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Asian Preparatory Meeting for the
Regional Consultation on the
Phosphatic Fertilizers and
Pesticides Industries in Africa

Lahore, Pakistan, 17-20 October 1988

REPORT*

* This document has not been edited.

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Preface

1. The Second General Conference of the United Nations Industrial Development Organization (UNIDO), held at Lima, Peru, in March 1975, recommended that UNIDO should include among its activities a system of continuing consultations between developed and developing countries with the object of raising the developing countries' share in world industrial output through increased international co-operation. The General Assembly, at its seventh special session in September 1975, endorsed the recommendation and requested UNIDO to implement it under the guidance of the Industrial Development Board.

2. In May 1980, the Industrial Development Board decided to establish the System of Consultations on a permanent basis, and in May 1982 it adopted the rules of procedure (the System of Consultations, PI/84) according to which the System of Consultations was to operate, including its principles, objectives and characteristics, notably:

The System of Consultations shall be an instrument through which the United Nations Industrial Development Organization (UNIDO) is to serve as a forum for developed and developing countries in their contacts and consultations directed towards the industrialization of developing countries;

The System of Consultations would also permit negotiations among interested parties at their request, at the same time as or after consultations;

Participants of each member country should include officials of Governments as well as representatives of industry, labour, consumer groups and others, as deemed appropriate by each Government;

Each Consultation meeting shall formulate a report which shall include conclusions and recommendations agreed upon by consensus and also include other significant views expressed during the discussions.

3. Thirty-four Consultations have been convened since 1977 covering agricultural machinery, building materials, capital goods, fertilizers, food processing, industrial financing, iron and steel, petrochemicals, pharmaceuticals, leather and leather products, training of industrial manpower, vegetable oils and fats, and wood and wood products.

4. Through Consultations, "UNIDO has set up a forum for developed and developing countries dedicated to the industrialization of developing countries. This forum has served to identify obstacles to industrialization and has considered these obstacles from a policy, economic, financial, social and technical point of view. This forum has also been used to monitor trends in world industry, with the result that a number of action-oriented measures towards increasing the share of developing countries in world industrial production have been identified and in some cases implemented. These measures have included policy changes on the part of developed and developing countries, new forms of international industrial co-operation, new concepts for entry into specific industrial sectors; and in addition, technical assistance projects of an innovatory type have been identified and implemented by the relevant arms of the Secretariat." (ID/B/341).

5. The Industrial Development Board, at its second session in October 1986, decided to include the Regional Consultation on Phosphatic Fertilizers and Pesticides Industries in Africa in the programme of Consultation meeting for the biennium 1988-1989.

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INTRODUCTION

Background to the Preparatory Meeting

6. The Convening of the Preparatory Meeting was in accordance with the recommendations of the Fourth General Conference of UNIDO, to the effect that special attention be given to co-operation between developing countries in Africa, and with the decisions taken at the second session of the Industrial Development Board (October 1986). In addition, the meeting is expected to contribute to the development of the fertilizer industry, which plays a crucial part by improving agricultural productivity and thereby ensuring self-sufficiency in the production of foodstuffs.

7. Phosphates are of primary importance to the fertilizer sector. With regard to the production of phosphates and their transformation into fertilizers, the current situation reflects a number of major problems, affecting virtually every stage of those operations. At present, there are many known phosphate deposits. Yet, phosphate producers and exporters throughout the world encounter problems in their operation. Demand for products of more suitable quality has brought about new technologies for phosphate enrichment, and the problems posed by energy consumption and environmental protection, which are confronting the industry, are also becoming increasingly acute.

8. Quite apart from those issues which are of concern to the experienced phosphate producers, there are phosphate deposits in other Asian countries which are by nature difficult to work or whose development is hampered by other technical and economic constraints. The situation therefore calls for a broad exchange of experience on a wide variety of topics relating to the production of phosphate and the development of the phosphatic fertilizer industry.

9. Some African countries including Morocco and Tunisia are among the world's major producers of phosphates, and have accordingly acquired invaluable experience in the mining, concentration and processing of phosphates. The phosphate industry provides those countries with one of their main export commodities.

Objectives of the Preparatory Meeting

10. - To exchange information on, and experience in, the planning, design, construction and operation of phosphate mines and phosphatic fertilizer plants in developing countries and particularly in Africa;
- To identify the problems confronting the phosphate and phosphatic fertilizers industry and examine possible solutions in the light of regional co-operation between Asia and Africa;
- To encourage contacts with a view to co-operation on the basis of long-term arrangements covering joint ventures, technical assistance, the supply of raw materials and marketing, etc.
- To identify in specific terms and in order of priority the key issues to be referred to the Regional Consultation on the Phosphatic Fertilizers and Pesticides Industries in Africa.

