3880024 ②
PD-AAF-027-B1

388-024

UNCLASSIFIED

DEPARTMENT OF STATE
AGENCY FOR INTERNATIONAL DEVELOPMENT
Washington, D.C. 20523

PROJECT PAPER

Proposal and Recommendations
For Review

FY 1978, 1979, 1980, 1981 and 1982

BANGLADESH : Fertilizer Distribution Improvement Grant

UNCLASSIFIED

3880024 (2)
PD-AAF-027-B1

AGENCY FOR INTERNATIONAL DEVELOPMENT

PROJECT PAPER FACESHEET

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9. ESTIMATED DATE OF OBLIGATION: A. INITIAL FY 78; B. QUARTER 3 (Enter 1, 2, 3, or 4); C. FINAL FY

10. ESTIMATED COSTS ($000 OR EQUIVALENT $1 –)

A. FUNDING SOURCE	FIRST FY B. FX	FIRST FY C. L/C	FIRST FY D. TOTAL	LIFE OF PROJECT E. FX	LIFE OF PROJECT F. L/C	LIFE OF PROJECT G. TOTAL
AID APPROPRIATED TOTAL						
(GRANT)	(40,000)	(10,000)	(50,000)	(225,500)	(24,500)	(250,000)
(LOAN)	( )	( )	( )	( )	( )	( )
OTHER U.S. 1.						
OTHER U.S. 2.						
HOST COUNTRY	-	100,000	100,000	-	655,000	655,000
OTHER DONOR(S)	60,000	10,000	70,000	390,000	70,000	460,000
TOTALS	100,000	120,000	220,000	615,500	749,500	1,365,000

11. PROPOSED BUDGET APPROPRIATED FUNDS ($000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	PRIMARY TECH. CODE C. GRANT	PRIMARY TECH. CODE D. LOAN	E. 1ST FY 78 F. GRANT	E. 1ST FY 78 G. LOAN	H. 2ND FY 79 I. GRANT	H. 2ND FY 79 J. LOAN	K. 3RD FY 80 L. GRANT	K. 3RD FY 80 M. LOAN
(1) FN	130	011		50,000		50,000		50,000	
(2)									
(3)									
(4)									
TOTALS									

A. APPROPRIATION	N. 4TH FY 81 O. GRANT	N. 4TH FY 81 P. LOAN	Q. 5TH FY 82 R. GRANT	Q. 5TH FY 82 S. LOAN	LIFE OF PROJECT T. GRANT	LIFE OF PROJECT U. LOAN
(1) FN	50,000		50,000		250,000	
(2)						
(3)						
(4)						
TOTALS						

12. IN-DEPTH EVALUATION SCHEDULED: MM 05 YY 79

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2 (1 = NO, 2 = YES)

14. ORIGINATING OFFICE CLEARANCE

SIGNATURE

TITLE: Joseph S. Toner, Director

DATE SIGNED: MM 05 DD 05 YY 78

15. DATE DOCUMENT RECEIVED IN AID/W, OR FOR AID/W DOCUMENTS, DATE OF DISTRIBUTION: MM 05 DD 08 YY 78

AID 1330-4 (3-76)

Bangladesh
Fertilizer Distribution Improvement Grant
FY 1978, 1979, 1980, 1981 and 1982
Project Paper

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BANGLADESH

FERTILIZER DISTRIBUTION IMPROVEMENT GRANT

Definitions of Rates, Weights and Terms

Currency

US Dollar $ 1.00 = Taka 15.0

Weights

One Maund = 40 Seers = 82.2 pounds
Metric Ton (MT) = 2,204.6 pounds (26.82 Maunds)
Long Ton (Ton) = 2240 pounds (27.25 Maunds)
(Since all BADC records are in long tons this measure is widely used in this PP.)

Fertilizers

Monoammonium Phosphate (11-55-0) = MAP
NPK = Symbols of Nitrogen, Phosphate, and Potassium respectively
Complex fertilizers containing, in any combination, Nitrogen, Phosphate, and Potassium = N -P-K
Ammonium Sulphate (20.5-0-0) = AS
Urea (46-0-0 or 45-0-0)
Triple Super Phosphate (0-46-0) = TSP
Muriate of Potash (0-0-60) = MP
Diammonium Phosphate (18-46-0) = DAP
Rock Phosphate = The component of TSP which provides the phosphate content.
Hyper Phosphate = HP
Super Phosphate = SP

Rice Seasons - Approximate

Aus season (about one-third of the total paddy acreage). Aus seeding is done between mid-March and beginning May; the crop is harvested between beginning July and mid-August.

Aman season (nearly 60 percent of the total paddy acreage). Seedlings are raised in June-July; the crop is harvested between mid-November and end-December.

Boro season Seeds are planted from November on; the crop is harvested between the end of April and May.

Government Administrative Data

Divisions	=	Four nationwide
Districts	=	19 (20 Agricultural)
Thanas	=	420; size about 100-150 square miles each
Unions	=	4,000 (plus); about 10 per thana
Villages	=	Approximately 15 per union; 65,000 nationwide.

Land

Bigha — A unit of land. The size of a bigha varies over Bangladesh from about one-third acre to one-half acre. In this paper one bigha is used as one-third acre. (.135 hectare).

Organizations

Bangladesh Agricultural Development Corporation (BADC) - Government Corporation responsible for supplying all agricultural inputs.

Bangladesh Chemical Industries Corporation (BCIC) - Government Corporation in charge of domestic fertilizer manufacturing, among other responsibilities.

Bangladesh Inland Water Transport Corporation (BIWTC) - Government common carrier for water transport.

Integrated Rural Development Program (IRDP) - Government agency charged with rural development, principally directed through multipurpose cooperatives.

Thana Central Cooperative Associations (TCCAs) - Thana level cooperative groups.

International Fertilizer Development Center (IFDC) - Organization established on the grounds of the Tennessee Valley Authority (TVA) in Alabama, USA.

Others

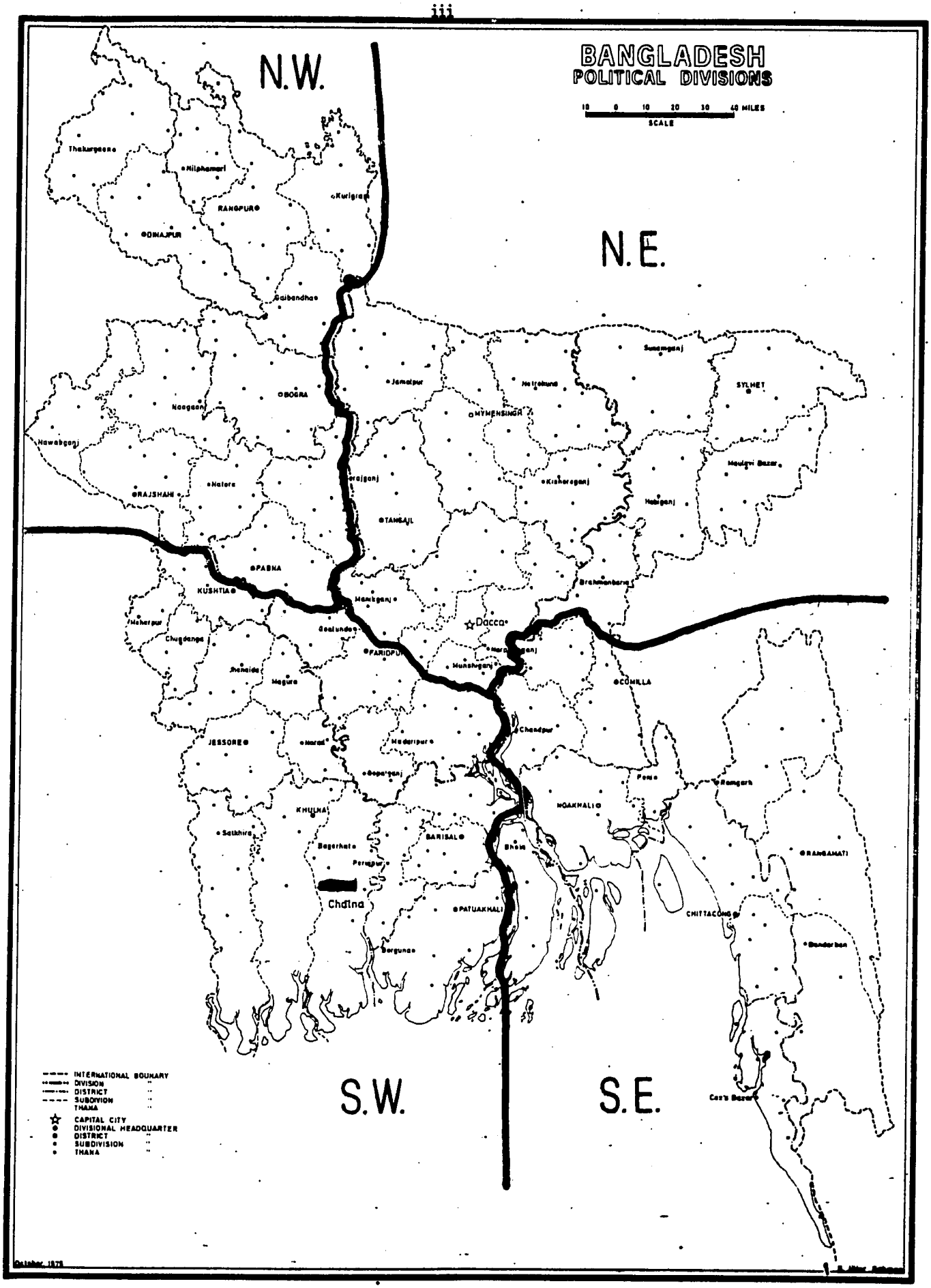
Ashuganj Study - Bangladesh Fertilizer Distribution and Marketing Study - Final Draft - September 1977.

Godown - Warehouse

Paddy - Rice which is either growing, or cut or unmilled. In the unmilled form it is approximately 67 percent rice and 33 percent chaff.

Crop Year - From July 1 to June 30

Borgadar - Sharecropper.


