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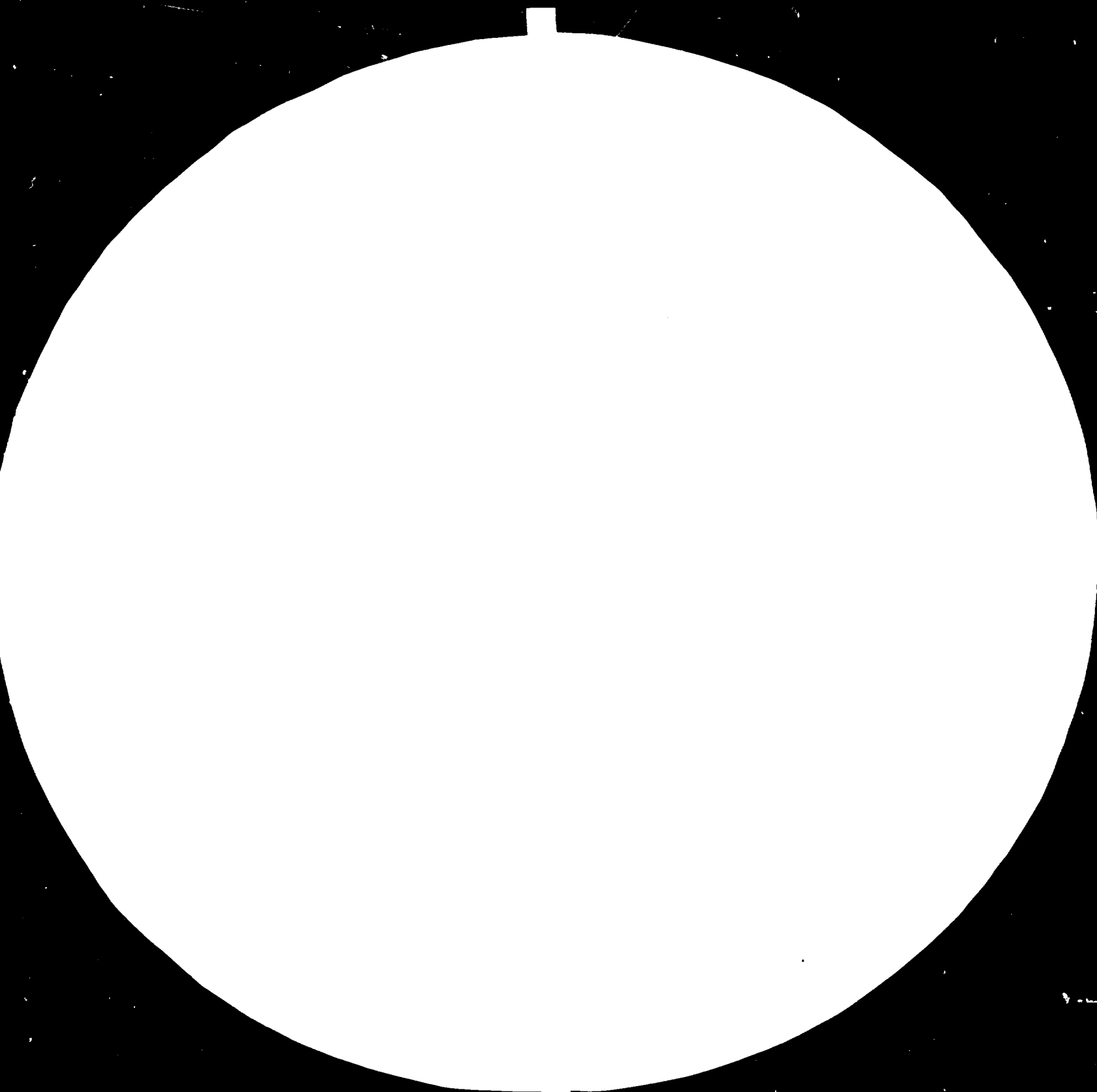