- To assess Asia's capabilities in the sector from the specific angle of its potential contribution to the development of the phosphatic fertilizer industry in Africa.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

11. The Preparatory Meeting concluded that the experience and capabilities of the phosphate fertilizer industries in Asia would be very valuable in the development of this industry in Africa because Asia had passed through similar problems in the not so distant past.
12. The Preparatory Meeting pointed out that the per hectare consumption of fertilizer in Africa was very low, but that several Asian countries had similar per hectare consumptions in 1950 and even today there are isolated areas in relatively developed countries in Asia such as in India where fertilizer demands vary from 2 kg/hectare to 175 kg/hectare. Therefore Asia is in a position to help Africa to attain much higher production and consumption of fertilizers.
13. Among the areas identified by the meeting where Asian experience would be help to Africa were:
 - a) Experience in the agronomic use of fertilizers, particularly the use of phosphatic fertilizers, on different types of soils and for various crops, particularly in tropic and semi-arid areas of Africa.
 - b) Asian experience in the development of the fertilizer industry in the last 20 years is of particular relevance to Africa. Therefore the utilisation of consultancy services from Asian countries for techno-economic and feasibility studies can be of considerable value to African countries.
 - c) Asia has developed indigenous know-how for several phosphatic fertilizers. Among them is single superphosphate (SSP) and sulphuric acid in China and India, which are amongst the largest producers of SSP in the world; calcium magnesium phosphates (CMP) in Japan, China and Korea (Rep. of). Phosphoric acid in Japan and nitrophosphates with up to 85% water solubility in China. Know-how for triple superphosphate (TSP) is also available in Japan, China, India and Turkey.
 - d) Established fertilizer manufacturers in developed countries which have appropriate know-how and technology to licence, could be encouraged to participate in tripartite activities with Asian and African countries. Assistance with financing can also be available from the developed countries.
 - e) Several Asian countries have developed considerable machinery manufacturing capabilities in the last 20 years and their experience in the chemical industry is of particular importance in those countries of North and West Africa which are now beginning to develop their machinery manufacturing capabilities.
 - f) Of particular interest to Africa would be the development of detailed engineering and fabrication drawing capabilities which, apart from Japan, have been developed in several other Asian countries including China, India, Korea (Rep. of), Turkey and Pakistan.

g) While a beginning has been made for joint ventures between Asian and African countries in the field of phosphatic fertilizers such as the India-Senegal joint venture for the manufacture of phosphoric acid, further possibilities exist in this field as Asia is one of the largest consumers of phosphatic fertilizers, and Africa the largest producer of phosphate rock. The production of phosphoric acid in Africa and its conversion to phosphatic fertilizers in Asia appears to be a natural field for such co-operation.

h) Asia possesses substantial experience in the development of new grass roots projects in the field of the fertilizer industry and such projects have special requirements of infrastructure and services. This is particularly relevant for Africa and therefore Asian services for project management, construction, procurement and inspection which could be of value to Africa.

i) The use of poor quality phosphate rocks has been developed in China, India, Turkey and Pakistan for SSP manufacture and this may be of value to Africa. The use of such rocks for phosphoric acid manufacture presents more problems but technology has been developed in Japan for use of such rocks, as well as in European countries some of whose representatives were present at the meeting.

j) Maintenance services for operating plants are highly developed and often computerized in developed countries. Several Asian countries are in an intermediate stage which may be more suitable for African conditions, although preventive maintenance of the standards prevailing in developed countries probably only exists in the Far East, particularly in Japan.

k) A considerable amount of work has been done in extension services for farmers in Asia. Japan and China have well-developed extension services and in recent years India and Pakistan have developed extension services which has resulted in the increase of the use of fertilizers by nearly 100 times in 30 years. These extension services, particularly in the public sector can be of considerable interest to African countries.

l) With exception of Japan, there are few Asian countries which can provide complete funding for fertilizer projects in Africa except through joint ventures. But if plant and equipment is purchased from Asian countries, long-term loans may be obtained from Asian countries such as China, India and Pakistan. Regional development banks and international financial institutions could also be considered for this purpose.

