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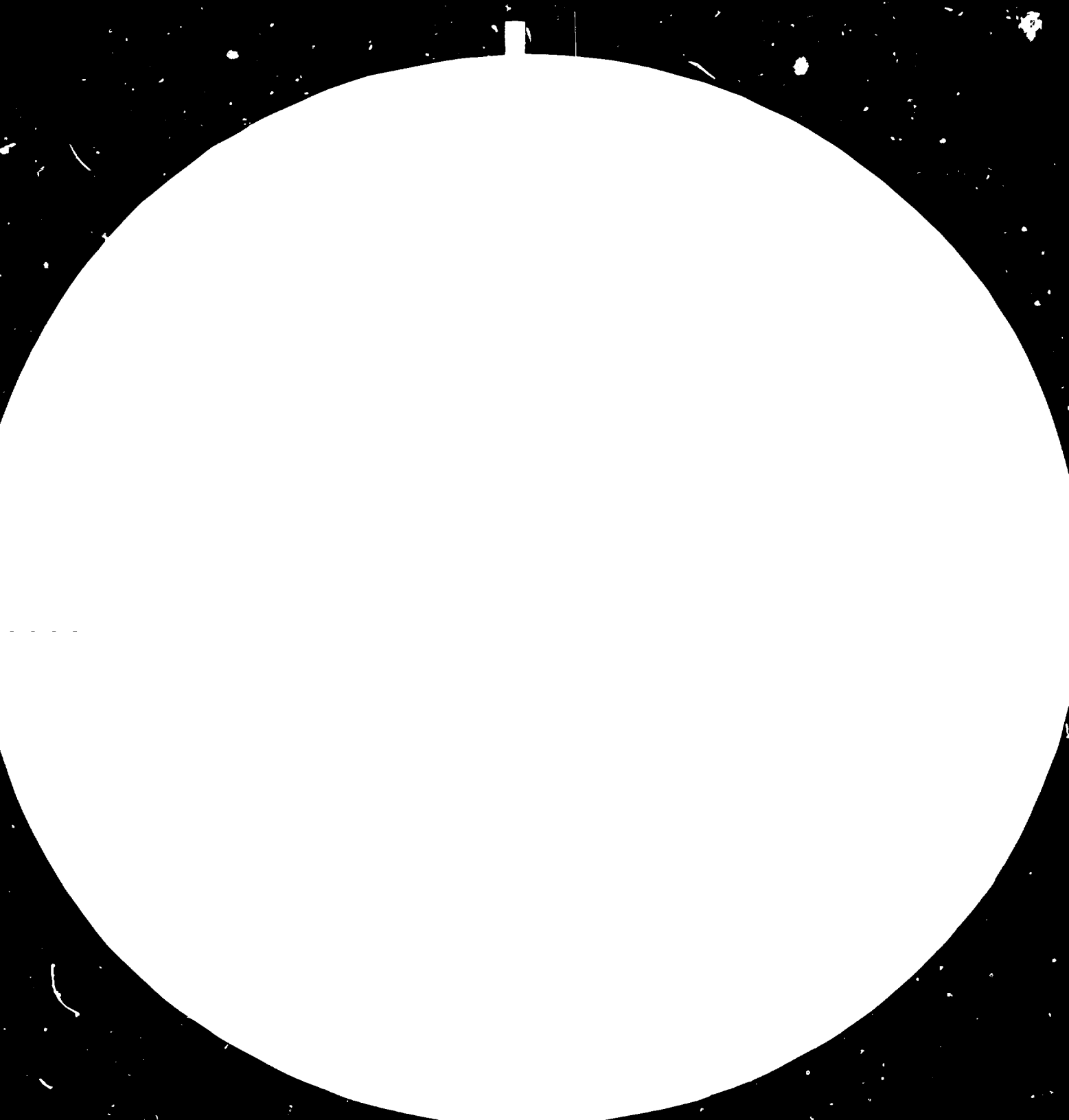
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1.25 

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Minimum Resolvable Detail, μ (microns)

