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Meeting on Co-operation between
Middle Eastern and North African
Countries on Research and Development
in Petrochemical Industries

Aliağa-Izmir - Turkey
16-20 October 1989

REPORT*

* This document has not been edited.

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I INTRODUCTION

The Meeting on Cooperation between North African and Middle Eastern Countries on Research and Development in Petrochemical Industries was held in Aliağa - Izmir, Turkey from 16 to 20 October 1989. The meeting was organized by UNIDO in cooperation with the Government of Turkey and PETKIM. The meeting is a further demonstration and effort in UNIDO's ongoing activities to foster and enhance the cooperation on research and development in petrochemical industries between developing countries.

The purpose of the meeting was:

- To establish a forum for the direct exchange of views and experience between the participants in the field of research and development in the petrochemical industries;
- To explore ways and means of cooperation in research and development such as training and establishment of R + D centres;
- To explore all ways and means for promoting the cooperation in all areas of R and D in petrochemicals.

II ORGANIZATION OF THE MEETING

The meeting was attended by twelve countries namely: Algeria, Egypt, Iran, Jordan, Kuwait, Morocco, Qatar, Saudi Arabia, Sultanate of Oman, Syria, Tunisia and Turkey as well as representatives from Turkish institutions and UNDP Ankara.

III OPENING OF THE MEETING

Delegates were welcomed on 16 October 1989 by the Managing Director of PETKIM, Dr. Faruk Yağiz, and the Chairman of the Board of PETKIM, Mr. Ali Nail Kubalı and other officials of PETKIM.

In a keynote speech, Dr. Yağiz welcomed all delegates and emphasized the importance of the meeting and the subject to be discussed. He gave some indication on Turkey's economy and its industrial development, petrochemical industries being one of the major elements of Turkish industry stated to receive special attention from the Government, PETKIM especially with its 1.6 million tons per annum of various petrochemicals production. PETKIM is a company of 24 years of experience in the petrochemical industries and would thus like to share its accumulated experience and knowledge with the countries of the region. At the same time, PETKIM would like to benefit from their experience also.

To support technology transfer, the company has established an R and D centre which has come to a stage of becoming more extensively and technologically mature. At the same time, while transferring technology, after each experience PETKIM progressed at least one step further towards technological development.

R and D support for technological development is an important element. It requires high calibre personnel, expensive equipment, etc. Even then developing countries must be involved in R and D at least to understand and assimilate the transferred technologies. In this area they must cooperate. Perhaps regional cooperation is one of the ways to start.

Dr. Yağiz expressed hopes that during this meeting some ways and means will be identified to start regional cooperation in R and D.

As a second speaker Dr. Ali Nail Kubali also welcomed the delegates and expressed his pleasure of addressing the meeting. Dr. Kubali also expressed the importance of R and D in the petrochemical industries. Then he stated the unique position of Turkey to receive raw materials from the neighbouring countries and to implement joint ventures. He also added the importance of marketing in the industry.

Emphasizing the experience PETKIM has accumulated in due time, Dr. Kubali expressed PETKIM's willingness to share it with the countries of the region and, pointing out the analogies present among the countries of the region, he wished success to the meeting for fruitful results.

The representative of UNIDO addressed the meeting on behalf of the Director General of UNIDO and expressed his sincere thanks and deep gratitude to the Government of Turkey for the generous hospitality extended to all invited countries and UNIDO. He recalled the various meetings held by UNIDO in petrochemical industries and mentioned that the present meeting is a direct outcome of the offer made by the Turkish delegation in a similar meeting held in Aliağa-Izmir in 1984. He pointed out that this meeting should draw cooperation schemes in order to drive a better understanding of the technological complexities and pave the way to more efficient cooperation between developing countries. He also indicated that UNIDO within its scope, mandate and resources could play the vital role of catalyst in the promotion of R and D in petrochemical industries in developing countries.

He finally reiterated his thanks to all PETKIM staff for the excellent preparation and the organization.