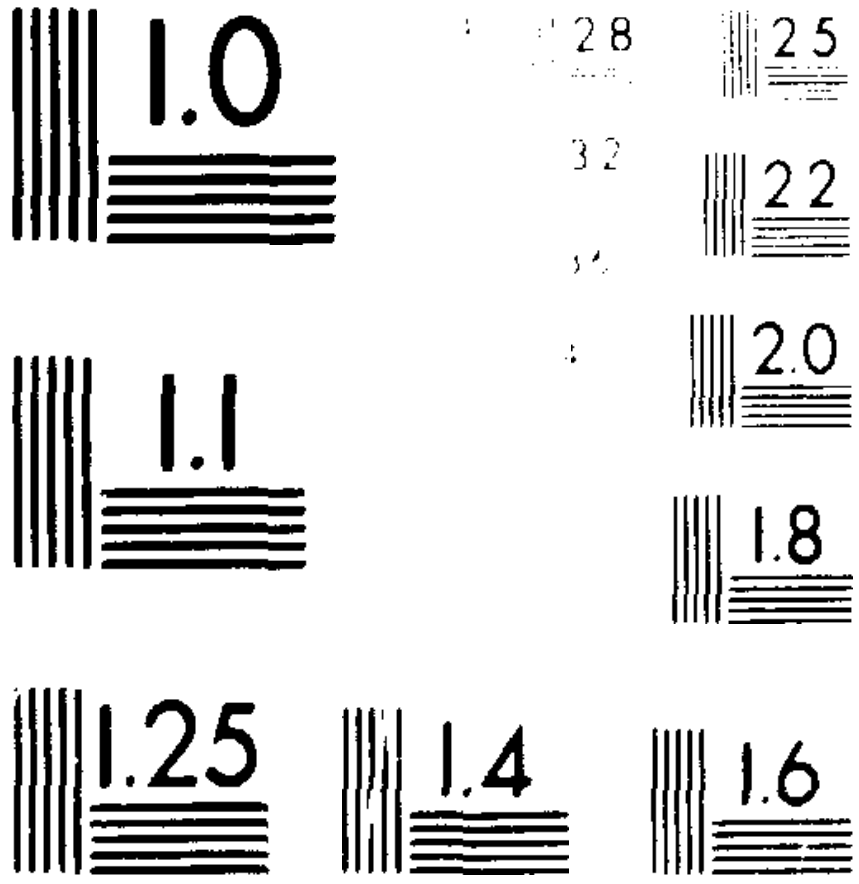

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TERMINAL REPORT

TECHNICAL ASSISTANCE PROJECT FROM UNIDO TO GOIC.

(TF/RAB/78/001/11-02)

February 1, 1979 to April 30, 1984

Prepared by

Mohammed Y. Shana'a
Petrochemical Expert

April, 1984

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TERMINAL REPORT

TECHNICAL ASSISTANCE PROJECT FROM UNIDO TO GOIC

(TF/RAB/78/001/11-02)

FEBRUARY 1, 1979 - APRIL 30, 1984

INTRODUCTION

The Gulf Organization for Industrial Consulting (GOIC) is an inter-governmental organization established in 1976 by seven Arab Gulf States: United Arab Emirates, State of Bahrain, Kingdom of Saudi Arabia, Republic of Iraq, Sultanate of Oman, State of Qatar and State of Kuwait. The Organization's main objective is to achieve industrial co-operation and co-ordination among the member states. Towards that end and according to its establishing ordinance, the Organization undertakes the tasks of fostering common industrial projects, co-ordination and development of technical and economic co-operation among existing or planned industrial projects, collection and publication of information about industrial development projects and policies, and provision of technical assistance for preparation and evaluation of industrial projects.

During July 1978 GOIC signed a technical agreement with UNIDO who will provide experts to advise and assist GOIC in developing the capabilities in different fields, mainly in the systematic identification and development of industrial investment opportunities to be implemented by one or more member countries either singly or jointly.

Based on the above mentioned agreement, UNIDO provided the following experts:

1. Mohammed Y. Shana'a, Petrochemical Expert, February 1979 to April 1984.

2. Mr. Mukundan, Metallurgist, July 1979 - July 1980.

3. Mr. Padmanabhan, Metallurgist, July 1980 - July 1982.

This terminal report deals only with the activities of Mohammed Shana'a, the Petrochemical Expert during the period February 1, 1979 through April 30, 1984. This is so because the expert did not have the responsibility and in fact was not directly involved in the details of the activities of the other two experts in GOIC.

The project was under a Trust and Fund Agreement where the Gulf Organization for Industrial Consulting paid all the costs during the life of the project.

Finally I would like to express my sincere appreciation for the cooperation and the support extended to me without which the project would not have been as successful. I hope that GOIC/UNIDO cooperation will continue in the future for the mutual interest of all concerned.

OBJECTIVES AND LOGIC OF PROJECT

The main objectives as stated by the agreement which was signed by GOIC and UNIDO are stated as follows:

- identifying and studying areas for possible industrial co-operation by the member countries, involving detailed studies and evaluation of prospective projects;

- pre-feasibility, pre-investment and feasibility studies;

- study and identification of petrochemical projects which can be undertaken singly or jointly by member countries;

- preparation of terms of reference for consulting firms or short-term consultants to be sub-contracted or employed by the organization to prepare feasibility or other studies.

It is obvious from the above and as stated in the GOIC/UNIDO agreement, the project is of a technical assistance nature where the anticipated activities were not scheduled to begin and end at any specific time.

Since the project has been structured as a continuous Technical Assistance programme, it becomes impractical for the expert to strictly follow the precise details of the general directions presented in the Chief Technical Adviser's Manual regarding the preparation of the Terminal Reports. Difficulties will be encountered with regard to the following:

1. Comparison of the major activities carried out and the outputs produced with the schedules and targets established in the work plan or the latest revision thereof. Such schedules did not exist.

2. Identification of factors which significantly facilitated or impeded the implementation of the different activities of the project.

3. Provision of quantitative data in support of the achievement of the immediate objectives of the project. This is true as GOIC considered the majority of the reports particularly the prefeasibility and techno-economic feasibility studies as well as other industrial and technical reports as confidential. UNIDO is ofcourse well aware of this situation.

4. Utilization of the results of the project. This is so because GOIC acts only in an advisory role and not as an implementing agency of industrial projects.

Despite the above, the preparation of the report will be in line with the overall guidelines of the Chief Technical Adviser's Manual. However, it should be pointed out that since this report covers the entire assignment period, some duplication with the materials presented in the various progress reports will take place.