m) The meeting noted with interest that mini-plants could be technically and economically viable and several Asian countries had installed mini-fertilizer plants in recent years. Thus China had built a 50 tons P_2O_5 per day phosphoric acid plant and India a 100 tons per day P_2O_5 PA plant. It was pointed out by representatives of developed countries that such plants had also been built in Cyprus and Australia. Small SSP and partially acidulated rock phosphate plants have been built in China and India among others.

n) Mini-plants are of particular value where raw material such as natural gas or phosphate rock deposits are limited. As pointed out

by an African delegate they are also of great value in isolated areas because transport costs to land-locked countries tend to be high.

o) It was noted in the meeting that arrangements for exchange of information between African and Asian countries only existed on an ad-hoc and bilateral basis. The need was felt for such contacts to be institutionalized and developed into an information network. Several Asian countries, such as Pakistan, indicated interest in helping in this connection.

14. The production of foodgrains is of primary importance in both Asia and Africa. It is essential that Government policies should be integrated in such a manner that incentives are given to both the farmers and the producers of fertilizers so as to increase the use of fertilizers and achieve a high production of foodgrains.

Recommendations

15. In order to develop fertilizer production and increase fertilizer usage in African countries, it is recommended that agronomic criteria should be given special emphasis through the necessary extension services to the farmers. In this connection the experience of Asia would be of great value to African countries and this experience could be transferred on both a bilateral or a multilateral basis.

16. The experience gained by Asia in the development of their fertilizer and machinery manufacturing industries can best be imparted to African countries by exchange of counterparts through visits of technical experts and by the provision of technical services by Asian countries to Africa.

17. Because of the experience of Asian countries in building mini-plants particularly for SSP, sulphuric acid and phosphoric acid, African countries should consider the transfer of these technologies which are available at relatively low cost.

18. In order to facilitate the supply of plant and equipment to Africa, Asian countries and financial development institutions should extend favourable financing packages such as soft term loans to African countries.

19. In view of the importance of training of manpower in project management, project development, in plant operation and maintenance in an essentially similar environment, African countries should utilize the many existing opportunities of training in grass roots plants and training institutes in Asia. For this purpose many Asian countries expressed their willingness to provide their assistance.

20. The exchange of information and experience between Asian and African countries is of particular interest to both regions. It is recommended that arrangements for such exchanges should be strengthened and formalized through adequate institutions. In this context international agencies can play an important role.

21. In view of the benefits to both parties in the joint venture between Senegal and India, it is recommended that further joint ventures between African and Asian countries be seriously considered. In this way both the development of industrial production, and the security of fertilizer supply can be achieved.

I. ORGANIZATION AND PROGRESS OF THE MEETING

22. The Asian Preparatory Meeting for the Regional Consultation on the Phosphatic Fertilizers and Pesticides Industries in Africa was held in Lahore (Pakistan) from 17 to 20 October 1988, in conjunction with the National Fertilizer Corporation of Pakistan (NFC).

Opening of the meeting

23. Mr. Z. Khan, Chairman of NFC in his introductory remark said that it honoured him to welcome the delegates to the Asian Preparatory Meeting for the Regional Consultation on the Phosphatic Fertilizers and Pesticides Industries in Africa which had been jointly sponsored by the United Nations Industrial Development Organization and the National Fertilizer Corporation of Pakistan. It was the third time that NFC had the honour of hosting a meeting of this nature in the city of Lahore. The first had been a seminar on Mini-Fertilizer Plants, in November 1982, with the second a workshop on UNIDO Model Forms of Contracts for the Construction of Fertilizer Plants in October 1986.

24. Ever since the Second General Conference of UNIDO, held at Lima, Peru in March 1975, had recommended a system of Consultations between the developed and developing nations with a view to raising the later's share in world industrial output through increased co-operation, the four Consultations on the fertilizer industry had paid encouraging dividends in terms of information and experience exchanged. Through these consultations, UNIDO was serving as a forum for both developed and developing countries to negotiate and discuss their plans regarding industrialization of developing countries.

25. He then proceeded to describe NFC's role and interest in the development of phosphatic fertilizers in Pakistan. NFC was producing 283 nutrient tons/day of P_2O_5 fertilizers and was the sole producer of phosphatic fertilizer in the country. Of this, the share of straight phosphatic fertilizer production was 300 tons/day of SSP (50 tons/day of P_2O_5) and the rest was in the form of nitrophosphate being produced at NFC's largest fertilizer complex in Multan. An upcoming SSP plant at Haripur in the north of the country was going to add a further 300 tons/day to this capacity. This plant was going to rely entirely on local phosphate reserves to meet its production requirements. It needed to be mentioned that the known phosphatic reserves in Pakistan were about 7.5 million tons. NFC was also exploring the possibility of setting up a TSP production facility of 1000 tons/day at Karachi as a joint venture.

