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DEVELOPMENT OF SCIENCE AND TECHNOLOGY
POLICY FOR KUWAIT

Two Volumes

VOLUME II

YOUSUF YACoub AL-SULTAN

Submitted in partial fulfilment of the
requirements for the Degree of Doctor
of Philosophy

UNIVERSITY OF ASTON IN BIRMINGHAM

1983

"IN THE NAME OF ALLAH,

THE COMPASSIONATE, THE MERCIFUL"

CONTENTS

<u>APPENDICES</u>	<u>PAGE</u>	
I	Some Excerpts From The Kuwaiti Constitution	1
II	Policy And Decision-Making Processes In Kuwait As Specified By The Constitution	4
III	Objectives And Responsibilities Of Ministries And Organisations Which Are Involved With Science And/Or Technology	11
IV	Training Centres In Kuwait	32
V	Vocational And Technical Institutions In Kuwait	37
VI	The Scientific Societies In Kuwait	76
VII	List Of Publications Of Water Resources Development Centre In Kuwait	119
VIII	Decree-Law No. 28/81 Concerning The Establishment Of Kuwait Institute For Scientific Research	125
IX	Major Research & Development Planning And Services Division In Kuwait Institute For Scientific Research	131
X	The Policies And Measures Adopted By Kuwait Institute For Scientific Research	158
XI	List Of Projects Executed Or In Progress In Kuwait Institute For Scientific Research, (1976-1982)	173
XII	Colleges & Affiliated Centres In Kuwait University	205
XIII	List Of Approved Projects To Be Conducted By The College Of Medicine, Kuwait University, July 1981	229
XIV	List Of Approved Projects To Be Conducted By The College of Sciences, Kuwait University, July 1981	231
XV	The Industrial Property & Patent System In Kuwait	234

APPENDICESPAGE

XXVI	A Decree Relating To The Trade Marks Register Implementation Ordinance In Kuwait	243
XXVII	Patent Classification As Employed By The Directorate Of Registry Of Commerce, Ministry Of Commerce & Industry In Kuwait	257
XXVIII	The Programmes & Activities Sponsored By KFAS	259
XIX	List Of Prizes, Awards & Travel Fellowships Funded By KFAS	270
XX	Projects Sponsored By KFAS (1978-81)	274
XXI	Consulting & Engineering Organisations In Kuwait	289
XXII	Industrial Consulting Office & Industrial And Engineering Consulting Office	291
XXIII	The Activities Of The Ministry Of Electricity & Water In Kuwait	301
XXIV	Projects Executed For The Ministry Of Electricity & Water (1976-82)	315
XXV	Details Of Hospitals In Kuwait	356
XXVI	Ancillary Medical Services In Kuwait	371
XXVII	Research Activities Of Preventative Medicine Division	380
XXVIII	Pharmaceutical Services In Kuwait	392
XXIX	Main Articles Of Establishment Of Kuwait Pharmaceutical Industries Company (KPICO)	409
XXX	List Of Finished Pharmaceuticals To Be Manufactured By KPICO	411
XXXI	Summary Of Major Kuwait Industries	414
XXXII	Industrial Licenses Issued In Kuwait (1980-81)	419
XXXIII	The Industrial Bank Of Kuwait	422
XXXIV	Industrial Products Of The National Industries Company, Kuwait	446

APPENDICESPAGE

XXXV	Significant Dates In Kuwait Oil Company's History	447
XXXVI	Tenders Executed For Kuwait Oil Company (1976-82)	450
XXXVII	The Kuwaiti Company For Petroleum Exploration Abroad	457
XXXVIII	Kuwait Oil Tanker Company	458
XXXIX	International Energy Development Corporation	465
XL	Santa Fe & C.F. Braun Companies	471
XLI	Kuwait Membership & Contribution To Regional & International Organisations (1981)	493
XLII	Kuwait Fund For Arab Economic Development	500
	BIBLIOGRAPHY	526

APPENDIX: I

Some Excerpts From The Kuwaiti Constitution



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Source: "The Constitution of The State of Kuwait",
Kuwait Government Press. Undated.

APPENDIX: II

Policy and Decision-Making Processes in Kuwait
As Specified By The Constitution



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Source: "The Constitution of The State of Kuwait",
Kuwait Government Press. Undated.



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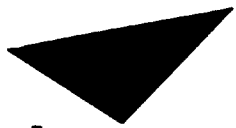


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APPENDIX: III

OBJECTIVES AND RESPONSIBILITIES OF MINISTRIES
& ORGANISATIONS WHICH ARE INVOLVED WITH SCIENCE
AND/OR TECHNOLOGY



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Source: AlKuwait Alyoum, "Government Official Gazette",
No. 1228, Jan. 14, 1979. In Arabic, Translation
has been conducted by the candidate.

Ministry of Planning Hierarchy, Kuwait.

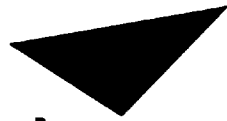
Decree Promulgating Law, No. 6 of the year 1980,
Concerning the Establishment of The Kuwait
Petroleum Corporation.

"The Chamber Law and Its Internal Regulations",
The Legal Department, Kuwait Chamber of Commerce
And Industry, 1975, in Arabic. Translation has
been performed by the candidate.

"The Chamber of Commerce and Industry in Its First
Decade : 1959-1968", In Arabic. Translation has
been done by the candidate.

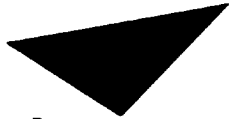
APPENDIX: IV

Training Centres In Kuwait



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Source: "Arab Regional Meeting For Technical Development
Among The Developing Countries", (Geneva: UNDP),
May 1980, PP.6-7. In Arabic.

"Central Training Department Booklet", (Kuwait:
Ministry of Social Affairs & Labour). Undated.
In Arabic.