BANGLADESH
POLITICAL DIVISIONS
10 0 10 20 30 40 MILES
SCALE
N.W.
N.E.
S.W.
S.E.
Thakurgaon
Nilphamari
Kurigram
RANGPUR
DINAJPUR
Gaibandha
BOGRA
Naogaon
Nawabganj
RAJSHAHI
Natore
Jamalpur
Netrokona
Sunamganj
SYLHET
MYMENSINGH
Maulvi Bazar
Kishoreganj
Habiganj
TANGAIL
PABNA
KUSHTIA
Manikganj
Brahmanbaria
Dacca
Meherpur
Chuadanga
Gopalganj
FARIDPUR
Munshiganj
Narayanganj
Jhenaida
Magura
COMILLA
Chandpur
JESSORE
Narail
Madaripur
Feni
Rangamati
NOAKHALI
KHULNA
Satkhira
Bagerhat
BARISAL
Bhola
RANGAMATI
Pirojpur
Chdina
PATUAKHALI
CHITTAGONG
Bandarban
Barguna
Cox's Bazar
INTERNATIONAL BOUNARY
DIVISION "
DISTRICT "
SUBDIVISION "
THANA "
CAPITAL CITY
DIVISIONAL HEADQUARTER
DISTRICT "
SUBDIVISION "
THANA "
October, 1979

FERTILIZER DISTRIBUTION IMPROVEMENT GRANT

Part I Project Summary and Recommendations

A. Recommendations

(1) Grant Financing

FY 1978	$ 50,000,000
FY 1979	50,000,000
FY 1980	50,000,000
FY 1981	50,000,000
FY 1982	50,000,000
	$ 250,000,000

(2) Fertilizer purchases from Code 941 countries.

B. Project Description

The project purpose is to increase fertilizer use on an equitable basis. Achievement of this purpose will require the removal of supply and demand constraints.

The project addresses import constraints on the supply side: inadequate fertilizer imports; inefficient internal distribution; restraints on private fertilizer retailers; and an absence of private fertilizer wholesalers. The one other constraint on the supply side, that of local production, is addressed by the Ashuganj Project (in which AID is participating) and by a number of other donor efforts at the existing factories.

On the demand side, the constraint is inadequate incentives to the adoption of HYV technology (including fertilizer) by small farmers. This constraint will have to be addressed if the benefits of removing the supply constraints are to be realized. The project does not deal directly with the demand constraints. However, other elements of Mission policy aim to impove the financial

position of sharecroppers and small farmers so that they can afford such investments. This involves, first, the support of farmgate prices at harvest time, both through an effective foodgrain procurement program and a phasing down of the public food distribution system; and second, the provision of low cost institutional credit to small farmers. The combination of these factors will ensure sufficient profit incentives to the adoption of HYV technology.

C. Statutory Criteria and Mission Director's Certification

The project meets all applicable statutory criteria; the statutory checklist is attached hereto as Annex E. The Mission Director has certified that Bangladesh has the capability to maintain and utilize the project effectively; the certificate is contained in Annex F.

D. Project Issues

The central issue is whether the BDG is committed to an agricultural strategy which will enable the rapid expansion of fertilizer use, especially among small farmers. The Government has indicated to AID that it will take the necessary steps to assure: (1) the availability at all times of adequate in-country supplies of fertilizer; (2) implementation of marketing reforms; (3) improvement of transportation and storage facilities; and (4) adequate financial incentives to small farmers.

Concerning the marketing effort, the basic question is the speed with which the private sector will assume the BADC's present role in fertilizer distribution and marketing.

A description of the fertilizer distribution system upon completion of the project in 1983 is presented in Part II. B. 3. Briefly, BADC will have released most of its 423 thana warehouses and will be selling fertilizer only in the most remote thanas and from primary distribution points (See Annex B. 11). These points will be strategically located along the major transport routes in such a way that the private sector will be able to sell fertilizer in the maximum number of areas. All restrictions on private movement of fertilizer within Bangladesh will have been eliminated.

During the first year of the project, these reforms will be introduced in Chittagong Division which accounts for approximately one quarter of the area of Bangladesh. To the extent they are successful they will be extended to the entire country. The adoption of these reforms nationwide is a condition precedent to additional disbursements under the Grant Agreement.

E. Project Committees

USAID Project Committee

Dean Alter, AGR, Chairman
Emory Howard, AGR, Member
Richmond Allen, PRO, Member
Phil Church, PRO, Member
Clarence Groceman, ENGR, Member
Gene McCoy, CONT, Member
Doug Robertson, RLA, Member

AID/W Project Committee

Part II. Project Background and Detailed Description

II.A. Project Background

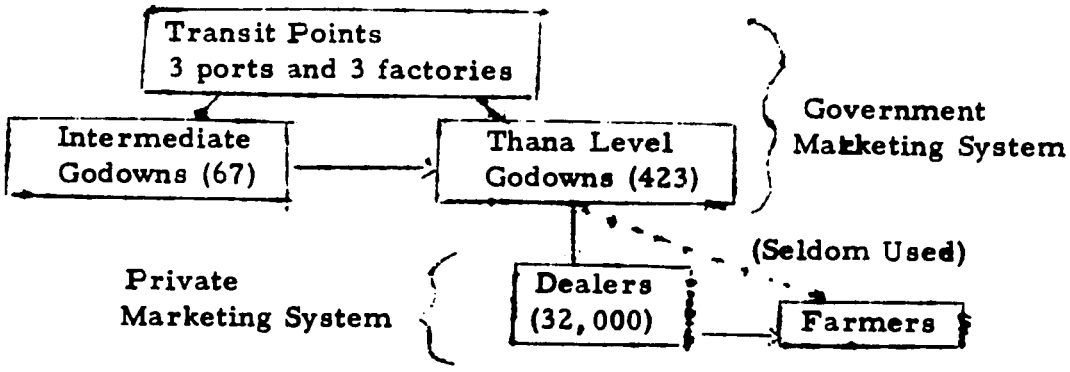
II.A. 1 Development of Fertilizer Use in Bangladesh

From 1951-52 through 1961-62 fertilizer sales of ammonium sulphate (mostly for the tea gardens of Sylhet) grew from 2,698 tons to 28,300 tons. The use of other fertilizers during this period was almost nil. Urea was not introduced until 1957-58 and by 1961-62 its sales were only 24,398 tons. In the same year, TSP sales were only 6,055 tons and MP sales were non-existant. No other fertilizers were sold.

This dismal picture began to change rapidly in 1962-63 with the establishment of the then East Pakistan Agricultural Development Corporation (EPADC - now BADC). As can be seen from a glance at Annex B.1, fertilizer sales have grown steadily in all years except 1971-72 and 1974-75 when the Liberation War and the explosion in the Ghorasal Urea Factory, respectively, disrupted conditions beyond the control of BADC. Sales in 1976-77 totaled 507,000 tons including 349,000 tons of urea, 124,000 tons of TSP and 22,000 tons of MP.

The BADC has built up a system of fertilizer distribution which can be most conveniently illustrated by the following diagram.

Fertilizer Distribution in Bangladesh:



The fertilizer originates either at the factory or at the port. Then most often it is transported to an intermediary warehouse but not infrequently it is moved directly to the thana warehouse. Up to this point the movement is in the public sector, but at the dealer level the fertilizer enters the private sector. There is a provision for sale from the thana warehouse directly to the farmer, but very few farmers avail themselves of this opportunity because, for the small quantities they require, the transport and paper work formalities (i.e., obtaining a bank draft) present an inconvenience. Presently the price from the dealer to the farmer is set at equal to the price which would be charged to the farmer if he were to purchase directly from the warehouse.

To understand the development of fertilizer use in Bangladesh one must focus on the operations of the dealers. These have been and still are considerably controlled by BADC. The average thana contains 125 square miles and is divided into ten unions of 12.5 square miles each. Dealers are required to register at the thana warehouse located in the thana where they are resident. They may purchase fertilizer from the warehouse in their thana or an adjacent thana if such a warehouse preferred by them to reduce transport costs. Each dealer is restricted to selling within his distance category and union. Since many unions fall entirely within one distance category and there are an average of 8 dealers per union, the system does allow for some competition between dealers.

At present the distance categories are set at zero to six miles and above six miles from the thana warehouse. Dealers up to six miles receive a discount of four takas per maund on the retail price of fertilizers and dealers beyond six miles receive six takas per maund discount. This means that the active dealer (of which there are an estimated 20,000) selling on average 25 tons per year makes a gross profit of between 2680 and 3350 takas per year. In the Ashuganj Study 1/ it is estimated that after expenses the average net profit is 600 takas per year ($40 per year).

1/ See II. A. 2 below.

All of the storage space at the transit points and the intermediary warehouses is held by BADC. The same is true in most of the thanas but an exception exists in approximately 80 thanas where the cooperatives sell fertilizer at the thana center level. In many of these thanas BADC has turned its thana warehouse over to the cooperative. But in all cases the dealers are still appointed and controlled by BADC.

On the BADC organizational side each thana warehouse is staffed by a thana inspector, a storekeeper, a tally clerk, and several guards. The thana inspector is in overall charge of the warehouse and is responsible for inspection of each dealer's facilities, records, and general operations. The storekeeper is responsible for sale of fertilizer from the warehouse and record thereof. The tally clerk is an assistant to the storekeeper.

Each thana inspector reports to a sub-divisional manager who reports in turn to a district manager. The 20 district managers report to 4 divisional managers. The entire operation is of course controlled from headquarters.

This basic system including BADC sale to private dealers at the thana level was created very early in BADC's existance and has changed very little in the last 10-12 years. This is the context in which fertilizer usage has increased so far.

II.A.2 Studies of the Fertilizer System

A large number of studies have been conducted of the Bangladesh fertilizer system. Taken collectively they provide comprehensive information on almost all aspects of fertilizer production, import, distribution and marketing. As such they provide a very solid basis for taking positive action as described in Part II.B. Detailed Description below.

The landmark study of the pre-liberation period is the East Pakistan Government's own study outlining objectives and targets for the Plan Period from 1970-71 to 1974-75. This study is on a fairly comprehensive scale including assessments of fertilizer use and need, mixed fertilizer, targets, soils research, purchase, movement, storage, subsidy, flood control, irrigation, credit, pest control, agricultural support prices, agricultural extension, dealers commission, fertilizer bulk import, two to three year import

programming, increased dealer's commission, private sector participation in fertilizer sales, and others. Most of the objectives and recommendations of this report hold as true today as they did in 1970.

The Bangladesh Fertilizer Situation, prepared for AID by TVA in October 1974 was the next major study. The report assembled a great deal of useful data on fertilizer imports, marketing, manufacturing and distribution. However, it fell short of resolving a number of important practical points touching upon existing constraints to increased fertilizer use and attainable objectives to remove these constraints.

In an attempt to address a number of these problems BADC and AID jointly conducted the 1976 Pilot Distribution Program the results of which were summarized in the FY 1977 Agricultural Inputs III Project Paper. Briefly, the pilot addressed improvement in distribution and sale of fertilizer at the level of the farmer, the point of consumption. Items tested included a flexible price mark-up to dealers to provide a greater profit incentive, the right on the part of the farmers to buy small amounts directly from the BADC thana warehouse, establishment of a reserve stock at thana or intermediate level, the right of farmers to buy from any dealer, and a limited testing of open dealerships. A further component was later added to permit dealers to sell at the local "hats" or markets, i.e., away from their own shops.