Resolution, cycles per inch



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**WORLD BANK ASSISTANCE IN THE DEVELOPMENT OF
FERTILIZER INDUSTRY IN THE DEVELOPING COUNTRIES***

by

Edilberto L. Segura**

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** Deputy Division Chief, Fertilizer, Refining and Other Chemical Industries Division, Industry Department, The World Bank, Washington, D.C., USA

A. Background

1. During the last two decades, many developing countries have increasingly focussed their attention on their fertilizer production capabilities. The wide variations in international fertilizer prices in the mid-1970s and the increasing domestic fertilizer consumption resulting from the more widespread use of high-yielding varieties and other farming technologies have led many developing countries to consider expanding domestic fertilizer production to assure their food supply against disturbances in the short-term market and possibly long-term trends in the supply/demand balances.

2. Many fertilizer consuming developing countries are now in a better position to consider domestic production of fertilizers (principally nitrogenous fertilizers). In fact, in view of the energy crises of the 1970s, many of these countries initiated oil and gas exploration efforts. Many of these efforts were successful principally regarding natural gas. Therefore, countries that found natural gas reserves are faced with the question as to the optimal utilization of these resources. In many cases, the production of nitrogenous fertilizers constitutes one of the most economic uses of the natural gas.

3. Local production of fertilizers, if economical, also brings other benefits to developing countries. It insulates the country from the vagaries of fertilizer imports to a great extent. The stability of the supply of fertilizers has a beneficial impact on the country's agricultural development programs; the existence of a fertilizer plant in a developing country is known to stimulate fertilizer demand. The long-term balance between domestic fertilizer production and imported materials must be struck with due regard to comparative advantage, in which raw material resource endowment, size of domestic fertilizer market and opportunity cost of the natural resource are important factors.

4. It should also be noted that during the last two decades, food production in developing countries has become increasingly dependent on fertilizer use, which has probably accounted for approximately 30% of the total increases in food production and more than 50% of the yield increases in cereal production over the past two decades. Undoubtedly, the increased use of fertilizer is a critical measure to increase crop production and help developing countries become self-sufficient in food production. Based on extrapolation of present trends, in the late 1980s fertilizer production will be far from adequate to meet world requirements. Such gap in supply may make it increasingly difficult for developing countries to meet their food

needs. Many developing countries have therefore approached the World Bank to meet their fertilizer needs.

5. Bank-supported fertilizer projects undergo a critical evaluation to ensure that they meet the best interests of a developing country. Bank involvement in fertilizer projects, as in all projects supported by it, goes through a number of stages spread over a number of years. In the first, "identification" stage the Bank and the borrower select suitable projects that support national and sectoral development strategies and that are likely to be economically, financially and technically viable. If the projects are likely to be sound, by mutual agreement between the country and the Bank, they are incorporated into the lending programme of the Bank for the country. Active and detailed preparation of the project, with close Bank technical assistance, then follows. During the "preparation" stage, the economic, financial and technical viability of the project is established. The Bank provides guidance, and in some cases makes financial assistance available, or helps the borrower obtain it from other sources, in order to enable it to complete project preparation. This period may take from a few months to one or two years, depending on the complexity and the stage of preparation of the project. After all information on the viability of the project is available, the "appraisal stage" of the project starts. Bank staff systematically and comprehensively appraise all aspects of the project such as marketing, technical, institutional, economic and financial. An appraisal report is prepared which is reviewed extensively within the Bank and which serves as the basis for loan or credit "negotiations" with the borrower. The project is then presented to the Executive Directors of the Bank for approval. Normally the period from appraisal to Board approval can take from six to nine months.

6. After Board approval and loan signing, we initiate what we call the "project supervision" stage. Although the borrower is responsible for the implementation of the project, the Bank supervises this implementation, including field visits. Procurement of goods and equipment for the project must follow official Bank guidelines for efficiency and economy, which normally requires international competitive bidding.

7. Following the final disbursement of Bank funds for the project, an independent department of the Bank - the Operations Evaluation Department - reviews the project and prepares its own audit. This ex-post evaluation provides lessons of experience which are built into subsequent projects.