Mr. Paul van Hanswijck de Jonge, Deputy Resident Representative of UNDP stressed the importance of R and D activities as a tool for technology transfer and independence, using the example of PETKIM for establishing its different complexes in various steps and approaches. This has been successfully achieved with the assistance of UNDP and UNIDO at different stages. The results achieved so far made PETKIM able to organize this TCDC meeting, a link between North African and Middle Eastern countries. The R and D facilities of PETKIM can be seen as a "Centre of Excellence" in the Petrochemical field at a regional level,

This illustrates as well the role which can be played by Turkey at the crossroad between Europe and the Middle East.

IV ELECTION OF THE BUREAU

The participants elected Dr. Faruk Yağiz, Managing Director of PETKIM, as Chairman of the Meeting. The Drafting Committee composed of Algeria, Egypt, Iran, Kuwait, Saudi Arabia and Turkey, was elected.

V ADOPTION OF THE AGENDA

The meeting adopted the following agenda:

- Opening of the meeting
- Election of the Chairman and the Drafting Committee
- Presentation of the report by the expert
- Presentation of the national papers and discussions
- Adoption of conclusions and recommendations
- Adoption of the Draft Report
- Closure of the meeting.

The list of participants is attached as Annex I.

VI SUMMARY OF PAPERS PRESENTED AT THE MEETING

ALGERIA

A summary of petrochemical design capacities is as follows:

- Ethylene	120,000 TPY
- V.C.M.	40,000 "
- P.E.	35,000 "
- P.E.B.D.	48,000 "
- Methanol	100,000 "
- Resins	20,000 "
- Ammonia	900,000 "
- BTX	400,000 "

The main petrochemical plants in Algeria have been constructed between 1965 and 1980. Following this period, lack of investment did not allow to achieve a catalytic cracking project (500,000 TPY) which would have launched further the petrochemical industry.

Since 1988, decisions have been made to re-invest in some projects, namely LAB, HDPE, Polyesters, PVC and PE extension plants.

As far as R and D in this area, the steps that have been taken since a few years concern the installation of entities in the industrial sector itself and making use of the human and material resources already existing within

universities and industries. These entities were gathered together to come up with a national programme on "Refining and Petrochemicals" scheduled for many years and related to many disciplines.

The main investments made up to now are:

- ENIP* laboratories at Skikda and Arzew
- CERHYD** laboratories at Algiers
- Various university laboratories and research centres

(* National Company for Petrochemical Industry)

(** Research Centre for the Valorization of Hydrocarbons and Derivatives)

EGYPT

Egypt is one of the developing countries which concentrates its industrial projects on petrochemicals. The paper presented states a number of petrochemical industries in Egypt. It also covers the different stages of establishment of the Petrochemical Complex at Alexandria, starting with a polyvinyl chloride unit, vinyl chloride monomer unit and chlorine - caustic soda unit. The paper covers the subject of future plans for production of several petrochemical products.

Petroleum and petrochemicals are the major activities of the Egyptian Petroleum Research Institute (EPRI).

The Petrochemicals Division in EPRI works on different topics like surface active agents, polymers and biocides and others which serve industry in Egypt.

The author suggests seven points for cooperation and coordination among the developing countries in the field of petrochemical industries.

IRAN

Most of the research and development activities in petrochemicals going on in the Islamic Republic of Iran is under the directive of the National Petrochemical Company of Iran (NPC). For its very immediate needs, NPC uses R and D to de-bottleneck its existing plants and solve their mechanical, process and corrosion problems and thereby improve productivity. In short, R and D in petrochemicals work towards finding ways and means to adapt and develop already introduced (imported) technology to the conditions existing in the country. R and D also work on products which are planned and develop processes for them.

NPC has used its design and engineering experience to establish the Shiraz Design and Engineering Company which aims at gaining capability to process design and engineer petrochemical plants.

R and D have led to finding alternate feeds for some of the petrochemical units, new lubricating oils which could be made available indigenously under the war conditions.

The Research and Scientific Centre established in 1958 is run by the Petroleum Ministry. It is the main institute doing R and D work on petrochemicals. The newly established Research and Development Centre for Polymer Science and Technology, under the jurisdiction of higher education is expected to carry on most of the research work on the subject of polymers.