ACTIVITIES CARRIED OUT AND OUTPUTS PRODUCED

Description of the activities and the outputs produced will be basically presented in the order in which they are listed in the original UNIDO/GOIC agreement as indicated below:

I. Identifying and Studying Areas for Possible Industrial Cooperation by the Member States.

The expert participated heavily and assisted in identifying the following industrial projects which could be suitable for implementation if proven economically viable, as joint projects among the member states:

1. Production of Compound Fertilizer

With the exception of a compound fertilizer plant which was under construction in Iraq, only urea was produced in the Arabian Gulf Region. As such, a project to produce NPK was identified to possibly satisfy the demand of the region as well as to strengthen and compliment the Iraqi project.

2. Float Glass Project

Since all float glass consumed in the region was imported from outside countries, a float glass project was identified as a possible joint project. A preliminary market survey indicated the demand could support a reasonable plant capacity.

3. Petroleum Coke Project

Products will be consumed by the existing aluminium smelters (ALBA in Bahrain and DUBAL in the UAE) in the region.

4. Acetic Acid and Formaldehyde Resins Projects

4A. Acetic Acid - Vinyl Acetate - Polyvinyl Acetate Complex

4B. Formaldehyde Resin Project

These projects were identified as a result of a comprehensive screening of practically all possible products which could be produced from the main natural gas components. A detailed market study confirmed the possible success of these projects specially the need of the paint industry for the polyvinyl acetate product.

5. Production of Aromatics in the Region

Many possible industrial projects such as polystyrene which utilize aromatics as feed stocks were not considered because of the non-availability of the aromatics in the region. As such, it was decided to consider the possibility of starting a regional aromatics project.

6. Production of Polypropylene

As a result of the screening process of the products which could be produced from the natural gas main components and based on the results of a detailed marketing study, the need to produce polypropylene was evident.

Unfortunately, the non-availability of propylene as a raw material prevented any further serious consideration of this project. The only attempt was to consider the possibility of separating this material from the off-gases of the Bahrain refinery which were reported to contain 25,000-30,000 tons per year. This proved to be not feasible. As such the project was shelved until this material becomes available in the future.

7 Soda Ash Project.

Because this product is presently widely used in various operations in the region and the strong possibility of implementing a float glass project in the area, it was decided to study the possibility of establishing a Soda Ash manufacturing plant in the area.

8. Petrochemical Refinery Project.

The main natural resources of the region consist of oil and natural gas. Many suitable industrial projects were not considered because of the lack of the main raw materials. Based on this and in an attempt to achieve the desired regional industrial development, the expert suggested to study the establishment of petrochemical refinery. The main function of this refinery is to provide feedstocks for the various petrochemical projects which could be initiated in the region. The main idea is to end up with a very sophisticated but well integrated petrochemical complex which will be geared not only to satisfy the regional petrochemical requirements but also to be an export oriented complex.

9. Oil Production Chemicals

With the extent of the oil production in the region, the expert assisted in identifying the need for the study of a project to possibly produce the needed chemicals for the entire oil production operation in the area.

10. Petrochemical End-Users Study

The downstream industries in the petrochemical field are normally erected by the private sector. As such, it was decided to carry out a comprehensive regional marketing study

regarding all the presently available petrochemical downstream industries. This will help in identifying the total consumption of these products in the Arabian Gulf Region.

11. The expert assisted in identifying various other non-petrochemical projects which are related to the fields of construction materials, engineering industries, sectoral strategy studies, industrial incentives and others.

II. Pre-feasibility, Feasibility and other Industrial Studies

The Gulf Organization for Industrial Consulting carryout the various pre-feasibility, feasibility and other industrial studies either internally and/or with the assistance of an outside consulting firm. In general, GOIC form a team of different specialities to be responsible for the completion of each study. The team is normally headed by a Project Leader who is responsible for the review and coordination at all activities related to the project.

In addition to the above, whenever, the techno-economic feasibility study for any industrial project proves its economical viability, the study is submitted to GOIC Board for approval to promote and establish the Company to implement the project. This is accomplished by a preparatory committee representing GOIC and every participating member state.

Considering the above mentioned, the expert participated in the following activities related to the pre-feasibility, feasibility and industrial studies and the industrial projects promotion committees:

1. Pre-feasibility, Feasibility and Industrial Studies Prepared with the Assistance of outside Consulting Firms.

A. Studies in Progress at the Start of the Mission

The expert was responsible for the follow-up and evaluation of the following studies which were commissioned by GOIC before the start of the mission:

i) Petrochemical Strategies in the Arab Gulf States in the 1980's

The expert was the Project Leader for this study. This study, which involved 16 main petrochemical products was carried out by Chem Systems. The objectives of the study were to acquire:

Information related to the international development of demand/supply of petrochemical products through 1982.

- Forecasting of the future demand of petrochemical products during 1982 to 1987 and its trends up to 1992.

- Marketing strategies of the main competitors to the producers in the Arab Gulf States.

- The effectiveness of the various marketing strategies to be adopted by producers in the Arab Gulf States.