The result has been that BADC has taken implementing action with respect to the following:

a. Increasing incentives to fertilizer dealers including implementation on test basis of a quantity discount for increased fertilizer purchase;

b. Permitting farmers to buy up to a stated amount of fertilizer directly from BADC warehouses;

c. Allowing farmers to buy from any dealer whether or not in the farmer's own thana or union;

d. Optimizing the number of dealers at union level, including simplifying the dealer application process;

e. Regularizing sales at local markets (hats) to permit dealers to sell at such hats within the union and distance category in which the dealer is resident;

f. Permitting dealers to buy fertilizer from the nearest BADC thana warehouse even if it is not located in the same thana where the dealer is located.

By far the most comprehensive recent study on fertilizer in Bangladesh has been the Bangladesh Fertilizer Marketing and Distribution Study (herein referred to as the "Ashuganj Study") published in final draft in September 1977. The Ashuganj Study was prepared by the associated firms of the Economist Intelligence Unit (EIU), Carl Bro International A/S, and Operations Analysis Corporation A/S. The Ashuganj Study in some four volumes and stretching to a total of 950 pages covers nearly all aspects of fertilizer distribution and marketing in Bangladesh. Quotations from the report in this PP have been taken based on the prior permission of BADC and EIU, given at the time of the Interim Report.

Numerous other reports and assorted other information are available relating to fertilizer use in Bangladesh. To list just a few - (1) under Ford Foundation funding, Arthur D. Little, Inc. has published a report and proposed work plan on Management Information System (MIS) for BADC; (2) the CRUX, Inc. has published reports on general inventory and financial management in BADC; (3) under AID financing Frederic R. Harris Inc. prepared the Site Selection Report for fertilizer bagging; (4) USAID with the assistance of Frederic R. Harris Inc. conducted a study of fertilizer transportation in Bangladesh, the results of which are summarized in Annex B.10 hereto; and (5) the BADC working in late 1977 and early 1978 through each District Manager collected further information on the storage needs in each district and thana.

II.A. 3 The AID Role

During the 1960's AID played a leading role in encouraging fertilizer use in the then East Pakistan and financed a large proportion of the fertilizer imports into East Pakistan. The above mentioned East Pakistan Government study for fertilizer for the period 1970-71 to 1974-75 gives special treatment to the fact that "foreign exchange funds ..... for USAID" must be requested "one year or 15 months before estimated arrival at Chittagong/Khulna".

In the period from the Liberation War up to 1976, AID financed a total of 178,321 MT of urea, 231,590 MT of TSP, 40,000 MT of rock phosphate and 10,000 MT of MP. Financing for these amounts was provided under the Relief and Rehabilitation Grant and the Agricultural Inputs I and II Projects (388-T-001 in FY 1974 for $25 million and 388-T-002 in FY 1975 for $30 million).

Presently there exist two active fertilizer projects to which this one is follow on.

The Fertilizer Storage Construction Project (388-0030 in FY 1976 for $5.25 million) is presently estimated to provide 75 percent FAR financing for the construction of 40 fertilizer warehouses with a total capacity of 42,000 tons. Construction at many of the sites has already begun. Final completion of all work is scheduled for no later than May 1979.

The Agricultural Inputs III Project (388-0035 in FY 1977 for $27.5 million) is financing primarily the import of 80,000 tons of urea and 82,000 tons of TSP which have arrived in Bangladesh during the period from February to May 1978.

Preparation for the Fertilizer Distribution Improvement Grant PP included the submission to AID/W in October 1976, of three separate PRP's, one each for Agricultural Inputs, Fertilizer Storage, and Bulk Handling. In its approval message for these PRP's, AID/W instructed USAID to consolidate them into one project entitled Fertilizer Distribution Improvement Grant, to formulate a more unified approach to fertilizer in Bangladesh and to address a series of issues vital to improving fertilizer distribution.

This has been the approach taken in this PP: the systems improvement aspect has been developed as a result of need to take positive action on many issues raised in the PRP approval message; bulk and bagged storage have been treated together in the storage aspect; and fertilizer imports form the third aspect. This formulation is considered to be in conformity with AID/W's instructions and consistent with AID's historical role of support to increased fertilizer use in Bangladesh.

II. B. Detailed Description

II. B. 1 Goal and Purpose

The program goal is increased foodgrain production, especially by small farmers. Indicators for this goal will be foodgrain production, and participation by type of farmer in foodgrain production. The project purpose is increased use of fertilizer on an equitable basis, to be indicated by BADC offtake data and fertilizer use by type of farmer.

The East Pakistan Government's study of fertilizer for the Fourth Plan period from 1970-71 to 1974-75 stresses that, "the single biggest factor that can help raise the production levels of crops is the use of fertilizer. It is generally accepted that production can be increased anywhere by..... 50 percent by the use of fertilizers". The paper estimates on a per crop and per acre basis that the agronomic requirement for fertilizer in Bangladesh is 2.8 million tons of product per year 2/. The benefit of increasing fertilizer use from 0.5 to 2.8 million tons per year is conservatively estimated at 7.0 million tons of foodgrain per year - a 50 percent increase in national production.

The plan target recognized that attaining the full 2.8 million ton level could not be achieved in one five year period. Therefore, an increase from 340,000 tons to 1,165,000 tons was targeted between 1970-71 to 1974-75. As it turned out 507,000 tons was reached by 1976-77. The shortfall resulted from a number of factors including the 1970-71 war, the 1974 Ghorasal Factory explosion, and a general lack of unified approach to supply, storage, etc.

2/ This figure reflects the 1968-69 cropping pattern. Adjusted for the 1976-77 HYV use and cropping pattern the figure would be 4.6 million tons per year as can be seen from Annex B.12.

The Bangladesh Government now plans to establish a fertilizer strategy of similar magnitude with the full commitment of all concerned Government bodies. This fertilizer strategy will be in support of their more basic strategy of foodgrain self sufficiency. The central idea of the AID project in support of this strategy will be that AID, while planning (subject to availability of funds) for project grant financing over a five year period, will agree with the Bangladesh Government on a set of desirable five year objectives for the fertilizer sector. Progress in meeting these objectives will be evaluated each year prior to concluding an agreement for the succeeding tranche of financing.

AID assistance will include funds for consultant services, storage construction, and fertilizer purchases. Annual AID increments of fertilizer financing will provide the occasion for review of progress toward the project objectives, for targets to be raised if possible, or for policies or procedures to be changed.

II. B.2 Constraints

A number of constraints limit increased fertilizer use. It is believed, however, that they can be sufficiently removed to achieve sharp food production increases. Before proceeding to establish objectives, these constraints are listed so as to fashion the objectives in a manner designed to deal directly with the constraints. The constraints are:

(a) Erratic and uncertain supply from local production and import.

(b) Marketing constraints at the retail and wholesale levels, including inadequate financial incentives to the retail dealers and the complete absence of private wholesale dealers.

(c) Limited internal transportation and storage capability.

(d) Inadequate farmer incentives.

II. B. 3 Objectives

General

Quantity Increases in Fertilizer Offtakes

By type of fertilizer, five years' targets will be established in the range of 15 percent annual increase or to attain a level of about 1.3 million tons fertilizer sale per year by 1982-83. It is recognized (as discussed in the Technical Analysis below) that a sustained compounded 15 percent annual increase over five years is an optimistic target. But this target is based upon the endeavor to take vigorous action against all constraints below.

(a) For the Supply Constraint

(a) (1) Efficient Operation of Domestic Fertilizer Plants

Rapid completion of the Ashuganj Fertilizer Factory and optimization of existing plants. AID is participating in the Ashuganj Project and other donors (the Japanese and the World Bank) may assist at the existing factories. But the primary responsibility for effective action will rest with the BDG. In its review of more effective operation of domestic plants, the BDG will undertake a commitment to maintain constant adequate professional staff at all of its fertilizer plants.

The Bangladesh Government will undertake a comprehensive study of the best use of the TSP Factory facilities, whether it would be best to improve the facilities for TSP production, convert the factory to produce some other fertilizer, or to make partial or sole use of the facilities for fertilizer bulk imports. The Government is committed to make the best feasible use of the facilities considering all issues.

(a) (2) Establishment of a Mechanism for Adequate Imports

Funds for import will be programmed two to three years in advance. Plans will include building up to a stock of average five months supply and contingency funding will be identified against

the possibility that offtakes may substantially exceed target. The basic control mechanism will include key training in international fertilizer purchasing, product specification and strategies, and import programming plus two elements: (A) Monthly fertilizer situation reports, most probably prepared by BADC with copies to Ministry of Agriculture, donors and others and (B) Periodic fertilizer coordination meetings to be announced in the newsletters or otherwise and to which donors and appropriate government agencies will be invited. These meetings will be predicated upon a BDG commitment to maintain stocks and to purchase fertilizer with their own funds to maintain stock levels.

(b) For the Marketing Constraint

In a phased manner nationwide wholesale and retail competition between private fertilizer dealers will be introduced. Private dealers are here defined to include the cooperatives on an equal competitive basis with private individuals and businesses. The private marketing consultant team will work with BADC in developing the details of the wholesale system to be introduced during the first year in the Chittagong Division. The principles of this system are as follows:

- BADC will sell only from primary distribution points and from remote and inaccessible thanas in which it can be predicted that the private sector will not come forth adequately at first. In all other thanas, BADC will maintain its warehouses as observation posts only and not sell from them unless the market price rises excessively above the administered price.

- At the primary distribution points, BADC will begin sales at reduced wholesale rates for large (wholesale) quantity fertilizer purchases. Once the fertilizer leaves the BADC warehouses, however, its resale price will be unrestricted up to the administered price to the farmer.

- All private dealers (individuals, companies, farmer associations, cooperatives, etc.) will be permitted to purchase from all BADC warehouses.

- Private movement of fertilizer will be unrestricted except in the five mile border area.

- A system should be developed whereby private dealers can obtain sufficient credit from commercial banks and the Krishi Bank. BADC will assist the dealers in obtaining bank support.

- If and when private dealers set up their own trade organization, it will receive BADC's and the Marketing Consultant's support.

It is understood that this system can work well only in a satisfactory supply situation. To the extent this system is successful, it will be directly extended to the entire country.

(c) For the Transportation and Storage Constraints

(c) (1) Transportation

In the past fertilizer movement has been hampered by the priority assignment to movement of other commodities, especially foodgrain. Considering the economic advantage of fertilizer and the large increase in its use which is being attempted, the Government will assign an effective priority to fertilizer movement. In addition the Government will undertake a review of its water and truck fertilizer movement contracts with a view towards rationalizing them.

An indepth analysis of other aspects of fertilizer movement in Bangladesh is contained in Annex B.10. Interviews with World Bank representatives in Dacca in March 1978 indicated that, partially based upon the contents of this annex, they intend to explore a project addressing fertilizer transport in Bangladesh.