NUMBER OF TRAINEES IN CENTRAL
TRAINING DIRECTORATE CENTRES
1980 - 1981

1400
1300

1410



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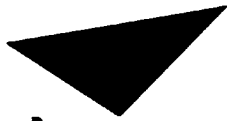
APPENDIX : V

Vocational and Technical Institutions in Kuwait



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Source:

- 1) "Teachers' Education Institute Prospectus", Ministry of Education, Kuwait.
- 2) "Kuwait Business Institute : 1979/80 Catalog", Ministry of Education, Kuwait.
- 3) "Health Institute - 1980 Bulletin", Ministry of Education, Kuwait.
- 4) "Kuwait Institute of Applied Technology's Bulletin 1981-83", Ministry of Education, Kuwait.

APPENDIX VI

The Scientific Societies in Kuwait



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Source:

1. The documents were supplied, with translation, by His Excellency, MR. ABDULREHMAN AL MAZROI, the Assistant Under Secretary for Youth Affairs in Ministry of Social Affairs and Labour, during an interview in his office on 5.8.1981.
2. Documents were supplied, in Arabic, by the Engineer KHALED AL-OTHMAN, Member of the Board of the Society, in December, 1981. The Translation has been carried out by the candidate.
3. Documents were supplied, in Arabic, by the Kuwait Economist Association Secretariat in January 1982. The translation has been carried out by the candidate.
4. Documents were provided, in Arabic, by Engineer ABDULLA AL-MONIES, General Secretary of Kuwait Society of Engineers in January 1982. The translation was accomplished by the candidate.
5. Documents were provided, in English, by the Directorate of the Environmental Protection Society, in December, 1981.
6. Kuwait Al-Yom, Official Government Gazette, No. 1316, p.p. 5-6, in Arabic. The translation has been done by the candidate.
7. Documents were supplied, in Arabic and English by MR. ESSA J. AL-KHALIFA, Director of Drug Quality Control Centre, and Member of the Kuwait Pharmaceutical Association, in January, 1982. Translation, where necessary, was performed by the candidate.
8. 1980 Annual Report of the Science Club, in Arabic. Translation has been performed by candidate.
9. (1975 - 1981) Science Club Activities Synopsis, in Arabic. Translation has been performed by the Candidate.
10. "The Directory of Public Utility Association", the document was supplied by MR. AHMAD AL-FARAJE, Youth Affaris Directorate, Ministry of Social Affairs and Labour. April 1982. In Arabic.

LIST OF PUBLICATIONS OF WATER RESOURCES
DEVELOPMENT CENTRE, KUWAIT



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Source: The list was provided by DR. FATIMA AL-AWADI, the Deputy Director of Water Resources Development Centre, Kuwait, 21 June 1982.

APPENDIX VIII

DECREE - LAW NO. 28

For the Year 1981 Regarding Kuwait Institute For
Scientific Research



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Source: Kuwait Al-Yom "Government Official Gazette",
Supplement To Edition 1344, Feb.2 1981,
PP. 23-5. In Arabic. Translation was provided
by HIS EXCELLENCY, HAMED AL-ROUMI, The Assistant
Under-Secretary For Technical Affairs, Ministry
Of Information.

Major Research and Development Planning and
Services Division in The Kuwait Institute
for Scientific Research

... divisions in



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-
- Source: 1) Documents were provided by DR.ADEL ELDIB, The Director of Division of Policy and Planning, KISR, in his letter of January 13, 1982.
- 2) "Annual Research Report: 1979 & 1980", KISR, Kuwait

APPENDIX X

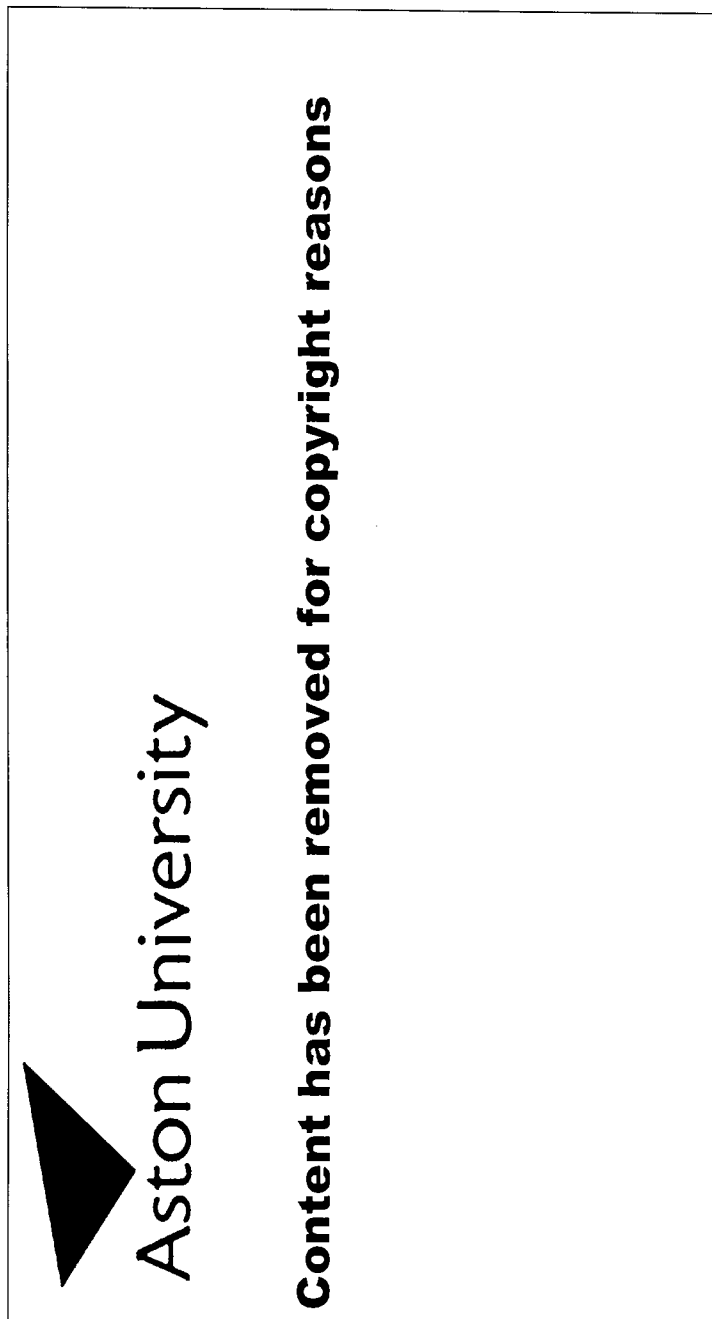
The Policies And Measures Adopted By
Kuwait Institute For
Scientific Research.