This study was completed and evaluated and a regional seminar was held on this topic during May 1979.

ii) Fibreglass Study

The expert was the Project Leader of this study. GOIC contracted Mid Gulf Consultants, Kuwait, to prepare

prefeasibility and feasibility studies for the establishment of a joint project for the region to produce textile fibreglass to meet the needs of the Arab Gulf States.

This study was completed in 1979 and is presently being implemented by the Private Sector representing six member states. The project will be located in Al Jubail, Saudi Arabia.

iii) Carbon Black

The expert was the Project Leader of this study. GOIC contracted Serete, a French consulting firm, to carry out a prefeasibility study regarding the establishment of a carbon black plant in the region. This study was completed and submitted to GOIC in September 1979. Because carbon black is mainly consumed by the tires industry, it was decided not to carry any further studies until a regional tires manufacturing plant is considered for the area.

iv) Cost of Construction, Production and Distribution of Petrochemicals Projects.

The expert was the Project Leader of this study. GOIC contracted SRI International to carry out a study on the cost of construction, production and distribution for petrochemical projects in the Arab Gulf States, and to compare these costs with similar projects in the U.S.A., Western Europe and Japan. One of the main objectives of the study is to calculate location factors appropriate for the various countries in the Gulf Region to be utilized for the estimation of the cost of building petrochemical plants.

The study was completed and evaluated by GOIC during May 1979. Subsequently a regional seminar on this topic

was held in Doha, Qatar, during the period 29th September to 2nd October, 1979.

v) Marketing and Production of Cement in the U.A.E.

The Ministry of Finance and Industry of the U.A.E. requested GOIC to carry out a study regarding the marketing and production of cement in the U.A.E. This study was completed under the supervision of the expert and was despatched to the Emirates where a seminar was held which was attended by the various concerned parties in that country.

B. Studies Initiated During the Mission Period

a) Production of Compound Fertilizer

The expert was the Project Leader for this study. The terms of reference for this project were prepared. After evaluating the offers received from outside consultants, the study was entrusted to Fisons in England. The project aimed at satisfying the consumption of the Arab Gulf States together with the other Arab Countries.

The prefeasibility was completed in April 1980. Because of the anticipated special relationship between this project and the Iraqi Al Kaim project, GOIC Board decided to postpone any further action until such relationship is clarified.

b) Intermediate and Finished Petrochemical Project

The expert was the Group Leader for this project. The aim of the project was to explore the possibilities of initiating intermediate and downstream petrochemical industries in the region.

The terms of reference were prepared. Offers from various outside consultants were recieved and evaluated. The contract was signed with Beicip of France. The study consisted of the following two phases:

b-1) Marketing Survey

The marketing survey included 26 petrochemical products. The aim was to determine the present and future consumption demand in the seven member states.

The marketing survey was completed by January 1980. Based on the results, 12 petrochemical products were selected to be subjected to prefeasibility studies.

b-2) Prefeasibility Studies

As stated above, Beicip was entrusted to carry out prefeasibility studies for the 12 products selected. These studies were completed by April 1980. After evaluation of the study and based on the recommendations of an Experts Group Meeting held in Doha, GOIC decided to:

i) Carry out a detailed techno-economic feasibility study for the production of Acetic Acid - Vinyl Acetate - Polyvinyl Acetate.

ii) Carry out a detailed techno-economic feasibility study for a formaldehyde resins project provided that similar projects are not presently under construction or being planned in the member states specially Saudi Arabia and Kuwait. It was further confirmed that similar projects were to be established in these two countries. As such, the project was dropped.

c) Petroleum Coke Project

The expert acted as the Project Leader for this study. The sesults of the pre-feasibility and the detailed techno-economic feasibility studies indicated the viability of the project.

In order to ascertain the suitability of the vacuum residue available in the United Arab Emirates, the terms of reference for the test were prepared and then discussed with the Abu Dhabi National Oil Company who agreed to sponsor the testing operation.

Then after bids were received from various specialized firms, a contract was signed with CONOCO in Houston, Texas. The final report was completed by the end of November 1983.

This report indicated high sulphur contents in the final product. But the Aluminium Technical people indicated this will not present a technical problem but rather a pollution one. As such, the project will be implemented.

d) Acetic Acid Complex

The expert was a Member of the Project Team. The detailed techno-economic feasibility was completed. Because the results were economically encouraging, the GOIC Board approved the implementation of the project.

The State of Qatar was suggested to be the location for the project. Presently, concentrated efforts are taking place between the Government of Qatar and GOIC to help arrive at a final decision regarding the approval of hosting the project.

e) Soda Ash Project

The expert served as a Member of the Project Team. Based on the results of the pre-feasibility study for the project, it was decided by GOIC Board to carry out a detailed techno-economic feasibility study. The Sultanate of Oman and the State of Kuwait indicated their interests to host the joint project.

The prefeasibility study was completed and GOIC Board decided to carry out a detailed techno-economic feasibility study.

f) Petrochemical Refinery Project

The expert served as the Project Leader. The pre-feasibility study for this project was completed and the economical results were positively encouraging. The project was defined in this study includes the processing of approximately 50,000 bbl/day Arabian light/heavy crude oil to produce the basic olefins, aromatics and other products. The GOIC Board approved the preparation of a detailed feasibility study.