(c) (2) Storage

During the first two years of the project, AID will provide financial assistance for construction of bagging and storage facilities, considering five months in country stock and slack space to accommodate factory production. AID assistance will be for 80 percent of the estimated construction costs, with the BDG contribution set at 20 percent. In addition, the BDG will undertake at its own expense effective access to and maintenance of all owned storage and related facilities. During the last three years of the project the World Bank may undertake a fertilizer storage construction loan.

(d) For the Constraint Relating to Farmer Incentives

The cost of fertilizer is not high when viewed in proportion to a farmer's total input costs, notably credit costs. Nevertheless, many farmers are reluctant to undertake an investment in fertilizer given their already narrow profit margins and the uncertainties involved in crop production. This is especially true of tenant farmers who undertake all of the investment risk, yet must surrender one half of their crop to the landlord. For such farmers, assured delivery of fertilizer at a reasonable price will not necessarily lead to its use. They will use fertilizer (or introduce HYV technology) only if they can anticipate a profit sufficient to offset the ever-present threat of crop loss. The matter of farmer incentives is dealt with in detail in the Economic and Financial Analysis Section (Section III B). At this point we note the principal policy areas to be addressed, namely, credit costs and output prices.

(d) (1) Credit Costs

Institutional credit is cheap in Bangladesh, ranging from 11 to 17.5 percent per annum under the various programs now in operation. However, only 5 to 10 percent of Bangladeshi farmers have access to institutional credit, and for various reasons, including the general requirement of pesting land as collateral for institutional loans, it has gone almost exclusively to the larger,

relatively wealthy landowners. Sharecroppers and small landholders must obtain credit from friends, relatives or moneylenders at effective rates of at least 100 percent per annum. At such rates, the cost of credit is usually the farmer's largest single input cost item and a major factor inhibiting investment whether in fertilizer or in HYV seeds plus associated inputs.

AID is addressing this problem primarily through its Rural Finance Experimental Project, which will attempt to identify a channel for credit to relatively small farmers, including sharecroppers, in selected areas at rates ranging from 12 to 36 percent per annum. The project will test AID's belief that at some level above present institutional rates, but far below prevailing "street" rates, lenders can be motivated to lend to the small farmer, and moreover, will be able to do so on a profitable basis. The small farmer will have access to cheaper credit than at present, if not at the subsidized rates which in practice are not available to him anyway.

(d) (2) Output Prices

In the past, Bangladesh rice and wheat farmers have been largely at the mercy of a price cycle in which prices vary by as much as 40 percent between the time of the major harvest in December and January and the height of the lean season which occurs in October. Farmers, especially subsistence farmers lacking storage capabilities and cash resources to meet pressing needs, have had to sell their produce at the low prices prevailing at harvest time, then later purchase rice for their own consumption at far higher lean season prices. To even out this price swing, AID has urged a policy involving: (1) Government procurement of all rice offered during the main harvest seasons at a pre-announced price deemed adequate to ensure farmer incentives; and (2) open market sales to prevent runaway prices during the lean seasons. To buttress the Government's efforts in the procurement area, AID has urged a phasing down of the Government's Public Food Distribution System, whereby rationed rice and wheat is sold at below market prices to mainly urban, relatively affluent consumers, the object being to effect a transfer of urban purchasing power to the private market.

Encouraging progress has been made recently in the procurement area. In the 1977 Aman harvest just completed, the Government conducted a largely successful program. The program's success could be measured not so much by the number of tons of rice purchased, as by the fact that the market price of rice held within a few taka of the procurement price in most areas for most of the harvest season. This program undoubtedly had a contributory effect on the effective farmgate price which averaged some 35-40 percent above the 1975/76 season. Plans are now well-advanced for procurement of the Boro harvest beginning in May. However, with prevailing market prices substantially above the procurement price level as of this writing (end-April), actual procurement purchases may be minimal.

The Government has taken certain steps in the foodgrain distribution area during the past year. The size of the individual ration in most ration categories was reduced in May, 1977; ration prices were raised in December 1977; and an effort was launched (also in December 1977) to place an income ceiling on ration card holders. Despite such efforts, both ration offtakes and the apparent number of ration recipients have continued to rise. Based on the record, then, the Government has yet to demonstrate a clear commitment to a phasing down of the system. Heretofore, AID's efforts to secure reforms in the procurement and food distribution areas have taken the form of exhortations and of provisions written into the self-help portion of P. L. 480 Title I Agreements. If these efforts have had mixed results with respect to the key agricultural policy objective of price support as a means to promote farmer incentives, they have done little to address the other side of the pricing equation, namely the effect of high rice prices on the poor, including poor rice farmers who become rice purchasers during the lean season. It is believed that both objectives could be met through an appropriate use of the recently enacted P. L. 480 Title III legislation.

(d) (3) <u>P. L. 480 Title III Proposal</u>

The new P. L. 480 Title III legislation permits the extension of a multi-year foodgrain commitment, with repayment obligations reduced by the extent to which local currency proceeds are used

for agreed development purposes. Under the AID Title III proposal, the U.S. would provide a given quantum of foodgrain annually for a two-year period. In return, the BDG would undertake a program involving open market sales operations to constrain rice prices during the lean seasons (approximately March through April and August through October), and use of the proceeds for agreed development projects. Alternatively, the proceeds could be applied to support of agreed upon floor prices during the annual procurement drive. Whether or not the Title III proceeds were used wholly or in part in direct support of foodgrain prices, the Title III Agreement would provide for BDG procurement as required to maintain market prices at agreed support levels.

Given that (for largely technical reasons) open market sales are more effective than ration sales in restraining prices, the BDG would be expected to reduce the level of ration offtakes. Government subsidies would be reduced accordingly. For the small farmer and sharecropper, the benefit of the proposed Title III Program would be twofold. He would have the benefit of assured minimum prices during the harvest season, and he would receive protection, not now available to him, from unduly high prices in the lean season when he must purchase rice for his own consumption. His real income (and his ability and incentive to invest in fertilizer and HYV technology) would be enhanced accordingly.

III. A. 1 Systems Improvements

The systems improvement aspect of the project involves primarily the creation of the new private sector fertilizer marketing system as described in Part II. B. Secondly, it provides for the selective strengthening of the remaining parts of the public sector fertilizer purchase and distribution system. Implementation of both aspects will be the primary responsibility of the BDG, especially BADC. Technical consultants will be required to monitor and assist in this effort (Annex B. 7).

For the private sector aspect, the primary tasks will be establishing new pricing and regulations, turning over BADC thana warehouses to private operation, monitoring private sector sales, and assisting wholesale and retail dealers in identifying and solving their problems. The principal objective is the development of competition and enterprise among private merchants, cooperatives, and farmers' associations.

For the public sector aspect, improvements are needed in five key areas to ensure the supply of fertilizer from the primary distribution points to the private marketing system: (1) international purchase strategy and programming, (2) transport, (3) communications (4) finance and (5) stock control. As with the private sector aspect, the primary responsibility will rest with the BDG.

Three full-time consultant technicians (specialists in marketing - team leader, training, and distribution) are required to provide adequate monitoring and support in the above areas. In addition, for both private and public sector aspects, the consultant will provide four work months of short-term technical assistance per year. Finally, there will be a limited amount of participant training (about 12 months per year) plus provision of printed materials on various fertilizer related topics.

III. A. 2 Storage

The additional storage requirement by June 30, 1983 is computed as follows:

Table 1

Calculation of Additional Storage Requirement Under the Project

(Tons)

Five Months in Country Stock (for 1983-84)	554,000 3/
Plus 20 percent Slack Space	110,000
Plus One Month's Factory Production	67,000
Total Requirement	731,000
Minus BADC Owned Storage	145,000
Minus Current AID Program	42,000
Minus BADC "Hard Core" Program	60,000
Minus Existing Factory Storage	85,000
Minus Planned Factory Storage (Ashuganj)	48,000
Additional Storage Required	351,000

The requirement to maintain in country an average five months stock to avoid local and even national shortage is explained in Part III. A. 3 Fertilizer below.

The requirement to accommodate one month's factory production is of great importance. If storage space runs out at the factories and if BADC is unable to offlift the production, then the factories must shut down. This actually happened during late 1976 when fertilizer supplies and arrivals exceeded available storage space. The figure for one month's production above is based on the expected annual production of 465,000 long tons at Ashuganj plus the highest annual production during the last two years at each of the existing factories.

3/ Assumes complete replacement of TSP by DAP. The total incountry tonnage otherwise required would be 639,000. Phosphate use is assumed to increase during the project from 29 to 34 percent of the total nutrient tons. The calculation applied is thus 639,000 - 18/46 x 0.34 x 639,000 = 554,000. This calculation is based upon the fact that each ton of TSP replaced by DAP also eliminates the need for 18/46 tons of urea.

BADC existing owned storage is approximately 145,000 tons capacity. The above computation does not consider rented storage which is presently at 200,000 tons capacity. Over the years since Liberation during which USAID has monitored numerous fertilizer shipments from the ports, through the transit and intermediary warehouses to the thana warehouses and during the field visits made in the course of site evaluations for the Fertilizer Storage Construction Project, approximately 95 percent of all fertilizer warehouses have been visited. The rented facilities in use were invariably found unsuited for fertilizer storage. The reasons for this situation are not hard to identify. There is a scarcity of suitable storage facilities in Bangladesh and especially in the rural thanas. Where suitable storage facilities exist, however, the owners prefer to rent them out to other clients for storage of such items as foodgrains or jute and thus avoid the corrosive effect of fertilizer (especially TSP). Therefore, fertilizer invariably must be stored in the worst available facilities, typically having mud floors, cracked walls, and leaky ceilings. Some fertilizer is even stored in thatch huts and mud huts.

The recommendations of the Ashuganj Study for new storage construction are summarized below:

Table 2 - Ashuganj Study Recommendation of Storage Construction

Type	Capacity in Long Tons	1980/81	(Extrapolated) 1983/84	Total	Total Capacity
Bagged	200	28	18	46	9,200
Bagged	400	35	7	42	16,800
Bagged	500	179	79	258	129,000
Bagged	1,000	93	46	139	139,000
Bagged	2,000	12	6	18	36,000
Bagged	3,000	6	3	9	27,000
Bagged	5,000	1	1	2	10,000
Bagged	7,000	1	-	1	7,000
Bulk	23,000	1	-	1	23,000
					397,000

The method of calculating the requirements in the Final Draft of Ashuganj Study was based upon an average turnover of 7.7 times per year at the intermediary warehouses and 3.3 times for thana warehouses. Although the method of calculation is different, the resulting total storage construction recommended tends to reconfirm the figures in Table 1.

In the move toward a private wholesale system, it is likely that the private wholesalers will begin to construct their own storage facilities. It is considered likely that many private wholesale dealers will prefer to maintain relatively low stock (say 10 to 30 tons) at relatively high turnover rates (say one turnover each week or two). The various AID engineering and other requirements would make AID grant financing of such numerous and scattered storage facilities prohibitive. Also, it is considered likely that such financing will not be necessary provided fertilizer wholesaling is a profitable business. This question will be kept open for review during the progress of the phased program, but, for the present it is decided not to finance any private sector storage.