26. Over the years Pakistan's chemical fertilizer industry could claim to have acquired considerable experience in terms of construction and operation of various manufacturing facilities. At the moment with nine production facilities including three in the private sectors, total production was projected to be about 2.87 million product tons in the year 1989 which was 1,077,158 tons of N nutrients and 96,095 tons of P_2O_5 nutrients. Having taken into account the rapidly expanding population of Pakistan and the correspondingly increased food requirements, the year 2000 was expected to see Pakistan's fertilizer requirements at a stand of 1.95 million tons of N_2 and 0.8 million tons of P_2O_5 . Emphasis would have to be placed on providing a variety of primary and secondary soil nutrients in order to obtain maximum

agricultural efficiency to meet the nutritional demands of the growing population. Thus the need to develop phosphatic fertilizers to supplement nitrogenous and other compound fertilizers was strongly being felt.

27. He concluded by underlining UNIDO's role as a facilitator in the development of the fertilizer industry in countries of Asian and African region. The forum which had been set up by UNIDO had served to identify to industrialization and had considered these from a policy, economic, financial, social and technical point of view. The forum had also been used to monitor trends in world industry, with the result that a number of action oriented measures towards increasing the share of developing countries in world industrial production had been identified and in many cases implemented.

28. The UNIDO representative in his opening speech thanked NFC and through it the Government of Pakistan for hosting this important event. He stated further that UNIDO was accustomed to the traditional and overwhelming hospitality of the Pakistani people and that he was sure that by the time this Preparatory Meeting finished all participants would take home with them the same sense of appreciation.

29. He emphasized the contribution of the fertilizer industry to agricultural productivity and therefore to economic well-being of great masses of people in the developing countries. A major study had been published by FAO on the prospects of solving the current food crises in Africa which was emphatic on the need for concerted action to develop this sector if policy targets in agriculture were to be met in the next twenty five years.

30. On the subject of the System of Consultations he reported that the System had been established in 1976 as a forum for developing and developed countries in their contacts and consultations directed towards the industrialization of developing countries. The main objectives of the System of Consultations were the following:

- identifying the problems associated with industrialization and considering all aspects of those problems;
- monitoring trends in world industry with a view towards preventing and solving the associated problems;
- promoting industrial co-operation, both between developing and developed countries and among developing countries themselves;
- formulating recommendations for action at national, regional, inter-regional and world-wide levels.

31. The System of Consultations was unique in that it was the only world-wide industrial forum in which decision makers at policy, economic, technical and social levels from member countries participated at a sectoral level. Thus the international dialogue promoted by the System of Consultations had already led to a better understanding of the factors that determined the changing patterns of world industry, thereby having enabled developing countries to review and improve their industrialization strategies, to master the process of industrialization.

32. He concluded by stating that it was more than a happy coincidence that the Asian Preparatory Meeting should take place in the same city and under the same patronage which enabled the initiation of other important tasks which had been related to the fertilizer industry notably a seminar on mini-plants and a Workshop on the application of UNIDO model forms of contract for the construction of a fertilizer plant. UNIDO was greatly indebted to the good-will and generosity which had been traditionally displayed by the authorities in Pakistan and particularly by the host organization of the meeting, National Fertilizer Corporation of Pakistan. NFC had traditionally played a key role, through its Chairman and other officials in the fertilizer activities of UNIDO through various mechanisms such as consultancy, expertise, participation in technical meetings, etc. Therefore, Lahore presented an ideal setting for the elaboration and identification of existing possibilities in Asia to promote the African fertilizer industry.

33. Mr. Bohari, Auditor General of Pakistan in a statement on behalf of Mr. Khan Mir Afzal Khan, Minister for Production, Government of Pakistan, formally opened the Asian Preparatory Meeting by stating that UNIDO and NFC deserved to be congratulated for their co-operation in holding the third seminar of this nature in Pakistan. He was happy to learn that UNIDO's consultations in the past had yielded positive and encouraging results with far reaching implications and he hoped that the meeting too would amply serve its purpose in relation to the objectives envisaged for it and the results expected of it. He continued by stating that for many developing countries the road to development had been long and tortuous. In duplicating the patterns of development which had been achieved by the developed countries, they repeatedly run into problems which were so daunting, that it was common to see large scale projects undergoing painful and unforeseen problems of gestation. He trusted that the experts present were only too aware of the problems of development which were multidimensional and stretched the whole gamut, from technological aspects to availability of resources, onto the geographical, financial and political aspects of economic planning.

