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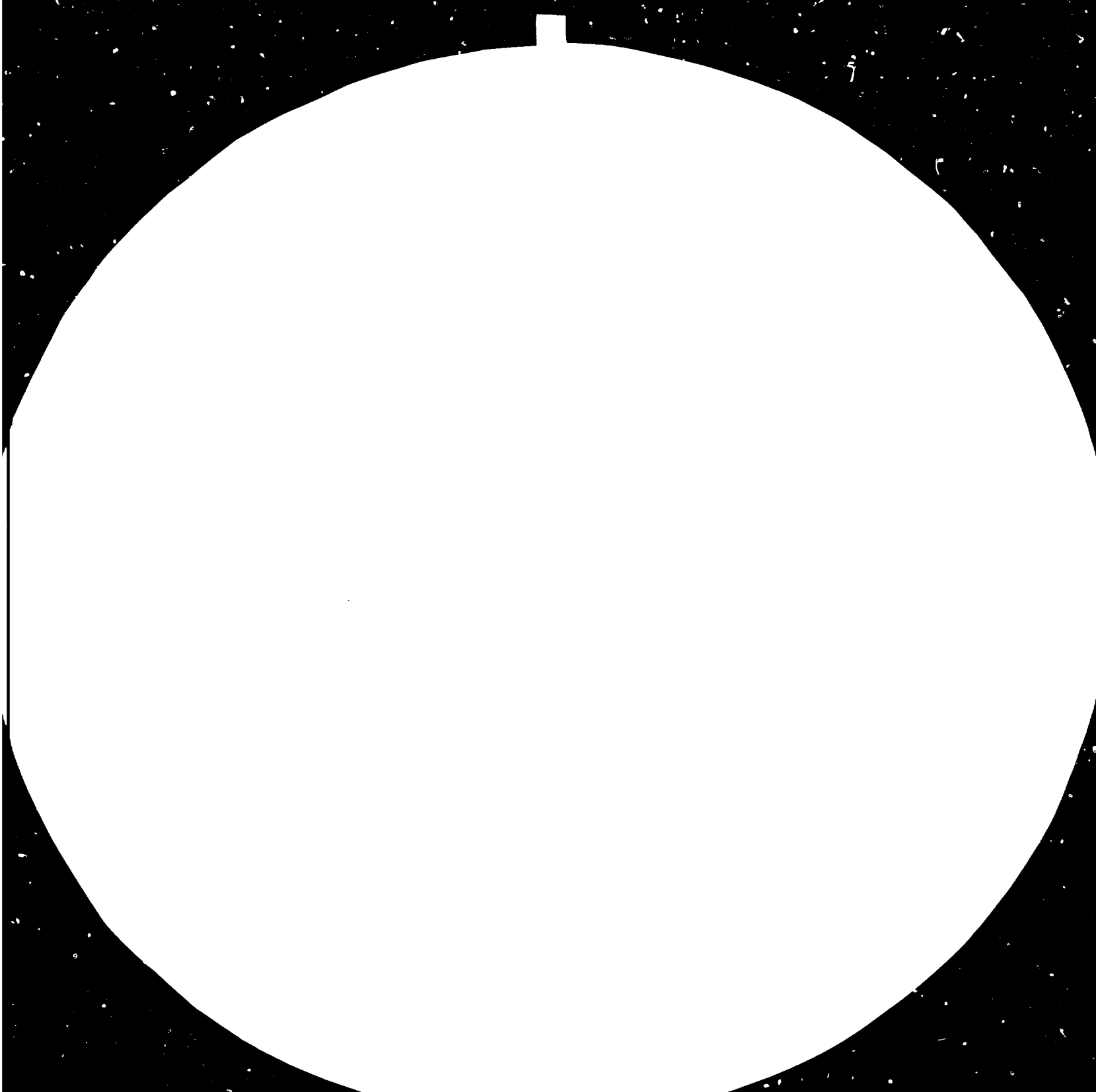
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Resolution Test Chart, NBS 1963-A, courtesy of the National Bureau of Standards

Resolution Test Chart, courtesy of the National Bureau of Standards

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First Meeting of the Advisory
Panel on Petrochemicals

Vienna, Austria, 3 - 4 October 1983

REPORT * (Meeting on petrochemicals).