During the course of this project, for construction planning purposes, the private sector is assumed to account for ten percent of additional storage requirement or 35,000 tons. This relatively low amount is considered prudent based upon the factors given above. Using round figures, this reduces the total construction requirement under this project to approximately 316,000 tons capacity.

The public sector storage system by the end of the project has been agreed to in principle as described in Part II. B above. Obviously, the exact number of primary distribution points and remote thanas will be subject to review during the progress of the project. However, to establish a concrete conception of the public sector storage requirements by end of project, BADC and AID have conducted a joint point by point and thana by thana review of the entire country. The result has been an agreed preliminary list of 88 primary distribution points and 121 remote thanas as per Annex B.14 below.

The major considerations for selection of the primary distribution points were (1) to locate them at the intersections of major transport modes; and (2) to minimize their number; but (3) to select sufficient points such that the private sector can feasibly and economically transport fertilizer to the maximum of areas from one or another of the selected points.

The thanas listed are those which are inaccessible during a season of high fertilizer use or where transport is difficult at all times of the year. In these thanas it is considered unlikely that during the next several years the private wholesalers will come forward in sufficient and competitive fashion to allow BADC to withdraw entirely.

As listed in Annex B.11, 50 primary distribution points have been selected for bagged storage construction involving AID grant financing during the first two years of this project. These 50 points have been selected (from the larger list of 88) considering both priority needs for storage and amounts of storage capacity already existing and/or already funded for construction. Construction during this period and under AID financing has been restricted to these 50 points because they are of the highest priority and because they are considered the maximum number which it will be practicable to handle from an implementation point of view. Construction at these points is considered to be a necessary precondition to the full introduction and smooth functioning of the new fertilizer marketing system as described above.

World Bank representatives visiting Dacca during March, 1978 indicated that they would be sending a Preappraisal Mission to Bangladesh in May 1978 to study the possibility of a fertilizer storage construction project to cover construction needs beginning from the third year of this project. Therefore, AID is not planning any fertilizer storage construction during the third, fourth, and fifth years of this project.

Construction of ancillary buildings, approach roads, wharfs, railroad sidings, fertilizer handling equipment, boundary walls and other facilities necessary for access to and proper operation of the storage facilities, will be required. This paper contemplates flexibility for USAID to approve use of AID project funds for such purposes, for the warehouses to be constructed.

III.A.2 (b) Bulk Handling and Bagging

Bulk handling and bagging facilities are planned at the two major ports of Chittagong and Chalna. A scope of work for a feasibility study and design of the facilities has been prepared by USAID, approved by the BDG and forwarded to the highest ranked firm in accordance with AID competitive procedures. Bulk import will save a minimum estimated $20 per ton of fertilizer and is thus likely to repay construction cost within the first year of operation according to the Frederic R. Harris, Inc. "Site Selection Report".

The amount of bulk and bagged storage to be built in connection with the bagging facilities will depend upon the outcome of the study and design to be contracted. At Chittagong, there is a possibility that use of the existing facilities at the TSP Factory may preclude the need for new storage facilities, and only improvement would be needed. The total need at each port may be on the order of 20,000 tons bulk and 10,000 tons bagged storage.

The two urea factories at Fenchuganj and Ghorasal have bulk storage capacities of 25,000 and 35,000 tons respectively. Both of these warehouses were built with dehumidifiers. However, through age and use both of these dehumidifiers now require replacement. The need for this dehumidification equipment is graphically illustrated by the situation at Fenchuganj in late 1977 where 15,000 tons of urea solidifed into one solid rock hard lump. The process of breaking it up with picks, shovels, and pneumatic hammers took several months to complete. The amount of storage involved is very large and has considerable impact on the total storage availability in Bangladesh and therefore on the feasibility of keeping an adequate in country fertilizer stock. Therefore, (1) action by the Government to finance an engineering study to determine the best method of making these storage units operable will be a condition precedent to initial disbursement for all except consultant costs under this grant; and (2) action to award a contract to install new dehumidifiers and any other necessary action to maintain and use the Ghorasal and Fenchuganj bulk storage facilities will be a condition precedent to additional disbursement under the grant.

III.A.2 (c) Bagged Storage

An engineering consultant will be contracted to assist BADC with both bulk and bagged storage construction. This consultant will inspect and supervise with respect to all storage construction under AID financing. For the bagged storage, he will also perform location feasibility study, site selection study, design study and final design for all sites approved for AID grant financing, as is outlined in Annex B.9.

Designs for the 500, 1000, 2000 and 3000 tons capacity warehouses have been completed by the engineering consultant for the Fertilizer Storage Construction Project and have been accepted by BADC. These designs are based upon local construction methods and locally available construction materials. For this project it is contemplated that similar designs will be required for two larger bagged product warehouses, as per Annex B.11.

III. A. 2 (d) Storage Summary

Storage is clearly a major constraint to expanded fertilizer use in Bangladesh. In many thanas, sales are low because of inadequate storage space. Total BADC owned space is now only 145,000 tons, whereas there is a need for maintaining stock in excess of double that amount. Therefore, a large amount of mostly unsuitable storage space has been rented as the only alternative. Further, there is a need to increase fertilizer sales dramatically. In light of this situation the storage aspect of this paper has been designed with the objective of addressing the storage constraint.

III. A. 3 Fertilizer

Presently the following fertilizers are being used in Bangladesh:

Urea - 46 Percent Nitrogen Nutrient
TSP - 46 Percent Phosphate Nutrient
MP - 60 Percent Potassium Nutrient

It has been agreed by the Bangladesh Government and AID that under this project it will be attempted to shift from TSP to DAP or MAP. The nutrient contents of these fertilizers are as follows:

DAP - 18 Percent Nitrogen Nutrient plus 46 Percent Phosphate Nutrient
MAP - 10 Percent Nitrogen plus 50 Percent Phosphate
- up to -
13 Percent Nitrogen plus 55 Percent Phosphate

Most probably the shift for the time being will be to DAP since it is much more available on the market and its price is about $5 per ton lower than MAP. It would undoubtedly be better to shift to just one phosphate fertilizer thus avoiding confusion between multiple products. The major and compelling reasons for the planned shift (well known to experts in the fertilizer field) are as follows:

1. The higher nutrient concentration affords a considerable cost savings in terms of ocean freight, storage, internal distribution, and bags. This savings is estimated at $30 to $40 per ton for purchases under this grant.

2. For nutrient purchase (FOB) DAP and MAP usually cost 10 to 20 percent less than their equivalents in urea plus TSP.

3. DAP and MAP are compatible in storage with urea and have little or no damaging effect on bags, warehouses and transport equipment.

4. The higher nutrient content will mean a lower storage and transport requirement under the project and thus facilitate a more rapid expansion of nutrient use.

To touch, sight, and smell, there is no difference between granular TSP, DAP and MAP. All three are used in a similar way: prior to planting - with urea or other nitrogenous fertilizer applied during the growing period. Therefore, it is believed there will be no difficulty in introducing DAP to Bangladesh. Indeed, it is interesting to note, that almost all countires in the region including Afghanistan, Pakistan, and India have made the switch.

Apart from the above agreed purchase strategy shift, it is desirable to see a shift in the nutrient usage pattern during this project. In 1976-77 the NPK ratio was at 1.0/0.36/0.08. This is far from optimum. Recommended application rates for rice, for instance, vary from 1.0/0.5/0.25 to 1.0/1.0/1.0, all considerably higher than the ratio in Bangladesh. The solution here seems to be continued or even increased skewing of the product prices in favor of phosphate and potash fertilizers coupled with dealer education in their merits.

The rapid rise in fertilizer sales has made the farm management surveys conducted in the 1960's obsolete with respect to fertilizer. Until large sample surveys are conducted the best estimates to be made must rely upon sales data (from BADC) and crop statistics (from the Ministry of Agriculture). Therefore only gross relationships can be defined.

Using such a process, the Ashuganj Study arrives at approximately the following estimate of fertilizer use during 1975-76 (see also Table IV, Annex B.6):

Table 3

Percent Fertilizer Use by Main Crops

	Percent
HYV Boro Rice	31
HYV Aus and Aman Rice	28
Local Rice	28
Jute	4
Sugarcane	2
HYV Wheat	1
Others	6
	100

The very high percentage of fertilizer use attributed to HYV rice reflects the fact that virtually all HYV varieties require fertilizer, and is attributable to the rapid expansion of HYV acreage in recent years: from 381,000 acres in 1968-69 to 3,163,000 acres in 1976-77.

Expansion of the acreage irrigated by power pumps has proceeded at a rate roughly paralleling that of HYV acreage: from an estimated 174,000 acres in 1965-66 to 1,217,000 in 1974-75, before declining by 20,000 acres in the succeeding two years. The HYV Boro (winter) crop, which requires irrigation, has accounted for a major share of the increased use of both pumps and fertilizer.

Although the exact inter-relationships are not clear, the above estimates indicate that there is a strong inter-dependence between the various agricultural inputs including HYV seeds, irrigation, and fertilizer. The scope of this project covers the fertilizer input, to assure the availability of this input, and thus to support the success of the other inputs.

Local urea production has been erratic and difficult to predict. As per one of the requirements under the Ashuganj Project, full operational studies of each of the existing factories are being conducted by BCIC through Bressler Associates under World Bank financing. In addition, the Japanese are planning an overhaul of the Fenchuganj Urea Factory.

However, operational improvements at a factory are a difficult and complex matter. For fertilizer import estimation purposes it is best to see the results of operational improvements for at least a few months before placing any dependence on them.

Therefore, except during expected periods of shut down for overhaul at Fenchuganj (six months in 1978-79) and repairs at Ghorasal (April and May 1978) the average historical operating rate (from Annex B. 4) is taken as the estimated operating rate for purposes of import estimation.

Previous average TSP production at 41,000 tons per year falls between 18 and 9 percent of projected phosphate offtakes for 1978-79 and 1982-83 respectively. Locally produced TSP requires import of rock phosphate and sulfur. AID has financed such import in the past and could conceivably do so under this grant. The tonnage of such imports is double that required for the finished product (TSP) and depending upon the prevailing market prices the costs of such import approach those of finished TSP. Therefore, in terms of total import requirements, the level of local TSP production makes very little difference. Local TSP production is therefore taken at zero for purposes of computing import requirements in Table 5. All MP is imported into Bangladesh.