Because of the complexity of the project, it was decided to carryout the study in the following two phases:

f-1) Marketing Phase (1983)

The world market study was carried out during 1983 and early 1984. It consisted of a comprehensive marketing survey of the important petrochemical products which will be produced by the petrochemical complex. On the other hand the specific market study for the Arab countries will be completed sometimes before the end of 1984.

f-2) Feasibility Study Phase

This study was planned to be carried out in 1984. But due to the delay in completing the Marketing Study in 1983, the study was not started. It would be logical to assume that the detailed feasibility study will be conducted in 1985.

g) Light Bulbs Project

The expert was the Team Leader. The project aimed at satisfying a sizable portion of the Gulf region requirements. Ewbank Engineers carried out the prefeasibility study for this project.

The prefeasibility study was completed by October 1980. The results indicated that the project was not economically feasible. This was mainly due to the inability to compete with similar products imported from Eastern Europe and the Far East. As such, GOIC Board decided not to take any further action unless the existing conditions are favourably changed.

h) Heat Exchanger Project

The Expert acted as the Project Leader. The Government of Kuwait requested GOIC to carry out a study regarding the establishment of a regional heat exchangers manufacturing project.

The expert prepared the terms of reference for this opportunity study. The Industrial Engineering Company of Kuwait was awarded the contract. The study was completed in July 1981. The results indicated that the project was not feasible. As such, the project was dropped.

i) Utilization of Associated Flared Gas

The GOIC together with UNIDO and OAPEC, carried out jointly a study to estimate the quantities of the flared associated gas in the oil producing countries. Then, the competitiveness of establishing petrochemical plants in the oil producing countries compared with the developed countries, was determined.

The petrochemical expert participated in all the relevant meetings to establish the terms of reference, to evaluate the marketing survey data and then to approve the final draft of the report. This report was submitted to the Algiers Seminar on Utilization of Natural Gas. This seminar was organized by OAPEC and was held during the period 29 June to 1st July, 1980.

After the Algiers Seminar, GOIC and UNIDO agreed on suitable terms of reference to complete the project to determine the competitiveness of establishing appropriate petrochemical projects in the developing countries. The final report was completed in April 1981, and was submitted to the Second UNIDO International Petrochemical Consultation Meeting which was held in Instanbul, Turkey, in June 1981.

2. Studies Prepared Internally by GOIC.

There are few studies which were carried out internally within GOIC. Some of these studies are indicated below:

2a) Float Glass Feasibility Study

The expert acted as the Project Leader. The project aims at satisfying the regional consumption requirements of the float glass which was estimated at around 80,000 to 100,000 tons per year.

Pilkington Bros. provided all the necessary technical information. The petrochemical expert played a major role in the preparation of the feasibility study. The results indicated the economic viability of the project. Then GOIC Board decided to implement the project in Iraq.

The formation of the new Gulf Float Glass Company is expected to be announced shortly.

2b. Refractories Project

The expert served as a Member of the project team. A preliminary survey regarding the regional consumption of refractories was made by the technical staff of GOIC. Based on the results of this survey, GOIC decided to prepare a prefeasibility study for the manufacturing of refractories.

At this stage, it was decided to contact the Member States specially Saudi Arabia to check on the possible availability of refractories plants as well as possible planned projects. It was found that two projects in Saudi Arabia and one project in Iraq were already licensed. The production capacities of these project will satisfy the regional requirements. As such, GOIC decided to drop this project.

2c. Propylene Separation Project

The expert was a Member of the project team. The Intermediate and Finished Petrochemicals Study indicated that provided the feedstocks mainly propylene are available, the production of polypropylene is very viable. As such, GOIC decided to estimate the cost of separating propylene from the Bahraini refinery off-gases.

The study was carried out by the technical staff of GOIC. The results indicated the very high costs for the separation

process and as such the relatively high cost of propylene produced. As such, it was decided not to continue with this project.

2d. Viability of Aromatics Production in the Arabian Gulf Region.

The expert served as a Member of the project team. This study was carried out internally by GOIC technical staff with the participation of the petrochemical expert. The objective was to estimate the Aromatics Production cost in the Arabian Gulf Area and to compare it with that in Europe and the United States.

The study was discussed by a Regional Group Experts Meeting which was organized by a GOIC team chaired by the petrochemical expert. It was decided, because of similar projects in Saudi Arbia and Kuwait to postpone any further action.

2e. Tires Production Project.

The expert served as the Project Leader of the project team. A prefeasibility study, to produce 4,020,000 tires (passenger, trucks, buses and commercial cars) in the Arabian Gulf Region was carried out. With the exception, of the Marketing Section, the Expert prepared the rest of the study.

The study indicated the economical viability of the project and recommended,

1. To carry out a detailed techno-economic feasibility study.

2. To conduct a fleet road testing for the tires to test their suitability for the Arabian Gulf Region.

The expert participated in the preparation of the Terms of Reference. As a result of several meetings with the Founder's

Committee, GOIC invited outside consultants to submit their offers to carryout the study. The expert participated in evaluating these offers and in interviewing the six companies who were short listed from the original list. It is anticipated that a decision regarding the final selection of the consulting firm will be made in the very near future.