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KISR'S Organisation Chart - Prior to 1980



Source: Kuwait Institute For Scientific Research,
Kuwait.

KISR'S Organisation Chart - May 1980

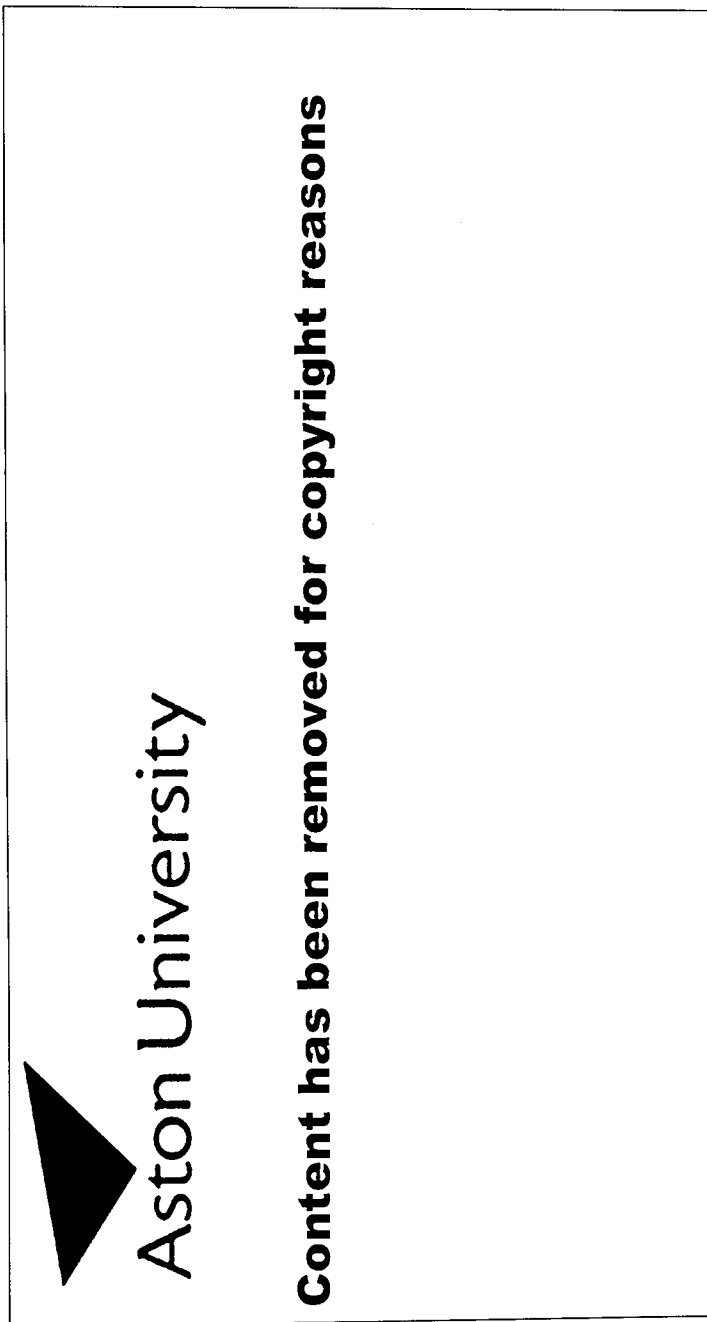


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Source: Kuwait Institute For Scientific Research,
Kuwait.

KISR'S Organisation Chart - June 1981



Source: Kuwait Institute For Scientific Research,
Kuwait.

KISR's Organisation Chart - Aug. 1981



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Source: Kuwait Institute For Scientific Research,
Kuwait.

APPENDIX: XI

LIST OF PROJECTS EXECUTED OR IN PROGRESS IN KISR: 1976-1982



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Source: The List was provided by His Excellency AHMAD AL-SAADON, The Deputy Chairman of the Kuwaiti National Assembly, April 1982. In Arabic.

APPENDIX XII

Colleges & Affiliated Centres
In Kuwait University



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KUWAITI ARTS GRADUATES FROM
DIFFERENT UNIVERSITIES :
1971-1976



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KUWAITI COMMERCE GRADUATES FROM DIFFERENT
UNIVERSITIES : 1971-76



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Source: "Annual Statistical Abstract: 1980",
Ministry of Planning, Kuwait, P.382

**KUWAITI ENGINEERING GRADUATES FROM DIFFERENT
UNIVERSITIES :1971-1976**



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- Source:
- 1) "University of Kuwait", The Middle East Education, Vol. 4, No. 5 (Sept. 1982), 19-34.
 - 2) "Hierarchical Structure of The University of Kuwait", A Document supplied by Mr. MOHAMMAD AL-ASFOOR, The Assistant Secretary General of Kuwait University. August 30 1981.
 - 3) AL-RAI ALAAM Newspaper (Kuwait), No. 6569, Feb.2 1982. P. 5. In Arabic.
 - 4) "College of Engineering Total & First Phase Plans", Report No. 3, Kuwait University, Sept. 1974, P.7.
 - 5) "College of Engineering & Petroleum 1981/82 General Catalogue", Kuwait University.
 - 6) Document of Arabian Gulf University was supplied by Dr. ABDULA AL-REFAI, The Secretary General of Kuwait University. Sept. 1981.

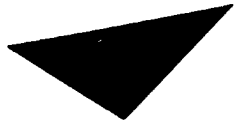
APPENDIX XIII

List of Approved Projects to be conducted by
the College of Medicine, Kuwait University (July 1981)



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Source : College of Medicine, Kuwait University.

APPENDIX XIV

List of Approved Projects to be Performed
by the College of Sciences, Kuwait University (July 1981)



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es: "College of Sciences", University of Kuwait.

