abilities of the West, which would result from closure of the Suez Canal, lies in the reducing the effectiveness of the tanker fleet. In the event of war with Russia, in which nuclear bombing took place, the Middle East oil fields will be neutralized, either by action against the production or nodal transportation points. In the event of war with Russia without the use of such weapons it is still doubtful whether the NATO nations could hold these fields against the strength of Russia in near proximity and be able to bomb with conventional weapons. On the other hand, it would be extremely difficult for Russia, if she gained control of the production, to move it over the extremely difficult terrain into Russia: the building of pipelines would involve tremendous engineering difficulties, and the United States and British navies could effectively block the Gulf and Mediterranean. Once again, then, Middle East oil would be neutralized.

It is, however, in the limited type of war that the Suez Canal closure would have important repercussions along the lines we have been discussing. No other nation other than Russia can interdict the Mediterranean to NATO, nor could it seriously challenge control of Middle East oil fields. Imposing the longer trips upon NATO would materially reduce an already short supply of tankers for the projection of military power to foreign shores, as well as, to haul the increased supplies of petroleum always needed

when war occurs. The jet airplane consumes about five times the gallonage of fuel as conventional types, haulage of which would put extreme demands upon the limited tanker fleet at times when domestic demand soars for war purposes. The chairman of the Federal Maritime Board has recently stated that tanker capacity would be in short supply in the event of war. A limited war, of greater extent than Korea, might cause serious inroads indeed, into such free world tanker capacity.

The second major reduction in strategic capacity, which a closure of the Canal might effect, the writer believes, is in the economic sector of NATO's life. These countries are already wrestling with the problems of implementing strategies within strictly limited budgets. To impose the increased costs of oil brought round the Cape or from America upon them would be to hurt their practicable strategic capacity.

In the longer run, certain solutions to these problems present themselves. First, the increasing use of the super-tanker tends to make the Cape trip more economical than the present charges of \$1.26 per ton Suez net, a little larger than net British-registered tonnage, with cargo, and fifty-seven cents in ballast. But over the next ten years no substantial help can be expected when the expected increase in absorption of Middle East oil by Western Europe is taken into account. The fact that at least half of the world's reserves lie in this region, reinforces the economic reasons for not increasing dependence upon American sources. The alternative that jumps to one's consideration, then, is to by-pass the Canal in some way to get to the Gulf, and the only feasible method, of course, is by pipeline. But this brings us to our second nodal point of political significance.

*b. Syria.* A glance at the map will reveal that if access via Egypt is omitted from consideration, only four nations can give access to the Mediterranean to Khazistan, northern Iraq, and Persian

Gulf oil: *Turkey, Syria, Lebanon, and Israel*. A second glance will reveal that the present pipeline system, gives a throttling grip potentially as great as that given Egypt by control of the Suez node, to Syria. Since the two presently operating lines—IPC's northern branch and Tapline — cross Syria and one of the two termini of the first lies in that nation. This potential strangulation is most threatening to Iraq since its northern fields do not have at the present outlets to the Gulf, so that most of its crude except for small amounts refined for local consumption, moves over the pipelines. On the other hand, Tapline is presently sending only one-third of its crude over the pipeline, marketing the remainder through the Gulf. But if Suez were closed, Aramco's relative two-route competition would substantially disappear.

The only alternative IPC now has is the ill-fated southern branch of the pipeline, which avoids Syria by using Jordan. However, the line stops at the Israeli border, for it had been intended to terminate it at the large Haifa refinery in one of the best harbors of the Levant. Needless to say, both politically and at present even physically this is no alternative.

Lebanon also has a strong bargaining position with both IPC and Aramco since it contains, at Beirut and Sidon, the termini to the companies lines. However, the existence of a Syrian alternative to the first, and of a Suez and Gulf alternative to the second, gives it considerably less maneuvering ability than Syria.

(SEE PLATE 3)

It is to be expected that the political nodal locations afforded Syria, Lebanon, and Jordan would be exploited, just as it is almost inevitable that if Suez remains in the hands of Egypt that nodal position will be exploited. This is particularly true because of the ironic fact of petroleum distribution that little of it has yet been found in those countries which could best use its proceeds in economic development. Consequently, these nations

feel quite justified in taxing the flow through their territories. At the present time, the IPC has agreements in force with Syria which share on a 50-50 basis with that government the money saved on transporting crude petroleum by pipeline instead of by tanker via Suez; Lebanon has signed a similar agreement with Tapline, with the exception that the one-half must be shared among two other transit lines. However, Lebanon is now attempting to pressure IPC by a law threatening heavy taxation retroactive to 1952 or confiscation. Her bargaining position is considerably weakened by the fact that IPC can withhold a planned 9 million-ton increase in throughput and send it through Syria — an illustration of the weaker bargaining position she finds herself in when compared with Syria.

Some difficulties have already manifested themselves in the Syrian sector. The support given Israel after 1948 led the Arab League to oppose the extension of American interests in the Middle East. The refusal of Syria to ratify an agreement to allow passage of Tapline to Lebanon caused construction to be suspended for a full year, and the company almost abandoned the project. The agreement was concluded speedily, however, when it was learned that Egypt was quietly attempting to obtain an Egyptian terminus for it, and work was resumed in 1949.

