

NON-CAPITAL PROJECT PAPER (PROP)

17p.

Country: Worldwide Project Number: TA(QA) 6-69-A-3

Submission Date: October 13, 1970 Original : \_\_\_\_\_

Revision No. : \_\_\_\_\_

Project Title: Fertilizers, Technical Assistance - Production,  
Distribution and Use

U. S. Obligation Span: 1965-1975

Physical Implementation Span: FY 1965-1975

Gross Life of Project Financial Requirements:

|                       |       |                    |
|-----------------------|-------|--------------------|
| Funding through       | FY 69 | \$ 399,000         |
| Funded                | FY 70 | 460,000            |
| Proposed Funding      | FY 71 | 500,000            |
| Projected Funding     | FY 72 | 700,000            |
|                       | FY 73 | 750,000            |
|                       | FY 74 | 750,000            |
|                       | FY 75 | 700,000            |
| Total Life of Project |       | <u>\$4,259,000</u> |

## I. Summary Description

### A. Objectives:

The ultimate objective of this project is the development of agriculture based on science and technology, particularly as related to the less-developed countries' need for technical assistance in the manufacture, distribution and use of chemical fertilizers. This assistance is intended to further the LDCs capabilities to sustain the 16 percent annual rate of growth of fertilizer achieved during the eight year period 1962-1969. To assist LDCs to achieve this A.I.D. policy objective, this project is intended to: a) establish a world memory bank of statistics and make this information available to LDCs, international organizations, industries and other organizations; b) provide technical assistance to LDCs for training personnel for organizing and managing fertilizer enterprises in fertilizer production, marketing and use; c) provide technical assistance for improving efficiency of fertilizer production, distribution and marketing aimed at lowering costs to farmers; d) familiarize research and educational personnel in LDCs with potentially useful new and improved fertilizers, to determine the performance of these materials when used under varying conditions of crop, soil and climate; e) improve upon A.I.D. effectiveness and responsiveness to regional, mission and country requests for technical assistance in the many facets of fertilizer production, distribution and use.

### B. Setting or Environment in the LDCS

#### 1. Problem Areas

Experience has shown that farmers in the LDCs -- like farmers in the developed countries -- do adopt yield increasing innovations, given the opportunities of economic incentives coupled with the timely availability of modern technological inputs. Fertilizer is only one of the "package" of inputs essential to increase agricultural production and productivity; it is however of critical importance to achieve the yield increasing potentials of high-yield varieties.

While the 16 percent annual rate of growth of fertilizer use during the past eight years (1962-1969) has been encouraging, the LDCs' fertilizer use rate per capita is one-fifth that used by the developed regions in 1957. As use increases it will be increasingly difficult to sustain the growth rate. Despite the LDCs progress in increasing fertilizer consumption per capita fivefold during the period 1955-1969; per capita food production in the LDCs is essentially static and could decline unless concerted efforts are made to alleviate the constraints imposed by the lack of rewarding investment opportunities open to farmers, allowing them to escape the confines of traditional agriculture. The major constraints imposed upon more extensive use of fertilizers in the LDCs are directly related to the low-level of effective demand. The underlying causes of this constraint are:

- 1) repressive government policies, attributed to lack of adequate data needed to guide fertilizer related investment and import policy and to devise programs to attract private sector investment into the production, marketing and distribution and use systems;
- 2) inabilities of farmers to purchase fertilizers in the amounts needed due to the lack of savings or production credit at rates and on terms that give an incentive to invest; high fertilizer prices at the farm in comparison to the net return from the sale of the additional grain or other crop produced by using fertilizer compounds the difficulty;
- 3) lack of adequately trained personnel, and personnel with sufficient experience in the operation and maintenance of fertilizer plants; managerial and financial skills are particularly lacking to improve distribution, and to provide reliable guidance to farmers in the effective use of fertilizers in terms of plant nutrient requirements under variable conditions of soil fertility, moisture availability, and crop varieties;
- 4) infrastructural inadequacies in terms of highways and access roads to farm communities; the need for agricultural research, both economic and agronomic; and the need for education and extension;
- 5) chronic shortages of foreign exchange limit the supply of fertilizers to the LDCs; and high shipping costs lead to high prices for imported fertilizers.