B. Bank Group Investments in Fertilizer Production

8. In order to help developing countries improve their fertilizer production facilities, the World Bank Group has provided significant financial and technical help during the last few years. A list of 45 fertilizer projects financed since 1968 by the Bank Group in 17 countries with total lending of US\$2.3 billion is given in the Table on the next page. The average size of the Bank loans has been \$50 million, with a range from \$1.0 million for a small engineering credit in Jordan to \$400 million for a large fertilizer project in India. Overall, the Bank has been involved in roughly one third of all fertilizer projects implemented in the developing countries during the recent past.

TAB. E 1

FERTILIZER PROJECTS FINANCED BY THE BANK GROUP SINCE 1968

REGION/COUNTRY	PROJECT	AMOUNT (US\$ MILLION)	END PRODUCT	CAL. YEAR APPROVED	IBRD/IDA/ IFC
<u>East Asia</u>					
Indonesia	Ferti II	30.0	Ammonia/Urea	1970	IDA
	Ferti II (Supplemental)	5.0	Ammonia/Urea	1973	IDA
	Ferti III	115.0	Ammonia/Urea	1975	IBRD
	Ferti Distribution	68.0	Distribution	1975	IBRD
	Ferti IV	70.0	Ammonia/Urea	1976	IBRD
	SUBTOTAL	288.0			
<u>Europe, Middle East, North Africa</u>					
Egypt	Talaha	20.0	Ammonia/Urea	1974	IDA
	Mw Valley Phosphates	11.0	Technical Assistance	1979	IBRD
Jordan	Fertilizer Industry (Eng. Cr.)	3.1	Phosphoric Acid/DAP	1975	IFC
	Arab Potash (Eng. Cr.)	1.0	Potash Engineering	1975	IDA
	Fertilizer Industry	70.0	Phosphoric Acid	1975	IFC
	Arab Potash	35.0	Potash	1978	IBRD
Morocco	Moroc Phosphate I	50.0	Phosphoric Acid/MAP	1974	IBRD
	Moroc Phosphate I - Expansion	50.0	Phosphoric Acid	1978	IBRD
Portugal	Quimigal	58.0	Ammonia/Ammonium Nitrate	1979	IBRD
Romania	Bacau	60.0	Ammonia/Urea	1974	IBRD
Senegal	Industries Chem. du Senegal	25.0	Phosphate Fertilizers	1981	IFC
	SEFICS	19.3	Fertilizer Transport	1981	IBRD
Togo	Dagbani Phosphates	5.7	Phosphate Engineering	1981	IDA
Tunisia	Gafsa	23.3	Phosphate Rock	1974	IBRD
Turkey	Igass	24.0	Ammonia/Urea	1973	IBRD
	Igass (Supplementary)	18.0	Ammonia/Urea	1975	IBRD
	Fertilizer Industry	110.0	Various Debottlenecking	1981	IBRD
	SUBTOTAL	583.4			
<u>Latin America</u>					
Brazil	Araucaria	50.0	Ammonia/Urea	1976	IBRD
	Sergipe	64.0	Ammonia/Urea	1977	IBRD
	Valafertia	42.0	MAP/TSP	1977	IBRD
	Sotave	16.0	Mixed Fertilizers	1980	IFC
Mexico	Fertimax I	50.0	Urea/Pesticides	1975	IBRD
	Fertimax II	80.0	AN/DAP/NPK	1979	IBRD
Peru	Bayover Phosphates	7.5	Phosphate Engineering	1980	IBRD
	SUBTOTAL	349.5			
<u>South Asia</u>					
Bangladesh	Ashuganj	33.0	Ammonia/Urea	1975	IDA
	Industry Credit	29.0	Various Debottlenecking	1980	IDA
	Fertilizer Transport	25.0	Rail and Storage	1981	IDA
India	Cochin II	20.0	NPK	1971	IDA
	Gorakhpur	10.0	Urea	1972	IDA
	Mangal	58.0	Ammonia/Urea	1973	IDA
	Trombay IV	50.0	NPK	1974	IDA
	Sindri	91.0	Ammonia/Urea	1974	IDA
	IFYCO	109.0	Ammonia/Urea	1975	IBRD
	Industry Credit	105.0	Various Debottlenecking	1975	IDA
	Nasira	400.0	Ammonia/Urea	1980	IDA
Pakistan	Oswood Hercules	34.9	Ammonia/Urea	1948	IBRD/IFC
	Maitan	35.0	Ammonia/NP/CAN	1974	IBRD
	Youji	55.0	Ammonia/Urea	1978	IDA
	Imports Credit	50.0	Purchase of Fertilizers	1980	IDA
Thailand	Potash Project	8.9	Potash Engineering	1981	IBRD
	SUBTOTAL	1,113.8			
	TOTAL BANK GROUP	2,224.7			