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INTRODUCTION

1. The Organization of the Petroleum Exporting Countries (OPEC), United Nations Industrial Development Organization (UNIDO) and the OPEC FUND for International Development (OPEC FUND) jointly convened the first meeting of the Advisory Panel on Petrochemicals in response to a recommendation of the Seminar on Co-operation among Developing Countries in Petrochemical Industries held in Vienna, Austria, from 7 - 9 March 1983.
2. The topics for consideration recommended by the Seminar were as follows:
 - a) A study should be undertaken on existing co-operation arrangements among groups of developing countries such as ASEAN, Andean Group, GOIC, APLA, etc. in the petrochemical industry with a view to formulating guidelines for similar co-operation arrangements;
 - b) A directory should be prepared on technological capabilities (including R and D, engineering and construction, equipment fabrication, training) in developing countries. This directory should be prepared in close co-operation with the countries concerned;
 - c) A directory on petrochemical products produced in developing countries and earmarked for export should be prepared to promote direct trade activities among these countries;
 - d) A worldwide investment opportunity study on the petrochemical industry in developing countries under different scenarios should be carried out;
 - e) UNIDO should actively promote co-operation among the developing countries' R and D centres by facilitating their contracts and exchange of experience;
 - f) It was also strongly recommended that the three co-sponsors should continue to collaborate in the follow-up on the recommendations continued above;
 - g) An advisory group to be selected from and among the participants should be established to assist the co-sponsoring organizations in the implementation of the recommendations of the Seminar.

I-ORGANIZATION OF THE MEETING

3. The first meeting of the Advisory Panel on Petrochemicals, jointly organized by OPEC, UNIDO and the OPEC FUND, was convened in Vienna, Austria, from 3 - 4 October 1983.
4. The meeting was opened by Mr. Garadaghipour, Assistant Director General of the Finance and Administration Services, OPEC FUND, who welcomed the participants on behalf of the Director General, OPEC FUND. He stated that the purpose of the meeting is to discuss the implementation of the recommendations of the Seminar on Co-operation among Developing Countries in Petrochemical Industries held last March.
5. The Chairmanship of the meeting was rotated among the sponsoring organizations. The following served as Chairman:
 - Mr.A. Hacini, Officer-in-Charge, Division of Policy Co-ordination and Head, Negotiations Branch, UNIDO
 - Mr.O.A. Al-Rawi, Head, Energy Studies Department, OPEC
6. The Advisory Panel adopted the following agenda:
 - a) Proposal for implementing the recommendations of the Seminar on co-operation among developing countries in petrochemicals.
 - b) Main problems and expectations at country and regional levels.
 - c) Suggestions for solving the problems identified through co-operation among developing countries.
 - d) Suggestions for discussion on co-operation between developed and developing countries.
 - e) Recommendations and plan of action to implement the recommendations of the Seminar and possible contributions of panel members thereof.
7. The List of Participants is included in Annex A.

II-TERMS OF REFERENCE TO IMPLEMENT THE RECOMMENDATIONS
OF THE SEMINAR ON CO-OPERATION AMONG DEVELOPING COUNTRIES
IN THE PETROCHEMICAL INDUSTRIES

8. Detailed terms of reference to implement the recommendations of the Seminar were presented by the sponsoring organizations. In addition, written proposals by Messers Tampier and Al-Jasem were also presented.
9. On behalf of the co-sponsors, Mr. Angulo explained the scope and content of the terms of reference presented to the Panel. It included three main proposals:
- (i) A country survey covering technological capabilities related to the petrochemical industry, production and export availability of petrochemicals, and research and development centres, corresponding to recommendations b, c and e.
 - (ii) A survey of regional organizations covering existing co-operation arrangements in the industry, corresponding to recommendation a.
 - (iii) A global investment opportunity study for establishing and/or expanding petrochemical production in developing countries, corresponding to recommendation d.

The Panel was expected to guide and orient the future work covering the obtention of a feasible programme for the next 18 months. The survey includes the domestic market for the petrochemical and processing industries.

10. Mr. Tampier stated that his thinkpiece is related to recommendation (a). Its emphasis is on identifying demand of petrochemicals in developing countries and to help other countries to set up their own petrochemical industry on a sound basis.