34. The meeting on the development of phosphatic fertilizer, Mr. Bohari believed, carried particular significance and interest for experts and top level administrators of the fertilizer industry in the developing nations of Asia and Africa. As most of the licensors, designers and engineers of plants, equipment and machinery for the fertilizer industry were based in the developed world.

35. He pointed out that for the developing countries with rapidly expanding populations, there was an urgent need to increase the food output to the maximum. A balanced and coordinated agricultural development was the key to achieving self sufficiency in food production. One of the most vital parameters in this regard was the increase in per acre yield of land and chemical fertilizers as such were an integral part of the agricultural technology of this time. To achieve security in the supply of food for the general populace, the best course of action for the developing countries was to forge an infrastructure of fertilizer manufacture that was strongly self-reliant, had the capacity to fully meet the expanding requirements and was flexible enough to adapt to changes and plans for the future. Compounded by the fact that the countries were practically running against time, this by no means was an easy task.

36. He identified as of one of the most constraining factors in developing countries the non-availability of key manpower resources. As modern fertilizer plants increased in complexity and technological sophistication, the question arose as to what extent local engineering skills and manufacturing capabilities could be exploited. To reduce the capital costs of fertilizer plants was only possible, if a strong local technological base existed and as such the problems of creating local engineering know-how, and the development of allied industries assumed greater importance.

37. He concluded by stating that from the reports of UNIDO's previous meetings and Consultations, it was encouraging to know that construction of fertilizer plants and their technical and socio-economic aspects had always been a matter of close and thorough examination. It was hoped that the impact of these efforts would soon begin to bear fruit and afford African and Asian countries with increasing opportunities to implement their fertilizer schemes economically and efficiently.

Technical visit

38. A technical visit was organized to the factory and installations of the Nitrophosphate Plant at Multan on the 20 October 1988. Subsequently the Technical Training Center adjacent to the fertilizer complex was also inspected.

II. SUMMARY OF DISCUSSION

39. A delegate wanted to know the Indian experience on SSP and reasons for declining use of SSP. The delegate from India replied that major reasons were logistics, economy of scale and low nutrient content. Another delegate stressed the soil conditioning quality of SSP for alkaline soils and said that this quality of SSPL could solve and postpone many agronomic problems.

40. To a delegate's enquiry if partially acidulated phosphates from phosphate rock found in Pakistan were studied he was informed that the product had low water solubility and was not suitable for alkaline soils which needed 80% water solubility.

41. To another enquiry regarding calcinating of phosphate rocks for use as fertilizers the participant was informed that calcinating was specific for phosphate rocks containing calcium aluminium phosphates such as found in Senegal.

42. Regarding disposal of phospho-gypsum produced as a by-product from phosphoric acid it was said that the one operative plant in East Germany producing clinker and sulphuric acid from phospho-gypsum was facing many problems and was very energy intensive. However, a new process under development in USA would be disclosed soon.

43. A delegate stressed the necessity for more consumption of ground phosphates as fertilizers on appropriate soils.

44. One delegate stressed that African countries should be recommended to pay subsidies on use of fertilizers.

45. A delegate stressed that UNIDO should help in the development of technology from engineering and fabrication points of view.

46. A delegate informed that in India calcium nitrate was not being separated from nitrophosphates in view of heavy costs.
47. A delegate suggested that programmes to educate the farmer on farming techniques should be launched and the farmer should be helped by providing facilities of soil testing. Some Asian countries could provide assistance to African countries in these areas. Another delegate said that assistance could also be provided in marketing, R+D and manpower training, in operation and management of fertilizer plants.
48. To a query on the factors on which farmers usually base their choice of fertilizers, it was stated that price and availability were the major factors. It was suggested that agronomic factors should carry more weightage.
49. Commenting on a delegates paper it was stressed by a licensor's representative that technologies sold remained the property of the licensors and could not be transferred by the licensees.
50. A delegate enquired if business organizations in developed countries were offering any concession to least developed countries. It was brought out that the business organization operated at low profit margins because of competitive market and could not offer any concession. However, it was an area for governments to consider. Delegates were informed that a Japanese government agency and Indian Government were offering soft loans and free training facilities to such countries.
51. It was suggested that there should be some mechanism regarding sharing of technology and experience. A pool for sharing spare parts was also recommended.
52. It was brought out that feasibility of mini fertilizer plants depended upon many factors which included primarily:
- a) availability and quantity of raw materials;
 - b) facility of infrastructure and market size.
53. Importance of collection and dissemination of data was given due recognition and it suggested that an African Centre for the purpose should be established. A delegate from FAO informed that data on African countries for the past 25 years was available and could be provided to member countries free of charge.