The largest question mark on the local production picture is the likely date on which Ashuganj Urea Factory will come "on-stream". At this time discussions are being conducted in an attempt to resolve construction bottlenecks. For present purposes December 31, 1980 is taken for Ashuganj start up at 465,000 tons of urea per year, and local urea production is estimated as follows:

Table 4

Estimated Local Urea Production

Period	Ashuganj	Ghorasal	Fenchuganj	Total
Jan-June 1978	-	68	37	105
1978-79	-	205	37	242
1979-80	-	205	74	279
1980-81	232	205	74	511
1981-82	465	205	74	744
1982-83	465	205	74	744
				2625

A number of projections for use of fertilizer in Bangladesh have been developed over the past five years. These were included in the Agricultural Inputs III Project Paper. Most recently, the Ashuganj Study has developed a set of high, medium, and low projections (Annex B. 3).

The BDG and AID have studied all of these projections and considered the assumptions on which they are based. These assumptions essentially include different degrees of confidence concerning the possibility of removing supply and demand constraints. In other words, the projections do not include a comprehensive, positive action plan to rapidly overcome all major constraints -- but this project does include such a plan. In addition, earlier projections would appear to have been somewhat superceded by recent marked increases in fertilizer consumption: 31 percent during the last year and 25 percent during the year before that.

Therefore, USAID considers that a sustained 15 percent annual increase should be possible during this project. This percentage increase is roughly equal to the Ashuganj high projection, but because the Ashuganj base data are more than one year old, the starting base is lower and thus the tonnage figures are lower:

Table 5

Comparison of BADC's Target Fertilizer Offtakes with Ashuganj Study Projections
(000's long tons)

Year	USAID Projection 15% Annual Increase	Ashuganj Study High Projection
1977-78	665 4/	613
1978-79	764	683
1979-80	878	785
1980-81	1010	904
1981-82	1161	1040
1982-83	1335	1196

4/ Reflects seven month's actuals plus BADC's target for remaining five months. Since the targets in the first seven months were consistently exceeded, this is considered a conservative estimate.

Achievement of the level projected for 1982-83 will require raising fertilizer use to a level equal to approximately 29 percent of the agronomic demand (agronomic demand is calculated based on recommend application rates; see Annex B.12). Such an achievement is not considered unrealistic given similar experiences in several developing countries (e.g. Formosa and Turkey) and given that fertilizer use in most western countries is several times higher - near or at the point where marginal returns equal marginal costs (i.e. at the economic demand level).

Given a certain sales level (whether it is increasing at 15 or whatever percent per year) it is then felt to be necessary to maintain five months stock level in Bangladesh. About half of this stock is needed as a minimum operating inventory for availability at the local level. The other half of the five months incountry stock is needed as a buffer against uncertain import financing, ordering, shipping and internal transport. Beyond these considerations, it is felt that the sheer weight of availabllity of stock is needed to create a pressure on sales.

Table 6

Fertilizer Import Requirements 5/
(000's long tons)

Period	Opening Stock	Urea Production	Projected Offtakes	Closing Stock	Import Requirement
Jan-June 1978	108	105	336	97	320 6/
1978-79	197	242	764	18	643
1979-80	318	279	878	365	646
1980-81	365	511	1010	420	554
1981-82	420	744	1161	483	480
1982-83	483	744	1335	556	664
1978-79 to 1982-83 Total		2625	5148		2987

In considering what amount of fertilizer imports AID should contribute during this project it is considered wise to reflect on the AID levels in recent years. Since Liberation through calendar year 1976, AID provided over 40 percent of total fertilizer imports of approximately 970,000 tons. During 1977, fertilizer imports were on a very low level of only 138,000 tons, none AID financed. During January to June 1978, AID will finance approximately 160,500 tons of the 320,000 tons estimated to be arriving.

AID funding for fertilizer imports during the project is proposed at a total of $221 million. Given a "high" and a "low" cost of $200 and $150 CIF per ton for fertilizer at Chittagong or Chalna, this funding will purchase between 1,105,000 tons and 1,473,000 tons of fertilizer total. In terms of the total import requirements shown above this, would mean AID would provide between 37 and 49 percent of the total.

5/ Product tons in terms of traditional urea, TSP, and MP imports. These figures will be appropriately adjusted downward as DAP imports develop to reflect the DAP imports at an equal nutrient level.

6/ Scheduled or already arrived.

III. B. Economic and Financial Analysis

III. B. 1. Farm Level Financial Analysis

Though high yielding variety (HYV) rice and wheat crops account for only 14 percent of the total acreage sown to foodgrains, they account for an estimated 60 percent of current fertilizer use, with traditional, or local varieties taking 28 percent, and other crops (jute, sugar cane, etc), 12 percent. (See Annex B.6 Table 4 for breakdown of current use by crop variety.) These proportions are expected to remain more or less unchanged, in accordance with Mission and BDG strategy which stresses rapid increases in foodgrain production through the introduction and spread of HYV technology.

This situation should not, however, obscure fertilizer's importance in connection with local varieties. If fertilizer use is not absolutely essential on local varieties, as it is on virtually all HYVs, nevertheless it is highly recommended for use on local varieties where it has been observed to produce about the same return per unit of input as on HYVs (see Annex B.6 for comparative crop response ratios). In some areas, or at certain seasons of the year, physical or climatic conditions may preclude the introduction of HYV varieties, but crop yields will still stand to benefit from fertilizer use. And for many farmers in a marginal benefit/cost position, fertilizer use may be practicable while the introduction of HYV seeds and related inputs such as irrigation may be too risky financially. For these reasons, the project purpose of increased use of fertilizer on an equitable basis would be best served if increased use of fertilizer were considered in connection with local as well as HYV crops.

Annex B.12 on Agronomic Demand provides a theoretical measure of the potential demand for fertilizer in Bangladesh. The extent to which this potential can be realized will depend largely on the financial position of the farmer and the prospective return, relative to the perceived risks, resulting from an investment in fertilizer. In line with the considerations already expressed, this analysis will focus primarily on the farmer's overall cost/benefit situation and the prospective returns necessary to induce investment in HYV technology, including fertilizer. A separate section deals with fertilizer investments, or incremental fertilizer investments, on existing crops; that is apart from the matter of a shift from local to

HYV cultivation. Particular attention is paid to the situation of the 39 percent of farmers who till the soil in whole or in part on a sharecropper or lease arrangement.

(a) Investment in HYV Technology; Overall Returns and Cost of Production

Annex B.13 provides a detailed analysis of returns to and costs of production of representative rice and wheat farmers in Bangladesh. The crops considered are HYV varieties of Boro rice, T. Aman rice and wheat. While generalizations from a handful of studies are inherently tenuous, nevertheless a few conclusions can be drawn.

First, even assuming harvest prices at normal seasonal levels, net returns of owner-cultivator farmers are sufficient (i.e., a benefit: cost ratio of 2 : 1) to induce investment in HYV technology (including for this purpose, fertilizer). This is, however, only marginally the case where the farmer does not have access to institutional credit, but must rely on "street" credit at rates of 50 percent or more per crop season. Under the same conditions regarding output price, the tenant farmer who is required to surrender half his crop to the landlord, and who is virtually never able to obtain institutional credit, cannot cover his HYV input costs. Under these conditions, he has no incentive to undertake investment risks. Both for lack of cash and by inclination, he will prefer to stay with traditional varieties and a minimum use of fertilizer.

The situation changes dramatically when the existing constraints are modified to provide an assured output price and institutional credit at reasonable rates. In that event, the case for HYV investments by owner-cultivator farmers becomes overwhelmingly favorable, especially if the farmer applies the recommended amounts of fertilizer. The benefit/cost ratio for the average sharecropper is still marginally below the desired level of 2 : 1, but close enough to it that one could expect a sizeable proportion of sharecroppers to undertake HYV investments. Benefit/cost ratios under conditions of an assured output price and credit availability at institutional rates are summarized in Table 7. (N.B. corresponding to Tables 3, 4 and 5 of Annex B.13).

Table 7

Benefit/Cost Ratios for HYV Crops Assuming Assured Output Prices and Availability of Institutional Credit

Category of Farmer and Fertilizer Use Practice	HYV Boro	HYV T. Aman	Wheat
Owner-Cultivator:			
Current practices	3.0 : 1	3.6 : 1	2.9 : 1
Recommended Practices	3.3 : 1	3.8 : 1	3.4 : 1
Sharecropper:			
Current practices	1.4 : 1	1.4 : 1	1.1 : 1
Recommended Practices	1.6 : 1	1.9 : 1	1.9 : 1

Note : Credit Assumptions:

Owner-Cultivator : 15 percent per annum
Sharecroppers : 24 percent per annum

(b) Returns to Fertilizer Investment

The foregoing section and Annex B.13 had the primary purpose of measuring costs of production and returns arising from investments in HYV seeds and related technology, including fertilizer. The findings suggested more than adequate returns to production for owner-cultivators and marginally adequate returns for sharecroppers on the assumptions of an assured output price and the availability of institutional credit. Referring to the "current practices" and "recommended use" levels of fertilizer, the further point can be made that the farmer, under the conditions stated, stands to gain not only from the adoption of HYV technology, but from higher use levels of fertilizer once the new technology has been adopted. The incremental costs associated with the increased fertilizer inputs in these examples led to benefit/cost ratios as follows:

Table 8

Benefit/Cost Ratios Resulting From Incremental Fertilizer Investments

	Owner-Cultivator	Sharecropper
HYV Boro	5.6	2.7
HYV T. Aman	4.9	2.6
HYV Wheat	5.4	2.2

Based on these examples, then, both owner-cultivators and sharecroppers stood to make impressive returns from additional fertilizer investments. It should be remembered, however, that the situation posited here included both a supported output price and the availability of institutional credit. Because these conditions do not yet universally obtain, a consideration of the factors underlying a fertilizer investment is worthwhile.

Obviously, the return on a fertilizer investment will be reduced to the extent that the investment involves additional costs for other input items (assuming yields to be unaffected by the additional inputs). There exists very little hard data on the question of such additional costs. Some additional labor must be involved, but to the extent the farmer can supply this, through his own or his family's additional efforts, he may not consider it a "cost" for purposes of his benefit/cost calculation. The higher yields associated with a fertilizer investment should in theory necessitate a greater input of pesticides, but the farmer may or may not use more pesticides and the extent to which his yield is affected one way or another is not precisely known.

With these considerations in mind, tentative benefit/cost estimates can be made at both ends of the range of assumptions: (1) assuming a relatively small fertilizer investment, with no related additional costs as the farmer perceives the situation; and (2) full accountability for additional related costs.

(1) Assuming No Additional Related Costs

If a farmer could limit his fertilizer investment solely to the cost of fertilizer - or additional fertilizer - and the financing of that fertilizer, his benefit/cost (B/C) could be calculated simply as:

$$B/C = R \frac{Pr}{(C_f + i \cdot C_f)} \times T$$

Where : R = Response ratio (additional output of grain per unit of additional fertilizer applied).

Pr = Farmgate price of rice per pound.