11. Some participants felt that the areas identified in the proposed terms of reference meet the recommendations of the Seminar. However, as the task involved is very large, questions were raised on who will carry out the surveys. Further, several participants indicated that emphasis should be given to demand rather than to supply of petrochemicals.

12. Concerning the demand of petrochemicals, a participant stressed the need to cover the downstream processing industry when appraising the demand for end-petrochemicals. He proposed a yes/no questionnaire about the existence of specific processing industries in the surveyed countries.

Several participants indicated that this approach is not practical for a survey of the end-use processing industry and could take several years. Instead, it was proposed that the essentials of petrochemical demand of the main countries be obtained, in order to identify immediate problems and solutions to them. The full survey, which should be done at plant level, is the long-term goal, but what is needed is to focus on short-term results.

Supply and demand of petrochemicals

13. On the question of supply and demand of petrochemicals, it was generally agreed that collecting data from developing countries would be a lengthy process. Some participants indicated that there is a world over-supply of petrochemicals and it was suggested that a world demand survey be carried out. It was also stressed that future demand is difficult to predict, one of the reasons being that domestic demand behaves very differently once petrochemical complexes are completed.

A participant indicated that one source for demand data could be the export statistics of developed countries. However, it was stressed that not all developing countries could have petrochemical production, in particular those countries without a strong domestic demand. Another participant pointed out that there is a close interrelationship between developed and developing countries on petrochemical supply, and which can not be dissociated. Hence to talk about petrochemical supply of developing countries alone is not practical.

A participant stressed that demand forecasts on country expectations poses a difficult problem. Long-term forecasts could only be done by macroeconomic projections. Country surveys are only useful to study the current situation.

14. Some participants stated that the purpose of this meeting is to find ways and means of implementing the recommendations of the Seminar, and it was felt to be helpful to draw up terms of reference of what should be done for concrete action. It was stressed the need to define what is meant by the terms co-operation, petrochemicals, and supply and demand.

15. A participant pointed out that much emphasis was given to the supply and demand aspect but not enough to economies of production under the structural changes being undergone by the petrochemical industry. More detailed investment studies are needed. Another participant indicated that the survey should also include the problems faced by countries which already have petrochemical industry, e.g. technology and marketing.

A participant stressed the importance to define supply and demand in the current industry and its evolution in the future. It was stated that the Consultations on the petrochemical industry have recommended UNIDO to draw up a supply and demand analysis of a selected number of petrochemicals which have economic importance. The first survey in 1981 received a minimal response, while the second survey ran in 1982 received a 100% response, albeit a number of them containing incomplete information. To remedy this situation, UNIDO is preparing a data base on petrochemicals from 1970 onwards. This data will be sent to the Panel members and other countries for checking and amending as required, sometime late in 1983.

16. Mr. Hacini asked the co-sponsoring organizations to prepare revised terms of reference along the lines of the foregoing discussion. He stated that with these terms of reference, the Panel should then be in a position to know what the survey should contain, and in which direction the work should be continued.

Co-operation among developing countries

17. A participant thought that the purpose of the meeting is to deal with the general question of co-operation, not with individual problems. It was stated that these are several kinds of co-operation which should be properly defined, especially on what co-operation would contain. A major purpose of co-operation would be to avoid the costly mistakes incurred by others in setting up their petrochemical plants and refineries.

Another participant indicated that the intended type of co-operation should also be included, e.g. technical co-operation or something beyond that, and also the type of petrochemical products. It was also questioned whether the discussion was of those countries which have experience and technology, or those which have not yet started but which might be starting sometime and would have to rely on co-operation of other developing countries.

Another participant reminded the Panel of the four categories of countries which were discussed in the Seminar, namely countries with raw materials but limited demand, countries with raw materials and large demand, countries with large demand but no raw materials, and countries which could develop markets through its downstream processing industry. It was stressed that this typology should be borne in mind during the present discussions.

18. A participant stated that on practical terms there should be two scenarios for co-operation:

- (i) The need to look at what developing countries have at present and how can that situation be improved through economic co-operation, and;
- (ii) the need to look in the long-term for those which currently do not have any petrochemical industry but which could have one if they would have the means to start it.