JORDAN

At first, we believe that the progress of research and development in any nation requires the utilization of all available capabilities. In this context, the following points should be considered:

- Firstly, adoption of a national strategy that concentrates on continuous building up of local capabilities;
- Secondly, interaction and collaboration between local capabilities should be enhanced. However, to the best of our knowledge, there is lack of local interaction between the National Research Centres and the Industry in each of our countries. A plan to overcome this problem is the threshold towards research and development progress. The private sector is the natural nominee to shoulder such responsibility. Actually, this responsibility is time and money consuming and cannot be borne alone by the private sector. In this context, international and regional organizations dealing with industrial development, such as UNIDO, AIDO, OPEC, OAPEC, etc., are expected to contribute positively. Having solved the R and D problems at the local level, collaboration on a regional scale can then be fruitful.

At the regional level, the common problems facing the petrochemicals industry mark a possible entry for regional cooperation in areas such as process and detailed engineering design, corrosion desalination, reclamation, waste disposal and other environmental pollutants. Two R and D regional centres sharing the responsibility for the above may be of great interest for our countries.

Having introduced our views, we are looking forward to a fruitful discussion and constructive suggestions that will certainly reflect valuable feedback. This will help us in mapping our future plans for research and development on solid grounds.

KUWAIT

PIC is the main petrochemical company in Kuwait. It is a state-owned enterprise. Its main goal is to utilize its own natural resources (N.G.).

PIC consists of three major production divisions, namely:

1 - Fertilizer Division:

- (a) Producing Ammonia (four lines) with name plate capacity of 3,000 mtpa;
- (b) Urea (three lines) with name plate capacity of 2,400 mtpa;
- (c) Sulphuric acid;
- (d) Ammonia sulphate which is closed for marketing reasons.

2 - Salt and Chlorine Division producing:

- (a) Salt
- (b) Liquid Chlorine
- (c) Hydrochloric Acid
- (d) Hypochlorides
- (e) Caustic Soda

3 - Polypropylene Division:

This project is under implementation and reaching the stage of signing contract with the Union Carbide Corporation which is the licensor for Unipol gas phase polymerization process.

As far as R and D is concerned, PIC has some R and D activities all within the Fertilizer Division, such as:

Day-to-day problems of plants quality problems, catalyst testing, testing and environmental pollution and control; an example of the latter is solving the area dust problem from prilling tower. Other R and D activities are in the area of process design and engineering for short-term needs, and in the area of corrosion PIC having a metallurgy laboratory where all the plant material of construction is tested.

This gives a brief idea of the R and D activities in PIC. One may notice that they are segmental and scattered between different sections and departments of the Company. I would emphasize the need for integrated R and D facilities including product development as the main goal for achieving more profitability and prosperity for the Company in the long run.

MOROCCO

The Petrochemical Industry in Morocco comprises three plants. Two are specialized in refining oil and are responsible to the Ministry of Energy and Mines. The third plant is responsible to the Ministry of Trade and Industry and is specialized in the PVC manufacturing.

Morocco imports 99% of its petroleum needs.

Description of plants:

1 - SAMIR (Société Anonyme Marocaine de l'Industrie de Raffinage)

It is situated in Mohammedia (about 30 km from Casablanca) and has a production capacity of six million tons (55% of the capacity).

The principal products are:

- 150,000 T/Y of butane and propane
- 250,000 T/Y of gasoline
- 850,000 T/Y of fuel/oil

and in the oil complex:

- 85,000 T/Y of lubricating oil
- 70,000 T/Y of bitumen, and
- 7,000 T/Y of petroleum paraffins.

2 - S.C.P. (Société Chérifienne de Pétrole)

It is situated in Sidi Kacem (about 280 km from Casablanca) and produces 1.20 million tons/year (95% of the production capacity) of refined oil.

The main products are:

- 60,500 T/Y of butane and propane
- 90,000 T/Y of gasoline
- 412,000 T/Y of gas/oil, and
- 420,000 T/Y of fuel/oil.

3 - S.N.E.P. (Société Nationale de l'Electrolyse et de la Pétrochimie)

There are in Morocco about 400 private plants in plastic transformation industries, and needs are 140,000 T/Y:

- 48% of polyethylene
- 22% of PVC.

However, S.N.E.P. produces principally:

- about 30,000 T/Y of PVC
- about 30,000 T/Y of Chlorine
- about 30,000 T/Y of Soda.

This Company has a project of producing low density polyethylene.