The Industrial Property And
Patent System in Kuwait



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Source: "Law No. 4/1962 regarding Patent, Industrial Design and Models", Ministry of Commerce and Industry, Kuwait, PP. 21-32. In Arabic. Undated.

A Decree
Relating To The Trade Marks Register
Implementation Ordinance



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Source: "A Decree to set up The Trade Mark Control",
Government Of Kuwait. In Arabic. Undated.

APPENDIX XVII

Patent Classification as Employed by The Directorate
Of Registry of Commerce, Ministry of Commerce
& Industry In Kuwait



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Source: "Law No.4/1962", The Ministry of Commerce and Industry, Kuwait. PP. 65-65. In Arabic. Undated.

APPENDIX XVIII

The Programmes and Activities Sponsored by
The Kuwait Foundation for Advancement of Sciences

... is an illustration of the various programmes



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- Source:
- 1) "Programme Profile", [Kuwait: Kuwait Foundation for The Advancement of Sciences]. Undated.
 - 2) "Grant Manual", [Kuwait: Kuwait Foundation for The Advancement of Sciences]. Undated.
 - 3) "Synopsis of The Foundation : April 1979-March 1982", [Kuwait Foundation for The Advancement of Sciences]. In Arabic.

APPENDIX XIX

List of Prizes, Awards and Travel Fellowships
funded by The Kuwait Foundation for the
Advancement of Sciences

The following are a list of Candidates that have been bestowed prizes and awards by The Kuwait Foundation for the Advancement of Sciences.



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1) "Synopsises of Kuwait Foundation For the Advancement of Sciences : April 1979-March 1982"

[Kuwait : Kuwait Foundation For the Advancement of Sciences]. In Arabic.

2) "Scientific Mission Programme", [Kuwait : Kuwait Foundation For the Advancement of Sciences]. In Arabic.



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Source: "Synopses of Kuwait Foundation For The Advancement of Sciences:
1979-1982", Kuwait. In Arabic.

Consulting & Engineering Design Organisations



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Source: "Supervision Section", Kuwait Municipality,
April 1982. In Arabic.

APPENDIX XXII

Industrial Consulting Office (InCo.) and
Industrial & Engineering Consulting
Office (InCo.Eng.)



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Source: "Industrial Consulting Office & Industrial & Engineering Consulting Office Document",
Kuwait. Undated.

THE ACTIVITIES OF THE MINISTRY OF ELECTRICITY AND WATER

The following is an illustration of the activities of the Ministry of Electricity and Water in Kuwait.

A) ELECTRICITY:

The rapid development experienced by Kuwait in various fields following the Petroleum Era which gave the country a new appearance of modernisation and progress, increased the demand for electrical power in a very rapid manner to the extent that the generators available in 1951 were inadequate to meet the country's growing needs. This led the Government to establish the Department of Electricity and to entrust it with the responsibility of securing adequate electrical power.

The following is a brief summary of the main electrical power sources, their development and capacity of each during the period between 1952 and 1980.

The Ministry started in 1952 the construction of first power generating station at Shuwaikh. The first steam generator was commissioned in March, 1953, with a production capacity of 750 KW. Additional various power generating units followed bringing the total number to 7 steam generators and 5 gas turbines having a totalled installed capacity of 324 MW, and production output of 654 million KWh in 1980.

The growing water and power consumption rates and the creation of Shuaiba Industrial Area led to the construction of Shuaiba North Power Station. The first steam turbine with a capacity of 70 MW was commissioned early in 1965. Since then, the Station was expanded to its present size which comprises five steam power generating units having a total capacity of 350 MW and two Gas Turbine Power generating units having a total capacity of 50MW, bringing the total Station's installed capacity to 400 MW. Its production output was 1483 million KWh in 1980.

The continued industrial and urban development necessitated expansion in power production. So it was decided to construct a new additional power station named "Shuaiba South Station" comprising six generators having a capacity of 134 MW each. The first generator was commissioned in 1970. The station's installed capacity reached 804 MW. In 1980 total output production was 2365 million KWh.

In view of the continuing increase in the electric power consumption, the Ministry constructed Doha East Power Station comprising seven generators of 150 MW capacity each. The first unit was commissioned in early 1977. The station's installed capacity reached 1050 MW and its production output was 4520 million KWh in 1980.

It is evident, therefore, from the above that the Stations' installed capacity in 1980 totalled 2578 MW, bearing in mind that the electrical peak load reached was 2100 MW.

B) ELECTRICAL NETWORKS:

Kuwait is, at present, covered by vast electric power networks system consisting of overhead lines and underground cables in addition to the primary, secondary and distribution transformer stations which ensure power supply to every consumer.

The following is a brief summary of the Electrical Network development:

In 1934, electrical network started using 300V (direct current) O/H lines with copper conductors on wooden poles. In 1949, the network voltage was changed to 380V A.C. (instead of D.C.) after the installation of two (200 KW) Diesel Generators.

Upon the transfer of the Company to Government ownership in 1951, Shuwaikh Power Station (a) was erected with Four Steam Turbines - each 7500 KW (1954 - 1955), and the network voltage was changed from 380V to 11 KV to meet the growing electrical load as a result of increase in the number of consumers. Also, 11 KV/415V secondary transformer stations, 11 KV underground cables and overhead lines were installed.

In 1958, Four (4) Steam Turbines each 10,000 KW were commissioned at Shuwaikh Power Station (B) followed in 1961 - 1962 by the construction of Power Station (C) comprising three units each 30,000 KW. With this, the electrical network voltage was raised from 11 KV to 33 KV. This change called for the construction of 33 KV primary transformer stations as well as 33 KV overhead lines and underground cables. Eventually, there was a 33 KV main network, 11 KV distribution network and 415V distribution network for consumer.

In 1964, the 5th Ring Road 132/33 KV Sub-Station was constructed to transmit power to Shuaiba and Fahaheel on 132 KV. Thus, the first 132 KV transmission network was commissioned. Then it was extended upon the construction of Shuaiba North Power Station in 1965 - 1969, followed by Shuaiba South Power Station (1970 - 1974).