III. CLOSING OF THE MEETING

54. In his closing address, Mr. Tariq Mustafa, Secretary, Ministry for Production, stated that the conclusions and recommendations of the meeting brought to light the quality of the work undertaken by the Asian Preparatory Meeting and that the papers presented by the delegates had made positive contribution to the preparatory meeting. A review of the programme of the meeting showed that the topics having been discussed during the previous days have included sharing of experiences, policies and perspectives, and aspects on utilization of phosphatic fertilizers. Presentation and discussion on issues by UNIDO consultants had been important to provide input to the forthcoming meeting in Africa.

55. The objectives of the Preparatory Meeting was to examine as to how the experiences and know-how available in Asian countries could be offered to the countries in African region in the development of their phosphatic fertilizers and pesticides industries in the form of technical assistance, joint ventures, greater trade, training and marketing, etc.

56. Nations in the African and Asian regions would do well to benefit from each other's experience in their development for the supply of technology, know-how, and machinery. Towards this end it greatly helped to assess in detail the capabilities of the Asian region in the development of phosphatic fertilizers which could provide comparatively advantageous economical resources to the African region for bringing about an agricultural revolution.

57. He further stated that the policy planners in Asia and Africa needed to be thoroughly aware of the development of phosphates, the process and technologies commonly used and any problems which had been faced in the operational stages. UNIDO's and other agencies' role could be vital in this respect.

58. Training of personnel in all areas related to the development of phosphatic fertilizers in particular and chemical fertilizers in general had as much bearing on the industry as the technology of production itself. The more experienced countries of the region could help by organizing training programmes and seminars on a regular basis that comprehensively cover the more important areas pertaining to the transfer of technical know-how. UNIDO's sponsorship of such programmes could effectively facilitate the achievement of the goal. It could also provide a strong basis for co-operation.

59. An institutionalized data base was necessary to gather the information required to manage the fertilizer sector efficiently. Pakistan was ready to provide any assistance in setting up such a center.

60. From the reports of UNIDO's previous meetings and consultation, it was encouraging to note that construction of fertilizer plants and their technical and socio-economic aspects had always been kept under close examination. It was hoped that the impact of these efforts would soon be visible in African and Asian countries.

61. Mr. Tariq Mustafa concluded that international forums like the Asian Preparatory Meeting were important links in acquiring relevant lessons and experiences. UNIDO and NFC deserved to be congratulated for this continued co-operation in holding such meetings and he sincerely hoped that the recommendations and suggestions which had come-up during the forum were going to form useful inputs to the Regional Consultation in Côte d'Ivoire, in December 1988.

Annex I

LIST OF PARTICIPANTS

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Annex II

AGENDA

1. Opening of the meeting
2. Introduction, objectives and background of the meeting
3. Presentation of papers by participants
4. Presentation of papers by UNIDO consultants and discussions
5. Discussions on conclusions and recommendations
6. Presentation and approval of draft report
7. Closing session

Annex III

LIST OF PAPERS PRESENTED

Zahur Ahmad Khan:	Utilization of Pakistan phosphates and its future
Zhang Jinfu:	The present situation of phosphate fertilizer industry
S.K. Saha:	Experience in establishment and operation of phosphatic fertilizers complex in India
P.N. Arunachalam:	Paradeep Phosphates Limited: Its role in the development of phosphatic fertilizers in India
Abdul Mannan:	Government policy and economics of phosphatic fertilizer industry in Pakistan
M.I. Bajwa:	Phosphorous in Pakistan agriculture
C.K. Gopalakrishnan:	Phosphatic fertilizer industry in India
M.C. Bhutto:	Comparative evaluation of phosphatic fertilizers in Pakistan
D. Leonardi:	Mining, processing and uses of phosphal
N. Yamanaka:	Production of phosphoric acid from low grade phosphate rock
B.T. Crozier:	Phosphoric acid: Ease of operation and energy saving in developing countries
S. Ahmad:	Trade among developing countries in fertilizers
Ahmad Shah Nawaz:	Asian experience in process development and machinery supply for the phosphate fertilizer industry
Zahur Ahmad Khan Zahid Aziz:	Identification of opportunities for Afro-Asian co-operation in fertilizer industry