C_f = Cost of fertilizer per pound.

i = Cost of credit

T = Share of his output farmer may retain under existing land tenure arrangements.

Such a situation might logically pertain in the case of a limited investment on a local, rainfed crop. Assuming a response ratio of 3 : 1, an unsupported farmgate rice price of Tk. 1.29/lb. (equivalent to Tk. 106 per maund of grain or Tk. 70 per maund of paddy), and the recent fertilizer price of Tk. 0.68/lb., farmers would experience benefit/cost ratios as follows:

	Credit @ 15 % p.a. (7.5% per crop season)	Credit @ 100 % p.a. (50% per crop season)
Owner-Cultivator	5.3 : 1	3.8 : 1
Sharecropper	-	1.9 : 1

Thus, in this simplified situation the sharecropper enjoys a B/C ratio of 1.9 : 1 (which can also be stated as a rate of return on investment of 90 percent), the prospect of which might well be sufficient for its undertaking. With either an assured output price or the availability of institutional credit, his rate of return would rise to over 100 percent. An effective procurement price did, in fact, prevail for the first time during the Aman harvest season just concluded. On the basis of that price - about Tk. 1.54/lb. to the farmer - and assuming the same fertilizer price (but still no institutional credit), the sharecropper's B/C ratio would have been 2.3 : 1.

(2) Assuming Full Accounting of Additional Costs

The calculation becomes more complex, and less favorable to the farmer, when his fertilizer investment does involve the hiring of additional labor, on either a cash or a badla (labor exchange) basis, and when he increases his input of pesticides in line with his anticipated higher yield. In that case, the benefit/cost formula shown above would be expanded to include in the denominator the additional labor and material costs, and the additional financing costs 7/, the effect being to reduce the farmer's rate of return.

Referring now to the schedule of costs underlying the T. Aman example in Table 4 of Annex B.13 8/ it will be seen that increased labor and bullock costs amount to one third and increased material (pesticide) costs to one fifth of the related fertilizer cost increase. At this rate, if the farmer has access to institutional credit at 15 percent per annum, he incurs total related additional costs equal to 62 percent of his additional fertilizer cost. If he must finance his costs at a market rate of 100 percent p.a., his related additional costs are 113 percent of his fertilizer cost. Table 9 shows the resulting benefit/cost ratios under various output price, credit and land tenure restraints. A fertilizer response ratio of 3.5 : 1 is assumed throughout.

7/ See Annex B.13 a. for the revised formulation.

8/ The additional costs related to incremental fertilizer investments were derived from material included in Dr. Hugh Brammer's, "Cost of Production, Profits and Returns For Paddy and Wheat Cultivation at the New (July 1976) Fertilizer Prices", UNDP/FAO, July 1976.

Table 9

B/C Ratios From Fertilizer Investment Under Varied Output Price and Credit Constraints
(Assuming Full Accounting of Related Additional Costs)

Category of Farmer and Credit Assumption	B/C Ratios At Unsupported Farmgate Price (Tk. 1.29/lb) 9/	At Supported Farmgate Price (Tk. 1.54/lb) 9/
Owner-Cultivator		
Credit @ 100% p.a.	3.1 : 1	3.7 : 1
Credit @ 15% p.a.	4.1 : 1	4.9 : 1
Sharecropper		
Credit @ 100% p.a.	1.6 : 1	1.9 : 1
Credit @ 24% p.a.	2.0 : 0	2.4 : 1

Note: 9/ Grain prices. Equivalent to the Tk. 70/Md. and Tk. 84/Md. paddy prices used in Annex B.13.

The findings parallel those with respect to the package of HYV investments discussed in Section (a) above and Annex B.13, but with somewhat more favorable implications for the sharecropper. As was the case with an investment in HYV technology, the owner-cultivator enjoys a highly favorable return on his fertilizer investment under all of the hypothesized conditions. The sharecropper enjoys a benefit/cost ratio of 2 : 1 or better only with assured institutional credit. However, it seems likely that the required return under a purely fertilizer investment is lower, given the smaller size of the investment, hence the lesser risk, than that for the larger investment in the full HYV package. In other words, while a 2 : 1 benefit/cost ratio might be the minimum desired level to induce an HYV investment a 1.6 : 1 ratio (the bottom end of the range of results shown in the foregoing example) might well suffice for a purely fertilizer investment.

Conclusions

It would be a mistake to place undue importance on rate of return calculations where yields (or response ratios) and cost conditions are subject to considerable variation. Nevertheless, the orders of magnitude do suggest strongly that the willingness of farmers - especially sharecroppers - to invest in fertilizer will depend on a several finely balanced risk and return calculations. This in turn leads to the conclusion that full achievement of the project purpose - both the fertilizer offtake target and the equity objective - depend on achievement of Mission objectives in the related areas of foodgrain price policy and credit. Correspondingly, progress toward achievement of project purpose should enhance the prospect for success in those areas.

III. B. 2 Analysis of Aggregate (National) Economic Impact

The basis for the calculation of the aggregate economic impact, or economic rate of return (ERR), of the project lies in the aforementioned fertilizer response ratio which measures the additional foodgrain output 10/ resulting from the application of a unit of fertilizer. As shown in Annex B. 6, response ratios vary considerably according to rice or wheat variety. For these purposes, as in other portions of this paper, a response ratio of 3. 5 : 1 is assumed as the average applicable to future fertilizer use.

The proposed project will involve the provision of some 1,300,000 tons of fertilizer over the five-year period, 1978-79 to 1982/83. Based on the assumed 3. 5 : 1 response ratio, application of this fertilizer will, in turn, lead to some 4,550,000 tons of additional foodgrain production. At $292 per ton, (see below for basis of valuation) the additional foodgrain output would have a value of $1,329,000 million. Applying this sum to total project costs of $250 million, the implied ERR is 432 percent.

It will be noted that the ERR calculation takes account only of that portion of future fertilizer offtakes and resulting additional foodgrain output that can be ascribed to AID - supplied fertilizer imports. It mades no allowance for such additional fertilizer offtakes that may take place as a result of the non-fertilizer supply aspects of the project, such as the storage construction, systems improvement, etc., which will account for $29 million, or 12 percent of total project costs. The reasoning behind this approach is that while these other aspects of the project undoubtedly will make their own contribution to fertilizer offtakes, there is no way in which the matter can be quantified. Viewed in another way, the non-fertilizer aspects of the project are treated as doing no more than to ensure the smooth distribution of the AID - supplied fertilizer. The calculation thereby contains a considerable degree of conservative bias.

Basis of Per Ton Valuation

The $292 per ton used as the basis for the valuation of foodgrain output in the ERR calculation represents the most recent cost of imported U.S. rice delivered up - country, adjusted to account for the somewhat lower quality of Bangladesh rice. Taking these points in order:

10/ For the sake of simplicity, crop production arising from the project is assumed to consist entirely of foodgrains. Foodgrains (rice and wheat) presently account for about 83 percent of total crop production.

(1) A recent and typical U.S. shipment involved No. 2 medium - grain rice, not more than 20 percent brokens, valued at $247 per ton, f.o.b. Adding $30 per ton for shipping cost and $40 per ton for in-country handling costs, the delivered up-country cost was about $317 per ton. The price of the roughly equivalent domestic rice, meanwhile, was about $259 ton at the Tk 15 : 1 $ U.S. 1.00 exchange rate. The import cost is preferred as the basis of valuation primarily because the foodgrain production will involve an import saving. Moreover, if overvaluation of the Taka and production subsidies were taken into account, the difference between the import and domestic production costs would be greatly narrowed, if not eliminated (the difficulty in calculating such subsidies being an additional reason for using the import cost).

(2) Adjustment of the U.S. import price is needed to reflect the fact that whereas most imported U.S. rice corresponds roughly to "medium" grain local rice, the project will encourage mainly the production of the lower quality "coarse" varieties produced under HYV cultivation. The market price of coarse rice average about 92 percent of the medium rice price. Thus, .92 x 317 = $292 as the per ton price used as the basis for evaluating the additional foodgrain production arising from the project.

Sensitivity Analysis

Rice price fluctuations are of course to be expected over the course of the project period. By way of a sensitivity analysis, if the rice price were to average 20 percent lower than the present level (fertilizer prices and the response ratio remaining unchanged), the project would have an ERR of 325 percent. If the response ratio were to be 3.0 : 1, instead of 3.5 : 1, the ERR would be 356 percent. If both were to occur, the ERR would be 264 percent.

Again, all of the foregoing ERR calculations are conservative, allowing as they do for no increases in foodgrain production other than those directly attributable to the fertilizer supply portion of the project.

III. B. 3 Balance of Payments

Leaving aside for the moment the matter of source of financing (i.e. whether own foreign exchange resources, loan - funded, or grant basis), and barring a wholly unforeseen adjustment of the prevailing relationship between world fertilizer and rice prices, the importation of fertilizer will always make sense from a balance of payments viewpoint up to the point at which either the agronomic demand for fertilizer or foodgrain self-sufficiency has been reached.

As an illustration of this point, take the following assumptions:

(1) Transport and distribution costs per ton are equal for foodgrain and fertilizer.

(2) Ocean transport averages $30/ton and internal distribution costs $40/ton.

(3) One ton of fertilizer produces an average of 3.5 tons of foodgrain.

Given these assumptions, the import of one ton of fertilizer saves (3.5 - 1.0) ($30 + $40) = $175. This $175 savings will purchase about 1.5 to 1.75 tons of fertilizer (FOB port of origin). Thus, the point should be clear, the savings in foodgrain transport and distribution costs will more than pay for the fertilizer. When the full costs of the alternative of foodgrain imports is considered, the case for fertilizer imports to alleviate balance of payments pressures seems to be compelling.

While the foregoing is clear enough, it remains necessary to weigh the cost of the proposed project from an overall balance of payments perspective. Though the importation of fertilizer will lead to a net improvement in the balance of payments, it nevertheless requires an initial foreign exchange commitment in competition with other imports. This commitment must be considered in the context of the Government's foreign exchange budget and in donor agreements and therefore must be considered from an overall balance of payments viewpoint.

Bangladesh's balance of payments situation has been characterized by generally stagnant exports, a large and generally widening trade deficit, and a consequent heavy dependence on foreign aid. While future aid requirements may be kept at approximately their current levels, the basic situation will continue to prevail for the forseeable future.

Export growth has been stymied by the sluggish world market for jute which in both raw and finished form accounts for some 70 percent of export earnings. Thus, notwithstanding encouraging recent progress with respect to certain nontraditional exports - notably fish, leather, and tea - total export earnings in recent years have not reached pre-liberation (1971) levels. Imports, meanwhile, have risen in line with worldwide inflation, which has seen average import prices more than double since 1972/73. The country's terms of trade (export prices divided by import prices) stood at 53 (1972/73 = 100) in 1976/77.