## 2. Capabilities of the LDCs

Officials of the LDCs have recognized that fertilizer is essential to increase crop yields and to increase profitability when used in conjunction with improved varieties and crop management. They are developing their natural resources to provide the raw materials to produce fertilizer but in many cases depend upon external financing, management and engineering. Fertilizer factories are being built in the LDCs but with two-thirds of the total development cost in foreign exchange. The distribution and marketing systems which have developed are functioning but strained under the increasing demands which are being placed on them. Many plants are not of the scale to compete with the extremely large units in developed countries which have access to a much greater market.

When it is found profitable, farmers in the LDCs have used fertilizers and are demanding more. Good seeds, better varieties, pest control, soil and water management have increased profitability. New information is being discovered at the research stations and passed on to the farmers through the extension services. Private savings and informal loans have been used to buy more than 80 percent of the fertilizer consumed in the LDCs.

The LDCs have also built their own training institutions. Most countries have universities which offer curricula in engineering, agronomy and business. Grade schools and high schools are available to increasing numbers of children, providing them with the basic tools to understand and function in factories and businesses. Various systems of formal and informal training have been evolved to prepare mechanics, electricians, operators and other skilled technicians.

### 3. Role of Other Agencies

The importance of fertilizer in agricultural development has attracted the interest of other international development agencies engaged in both technical assistance, and capital development loan programs. United Nations organizations most heavily committed to fertilizer related activities are the Food and Agriculture Organization (FAO) and United Nations Development Program (UNDP) in the area of technical assistance, and the International Bank for Reconstruction and Development (World Bank) in the area of capital development loans.

The FAO "Freedom from Hunger Campaign" includes a Fertilizer Trial and Demonstration Program supported by the Fertilizer Industry Advisory Committee to FAO. Also, FAO publishes reports on fertilizer production, import/export, and country fertilizer-use, from data supplied by cooperating governments. These programs are complementary to the bilateral assistance programs of the United States, and other countries. A number of the developed countries are making "earmarked" contributions to fertilizer-use related activities through the International Labor Organization (ILO), as an element of assistance to develop farmer cooperatives.

World Bank has participated with foreign governments and private sector fertilizer industry investors for the construction of fertilizer plants in Peru, Pakistan, India and Brazil, and in the development of phosphate ore lodes in India. International Development Association (IDA), the Inter American Development Bank (IDB) and International Finance Corporation are either actively making or considering loans for fertilizer related investments.

Foundations are making notable contributions toward greater fertilizer use through breeding of responsive varieties at regional research centers such as IRRI, CIAT, IIAT and the CIMMYT program.

#### 4. Additional Assistance Needed

Although fertilizer use in the LDCs is increasing rapidly, it will be increasingly difficult to maintain the current growth rate. Help will be needed by most countries in obtaining the necessary data and information to set realistic goals for use, production or import of fertilizer. Government officials in the LDCs need to have more knowledge of constraints which limit fertilizer production, distribution and use and of those incentives which effectively stimulate more use. With this knowledge they can shape their policies to meet their goals.

Most developing countries need assistance in assessing deposits of basic raw materials for producing fertilizers. When adding to production capacity most of the LDCs will need assistance in selection of products to be made and the best process to employ. Assistance is needed in increasing the efficiency of existing factories. This may include modification, closer control of operating conditions of improved maintenance and repair.

Distribution and marketing are areas in which assistance is needed. A major task is identifying the specific points or causes of delay and failure. Another is in providing workable alternatives to the systems which are not getting the job done.

Assistance is still needed to improve the use of fertilizer on the farm so that the returns are adequate. This will largely mean improving the flow of information to the farmers. The systems of credit must be made more responsive to farm needs so that interest does not take the farmers potential gains.

Most LDCs will neither produce all the fertilizer they need nor earn sufficient foreign exchange to purchase the fertilizer which they need to meet agricultural development goals for the next ten years. They will be dependent on commodity loans or grants from the U.S. or other developed countries to make up the deficit.

Further specialized training will be needed in fertilizer technology, marketing and use. Assistance will be needed especially in providing a base for local training reducing dependence on foreign training.