2f. Other Studies (Petrochemical Downstream Industries)

GOIC carried out a detailed marketing survey regarding the existing regional petrochemical downstream industries. The survey included the products, capacities, investments, manpower, marketing etc.

The study was finalized in 1983. The results included:

1. Consumption of the different main petrochemical products by each State and by the region.

2. An Industrial Directory for the States of Kuwait, Bahrain, Qatar, UAE and Oman was prepared. Another Directory to cover Iraq and Saudi Arabia will be prepared during this year.

The expert served as a Member of the Project Team.

3. Industrial Projects Preparatory Promotion Committees.

The expert was asked to participate in the following projects promotion committees:

1. Textile Fibre Glass Project

This project is presently being implemented by the private sector representing six Arab Gulf States. The project will be established in the Eastern Province of Saudi Arabia.

The expert initially made a comprehensive presentation regarding the feasibility study to the representatives of the private sector. In addition, the expert continued to provide technical support to the project committee. It is anticipated that construction of the project will commence before the end of 1984.

2. Float Glass Project

The expert was assigned to participate in the promotion committee which is concerned with the implementation of this project in Iraq. The first meeting of the committee was held in Doha December 4 - 5, 1982 and the second meeting was held in May 1983.

It is anticipated that a company will be formed shortly to implement the project.

3. Acetic Acid Complex

The expert was assigned to the promotion committee of this project. Negotiations and discussions are currently taking place with the officials of the State of Qatar to decide whether Qatar will or will not host this project.

4. Petroleum Coke Project

The expert was involved with this committee to review and evaluate the technical specification of the calcined coke expected to be produced and consumed in the region.

5. Aluminium Rolling Mill

The expert participated in selecting the Consultant for this project. This took considerable time in Bahrain and Doha. Finally, Kaiser Engineers was appointed last year for the project.

The Aluminium Rolling Mill Co. is presently under construction and production is expected to start in 1984/1985.

III Preparation of Terms of Reference for Consulting Firms

The expert either completely prepared or participated in the preparation of the terms of references for all studies related to the petroleum or petrochemical projects as well as some other GOIC projects.

IV. Other Responsibilities Assigned to the Expert.

1. Organization of Seminars

The expert was asked by GOIC Secretariate to help in organizing and/or supervising the following seminars:

a) Petrochemical Marketing Strategies in the Arab Gulf States in the 1980's.

The expert served as a Co-chairman of this regional seminar. The seminar was held in Doha during 19th to 21st May, 1979, with the following objectives:

- To inform the Member States of the results of the study prepared for GOIC on petrochemical marketing strategies for the Gulf States in the 1980's.

- To discuss the advantages of the proposed joint strategies of the petrochemical marketing products on a regional and Arab World level.

- To discuss the prospects of co-ordination and co-operation in producing the intermediate and final petrochemical products in the Member States.

- To recommend the most appropriate petrochemical marketing strategies of the Member States.

A copy of the proceedings of this seminar, which was prepared under the supervision of the Expert was forwarded to the Negotiation Section of UNIDO in connection with the Petrochemical Demand/Supply Study.

b) Chemical Construction, Production and Distribution Costs.

The expert served as a Co-chairman of this seminar. The objectives of this regional seminar were as follows:

- To develop procedures to enable GOIC and the Member States to estimate chemical plant construction and production (plant gate) costs in the Arab Gulf Area and to compare such costs with corresponding figures for Europe, Japan and the U.S.A.

- To develop procedures to enable GOIC and the Member States to estimate net back prices based on market prices at points of sales in prospective markets and in this way to arrive at profit margins for production in the Gulf Area.

- To demonstrate the procedures developed by sample calculations for the production of Ethylene (from Natural Gas) and Methanol for hypothetical plants at the Industrial Shuaiba Area in Kuwait.

Again, the proceedings for this seminar were prepared and a copy was sent by GOIC to the Negotiation Section of UNIDO to help them in their Petrochemical Study which was presented at the 2nd UNIDO Petrochemical Consultation Meeting in Istanbul, Turkey, in June 1981.

c) Industrial Projects Evaluation Training Seminars

This seminar was organized for two consecutive years in 1982 and 1983. The aim is to train some local engineers and economists from the various industrial ministries and organizations on the preparation and evaluation of industrial feasibility studies.

The 1982 seminar was conducted jointly with Feasibility Studies Section at UNIDO who provided two lecturers for a two week period. The 1983 seminar was handled completely by GOIC technical staff under the supervision of the Petrochemical Expert.

In each seminar, over twenty trainees representing the Arab Gulf States participated. GOIC believes that both seminars were a great success. As such, GOIC Board based on the recommendation of GOIC Secretariate decided to make this seminar a yearly GOIC function.

d) Simulators Technology Training Seminar

The expert was heavily involved in organizing the preparation of a simulator technology training seminar which was held in Bahrain March 1 - 3, 1983. The main objective of the seminar was the manpower development in the region through simulators.

GOIC agreed to sponsor the seminar jointly with the Lummus Co. from the United States of America. Lummus agreed to fly their computers from the USA to Bahrain to display and present practical demonstrations for the Directors of Training of the various petroleum and petrochemical companies in the region. The seminar was attended by over sixty participants representing all the Gulf States.

e) OAPEC Training Seminar on Oil and Petrochemical Industry.