With the continuous growth of the peak demand and the corresponding increase in the generating capacity, it became evident that the present 132 KV transmission network will soon reach its economic capacity limit. Hence, it was decided to introduce a new 300 KV transmission network. So, in 1978, the first part of the 300 KV network was constructed using 300 KV overhead lined and underground cables and was temporarily operated at 132 KV. The completion of the network is under way and will be ready

for commissioning in 1982 upon the completion of Doha West Power Station and the main Sub-Stations at Omariya, Jabriya, Salmiya, Fintas and Shuaiba.

From the above mentioned, it is obvious that the expansion of the power transmission and distribution networks runs parallel to the power generating expansion projects.

The Ministry constructs annually a number of various transformer stations. The number of 132 KV primary Sub-Stations reached 51 and the number of 33 KV primary Sub-Stations 82, while the 33 KV Spur Sub-Stations 52. The number of the 11 KV Ring Main transformer stations totalled 2309 and the Spur 11 KV ones 692 by the end of 1980.

By the close of 1980 the lengths of 300 KV underground cables reached (18 Km), the 132 KV (578 Km), the 33 KV (827 Km), the 11 KV (2780 Km) while low tension ones (8607 Km).

The lengths of 3000 KV overhead lines totalled (34 Km), the 150 KV (63 Km), the 132 KV (1029 Km), the 33 KV (949 Km), while the medium and low tension cables (703 Km).

Furthermore, the Ministry has been expanding, improving and modernising street lighting. The length of illuminated main and branch streets totalled (2174 Km) by the close of 1980.

In an effort to ensure strict supervision and control over the expanding network system throughout the country and to ensure continued satisfactory operation, the Ministry established the System Control Centre (S.C.C.) that compares with the highly sophisticated ones in the developed countries.

ELECTRICAL ENERGY GENERATED BY MINISTRY OF ELECTRICITY
AND WATER DURING 1954 - 1980



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* Production started from Third Quarter of 1954.

Source: "Ministry of Electricity and Water", Kuwait.

C) FRESH WATER:

The progress that Kuwait realised in becoming in an exceptionally short period of time self-sufficient in water resources has surpassed that of all others in this field. Even the industrialised countries facing the problem of population and industrial growth are turning their eyes towards Kuwait to study its amazing accomplishments. Such progress runs parallel with the provision of electrical energy. Both services have played their roles in the development of Kuwait, and were made possible by the availability of oil revenues and the endless efforts to promote and further peoples' welfare.

Kuwait secures its fresh water needs from the following main sources:

- 1) Distilled Water from Distillation Plants associated with the Electrical Power Stations at Shuwaikh, Shuaiba, and Doha and this is the major source.
- 2) Natural underground water from the water fields at Rawdhatain and Um Al-Eish.

Shuwaikh D/Plant: It was commissioned in 1953 with a capacity of 1.0 MIGPD. At present, it comprises 7 Units having a total capacity of 14 MIGPD (nominal).

Shuaiba North D/Plant: When first commissioned in (1965 - 1966) it comprised 3 (1 MIGPD) Units, while now it comprises 7 Units having a total capacity of 14 MIGPD.

Shuaiba South D/Plant: The first Distillation Unit was commissioned by the end of 1971 with a capacity of 5 MIGPD. At present, it comprises 6 large distillation Units having a total capacity of 30 MIGPD.

Doha East D/Plant: It comprises seven distillation units with a total capacity of 42 MIGPD. The first 3 Units were commissioned in 1978, the other 4 in 1979.

The usual rate of production of fields at Rawdhatain and Um Al-Aish is about 1.5 MIGPD of fresh underground water which, when necessary, could be raised to 3 MIGPD.

In the field of fresh water storage, the Ministry, in addition to ground reservoirs (capacity 221 MIG) constructed 31 cone shaped towers in different areas. Twenty of these cone shaped ones have a storage capacity of 660,000 I.G. of fresh water each. These elevated reservoirs help to maintain the water pressure in the distribution network and to insure continuous aeration as well as increase the storage capacity.

ELECTRICAL TRANSMISSION NETWORK

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Source: "Ministry of Electricity and Water", Kuwait.

They are located in various areas in groups of 3 or 6 towers and each group serves one of the consumption areas (see chapter VI). However, in conformity with the progress in the country, the Ministry has constructed Kuwait Towers which were designed to reinforce potable water reserves and insure the supply of water to other tall buildings in the town and at the same time, act as a manifestation of Kuwait's progress besides its function as a tourist attraction for natives and visitors from outside. The main tower is 187 mt. high while the second is 140 mt. with a storage capacity of one million gallons of fresh water each.

In view of the ever increasing needs as a result of the amazing cultural leaps achieved by Kuwait, a highly specialised Centre was established to carry out researches in the domain of sea water distillation and development of underground water resources (W.R.D.C.). The Centre also analyses samples of potable water, brackish water and water from Rawdhatain and Um-El-Aish. It also carried out periodical laboratory analysis and experiments on potable and underground well water to insure its freedom from bacteria and its suitability for human consumption according to international specifications and standards in this respect.

It is worth mentioning that the installed capacity of distilled fresh water reached 100 MIGPD in 1980, i.e. an increase of 61.3% over 1976 while maximum daily consumption was 79.8 MIGPD.

D) BRACKISH WATER:

The Ministry was careful to utilise the brackish water discovered in various parts of the country and to serve as a supplementary source to distilled water. Brackish water could be used for different purposes such as household, agriculture, street sprinkling and livestock watering in addition to blending with distilled water.

It exists in an aquifer stretching each of Arabian Peninsula and slightly sloping towards Arabian Gulf. Sulaibiya, Al Shagaya (in the Centre and South West of Kuwait), Al-Abdalia and Al-Wafra are the main locations of this water.

To make use of brackish water, the Ministry conveys it to consumers through a separate pipe network parallel to the fresh water distribution one, as well as from the water filling stations.

To present total output of the ground water wells which were equipped with the necessary pumps is around 58 MIGPD. By the end of 1981, underground water production is expected to hit 75 M.I.G./Day.