The project production capacity will be about 80,000 T/Y.

The research and development activities of the National Centre linked to the above-mentioned companies of research (CNR), universities and Engineering School Laboratories (Office National de la Recherche et de l'Exploitation Pétrolière - ONAREP) mean also dealing with research and prospecting of oil fields in Morocco.

QATAR

Qatar embarked in petrochemical activities in 1973 when an Ammonia and Urea plant (QAFCO) was set up in Ummal-Said to produce 600,000 TPA Ammonia and 660,000 TPA Urea based on Methane gas as feedstock and fuel jointly owned by QGPC (75%) and Norskhydro (25%). Another petrochemical complex (QAPCO) came on stream in 1980 to produce 280,000 TPA of Ethylene, 40,000 TPA low-density polyethylene, and 46,000 TPA of Sulphur jointly owned by QGPC (84%) and ORKEM (16%), based on Ethane rich gas as feedstock. The R and D required are done by the foreign partner.

The only R and D institute available in Qatar is the Scientific and Applied Research Centre (SARC) which was established to lean actively on teaching staff at Qatar University, drawing its R and D plans on oil, gas and petrochemical industries. For example, the Qatari-German pilot plant (Fisher-Tropsch Technology) is being relocated in Qatar.

Qatar believes in regional cooperation in R and D between developing countries as Qatar intends to utilize its huge gas resources by implementing a master plan of future gas-based industries.

SAUDI ARABIA

Representative of the King Abdul Aziz City for Science and Technology (KACST).

R and D in petrochemicals in the Kingdom of Saudi Arabia.

The increasing revenues from oil caused:

- The Kingdom's population to increase;
- The Kingdom's imports to increase;
- In 1950, a few industries were created;
- In 1954, the Kingdom had only 5 industries but in 1971, this number increased to 190.

In order to utilize the refinery's products and associated gases, and to develop the country's economy and industry, the government launched four/five year Development Plans.

The success of petrochemical industries and this plan came through the government and governmental organizations such as:

- PETROMIN
- Royal Commission for Jubail and Yanbu
- SABIC
- KACST
- Universities, and
- Private sector organizations.

The Government realized that the Kingdom can be diversified by appropriate research and development. Some of the technologies involved in the petrochemical plants in the Kingdom need intensive research work to be competitive on the market.

KACST is building a Petroleum and Petrochemical Research Institute (PAPRI) to develop new refining techniques with high efficiency, to develop and improve the present applied industrial processing techniques in petrochemical industry in the Kingdom, and so on.

Representative of Saudi Arabian Basic Industries (SABIC):

Saudi Basic Industries Corp. (SABIC) was established in 1976 to carry out the production of Fertilizer, Methanol, Petrochemicals and Iron and Steel. The largest quantity of production is polyethylene reaching about 900,000 metric in 1988. From its three production sites (Yanpet, Kemiya, Shara) SABIC markets its products worldwide with a very strong service before and after sales.

SABIC is realizing that to provide support for its manufacturing plants to facilitate transfer of technology, an R and D centre has to be built. The site of this R and D centre is already selected to be in Riyadh at the

headquarters of SABIC where the engineering of Phase I of this Centre is launched. The Centre is expected to be commenced in the first quarter of 1991.

The R and D Centre will contain 2 Reactor Pilot Plants with design capacity of 50 lb/hr and 5 Polymer Research Laboratories for catalysis, physical analysis and fabrication and product development. Furthermore, this Centre will also take over the Technical Service laboratories operated since 1988 to solve the technical problems raised by customers of SABIC.

SYRIA

Syria has recently started to invest in petroleum and natural gas areas. In 1976-1980, a C.A.N. plant based on naphta was erected with capacities of 1,000 mt/D and 1,050 mt/D of ammonia and urea respectively.

In 1988, the plants were adapted for natural gas. There are plans for expansion of the capacities based on the natural gas that is available in Northern Syria.

TURKEY

R and D activities were started in 1969 by establishing the R and D Department which was then developed into an R and D Centre as a joint project with UNIDO with local support.

Now, the R and D Centre has the facilities for carrying out laboratory and bench scale polymerisation for suspension, emulsion and stereo specific polymerisation, Catalyst Laboratories for catalyst evaluation and screening, Analytical Services and an Information Centre to collect and disseminate the technical information. There is also a Process Engineering and Design Group backed with flowsheeting and design programmes.