The expert was asked by GOIC to participate in this Seminar which was held January 1983. The expert lectured on Industrial Projects Evaluation. (A copy of the lecture in Arabic was sent previously to UNIDO).

2. Participation in International/Regional Seminars,

At the request of GOIC, the expert participated in various International and Regional Seminars. Some of the most important are listed below:

a) The First Petrochemical Consultation Conference in Mexico City

The Expert accompanied the GOIC Secretary General and the Assistant Secretary General for Industrial Studies to represent GOIC in the First Petrochemical Consultation Conference which was held in Mexico during March 1979.

During this conference the Expert was in direct contact with UNIDO officials including Mr. Hacini and Mr. H. Mays. The results of the conference were documented by UNIDO and, therefore, there will be no need for further elaboration, except to mention that the expert participated very actively during the conference.

b) Achema Meeting in Frankfurt

The Expert accompanied the Secretary General of the Gulf Organization for Industrial Consulting to represent GOIC at the Achema Meeting which was held in Frankfurt, West Germany, during May 1979. The meeting lasted for one week.

c) Baghdad Second International Petrochemical Seminar

The expert attended the Baghdad Second International Petrochemical Seminar during the period 3 - 8 March, 1980, where he presented the paper "Petrochemical Development and Marketing in the Arab Gulf States". A copy of the paper was previously sent to UNIDO.

d) Petrochemical World Demand/Supply Working Group

The Expert represented GOIC in the meeting regarding the Petrochemical World Demand/Supply working group which was held at UNIDO - Negotiation Section in Vienna during the last week of March, 1980.

e) The Second Petrochemical Consultation Conference in Istanbul

The expert accompanied the Secretary General and the Assistant Secretary General of GOIC to represent GOIC in the Second Petrochemical Consultation Conference which was held in Istanbul in June 1981.

During the course of the conference the Expert was continuously in direct contact with UNIDO officials. One should mentioned that the expert was very active in presenting Group 77 during the conference.

f) Second Arab Energy Conference, March 1982

The Expert participated in this conference as indicated below:

i) Preparation Committee for the Conference

GOIC asked the expert to serve as a member of

the preparatory committee incharge of the Petrochemical Industrial Projects and Papers. This of course required, in addition to the selection of papers and authors, the evaluation of the first drafts of these papers. These activities took considerable time.

ii) Presenting a Paper on "Future Prospects of Petrochemical Industry in the Arab World"

The expert prepared the above mentioned paper jointly with the GOIC ex-Secretary General, Dr. Ali Al Khalaf. The paper (a copy of which was sent to UNIDO) was presented during the conference which was held in March 1982 in Doha, Qatar.

g) The Petrochemical Industry Briefing Seminar

The expert accompanied both the GOIC Secretary General and the Assistant Secretary General to attend this seminar in Brussels which was organized by the European Management Center during April, 1982.

h) UOP Technology Conference

The expert accompanied the GOIC Secretary General to attend this Seminar which was held in Copenhagen in Denmark during September, 1982. The seminar was a basic review of refining and petrochemical industry.

i) Internationalization of Norwegion Engineering Services Seminar

Upon the invitation of the Norwegian Chartered Engineers Society, the expert accompanied the Secretary

General to attend this seminar which took place September/ October 1982.

j) First Gulf Energy Convention - 1982.

The expert together with a colleague from GOIC attended this convention. In addition, we presented a paper titled "The Need for Diversification of Petrochemical Industry in the Arabian Gulf States". A copy of this paper was previously sent to UNIDO.

3. Participation in GOIC Committees

The expert has participated in the various technical committees of GOIC. Some of the most important are:

a) Coordination Committee

The expert served as a Member of this committee. This committee which meets once a month is in-charge of reviewing and evaluating the activities of GOIC.

b) Editorial Committee

The expert served as a Member of this committee. This committee is responsible for the review of all technical papers submitted by various authors for publication in GOIC quarterly journal "Industrial Cooperation".

c) Publication Committee

The expert served as a Member in this committee. This committee is responsible for reviewing the monthly bulletin of GOIC with a one technical feature in each publication.

d) Screening Committee

The expert served as a Member in this Committee. It is responsible for setting standards for screening the published technical articles related to technology, industry and its development. A monthly publication is currently been issued.

e) GOIC Work Plan Committee for 1985

The expert served as the Chairman of this committee. The expert participated during the past five years in helping to formulate the GOIC yearly work plan. Starting this year, a committee, headed by the petrochemical expert was established to prepare and coordinate all activities related to the 1985 GOIC Work Plan.

f) Other Committees

The expert participated in the work of other committees as requested by the Secretary General from time to time.

ACHIEVEMENT OF IMMEDIATE OBJECTIVES

As stated previously, this project was conceived as a continuous technical assistance project for the entire period of the expert's mission. As such one could talk about the overall objectives rather than the immediate ones. These overall objectives as stated in the GOIC/UNIDO agreement were to advise and assist GOIC in developiang its capabilities in different fields, mainly in the systematic identification and development of industrial investment opportunities to be taken by one or more member countries either singly or jointly. The main emphasis were placed on:

1. identifying and studying areas for apossible industrial co-operation by the member countries, involving detailed studies and evaluation of prospective projects;

2. pre-feasibility, pre-investment and feasibility studies;

3. study of and identification of petrochemical projects which can be undertaken singly or jointly by member countries;

4. preparation of terms of reference for consulting firms or short term consultants to be sub-contracted or employed by the organization to prepare feasibility or other studies.