projects. To support the loans, during the "project preparation stage", a great deal of investigation work is required on marketing, financial, technical, managerial and economic aspects of the projects. Even where the Bank financial assistance for the project preparation work may be small, it is often able to attract other institutions to provide financing for these activities. In addition, the Bank frequently assists the implementation of policy and institutional improvements necessary to promote optimum use of fertilizer under efficient conditions. In this context, the Bank has played an important role in improvements in fertilizer pricing policies, distribution system, organization and management of the fertilizer sector of the borrowers in many countries.

D. Other Benefits

10. Although the primary object of the Bank's activity has been to allow developing countries to produce, where appropriate, fertilizers at economic costs with which to grow food, there have been many other benefits from these projects which must be taken into account in assessing the value of the Bank contribution to the fertilizer industry in developing countries. The infrastructure and social improvements which come about directly and indirectly as a result of a new fertilizer plant can be very significant. In one recent project appraised, it has been estimated that the project would create directly 1,565 jobs but indirectly up to 5,000 jobs in transportation, marketing and communications (with, of course, some additional investments in these downstream activities). If the overall effect on new jobs could be estimated due to increased agricultural production and associated activities, the number would be very much greater still. In addition to increased agricultural production, the diversified nature of the fertilizer industry brings with it benefits such as ports, railroads and related industries. Another important indirect benefit of Bank-financed projects is transfer of technology to developing countries. Implementation of these plants has led to the development of local skills in design and engineering, equipment manufacturing and in management skills in construction and operation of large industrial projects. In view of the high level of Bank activities in financing fertilizer plants in developing countries, the overall impact of these activities has undoubtedly been very considerable.

E. Co-Financing

11. Co-financing has continued to be an important element in Bank Group financed projects. In most cases, the Bank has provided one-third or less of project financing and was often not the largest single lender. Regional and bilateral agencies that have worked with the Bank include KfW, USAID, Exim-Bank, Japan OECF, UK-ODM, ADB, IDB, Kuwait Fund, Arab Fund, Abu Dhabi Fund, Islamic Development Bank, OPEC Special Fund, Saudi Fund, Libyan and Iraqi Funds, etc., and in addition a number of commercial banks. As is the case in many other Bank financed projects with co-financing, frequently the co-lenders have relied on Bank staff analysis to make their own investment decisions and have asked the Bank to take a lead in suggesting various projects and financing alternatives. In many cases, the Bank has coordinated the activities of half a dozen or more co-lenders. While this has increased Bank staff input, it has facilitated efficient project processing and implementation.

F. Engineering Loans/Credits

12. While most Bank financed projects were prepared by the borrowers with their own resources, the Bank has also used "engineering loans and credits" as vehicles to help resolve critical technical and economic issues and to prepare for subsequent Bank appraisal complex projects with outside assistance. The Bank through an engineering credit enabled Jordan to carry out a pilot project to recover potash from the Dead Sea and to develop optimum project design to exploit this valuable resource. The successful completion of this pilot project and feasibility study was followed by a loan for a potash producing project in Jordan, mostly for exports. In the last two years the Bank and IDA have made several engineering loans to help Egypt, Peru and Togo develop new phosphate deposits and also Thailand develop a large potash deposit.