## II. Strategy and Method Proposed for Achieving Project Objective

### A. Justification for Central Funding

1. The project activities have worldwide implications and transferability in terms of supply and demand, applicability of training, fertilizer use demonstrations and methods of production and use technologies.
2. Central funding enables timely response to Mission requests for assistance, which in many cases are unpredictable under normal budget projections processes. The dynamics of the LDCs' awareness of the importance of fertilizers and rapidly changing opportunities in supplying availabilities worldwide demand a high degree of flexibility in A.I.D. fertilizer related technical assistance.
3. Central funding assures the availability of experts when needed. Surplus personnel cannot be retained on the domestic staff of the contractor on the assumption that they will probably be needed.
4. The Regional Bureaus and Central Engineering have strongly supported central funding
5. Central funding also assures inter and intra-agency collaboration, LDCs - Mission support in unison with AID/W for well coordinated technical and administrative backstopping.

### B. Methods for Providing Technical Assistance

1. The National Fertilizer Development Center of T.V.A. is well staffed and equipped to provide this assistance. It has a staff of over 250 professional employees specializing in the various phases of fertilizer production, distribution, and use. It has the facilities to support them including a library, computer, laboratories, pilot plants and shops, greenhouses and field plots. Over fifty of staff members have already worked in one or more of the 23 LDCs to which T.V.A. has provided assistance. Through previous work T.V.A. personnel have established good working relationships with A.I.D. staff both in Washington and the Missions and with host government officials. There

is no comparable source of such concentrated, available, and motivated expertise in the U.S.

2. T.V.A. responds to requests of Missions, the Regional Bureaus, Central Engineering and TA/AGF for specific information, advice and services by correspondence, by trips of specialists to Washington and to the LDCs and through laboratory, pilot plant and field studies at T.V.A. or abroad. It publishes data on the worldwide fertilizer situation periodically and reports on special topics as the information is assembled. These publications are either sent to Missions on a regular basis or when on the more specialized topics on a selective basis. T.V.A. is continuing chemical engineering, and agronomic investigations at the Center which are pertinent to the project.

### III. A.I.D.'s Current Involvement

A.I.D. and its predecessor agencies have financed the purchase of more than a billion dollars worth of fertilizer since 1958 for LDCs. During FY 70 expenditures reached \$65,000,000 down from \$197,000,000 in FY 68. A.I.D. has lent or agreed to lend approximately \$150,000,000 for fertilizer plant construction and extended over \$200,000,000 in guarantees to cover the risks of investment in the LDCs. The local investment resulting from these A.I.D. loans is at least double the value of the loans and guarantees. In addition A.I.D. loans have created a climate in which other investors were willing to risk their money in fertilizer factories.

A.I.D. has trained top personnel for many of the producing fertilizer factories throughout the developing world and supplied consultants to assist with their operation and management. Assistance has been provided in developing an agricultural extension service and schools which are training extension agents. Research has been and is being conducted on fertilizers and their use by A.I.D. personnel, local personnel whom they advise and their contracts with universities and regional institutes such as IRRI, CIAT and IITA. These efforts are still going on, although on a reduced scale as a result of reductions in A.I.D. personnel.

Highly efficient soil testing laboratories have been developed throughout Latin America. These laboratories are being used by A.I.D. as the spearhead of fertilizer use programs which seek to meet individual needs rather than seek convenient generalizations to be applied to all situations.

New emphasis is being placed on tropical soils through research and development assistance contracts. Fertilizer will of necessity play a key role in the use of these soils. Water management and

irrigation are also important aspects of the current A.I.D. agricultural development program. Both activities will lead to greater demands for fertilizer.

A.I.D. is continuing to supply fertilizer under concessional loan agreement, to assist developing countries to make up their deficits. The current level of A.I.D. contribution is \$100 million. Two-thirds of this is for fertilizer, the remainder for handling and shipping.

#### IV. Course of Action

##### A. Life of Project Projections

##### 1. Anticipated Accomplishment

a. By 1975 there will be data available on the computer on production, trade and use of fertilizer for twenty years classified by product, factory, country and region. Methods will be refined for predicting production and demand. The data will also provide a basis for judging accomplishments and pinpointing problem area.

b. Preliminary evaluation of 50 to 75 potential mining sites for fertilizer material will be made during the next five years.

c. Production capacity of fertilizer factories in cooperating countries will be raised from the 1969 average of 61 percent of rated capacity to 80 percent by 1975.

d. Investment in new factories will be encouraged to help meet increasing fertilizer needs in LDCs.

e. By introducing more efficient methods the C & F cost of fertilizer purchased through A.I.D. loans and grants will be reduced \$10 per ton below the cost if it were handled in the present manner.

f. Training courses will be designed, texts and materials prepared and instructors trained to present the courses in their own country or region. Courses will cover all phases of fertilizer production, distribution and use.

g. The services of 50 to 60 men will be made available annually to the Missions, Regional Bureaus, Central Engineering and the Technical Assistance Bureau for planning, problem solving and assessment of activities related to fertilizers.