It was also pointed out that supply and demand analysis of developing countries alone would give a misleading picture of the long-term future, hence a global picture is needed to appraise structural trends, the closing down of plants in developed countries, current developments influencing the industry, the strategies for changing the structure of the industry worldwide, etc.

The above global picture of the petrochemical industry could, later on, be completed by a similar appraisal of the downstream processing industry.

19. Some participants presented an overview on how their petrochemical industries were developed, as possible inputs for a programme of economic co-operation among developing countries in petrochemicals. A participant suggested that the work of the World Bank in this area should be considered, while another participant warned that analysis of developing countries demand alone may not give enough room for investing in new petrochemical plants.

Investment opportunity study

20. Some participants stressed that the study be oriented in such a way that those countries which did not have petrochemical plants could get enough information to help them appraise the possibilities of having petrochemicals and/or processing industries. The important aspect was to define the type of co-operation envisaged between developing countries with petrochemical plants and countries which have no production but are willing to set up petrochemical plants.

In addition, the study should also define the type of co-operation expected between developed and developing countries.

21. A participant stated that an overall view of the global situation of the petrochemical industry was needed. However, the study should not concentrate excessively on the market requirements of current producers which need to find outlets for their products, but should include the factor of availability of raw materials reflecting on the economics of establishing plants which could compete favourably against existing plants. It was added that, although there is over-capacity, new plants are still being established due to major shifts in the economics of the production structure.

Directory of capabilities existing in developing countries related to the petrochemical industry

22. There was some discussion about the preparation of a directory of capabilities and whether this should cover generalities or specifics, and the difficulties in obtaining adequate information. A participant stated that concerning equipment, it would be sufficient to have the list of equipment produced so that interested project personnel could get directly in contact with the listed equipment vendors to ascertain its qualifications and experience. Another participant pointed out that the item on technology should be qualified to include only proven and available technologies and that the various categories of contractors should be presented separately.

23. Several participants stressed that items of the terms of reference for the directory should be divided concerning the period of validity of the information. Some information may remain valid for several years while other information may be outdated in a matter of months.

A participant suggested that in view of the above, two directories may be prepared, one covering producers and the other covering the engineering and equipment aspects. The first directory may be updated annually whilst the second directory may be updated every 4 to 5 years. A revised list of products to be covered was prepared by Messrs. Tampier, Shanaa and Angulo.

24. A participant stated that the processing industry should be consolidated by capacity not by end-petrochemical product. Another participant pointed out that inclusion of the Government's petrochemical policy was missing although it influences the outcome of the industry.

Petrochemical exports

25. There was some discussion about the contents of the terms of reference for this topic, in particular concerning transport. Several participants stated that the investment opportunity study should cover transportation of petrochemicals in detail.

Research and development of petrochemicals

26. There was a short discussion on the research and development of petrochemicals. A participant proposed that two types of centres be covered, namely in-house R and D and product application R and D specific to the markets of developing countries.

Another participant cautioned that in-house R and D, including after sales service, often is covered by secrecy agreements as part of the technology package.

Co-operation arrangements in the petrochemical industry

27. Participants were requested to present their experiences in co-operation arrangements on petrochemicals within their regions.

Mr. Vicente presented a comprehensive paper on Philippines and the ASEAN countries, Mr. Lee gave the latest figures on Korea, and Mr. Paschoal handed over papers on the Brazilian industry.

28. In addition, Mr. Shanaa promised to send a paper on GOIC's experiences on petrochemicals within 4 weeks. Mr. Tampier explained the types of arrangements existing in Latin America, namely the Andean Group, ALADI and APLA, and promised a paper on APLA's experiences. Mr. Anzola explained in more detail the workings of the Andean Group and promised a paper on the Andean Group's experiences in petrochemicals.

Mr. Lee explained about the East Asia petrochemical club which has an annual data exchange. He promised to make available a report of this club.

29. Mr. Hacini proposed to convene an ad-hoc meeting of participants providing information on regional co-operation arrangements in order to discuss a draft report on the subject.

III-THE DEVELOPMENT OF THE PETROCHEMICAL INDUSTRY THROUGH CO-OPERATION

30. Participants presented a short overview of their respective national experiences in developing their petrochemical industries. It was stated that since the objective of this meeting is the development of petrochemical industries through co-operation, there is a close interrelationship between co-operation among developing countries and co-operation between developed and developing countries.