Two more instances of political interferences with pipelines throughput concern actions of Iraq. The Arab-Israeli war broke out in the midst of constructing the southern branch of the IPC line. Iraq refused to allow any of her oil to be sent to Haifa, at the same time she was agitating to obtain more production, and, therefore, at a serious financial loss to herself. To this date she has maintained this opposition, and Israel's Haifa refinery is forced to import costly crude from Venezuela. Another instance of Iraq's interference with pipeline construction, concerns the proposed Mepline project, or Middle East Pipeline, intended to open up Kuwait's Gulf oil to a Syrian port and refinery at Tartus. Iraq refused to allow passage on the basis that its own oil fields

were not being called upon to produce enough oil, and made her acceptance conditional upon another pipeline from the Kirkuk fields to the Levant. The Mepline project was shelved.

These nationalistic considerations are becoming increasingly complicated, of course, as the Arab-Israeli dispute and the natural rivalries of Middle East nations become more entangled in the rising forces of Arab nationalism and Russian influence in the area. The Soviet Union has grasped the realities of the Middle East petroleum situation by focussing its attention upon two nations: Egypt and Syria. The latter has been assured of Russian backing and offered Russian arms. It contains the least stable government in the Middle East, dominated at the present time by the Army and a Social Resurrection party, both pro-Egyptian and Pan-Arab, with a shaky governmental coalition in power. Communist influence is stronger here than in any other nation in the area. On the other hand, Iraq has moved closer to the West in the Baghdad Pact, frightened as she has been of Russian invasion, particularly since the departure of the British Ismailia garrison, desirous as she is of concentrating her energies upon economic development, and lacking, as she does, a common frontier with Israel. Saudi Arabia forms the third of the Egypt-Syria-Arabia bloc which finds Jordan wedged between her family ties to Iraq, her anti-Israeli interests and popular feeling, and her needed \$30,000,000 subsidy from Britain. Quite apart from the natural wariness of foreign investment under such conditions, purely strategic considerations would militate against the expansion of pipeline facilities. Although the threat to Suez might seem to argue for their expansion, it is when such threat exists that the bargaining power of the transit nations really increases and becomes most dangerous. Moreover, any action against a Nasser must take into account the possibility of the joint military command of Egypt-Syria-Saudi Arabia cutting off the Levant sources as well as Suez. Thus, further extensions along these routes seem doubtful.



The alternative nation on the Mediterranean does exist, however. With Iraq as solidly in the Western camp as can be expected, the project now being considered is to link the Kirkuk-Mosul fields with Turkey, bypassing Syria, and terminating at Iskanderun. The major objection to this is the cost of extending the line through extremely mountainous terrain, particularly inside Turkey.

Given the gravity and unpredictability of the political situation in the Middle East, and given that we are correct in believing that the major strategic threat to Western nations in times of war, lies in the increased need for a limited tanker fleet which it entails, a more rational approach seems to be in extending the use of the so-called supertanker. Pipelines are the most immobile of transport media, peculiarly subject to blackmailing and confiscation, not to mention shutdown. Tankers, on the other hand, possess a flexibility without which, for example, the gap left by the closing of Abadan could not have been filled so quickly. From the viewpoint of the foreign owner of capital, as well as from the Western nations' ability to meet potential threats arising from the spatial structure of Middle Eastern oil, an increase in the tanker fleet seems the medium-term answer. Also, this involves the creation of a bargaining tool with the controllers of nodal points in the oil structure which could be invaluable in keeping them open. And, lastly, such action would merely further the increasingly attractive use of the super-tanker which actually can make the trip around the Cape at least as cheaply as through Suez, although perhaps not so cheaply as by pipeline to the Levant and tanker beyond.

5. *Summary and Conclusions.* I have attempted to focus attention upon the two resources which the Middle East possesses which are most relevant to the international power struggle: petroleum and location. To do so, I have had to present a study of the spatial structure of the petroleum industry in this area, focussed upon nodal points of shipping and refining. It is difficult to escape

**the conclusion that Western Europe is so dependent upon this oil and will become increasingly so in the future that United States and NATO strategy must take all possible steps to guarantee the continuance of its flow. Some of the considerations most relevant in this strategic appraisal have been presented.**

## **BIOGRAPHIC SKETCH**

### **Professor Robert E. Kuenne**

After serving with the United States Army from 1943 to 1946, Professor Kuenne attended the University of Missouri and received his B. J. degree there in 1947. The next two years he attended Washington University at St. Louis, Missouri, where he received his B. A. and M. A. degrees in Economics.

He was an instructor at Washington University during the summers of 1949 through 1952. From 1951 to 1953, he was a Teaching Fellow in the Department of Economics at Harvard University, and received his A. M. and Ph. D. degrees.

Professor Kuenne was an instructor in Economics at Harvard University from 1953 to 1955. The following year, he was Visiting Assistant Professor of Economics at the University of Virginia. At the present time, he is Assistant Professor of Economics at Princeton University, where he has been on leave during the first term of Academic Year 1956-1957 to act as Consultant on Economics at the Naval War College.