2. Funding

|                   |       |    |         |
|-------------------|-------|----|---------|
| Funding through   | FY 69 | \$ | 399,000 |
| Funded            | FY 70 |    | 460,000 |
| Proposed Funding  | FY 71 |    | 500,000 |
| Projected Funding | FY 72 |    | 600,000 |

Breakdown of annual expenditures (based on FY -71 estimate) =

| Activity   | Cost       |
|--|------------|
| Worldwide Fertilizer Statistics                    | \$ 80,000  |
| Fertilizer Packaging, Shipping<br>and Distribution | 70,000     |
| Evaluation of Basic Raw Materials                  | 15,514     |
| International Training                             | 104,000    |
| Fertilizer Marketing                               | 20,000     |
| Testing of Experimental Fertilizers                | 15,000     |
| Technical Support*                                 | 202,486    |
| Total FY 71  | \$ 500,000 |

\*Technical support funding includes \$30,000 for service to Central Engineering

The increase in funding from FY 71 to FY 72 is to cover the cost of fully developing the marketing phase of the project which has been deferred.

B. Activities for FY 71

1. World Fertilizer Statistics

Continuation of this activity will enable the tabulation, collation, analyses, and publication of worldwide, regional, and country statistics on fertilizer production capacity, actual quantities produced, and projection of future needs in relation to present growth rates in fertilizer use. The computerized data source enabled by this activity is essential to provide rapid access and sorting of information to guide the development of investment and credit policies of the LDCs and lending agencies, whether domestic, regional or of an international nature. Through a readily available source of information and analyses, LDC Governments may evaluate the effectiveness of fertilizer production or import, distribution and use policies. Long-term supply-demand projections

are essential to PD-41<sup>1/</sup> policy objective of sustaining the 16 percent annual growth rate of fertilizer use because of the long lead time required to bring new fertilizer plants from the initial planning stage to full production.

## 2. Fertilizer Packaging, Shipping and Distribution

Packaging, shipping and distribution of fertilizer make up a major component of the delivered cost. Large savings in these costs are possible through reducing losses and employing more efficient methods. An important contribution will be the transfer of operations from countries in which these costs must be met in foreign exchange to the importing country where costs can be met in local currency directly recoverable through the sale of the fertilizer.

This activity will provide long-term benefits to the developing countries by improving the efficiency of internal distribution. The major benefit will be in reducing the current drain on foreign exchange and the debt load which they must assume to cover the cost of importing fertilizer. Both absolute savings and shift from dollar to local currency expense are important to A.I.D. and the U.S. By reducing dollar cost, more fertilizer can be supplied within the limited budget, or the savings can be used for other commodities.

## 3. International Training

Provision of specialized training in fertilizer production, distribution and use is an A.I.D. objective made explicit in PD-41. The persons now involved in these activities in the LDCs are performing, but do not reach the standards needed to meet the demand for fertilizer. With need growing so rapidly, it is impossible to train the necessary staff in the U.S. or other developed countries.

To permit training of sufficient numbers of managers, operators, maintenance personnel and salesmen in the LDCs, courses which can be presented by local instructors must be developed. Even these cannot be developed separately for each country. The courses with supporting materials and aides must be prepared in general terms, then adapted for use in particular countries. Three such courses will be developed during the year FY 71.

<sup>1/</sup> PD-41 or M.O. 1612.10.2 of July 31, 1969 is a statement of A.I.D. policy on fertilizer as an essential input for achieving the projected agricultural sector development in the LDCs and of the various sources and types of assistance which A.I.D. can employ to make sufficient fertilizer available. A copy of the M.O. is attached as Annex 1.

To assist personnel already trained to keep up with advances in their field publication of Fertilizer Abstracts will be continued.