Co-operation among developing countries

31. After some discussion, participants indicated the following topics as relevant to co-operation among developing countries:

- a) Lack of information about petrochemical companies and the need to exchange experiences among them;
- b) technical assistance on production and marketing of petrochemicals;
- c) the need to avoid the repetition of past mistakes incurred by some petrochemical producers, in particular concerning the need for outside expertise, manpower and training, plant size, proper technology and financial aspects;
- d) petrochemical exports and trading;
- e) training;
- f) financing.

32. Some participants, although acknowledging that the more pressing problems of the petrochemical industry may be similar to those of other industries, the technological complexities of petrochemicals makes it necessary to introduce changes into its definitions and solutions thereof. Further, a clear distinction should be made between the type of problems that can be solved through co-operation and those problems which require other solutions.

33. Although regions and countries do have specific problems, participants concurred that the priority problems for all developing countries were the following:

- a) marketing including exports;
- b) manpower development and training;
- c) financing;
- d) better information and exchange of experiences.

Co-operation between developed and developing countries

34. Mr. Angulo explained that earlier in the year, UNIDO has been approached by the International Management Institute, Geneva about the possibility of holding a meeting on North-South Co-operation in petrochemicals, tentatively scheduled for 15 to 18 April 1984 in Geneva, Switzerland.

The sponsoring organizations and the Panel were expected to present the point of view of developing countries whilst the Institute and the international petrochemical industry would present the viewpoint of developed countries. To facilitate the preparation of the meeting, the Institute has proposed a 12 point preliminary agenda, which was presented to the Panel for discussion.

35. After some discussion on the preliminary agenda, the Panel agreed that the more important topics for a North-South meeting on co-operation in petrochemicals, were the following:

- a) Entry to international markets;
- b) restructuring of the petrochemical industry;
- c) financing and sharing in the restructuring process
- d) specific areas for co-operation, which could include the remaining topics of the preliminary agenda.

This proposed agenda should be sent to the Institute. In addition, the sponsoring organizations were requested to prepare a paper covering the topics above, for commenting by the Panel and presentation to the Geneva meeting.

To better prepare the paper, participants were requested to forward to UNIDO copy of all relevant information and/or studies existing in their country or region related to the above topics.

IV-CONCLUSIONS AND RECOMMENDATIONS

36. The revised terms of reference to implement the recommendations of the Seminar were prepared taking into account the views of the Panel. Annex B presents the revised terms of reference and Annex C gives the revised list of petrochemical products to be considered. From this list, the 25 largest tonnage petrochemicals should be updated regularly.

37. Participants indicated their willingness to collaborate with the sponsoring organizations in the implementation of the recommendations of the Seminar and the preparation of the paper for the Geneva meeting.

38. The advisory panel on petrochemicals should participate at the Geneva meeting to present the case of the developing countries.

ANNEX A

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ANNEX B

REVISED TERMS OF REFERENCE FOR CO-OPERATION AMONG
DEVELOPING COUNTRIES IN THE PETROCHEMICAL INDUSTRY

In order to facilitate the implementation of the recommendations of the OPEC/UNIDO/OPEC Fund Seminar on Co-operation among Developing Countries in the Petrochemical Industries held in Vienna, March 7-9, 1983, and taking in view the draft outlines prepared by secretariats of the three organizations and discussion of the Advisory Panel established by the seminar meeting in Vienna, October 3-4, 1983, the following outline was considered to represent the basis for future work in this field to be pursued by the three organizations.

I. Inventory of the Petrochemical Industry in the Developing Countries

In order to facilitate the process of co-operation among developing countries it would be necessary to increase the awareness of developing countries about the existing and potential possibilities of each other in the field of petrochemicals through the collection, organization and dissemination of information on this sector. However, a country-by-country survey should be made requesting information on the following:

1. Petrochemical plants: listing companies, plants, products, capacities, raw materials used, years of productions, planned expansion, technology used, production by products, and price changes.
2. Training facilities available for local manpower and capabilities for training others explaining method of training, areas of training, languages used and duration of training programme.
3. Availability of petrochemical technology for transfer to other developing countries.
4. Available capabilities for the construction of petrochemical plants.
5. Available capabilities for the manufacturing of equipments for petrochemical industry, listing manufacturing companies and products they produce.
6. Condition of the markets regarding amounts of petrochemical produced, exported, imported and consumed over a number of years. The pattern of consumption should also be indicated with specific reference to plastic textile and rubber manufacturing and to the prices of various products.
7. Availability of research and development capabilities, listing main countries and areas of research and the technical capabilities of these research products.
8. Outline of principal policies related to the development of petrochemical industry regarding plans, investment, protection, pricing, export, co-operation arrangements and the development of the downstream industry.