Raw material, chemicals and catalyst substitutions, by-product upgrading, de-bottlenecking, trouble-shooting, development works are the main works carried out in the Centre.

There are 42 full-time staff members in the R and D Centre. Additional personnel is employed on a part-time basis for the handled projects and related services.

PETKIM Petrochemicals Holding Inc. is one of the leading government industrial enterprises in Turkey. It was founded in 1965 with the aim of establishing and developing petrochemical industries in the country. The

Holding now has three subsidiaries: YARPET, the first Petrochemical Complex; ALPET, the second one; and PETLAS, the Rubber Tyre Company. YARPET and ALPET have been on stream since late 1970 and 1985 respectively. PETLAS, on the other hand, is about to start production.

As petrochemical raw materials, intermediates and final products, 2,6 million tons of petrochemicals are produced by these two complexes annually. PETLAS will produce 1,2 million pieces of tyre, 450,000 pieces of tube and 8,000 pieces of aircraft tyres per annum very shortly.

UNIDO

In addition to the papers presented by the participating countries, UNIDO contributed to the meeting with the presentation of two papers concerning R and D activities in general in the petrochemical industries.

VII CONCLUSIONS AND RECOMMENDATIONS

It is agreed that R and D are an essential part of petrochemical activities to understand, assimilate and develop the technologies purchased by the developing countries. It is also concluded that this area offers opportunities for cooperation between the countries of the region. Another point agreed on was that attempts to create cooperation among the countries in question in other aspects of petrochemical industries can also create a very effective tool to contribute to the activities of the countries involved, if matters concerning cooperation are pursued incessantly following discussion.

Therefore the following conclusions and recommendations are drawn:

1. Exchange of experts and scientists among the developing countries either for short or long periods is recommended. In this line, Turkey has already offered ten (10) fellowships/year details of which will be forwarded to UNIDO shortly for distribution to the interested countries of the region. Similarly other participating countries are expected to discuss the matter with their authorities and inform UNIDO of the fellowships offered by their countries by the end of 1989. UNIDO will then distribute the fellowships and their subject areas to the participating countries in early 1990 and arrange for their implementation;
2. Organization of seminars, workshops, with the assistance of UNIDO at the regional level, in selected subject areas such as:
 - Catalysis
 - Polymer Science and Process Technology
 - Application of Computer Simulation in Petrochemical Industries.For this purpose, the countries which are interested and willing to host such seminars or workshops will do their best to submit the timetable and selected topics to UNIDO before the end of 1989 to be offered to the interested countries for implementation;
3. To launch bilateral and regional activities, it is recommended that each country prepare a list of R and D topics carried out in their country together with the experts involved. Each participating country could also line up a list of experts in the petrochemical field having experience in plants;

4. The continuation of meetings on the same subject is highly recommended. Therefore, the date for the next meeting is suggested for late 1990 in one of the participating countries. Each participant will discuss the matter with his authorities and inform UNIDO of the proposal of hosting the meeting in his/her country. Possible countries for the meeting are recommended to be Kuwait (KISR) and Egypt (EPRI).
5. It is recommended that exchange of information should be established on the status of petrochemical industry. This will include availability, needs and surplus of raw materials, and manpower requirements. Annual reports should be prepared to initiate further trading and marketing being the main elements of information for starting R and D projects to serve the region. These reports will be prepared as country reports and sent to UNIDO for consolidation and distribution. Optimum use should be made of the information networks and petrochemical data bases available in UNIDO for this purpose.

VIII MOTION OF THANKS TO THE GOVERNMENT OF TURKEY, PETKIM AND UNIDO

The participants to the Meeting on Cooperation between North African and Middle Eastern countries in the Petrochemical Industries held in Aliğa-Izmir from 16 to 20 October 1989 deeply express their special thanks to the Government of Turkey, PETKIM and UNIDO for the excellent preparation and organization of this meeting.

The participants also expressed their deep gratitude and appreciation for the warm hospitality and generosity which the Turkish Government and PETKIM have heartedly provided for their excellent conditions of stay and work in Turkey.

Annex I

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