#### 4. Marketing

A.I.D. policy is to insure that there is no slow-down in the rate of growth of fertilizer use in the LDCs. To achieve this policy objective TVA will assist LDCs and USAID to identify problems and indicate solutions in the following areas: government policy, in terms of input cost and farm product price ratio improvement; and assessment of inadequacies in infrastructure requirements in terms of transport, facilities, management capabilities, and in most all aspects covered elsewhere in this proposal. TVA's studies, fertilizer system evaluations, and consultations will center on seven critical areas:

a) the nature and magnitude of established marketing systems (types of systems); b) nature and magnitude of fertilizer supply and demand; c) the existing fertilizer marketing infrastructure -- transportation, credit, storage, distribution points, etc. d) financing and capital requirements of existing systems; e) economic and social factors associated with marketing fertilizers in the LDCs; f) educational, extension, and promotional programs used in marketing fertilizers; g) factors inhibiting fertilizer consumption; and h) government policies and practices as they relate to fertilizer marketing.

#### 5. Raw material Testing

The expanded service relates to PD-41 in the following aspects: a) establishment of domestic manufacturing capabilities Page 3, Item b. 1 is directly dependent upon geological exploration, assaying of "core samples" to determine plant nutrient element content, form and refraction processes requirements/limitations and probable profitability. If "core samples" tested under this TVA service disclose commercial potentials, national governments will be expected to finance additional extensive testing. Missions are unable to forecast funding requirements, and LDCs are reluctant to undertake geological surveys with such a low-probability rate and normally high costs for testing. The cost of developing numerous PIO/Ts by individual Missions might exceed the proposed \$15,000, and involve a great deal of paper work and bureaucratic red tape.

## 6. Testing Experimental Fertilizers

New fertilizers offer potential savings through better performance in the field, higher concentration with reduction in shipping and handling costs and utilization of lower cost raw materials or less expensive processes. Such new materials are being produced and tested in the U.S. Supplying them to the LDCs and assisting in their evaluation may lead to savings and will certainly increase the competence of research personnel, one of A.I.D.'s stated goals.

## 7. Technical Support Activities

Requests for assistance from Missions and Governments of LDCs, Regional Bureaus, Central Engineering and TA/AGF are covered under this item. This includes sending advanced teams to LDCs to aid in solving specific problems in manufacture, distribution, marketing and use of fertilizers; supplying information for planning or to be used in publications; evaluation of specific proposals for production, marketing and use of fertilizers in the LDCs and identifying new processes, methods or systems which will have applicability in the LDCs.

This support applies directly to the need of the LDCs for assistance and A.I.D.'s commitment to it as expressed in PD-41. Assessment of overall need will provide the basis for establishing goals and selecting the best means to achieve them. Investigation of a factory with low production can determine whether the cause is one of basic design, improper control or inadequate maintenance. The rapid growth in the amount of fertilizer to be moved has caused both physical and managerial problems. Supporting institutions, particularly those supplying production credit to the farmer but also inventory credit to the dealers, are not providing services to fit the need. Farmers still need more guidance to get profitable returns from the fertilizers they apply.

AGENCY FOR INTERNATIONAL DEVELOPMENT

**MANUAL TRANSMITTAL LETTER**

DATE  
July 31, 1969

NO.  
21:5

MATERIAL TRANSMITTED:

M.O. 1612.10.2 - A.I.D. Fertilizer Policy

This manual order codifies, without change, the A.I.D. Fertilizer Policy approved by the Deputy Administrator on November 27, 1968, formerly stated in Policy Determination 41.

SUPERSEDES:

M.O. 1612.10.2 (PD-41) (TL 21:3)

FILING INSTRUCTIONS:

1. Remove superseded M.O. 1612.10.2 (PD-41) (TL 21:3).
2. File the attached in its place.
3. Write the date, change the subject, and write the TL number of this manual order in the appropriate place on the Chapter Checklist.
4. Initial the Transmittal Check Sheet beside TL number 21:5

KEEP YOUR A.I.D. MANUAL UP TO DATE.