In the field of water storage, 12 (660,000 I.G.) cone-shaped tower reservoirs were constructed by the Ministry and distributed in threes in areas of Adalia, Bayan, Al-Surra and Khitan in addition to 2 (1 MIG) reservoirs south of Sabahia and another (250,000 I.G.) tower reservoirs at East Ahmad; thus the present total capacity of brackish water tower reservoirs is 10.5 MIG. As to ground storage, the total output is 134 MIG located in production fields as well as Shuwaikh, Hawalli, Khitan, Sulaibiya, Al-Shagaya and Al-Jahra.

It is worth mentioning that the Ministry started utilisation of brackish water in 1953 on a small scale for limited purposes but in 1960, it embarked on wider scale project to provide consumers with it through special pipe network to check distilled fresh water consumption.

B) FRESH AND BRACKISH WATER NETWORKS:

The water distribution system in Kuwait comprises two networks - one for Fresh Water and the other for Brackish Water. Each system has its own underground reservoirs, pumping stations, and elevated towers.

The Brackish Water is used for blending with distilled water, agricultural landscapes, public parks and household purposes while Fresh Water is used for the remaining ones.

The water produced from distillation plants or ground wells is pumped to underground reservoirs then to distribution networks and elevated towers located in several areas to secure public needs at peak hours.

Pumping and distribution network operation are seen by the "Water Control Centre" in Shuwaikh.

The distribution networks consists of main pumping and distribution lines and subsidiary networks in different areas. Diametres of subsidiary networks piping range from 50 mm to 400 mm while main networks are from 400 mm to 120 mm. Subsidiary networks use, in general, asbestos pipes except at low and industrial areas where ductile pipes are used. Most of the main networks are of ductile cement panelled pipes, the rest of asbestos or steel coated within and without. By the end of 1980, the total length of the entire network was 5760 Km.

The house connections are of galvanised steel pipes. The length of each fresh and brackish water connection is between 5 - 10 metres. The diametres are $\frac{3}{4}$ " for private dwellings and from 1" - 2" for commercial and industrial establishments.

Number of house connections to all private, commercial and industrial buildings amounts to 49,206 connections with meters for fresh water and about 20,000 unmetered connections for brackish water, taking into consideration that there is only one fresh water connection and one meter for each commercial building regardless of the number of flats it comprises.

In areas where piped water is not yet available, people can obtain their water from water filling stations located in all different areas of Kuwait. There is no reliable figure for the number of houses and flats which get their water by this way. Moreover, it is noticed that the distribution rate of these stations is in the range of 30% of the general consumption.

The number of consumers who are getting their water from lorry filling stations is gradually reducing because of the construction of new distribution pipelines in the new developed areas which previously lacked this service.

PRODUCTION OF BRACKISH WATER BY MINISTRY OF
ELECTRICITY AND WATER DURING 1954 - 1980
(IN MILLION IMP. GALLONS)



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Source: "Ministry of Electricity and Water", Kuwait.

DEVELOPMENT OF DISTILLATION PLANTS INSTALLED CAPACITY

DURING 1953 - 1980 (IN M.I.G. PER DAY)



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Source: "Ministry of Electricity and Water", Kuwait.

F) FUEL:

Natural gas is one of the best types of fuel because it is clean and easy to transport and utilise. Hence, it is used as a main source of thermal energy in the Power Stations and Distillation Plants. Because gas cannot be stored in large quantities, the Power Stations use gas-oil as a standby fuel in emergencies. Hence, the present Power Stations mainly rely on natural gas as a main fuel. Yet, all their boilers are designed to burn gas oil to meet any interruptions in natural gas supplies. Moreover, both Doha East and West Power Stations are designed to burn crude oil as main or standby fuel.

Natural gas is associated with the petroleum which come out of the oil wells under a pressure of approximately 300 lbs/sq.in. It is separated from oil in separators specially constructed for this purpose at the gathering centres, then delivered from these centres at Rawdatain and Burgan fields to the pumping stations then to the Gas liquefaction plant and finally to the consumers through eight main steel pipe-lines.

- 1) First Pipe Line (Dia. 8") - This (42 Kms) line has a capacity of 18 million standard cu. ft. per day and delivers gas under a pressure of 420 lbs/sq.in. to the gas scrubber and reducing station near the airport where pressure is reduced to 300 lbs/sq.in. under which gas is fed to the Power and Distillation Plants in Shuwaikh. Owing to the fact that some other installations with different operating pressures are fed from this line, another station to reduce the pressure from 300 lbs/sq.in. to 40 lbs/sq.in. was constructed on a branch line to feed industrial installations at Shuwaikh Area as well as hospitals, schools, army camps and other Government utilities.

There is another 4" pipeline which reduces gas pressure to 150 lbs/sq.in. to feed the Sand-lime brick plant.

- 2) Second Pipe Line (Dia. 16") - This (45 Kms) line has a capacity of 100 million standard cu.ft. per day and carries gas under a pressure of 420 lbs/sq.in. to the reducing station near the Airport where pressure is reduced to 270 lbs/sq.in. Gas is delivered under this pressure to feed the Power and Distillation Plant in Shuwaikh.
- 3) Third 42" Pipeline - capacity 120M cu.ft./day, length 17 Km delivers gas under pressure 85 lbs/sq.in. from liquefaction plant to both North and South Shuaiba P and WD/PS and other industries in the area.