G. Sectoral Work

13. Frequently, the Bank has been asked by member governments for advice on the development of their countries' fertilizer sectors and, in many cases, this has been included as a major part of Bank pre-appraisal and economic missions. The Bank has also been asked for advice on the feasibility of various fertilizer projects including those where Bank financial help would, and would not be required. In certain cases, the Bank has been able to provide important and critical judgement as to why fertilizer plants should or should not be built or suggest modifications in the timing, configuration, scope, size, etc., of the projects for economic or technical reasons.

H. Fertilizer Rehabilitation and Energy Savings Projects

14. Although the major projects financed by the Bank Group and completed during the past few years have generally given satisfactory performance, many other fertilizer plants in developing countries have failed to meet their rated capacity. This has often been the result of political and infrastructural constraints as well as shortcomings in plant design and operation or imbalances between various plant units. Furthermore, before the energy crises, the trade-offs between capital and operating costs favoured projects with lower capital costs, even though energy consumption could be high. With the recent increases in energy prices, in many cases, it makes economic sense to invest in additional capital facilities to achieve energy savings. The Bank Group has been working on these problems in a number of countries and has provided several loans to rehabilitate the fertilizer industry and also to achieve energy conservation and other operating savings. At the end of 1975, IDA approved a credit of US\$105 million to help increase India's fertilizer production by improving capacity utilization in ten existing plants. A fertilizer industry modernisation project in Portugal will do the same by revamping old facilities, building additional capacity in a few areas to better balance different capacities and by replacing obsolete plants with more energy efficient plants. Similar operations are under implementation or consideration in other countries, including Turkey, Bangladesh, Pakistan and Egypt.

I. Industry Department - Fertilizer Responsibilities

15. Within the World Bank itself, the operational work on fertilizer projects is carried out in the Industry Department by the "Fertilizer, Refining and Other Chemical Industries" division who has the responsibility for the identification **preparation, appraisal and supervision**

of Bank fertilizer projects. In addition to projects in the fertilizer sector, the Fertilizer Refining and Other Chemicals Division is responsible for the Bank's operation in energy industries, including petroleum refineries, petrochemicals, coal gasification, ethanol, methanol, and energy conservation (retrofitting) projects. The Division also handles inorganic chemical industries. The Industry Department also provides advisory service on fertilizer topics within the Bank Group, and to other international agencies. IFC has its own staff of engineers and financial analysts who handle fertilizer projects in the private sector.

J. The World Bank FAO/UNIDO Fertilizer Working Group

16. One of the recommendations of the World Food Conference which took place in the middle of the "Fertilizer Crisis" of 1974 was that the international agencies as a matter of urgency establish and regularly maintain an authoritative analysis of the medium- and long-term fertilizer supply and demand situation in order to provide the elements of a world fertilizer policy that would include the overall aim of avoiding cyclical imbalances between supply and demand. Since the beginning of 1975 the World Bank/FAO/UNIDO Fertilizer Working Group, in association with representatives from the international fertilizer industry, have been responsible for maintaining this data base.

17. The Group, comprising experienced analysts and representing the three main fertilizer nutrients and raw materials, meets **annually** to discuss and update its information. The supply situation is calculated on a plant-by-plant basis and the demand is derived and analyzed using a variety of **methodologies by institutional members**. Where there **are differences in views, these are discussed frankly and if necessary a judgement is applied to harmonize results**. The data base of the Group has improved over the years and continues as methodology is refined and more information comes available. The World Bank has computerized most of the **detailed information as have other members of the Group**.

18. The results of the Group's work **aggregated at regional and world levels are presented through the FAO Fertilizer Commission meetings and also through the UNIDO Consultation Meetings on Fertilizers**. Apart from the importance of the information for investment purposes and to help prevent cyclical imbalances the Group also acts as a forum for exchange of information. In this way, international fertilizer industry is also kept informed of the work of the international agencies.