# MANUAL ORDER

## AGENCY FOR INTERNATIONAL DEVELOPMENT

|  |   |                              |
|--|---|------------------------------|
| SUBJECT<br><br><b>A.I.D. Fertilizer Policy</b> | EFFECTIVE DATE<br><b>July 31, 1969</b>                | ORD. NO.<br><b>1612.10.2</b> |
|  | TRANS. LETTER NO.<br><b>21:5</b>                      | PAGE NO.<br><b>1</b>         |
|  | SUPERSEDES<br><b>M.O. 1612.10.2 (PD-41) (TL 21:3)</b> |                              |

1. Introduction. This statement on fertilizer policy is intended to be fully consistent with the Agency's general agricultural policy set forth in M.C. 1612.10 - The War on Hunger: Guidelines for Planning and Programming A.I.D. Assistance in Agricultural and Related Sectors. M.C. 1612.10 recognizes that agricultural development requires a "package" of ingredients, including governmental policies, technology, institutions, and infrastructure, as well as physical inputs for production; and that these factors are interdependent and must move more or less in phase. The fact that this policy statement singles out fertilizer for special treatment implies no judgment on its relative importance among these ingredients. It mainly reflects the importance of the commodity in A.I.D. financing - both for imports and for plant construction. This manual order considers fertilizer use in relation to the priority A.I.D. objective of providing adequate diets to the peoples of the developing world. The problem of increasing fertilizer use is seen to be primarily a problem of increasing effective demand; and the prime objective set for A.I.D. is to contribute to this end. The several measures directly related to enabling the farmer to obtain fertilizer are discussed. It should be clearly recognized at the outset, however, that effective demand for fertilizer will exist only when conditions permit the farmer to use it profitably. The farmer must be able to sell his produce at a price which provides an adequate incentive for him to buy and use fertilizer. The following policy guidance should be interpreted in the light of these considerations.

### 2. Supply and Demand 1967-1975

#### a. Findings

(1) Total world fertilizer-production capacity in 1967 was 55 million tons, substantially in excess of total consumption of 50.7 million tons. The ratio of potential production to consumption was 1.10 in 1967, is expected to rise to 1.14 in 1970, and then to fall off rapidly to 1.07 in 1972. If the free world is considered separately (a procedure which is not fully satisfactory, since a part of Communist requirements are met from free-world sources), the margin of potential production over consumption is larger - 45.1 to 36.7 million tons. The ratio of 1.17 in 1967 remains the same in 1972. A

substantial amount of additional plant is scheduled for construction in the free world during the period 1967-1972, and LDC capacity is expected to rise from 3.9 to 9.4 million tons a rate of increase exceeding that expected in the developed countries. The situation after 1972 cannot be predicted with any confidence. On the basis of present indications, however, excess capacity will diminish rapidly, and a deficit could develop by 1975. Long-term estimates of supply and demand are important because of the long lead time required to bring new fertilizer plants from the initial planning stage to full production. This lead time is around three years in the U.S., and up to five years in the LDCs.

(2) The most uncertain factor in forecasting future demand is the rate of growth of fertilizer use in the LDCs. Use has been increasing at 16% per year during the past five years, and this has been an essential element in the success of the "Green Revolution." However, total consumption by the LDCs of some 6.2 million tons in 1967 (nearly half from imports) was only 9% of that of the developed countries on a per capita basis, and 14% on a per hectare basis. The future rate of growth in the use of fertilizers in the LDCs cannot be predicted on the basis of objective data or by projecting long-term trends, because none exists. The growth rate achieved will depend, within fairly wide limits, on difficult policy decisions, separately arrived at in a score or more of developing countries, and on the energy and determination with which these decisions are carried out. It will be markedly affected, also, by the policy of A.I.D. and other donors.

#### b. A.I.D. Policy

(1) The availability of new high-yielding cereal varieties provides an unprecedented opportunity to increase food production in the developing countries and to improve the substandard diets of hundreds of millions of peoples. These high-yielding varieties are effective only when heavily fertilized, and if their potential is to be adequately exploited, there must be no slow-down in the rate of growth of fertilizer use in the LDCs. It is estimated that if the growth rate of the past five years is maintained, together with necessary accompanying measures, food production could be raised sufficiently by 1975

| NO.       | PAGE NO. | EFFECTIVE DATE | TRANS. LETTER NO. | A.I.D. MANUAL ORDER |
|-----------|----------|----------------|-------------------|---------------------|
| 1612.10.2 | 2        | July 31, 1969  | 21:5              |                     |

permit most countries to meet the FAO consumption standard.

(2) As a guide to planning, A.I.D. should establish this as an overall goal - i.e., continuing increase in fertilizer use in the LDCs at a compound annual growth rate of 16%.