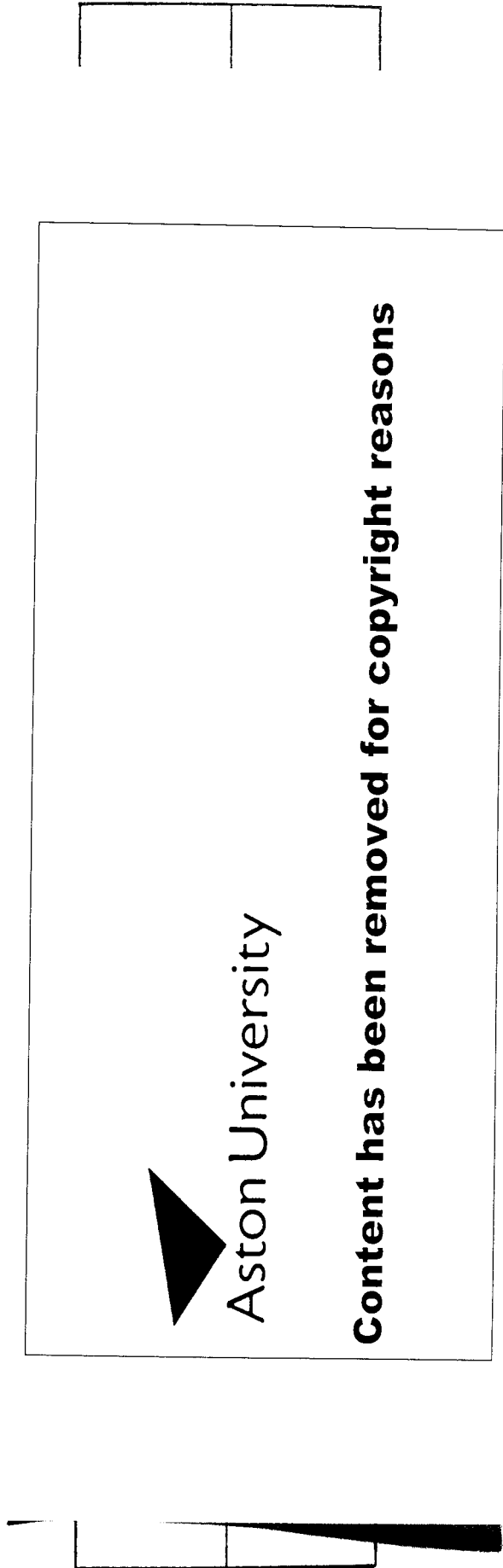
- 4) Fourth 52" Pipeline - capacity 180M cu.ft./day, partial length 3 Km delivers, in addition to 42" pipeline, gas under pressure 85 lbs/sq.in. from liquefaction plant to feed North and South Shuaiba P and WD/PS and other industries in the area. The remaining 14 Km line was kept as a standby for Shuaiba Industrial Area in emergencies.
- 5) Fifth 12" Pipeline - a branch of 52" pipeline with a capacity of 15M cu.ft./day delivers gas under pressure 85 lbs/sq.in. to feed different industries in Mina Abdulla Industrial Area.
- 6) Sixth Pipeline (Dia. 30"/34") - This (55 Kms) line with a capacity of 500 M cu.ft./day delivers gas under a pressure of 420 lbs/sq.in. from gas liquefaction plant in Shuaiba to the pressure-reducing station on Jahra Road opposite Doha Area.
- 7) Seventh 30" Pipeline - capacity 400M cu.ft./day, length 8 Kms, delivers gas under pressure 300 lbs/sq.in. from pressure-reducing station near Jahra Road to P and WD/PS in Doha.
- 8) Eighth 18" Pipeline - a branch of 30" pipeline with a capacity of 120M cu.ft./day, 17 Kms in length delivers gas under pressure 300 lbs/sq.in. to P and WD/PS in Shuwaikh. A 6" pipeline, 20 Km in length feeds Al Jahra Hospital and another 6" pipeline, 2 Kms in length feeds Al Adan Hospital, while a third 6" pipeline, 7 Km in length feeds Al Farwania Hospital.

There are 3 pipelines for gas oil delivery. One 8" pipeline runs from K.N.P.C. Refinery in Shuaiba to P and WD/PS in the area, another 8" pipeline runs from gas oil stores in Shuwaikh to the nearby plants while a third 12" pipeline for crude oil delivery runs from Jahra Area near the gas pressure - reducing station to Doha P and WD/PS.

The Ministry provides gas supplies to State utilities and other private sector companies through a network, of main and secondary gas lines with different diameters having a total length of 880 Kms extending in Kuwait Town and Suburbs.

TOTAL CONSUMPTION OF NATURAL GAS DURING 1973 - 1980

(IN MILLION S.C.F.)



Source: "Statistical Year Book - 1981", Ministry of Electricity and Water, Kuwait.

APPENDIX XXIV

Projects Executed for Ministry of Electricity & Water: 1976-1982



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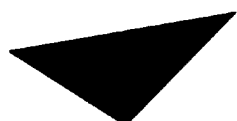
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* 1981/82 projects are up to
March 1982.

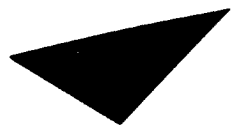
Source: Information was provided by His Excellency KHALF AL-KHALF,
The Minister of Electricity and Water, Kuwait, April, 1982.

Hospitals In Kuwait



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Source: "Cost Analysis and Performance Evaluation for The Health Services: 1978/79", Vol. 1. Ministry of Public Health, Kuwait.

APPENDIX XXVI

Ancillary Medical Services in Kuwait

The following are the ancillary medical services provided in the



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sections in the Ministry.



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- Source: 1) "Cost Analysis & Performance Evaluation For The Health Services: 1978/79", Vol.1, Ministry of Public Health, Kuwait.
- 2) Information was provided by His Excellency DR. NAIL AL-NAQUEB, The Undersecretary of the Ministry of Public Health on Jan.20, 1982.
- 3) AL-ANBA Newspaper (Kuwait), No. 2277, April 1982, P.2.
- 4) "Health Services In Kuwait", Ministry of Public Health, Kuwait, Nov. 1981.

APPENDIX XXVII

RESEARCH ACTIVITIES OF PREVENTATIVE MEDICINE
DIVISION, MINISTRY OF PUBLIC HEALTH

Ecological Approach To Cancer In Kuwait



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Source: Documents were provided by Dr. Gaffar Ezzat, Head of Preventive Medicine Division, Ministry of Public Health, Kuwait, June 20th, 1982.



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- Source:
- 1) Document was provided by Dr. S. Al-Saffouri, Director of the Pharmaceutical Factory, Ministry of Public Health during the meeting of March 23rd, 1982.
 - 2) "1980 Pharmaceutical Factory Report", Ministry of Public Health, Kuwait.
 - 3) "Cost Analysis and Performance Evaluation For The Health Services : 1978/79", Vol 1, Ministry of Public Health, Kuwait.



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Source: "1980 Pharmaceutical Factory Report"
Ministry of Public Health, Kuwait.