The petrochemical expert during his mission to GOIC did not necessarily work individually on projects but rather with various technical groups comprised of GOIC specialized experts. As such, the expert only contributed, advised and assisted GOIC in achieving the various tasks discribed previously. None-the-less, and as

indicated previously, the expert strongly believes that these objectives were successfully achieved. It should be stated however, that the GOIC Management is the final judge as to the extent of the success of this project. This is so because the work performed by expert was generally in accordance with the GOIC Work Plans and specifically in accordance with the guidelines and directions of the GOIC Secretary General and his two assistants.

UTILIZATION OF PROJECT RESULTS

Even though the expert worked mainly with other technical groups either as a Project Leader or as a Member of the team, it is felt that the contribution of the expert has aided greatly to the success of these projects.

Some of the projects which were identified and studied are either under construction or presently being promoted for implementation as indicated below:

1. Projects Under Construction/Implementation

A. Aluminium Rolling Mill Project

This project is under construction in the State of Bahrain. Six Arab Gulf States are jointly implementing the project with a 40,000 MT/Year capacity. Production is expected to start around the end of 1984 or early 1985.

B. Textile Fibre Glass Project

The project is presently under implementation by the private sector representing six Arab Gulf State. The project designed for a 15,000 MT/Year and a production rate of 12,000 MT/Year will be located in Al Jubail, Saudi Arabia. Construction is scheduled to start before the end of 1984.

2. Projects Under Promotion for Implementation

All the detailed techno-economic feasibility studies for some industrial projects were completed with the final results indicating the economic viability of these projects. These are

presently being promoted for implementation and are listed below:

a) Acetic Acid Complex

The project is presently being promoted as a joint project between the Member States. It will be designed on the following capacities:

Acetic Acid	80,000 MT/year
Vinyl Acetate	112,000 MT/year
Polyvinyl Acetate	400,000 MT/year

All the polyvinyl acetate will be geared for local consumption while the vinyl acetate will partly be consumed to produce the polyvinyl acetate and the balance will be exported to other countries.

GOIC suggested the State of Qatar as a suitable site for this project. It is anticipated that a decision will be made sometimes before the end of 1984.

b) Petroleum Coke Project

The techno-economic feasibility study was based on a capacity of 200,000 MT/year of calcined coke. Later on, the capacity was altered to 160,000 MT/year because of the raw materials limited availability. This quantity will be sufficient to satisfy the present requirements of the two aluminium smelters in the region (ALBA in Bahrain and DUBAL in the UAE).

The project is presently being promoted to be established next to Al Ruwais Refinery in Abu Dhabi with the

assistance of Abu Dhabi National Oil Company. It is expected to be a regional project as four member states already indicated their interest to participate in the project.

c) Float Glass Project

The Float Glass Project will be designed to produce 100,000 MT/year of saleable glass. This quantity will be mainly consumed in the Arab Gulf States.

The project is presently under promotion to be located in the Republic of Iraq as a joint project. So far five member states consisting of Bahrain, Saudi Arabia, Iraq, Qatar and Kuwait have tentatively agreed to participate in this joint project.

It is expected that the formation of this company will take place within the next few months.

In addition to the above, the Petrochemical Expert assisted and contributed to the following:

1. Setting up the standards for the preparation of the terms of reference for the prefeasibility/ feasibility studies.

2. Setting up the standards for the quality of the feasibility studies, technical and industrial reports and contracts with foreign consultants

3. Organization of the yearly project evaluation training seminar.

4. Other related items.

The above mentioned are currently practical by GOIC which is presently being considered as one of the most efficient professional organization in the Region.

FINDING

There is no doubt that because of the dependance of the Region on essentially one source (namely petroleum) which will eventually be depleted, there is a need for a strong industrial development as a future revenue substitute.

This industrial development, because of the available resources, must be based basically on:

1. Petrochemical Projects based on oil and natural gas, to satisfy the regional requirements as well as to be exported to international markets.

2. Energy intensive industries because of the availability of the oil and natural gas as the main energy source at reasonable prices. These industries include aluminium smelters and steel mills.

3. Capital intensive industries because of the availability of the capital needed to establish these projects.

The main constraints are the lack of technical manpower who are an essential element for the success of such development. But, it is believed with concentrated efforts to train local people as is the case in Saudi Arabia, this problem can be minimized.

RECOMMENDATION

There is no doubt that for GOIC to stay and continue as a very strong professional organization, well qualified experts must be made available. Examination of the present situation, the Petrochemical Expert recommends that the following types of experience are needed:

2 Experts in the petrochemical field.

1 Expert in the Aluminium field

1 Expert in the iron and steel field

1 Project Evaluator

1 Expert for the supervision and control of all GOIC publication

1 Expert in Data Collection with solid computer background.

The above should be of the highest standards with solid experience and background. As such, it is recommended that discussions between UNIDO and GOIC should take place to discuss the possibility for UNIDO to provide such experts.