### 3. The Creation of Effective Demand

#### a. Findings

(1) Difficult as it will be to finance fertilizer in the amount mentioned above, the creation of conditions necessary to its effective use will have to overcome more complicated problems. These problems ramify through the economic, political, and social structure of the developing country; and this manual order does not attempt to explore them fully. There are four elements of such critical importance, however, that they must be taken into account. These are incentives, credit, knowledge (which includes research, training, and education), and distribution.

(2) These factors are, of course, important for agricultural development in general, and success in dealing with them, as with most aspects of economic development, will depend primarily on the efforts of the developing country itself. However, A.I.D. can encourage governments to focus these problems, and can help those which do.

b. A.I.D. Policy. A number of resources and instrumentalities are available to the Agency to promote general agricultural development and specifically to help create effective demand for fertilizer. These include P.L. 480 and fertilizer-loan agreements, the potential of private industry, and the Agency's technical-assistance capability. They should be used to encourage constructive actions in the following areas:

(1) Incentives. Experience has shown that the remarkable fertilizer response of the new high-yielding varieties tends to encourage experiments with its effect on other crops. The Agency's program to expand the use of the new varieties is proving to be one of the most effective ways to increase fertilizer use. The creation of the relation between the cost of fertilizer inputs and the price of farm produce needed to encourage fertilizer use may require changes in government policies (e.g., the elimination of import duties, of controls on food prices, and other deterrents), and may cost money. The potential of P.L. 480 and fertilizer-loan agreements to induce policy changes needed to create incentives to fertilizer use and to finance costs incidental to such measures should be fully exploited.

(2) Credit. A.I.D. should support the development of agricultural credit institutions and improved agricultural credit for financing improved inputs, linking credit to marketing of crops produced with it. Encouragement should also be given to the development of bank credit to private distributors to finance inventories. (Availability of credit to small stores for purchasing fertilizer has been a main feature in the success of the Philippine program.) In some cases it may be desirable to seek agreement of the host country to commit part of the local currency proceeds of P.L. 480 or fertilizer loans to the financing of agricultural credit institutions.

(3) Research, Training, and Education. A.I.D. should mount an expanded, systematic effort to increase available knowledge concerning major- and minor-element fertilizer response of various soil types and plant varieties, and the effects of various techniques of water management. This should be an integrated effort, utilizing such resources as the T.V.A., the Land Grant Universities, and the U.S.D.A. cooperative efforts between various agricultural research centers - national and international - should be encouraged. The Agency should strengthen its efforts to build local competence in research, and to improve the agricultural extension services of the developing country, which will have the major responsibility for making knowledge of fertilizer use available to the farmer. Expansion of agricultural training at all educational levels should be encouraged.

(4) Distribution. In general, the Agency should promote the distribution of fertilizer through private channels. Recognizing that in many LDCs, the scale of operations will not support a business limited to this activity, the Agency should encourage combined operations, with credit, and with improved seed and insecticides. A stronger effort should be made to enlist more active cooperation of the American fertilizer industry in programs designed to increase fertilizer use, particularly in fertilizer demonstration programs, and in marketing and distribution. The Agency should experiment with contracts with private industry to establish local distribution systems and train personnel, as ESSO has done in the Philippines and Central America.

### 4. Meeting Increased Demand

#### a. Findings

(1) The major portion of the fertilizer production capacity of 5.73 million tons which now exists in the LDCs has been created in the past few years. Although plant construction costs are higher than in the developed countries,

and plants normally operate at less than 70% of rated capacity (as compared with more than 90% in the developed countries), in the aggregate, fertilizer production in the LDCs is a paying proposition, and effects significant savings in foreign exchange.

(2) If an overall growth rate of 16% per year in the use of fertilizer is to be maintained, there must be increases both in LDC production capacity and in imports. Varying estimates have been made concerning the cost of constructing fertilizer plants in the LDCs; a rough average of \$400 per annual metric ton of plant nutrients provides an indication of magnitude adequate for the purposes of this paper. (This figure includes warehousing; railroad cars, or equivalent; and distribution outlets as well as actual mines and plants; but makes no allowance for infrastructure such as port facilities, railroads, etc.) On the basis of present relatively firm investment plans, T.V.A. estimates that the total fertilizer productive capacity of the LDCs in 1972 will be 9.4 million tons - an increase of 5.5 million tons over the 1967 level. This represents a growth rate of a little better than a million tons per year. Assuming a continuation of this rate of growth through 1975, productive capacity then would be 12.7 million tons, or 8.6 million tons over the 1967 level. Applying the factor of \$400 a ton for installed capacity, it can be calculated that the addition of 8.6 million tons will require a total investment of about \$3.5 billion of which, say, \$2.5 billion would be in foreign exchange, and \$1 billion in local currency. If a production rate of 75% is assumed, 12.7 million tons of production potential would yield about 9.5 million tons of fertilizer - or just 50% of the proposed annual target of 19 million tons. Meeting the remaining 9.5 million tons needed to reach the target by imports would cost \$1.7 billion per year.