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Source: "1980 Pharmaceutical Factory Report",
Ministry of Public Health, Kuwait.



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Source: "1980 Pharmaceutical Factory Report",
Ministry of Public Health, Kuwait.



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Source: "1980 Pharmaceutical Factory Report",
Ministry of Public Health, Kuwait.

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Source: "1980 Pharmaceutical Factory Report",
Ministry of Public Health, Kuwait.

Parmaceutical Factory Production Development of External Drops

1971 - 1980



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71 72 73

Source: "1980 Pharmaceutical Factory Report",
Ministry of Public Health, Kuwait.



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Source: "1980 Pharmaceutical Factory Report",
Ministry of Public Health, Kuwait.



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Source: "1980 Pharmaceutical Factory Report",
Ministry of Public Health, Kuwait.



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Source: "1980 Pharmaceutical Factory Report"
Ministry of Public Health, Kuwait.



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9 80 YEAR

Source: "1980 Pharmaceutical Factory Report",
Ministry of Public Health, Kuwait.

Pharmaceutical Factory Production Development of Capsules 1971 - 1980

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Source: "1980 Pharmaceutical Factory Report"
Ministry of Public Health, Kuwait.

Pharmaceutical Factory Production Development of Tablets 1971 -1980

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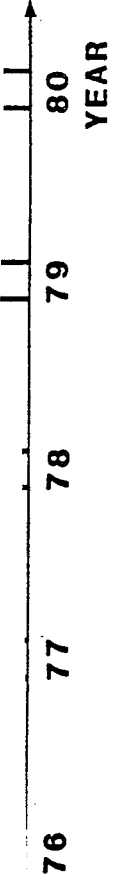
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71 72 73 74 75 76 77 78 79 80
Source: "1980 Pharmaceutical Factory Report",
MINISTRY OF PUBLIC HEALTH

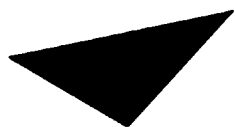


MAIN ARTICLES OF ESTABLISHMENT OF KUWAIT
PHARMACEUTICAL INDUSTRIES CO. (KPICO)



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Source: "Agreement of Establishment and Fundamental Order of Kuwait Pharmaceutical Industries Co.", Kuwait, 1980. In Arabic.

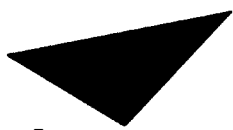
APPENDIX XXX

LIST OF FINISHED PHARMACEUTICALS TO BE
MANUFACTURED BY KUWAIT PHARMACEUTICAL
INDUSTRIES CO. (KPICO)



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Source: The list was provided by Pharmacist Essa J. Alkhalifa,
Member of Board of Directors of KPICO, March 3, 1982.



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Expansion

Source: R. El-Mallakh, "Kuwait: Trade & Investment",
(U.S.A. : Westview Press Inc.), 1979.

APPENDIX XXXII

Industrial Licenses Issued In Kuwait

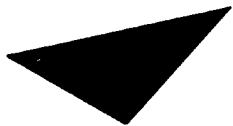
1980 - 81

The following table lists various industrial licenses that have been issued by Ministry of Commerce and Industry for the period 1980 till June, 1981:



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Source: "Industrial Licences in Kuwait", Finance & Industry
2, (1981) 115-123, In Arabic.

The Industrial Bank of Kuwait



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- Source:
1. Documents were provided by Mr. ANWAR AL-NOURI, The Bank's Chairman, during the meeting in January, 1982, and by Mr. YOUSEF AL-SANEI, the Bank's Manager of Banking & Finance, during his meeting of August, 24th, 1981.
 2. The Industrial Bank of Kuwait - "Memorandum and Articles of Association"
 3. The Industrial Bank of Kuwait, "Information and Legal Documents Required by the Industrial Bank of Kuwait on Industrial Projects"
 4. 1980 Annual Report, Industrial Bank of Kuwait.

APPENDIX XXXIV

Industrial Products of The National
Industries Company of Kuwait



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2) Limestone Products Unit.



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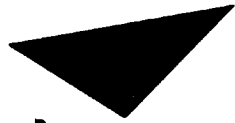
Source: Information was supplied by MR. MUFARREJ I. AL-MUFARREJ, The Chairman and Managing Director of NIC, during the meeting in September 1981.

Significant Dates in
Kuwait Oil Company's History



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Source : "Information Department", Kuwait Oil Company,
Kuwait. February 1981.



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Source: "Kuwait Oil Company", Kuwait, March 1982.

APPENDIX XXXVII

The Kuwaiti Company for Petroleum Exploration
Abroad



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Source: Alkuwait Alyoum, "Government official Gazette",
No.1350, March 29, 1981, p.70. In Arabic.

Kuwait Oil Tanker Company



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- Source: 1) "Kuwait Oil Tanker Company : Article of Association,"
Kuwait. Undated.
- 2) "1979 Annual Report", Kuwait Oil Tanker Co., Kuwait.

International Energy Development Corporation
(I.E.D.C.)



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Source: "International Energy Development Corporation",
Geneva, Switzerland. Undated.

Santa Fe and C.F.Braun Companies



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Source: Documents were furnished by Mr. ABDULMALEK AL-GHARABALLY, Executive Assistant to Managing Director of Planning, Kuwait Petroleum Corporation, during the meeting of January 12, 1982

KUWAIT MEMBERSHIPS AND CONTRIBUTION TO REGIONAL
AND INTERNATIONAL ORGANISATIONS (1981)



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Source: A copy of the Enquiry's Answer to the Parliament as submitted by His Excellency The Minister of Foreign Affairs and Acting Minister of Information, SHEIKH SABAH AL-AHMAD AL-SABAH, Ministry of Foreign Affairs, Kuwait, April 1982.

APPENDIX XLII

Kuwait Fund For Arab Economic Development



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- Source:
- 1) "Kuwait Fund For Arab Economic Development Law and Charter", Kuwait Fund For Arab Economic Development, Kuwait.
 - 2) Statistics were provided by MR. BADER AL-HUMAI DH The Fund's Deputy Director General for Operations and Finance. Jan. 1982.

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