9. Raw material potential namely natural gas, crude oil and refinery products.
10. The list of petrochemical products included in the secretariat draft should be augmented to cover these products most important to the developing countries.
11. Survey on co-operation arrangements on petrochemicals in developing countries at regional level.

A survey should be carried out of existing co-operation arrangements between developing countries in the field of petrochemicals at regional and sub-regional levels as well as bilateral arrangements. The survey should cover basically the following areas:

1. Enumeration of existing co-operation arrangements indicating names, locations, countries or companies concerned, achievements, problems, etc.
2. Institutional framework of these arrangements including objectives, structure, mechanism, programmes, and the policy and role of the private and public sectors.
3. Formulation of co-operation arrangements taking in view existing arrangements and extending them to new areas and fields of activities.

III. World-wide investment opportunity study for the petrochemical industry

1. Assessment of demand for (30-50) petrochemical products using both micro and macro methods of projection taking in consideration the historical trends.
2. Assessment of supply availability containing production capabilities, type of products, efficiency of productions and patterns of supply.
3. Analysis of demand/supply balances on global, regional and sub-regional basis.
4. Assessments of new plants to be established on global, regional and sub-regional basis, indicating the amount of investment need, manpower requirements, infra-structural needs, etc.
5. Assessment of raw material potentials needed for the establishment of the selected petrochemical products such as natural gas, gas oil, refinery products. Assessment of manpower availability, financial capabilities, physical infra-structure and technological infra-structures.
6. The technoeconomic evaluation of the proposed plants and their competitiveness with plants in different developed regions.
7. Assignment of proposed production capacities.
8. Framework of co-operation among developing countries for the development of existing capacities and the construction of proposed ones.

ANNEX C

LIST OF PETROCHEMICAL PRODUCTS

a) Ethylene and Derivatives

Acetaldehyde
Acetic Acid
Ethyl Acetate
Ethyl Alcohol
Ethylene
Ethylene Dichloride
Ethylene Glycol
Ethylene Oxide
Polyethylene, High-Density
Polyethylene, Low-Density and
LLDPE
Polyvinyl Chloride
PVC compounds
Vinyl Acetate
Vinyl Chloride

b) Propylene and Derivatives

Acrylic Fibers
Acrylonitrile
n-Butyl Alcohol/Acetate
Butyraldehydes
Dodecene
2-Ethylhexyl Alcohol
Isobutyl Alcohol
Isopropyl Alcohol
Methyl Methacrylate
Polyacrylic Resins and Sheets
Polypropylene
Propylene
Propylene Glycol
Propylene Oxide
Polyols

c) Butadiene and Derivatives

Butadiene
Polybutadiene Rubber

d) Aromatics and Derivatives

ABS Resins
Acetone
Alkylbenzene
Benzene
Caprolactam
Cumene
Cyclohexane
Dimethyl Terephthalate
Ethylbenzene
Maleic Anhydride
Nylon 6 Fibers
Nylon 66 Fibers
Phenol
Phthalic Anhydride
Polyester Fibers
Polyethylene Terephthalate
Polystyrene
Styrene
Styrene-Butadiene Rubber
Terephthalic Acid
Toluene
Toluene Diisocyanate
o-Xylene
p-Xylene
Xylenes, Mixed
Alkyd Resins
Polyester Resins (non-Saturated)
Phthalic Plasticizers
Alkylbenzene sulfonates
(detergents)

e) Methanol and Derivatives

Carbon Tetrachloride
Cellulose Acetate
Chloroform
Chloromethanes
Formaldehyde
Melamine-Formaldehyde Resins
Methanol
Methyl t-Butyl Ether
Phenol-Formaldehyde Resins
Urea-Formaldehyde Resins
Polyvinyl Acetate
Carbon Black