b. A.I.D. Policy. The continuation of the "Green Revolution" requires the availability of increasing quantities of fertilizer. In a period of exceptional financial stringency, exceptional efforts will be needed to assure that quantities needed are available. Policy must take account of A.I.D.'s own fund shortages, as well as the difficulties of the LDCs in meeting their foreign-exchange requirements.

(1) Although the construction of uneconomic facilities should not be encouraged, reasonably efficient local production which reduces import requirements and conserves foreign exchange will usually be desirable. The immediate emphasis in this area should be on the provision of technical assistance which will enable the LDCs to raise their present low level of production closer to rated capacity.

(2) Investment in fertilizer plants should normally be financed by private enterprise, but A.I.D. should stimulate, promote, and support such investment.

(3) A.I.D.'s funds for fertilizer procurement should be managed for maximum impact. This will require relating fertilizer supplied more effectively to the specific soils and crops on which it is to be used, and this in turn will require an improvement in A.I.D. operations. (See paragraph 5.)

#### 5. Improving A.I.D.'s Effectiveness, and Mobilizing Other Assistance

a. Findings. A.I.D.'s total expenditures for fertilizer procurement are now running close to \$200 million per year; the Agency has lent over \$100 million to fertilizer projects, has covered \$40 million of investment in fertilizer plants with extend risk guarantees, and has issued \$170 million of political-risk guarantees. In spite of these large-scale operations, the Agency itself has limited competence in this field. It is fortunate in being able to call on the services of the T.V.A., which is uniquely qualified in matters of production and plant design, and whose activities and competence in the international field have steadily increased over the past few years. It is anticipated that there will be an increased need for these services in the future.

#### b. A.I.D. Policy

(1) The responsibility for performing a major part of the actions recommended in this manual order will fall to cooperating agencies, including the T.V.A. The Agency's financial support of these agencies will need to increase significantly over the next several years. These expanded activities on the part of the T.V.A. will make the Authority more than ever what it has already in fact become--the world's only international center for fertilizers. It would be desirable to recognize this unique qualification by an appropriate descriptive name. For example, personnel engaged primarily in activities abroad might be called the "International Fertilizer Development Staff," or some similar designation.

(2) The cooperation of the American fertilizer industry in expanding and increasing the effectiveness of fertilizer use in the LDCs should be more effectively enlisted. Arrangements should be made with companies seeking investment guarantees on fertilizer plants for their undertaking some advance work in building the market and developing a distribution system. Possibilities of enlisting companies from which

|                  |               |                                 |                         |                     |
|------------------|---------------|---------------------------------|-------------------------|---------------------|
| NO.<br>1612.10.2 | PAGE NO.<br>4 | EFFECTIVE DATE<br>July 31, 1969 | TRANS. LETTER #<br>21:5 | A.I.D. MANUAL ORDER |
|------------------|---------------|---------------------------------|-------------------------|---------------------|

A.I.D. procures fertilizer in technical-assistance activities of this sort should be fully explored.

(3) In the past few years, the United States Government has conducted a campaign to increase the awareness of other donor countries and appropriate international organizations of the urgency of the food/population problem in the LDCs, and of the need for increased external assistance in this area. These efforts have had a measure of success, but the potential has not as yet been fully exploited.

(a) The 1967 initiative of the O.E.C.D. in fertilizer should be pursued, and attention given to the question of when demand will begin to catch up with supply and to opportunities for profitable investment in the LDCs.

(b) A.I.D. should review the problem of financing fertilizer plants with the I.B.R.D., and should explore the possibility of developing some form of World Bank-Government-Private Industry program parallel with consortia or consultative groups.

(c) The efforts of the various regional banks in the agricultural field should be reviewed, and the possibility of their doing more to finance fertilizer procurement and the construction of new plants explored.