The following Table summarizes recent trends in the country's foreign trade, as compared with the last full preliberation year, 1969-70. Foodgrains and fertilizer are identified separately.

Table 10

Foreign Trade, 1969-70 and 1972-73 - 1976-77

($ Millions)

	1969-70	1972-73	1973-74	1974-75	1975-76	1976-77
Exports	479	340	362	440	381	412
Imports	-594	-727	-925	-1236	-1290	-960
Food	NA	321	308	544	358	158
Fert	NA	28	24	86	61	9
Other	NA	378	593	606	871	793
Balance	-115	-387	-563	-796	-909	-548

As shown in the trade data, a $330 million (26 percent) reduction in imports in 1976/77 brought the trade deficit down sharply to its lowest level in four years. Apart from the reduced importation of foodgrains and fertilizer (lower by $200 million and $52 million, respectively), the decline could be attributed largely to the taka devaluation of May 1975 which occassioned increases in local prices of imported goods. The decline in non-food imports had an adverse effect on certain sectors of industry which operated at less than capacity for lack of imported materials and parts. A major expansion of imports is planned for 1977/78, as will be seen in the balance of payments data below.

As shown in the Balance of Payments Table, the country's trade deficits have been covered almost entirely by foreign assistance, divided more or less evenly among food, non-food commodity, and project aid. Foreign aid is less of a problem in Bangladesh than in many LDC's, given the fact that it is accorded top priority by the major donors, both as to the amount and terms of aid. As is often noted, aid commitments have been far in excess of the amounts annually disbursed. A sizeable proportion of the aid is on grant or soft loan terms, and annual repayment obligations are certainly low by current developing country standards.

Table 10

Bangladesh: Balance of Payments, 1975/76 - 1977/78

(Millions of US $)

	1975/76	1976/77	1977/78 (proj.)
Current Account	-908	-538	-901
Exports (f.o.b.)	381	412	431
Imports (c.i.f.)	-1290	-960	-1329
Other	1	10	-3
Capital Account			
Foreign Aid	814	574	820
Food	307	135	275
Commodity	378	229	315
Project	129	160	230
Cash	-	50	-
Debt Repayment	-78	-42	-25
Private Transfers	122	46	50
IMF Position	-	3	-23
Reserves			
Change (-= increase)	50	-43	79
End of period 11/	213	294	215

11/ Available data to not explain the inconsistensies between reported changes in reserves and reported year-end reserve positions.

Source: World Bank and Planning Commission

If Bangladesh is relatively well off in these respects, nevertheless, the size of the aid commitment can be misleading. It should not be permitted to obscure the fact of a continuing extremely tight balance of payments situation. The bulk of the unused aid commitment (or aid pipeline, as it is often termed) - $1.2 billion of a total $1.6 billion as of Oct. 1, 1977 - consists of project aid. The government can perhaps be faulted for its inability to disburse project aid more quickly, but its failure to do so remains a fact of life. Moreover, much as project aid is needed for long-term development purposes, it remains project - specific aid not generally available for the

year-to-year maintenance of the economy. Food aid is, of course, also specific as to purpose, and while it does provide balance of payments relief in so far as it frees exchange reserves for spending in other areas, it does not contribute directly either to maintenance of the economy or to future economic growth.

In short, for imports needed to keep the economy going, of which fertilizer is a prime example, Bangladesh is dependent on commodity aid, project aid that can take the form of commodity assistance, or on its own foreign exchange resources. Such resources are extremely meagre relative to the need. As evidence of this, non-food imports in 1976/77 were 11 percent below the 1972/73 level when measured in real terms (i.e. after discounting for the effects of inflation). The proposed project would provide the government on a grant basis the assurance of from 37 to 49 percent of the import portion of its fertilizer requirement over exchange availabilities from other essential needs.

III. B. 4 Financial Budget Tables

Table 11

a. Summary Cost Estimate and Financial Plan (In Million $) 12/

Inputs	AID FX	AID LC	AID Total	BDG FX	BDG LC	BDG Total
Systems Improvements	2	0.5	2.5	0	0	0
Storage and Bulk Handling	2.5	24	26.5	0	10	10
Fertilizer Purchase	221	0	221	0	363	363
Operating Costs	0	0	0	0	282	282
Total	225.5	24.5	250	0	655	655
Percent of Total			18.31			47.99

	OTHERS FX	OTHERS LC	OTHERS Total	TOTAL FX	TOTAL LC	TOTAL Total
Systems Improvements	0	0	0	2	0.5	2.5
Storage and Bulk Handling	0	70	70	2.5	104	106.5
Fertilizer Purchase	390	0	390	611	363	974
Operating Costs	0	0	0	0	282	282
Total	390	70	460	615.5	749.5	1365
Percent of Total			33.70			100.00

Table 12

b. Project Components Included in FY 1978 AID Grant Funding

Systems Improvement	$ 500,000
Storage and Bulk Handling	12,500,000
Fertilizer	37,000,000
Total	50,000,000

12/ An annual inflation rate of approximately seven percent has been applied in each year.

Table 13

c. Cost Estimates for Project Components in FY 1978 AID Grant Funding

(i) Systems Improvement	-- 48 work months	--	480,000
	Other Costs	--	20,000
	Total		500,000
(ii) Storage and Bulk Handling	- 86,500 tons storage capacity plus ancillary buildings (see Annex B.11)	--	11,500,000
	Engineering Design of Bulk Facilities		1,000,000
	Total		12,500,000
(iii) Fertilizer	-- 185,000 tons CIF (@ $200/ton)		$ 37,000,000
or	-- 240,000 tons CIF (@ $150/ton)		

III. C. Social Analysis

1. Social Cultural Feasibility

a. The Social Landscape

The population of Bangladesh is approximately 83.5 million with 90 percent living in rural areas and substantially dependent on agriculture and agro-related industries for their livelihood. In addition, many upper and middle class urban dwellers retain title to agricultural land and receive income from agricultural production. Although agriculture accounts for 54 percent of Bangladesh's gross domestic product, per capita food production is among the lowest in Asia.

An important element of the social hierarchy in rural Bangladesh is the land tenure system. Land is considered the most secure form of investment and a primary determinant of social status in rural Bangladesh. In a situation where institutions are weak, resources scarce and population expanding rapidly, land ownership is the firmest guarantee that one can provide the necessary subsistence for one's family. Further, title to land is usually necessary for a farmer to obtain institutional credit. Credit from moneylenders is extremely costly, i.e. 50 percent interest per crop or at least 100 percent per year. Instances of up to 300 percent per crop have been noted. On the other hand, institutional credit (though historically very limited) is quite cheap, between 13 and 15 percent per year, with interest rates being established by the Government rather than the market. This accentuates the differences between landowners and non landowners.

Under Moslem inheritence practices, all sons are entitled to equal shares of their father's land while daughters receive lesser shares. This leads to a perceived need to pass on to one's sons sufficient land to ensure their survival and that of their families. Thus the pressure to hold on to the land one has or, if possible, acquire new land is enormous. Given these pressures, profits derived from agricultural production are very likely to be invested in procuring additional land. Conversely, agricultural production losses, over a period of time, are apt to result in the loss of land.

Previous research into the land tenure situation has cast most Bangladeshi farmers as a small landowners. That is, most farmers own small holdings which they till with their own and family labor. The Bangladesh Government's Land Occupancy Study has indicated this is not the case and, in fact, the owner-cultivator, as defined above,

is more the exception than the rule. The Study indicates that 38.8 percent of the farmers till the soil in whole or in part on a sharecrop or lease arrangement. An equal amount of land is estimated to be cultivated by agricultural laborers supervised by owner-managers.

For purposes of this analysis, these three groups will be used :

1. Sharecroppers - Those who own no land, except possibly their homestead, and till the land of others in exchange for a share of the crop.

2. Owner-cultivators - These who till their own land using their own or family labor.

3. Owner-managers - Those who oversee the cultivation of their own land by agricultural laborers.

The Land Occupancy Study defines sixteen different tenurial arrangements and the above groups are not necessarily synonymous with any one of the sixteen. Each of the three above cover, in whole or in part, three or four in turn of the sixteen in the Land Occupancy Study. These three groups however do offer useful comparisons and, at the same time, are sufficient for purposes of the present analysis.

b. Motivation

The primary motivating factor for all three of the principal tenurial groups to adopt fertilizer will probably be economic, dependent on the financial situation of the farmer and his benefit/cost calculations with respect to investments in agricultural inputs. A complete discussion is contained in the Financial Analysis Section, but certain key considerations may be indicated here as background to a consideration of social consequences and benefit incidence (Section III.C.3 below).

The sharecropper normally bears the full cost of inputs (seed, labor, fertilizer, animal power, etc.) while paying exorbitant interest rates to non institutional sources to meet his credit requirements. At the same time, he is required in nearly all cases to surrender half of his crop to his landlord at the time of harvest. Under these conditions he is in a poor position to undertake further investments and is in constant danger of losing his land to his landlord.

Owner-cultivators are in a much better position, if only because they can keep their own crop. In addition, their status as landowners at least entitles them to low -- cost institutional credit, even though only a minority are in practice able to obtain it.

The owner-manager probably faces much the same situation as the owner-cultivator. The very nature of his status, however, indicates that he is in a position to be more "risk taking" and innovative than either of the other two groups. It is unlikely that a single crop failure will result in a decline in his status, although inheritence practice may place his children in the owner-cultivator category. A key element for both the owner cultivator and the owner manager is that increased income will tend to be used for the acquisition of more land, displacing marginal landowners. Moreover, increased returns on production and the continued declined in agricultural wages to farm labor 14/, could attract present absentee landlords into the ranks of the owner-managers, thereby contributing to the forces tending toward the decline of the sharecropper.

III.C. 2. Spread Effect : The Diffusion of Innovation

A major objective of this project (see Part II.B) relates to removal of the marketing constraints by strengthening the private sector role at the retail and wholesale levels. In this context it is important to note that there is a remarkable lack of entrepreneurship in rural Bangladesh. A number of hypotheses have been advanced as reasons for this phenomenon. Among these are :

1. Entrepreneurs are attracted to the urban areas by better opportunities;

2. Economic policies are not conductive to entrepreneurship;

3. Lack of credit, adequate transportation, communication systems, and rural electricity hamper investment in rural industries and services;

4. The culture in Bangladesh gives relatively high status to the professions and civil service and relatively low status to businessmen or traders;

5. Much of the mercantile class (historically mostly Hindu) have left Bangladesh leaving a void which has only been partially filled; and

6. Where resources and wealth are perceived to be fixed and one man's gain is another's loss, profit-seeking entrepreneurs are viewed with a great deal of suspicion.

14/ The Quarterly Journal of the Bangladesh Institute of Development Studies, Vol, IV, No. 4, October, 1976 "Institutional Change and Agricultural Wages in Bangladesh" by Edward Clay.

In view of the above, it is critical that the BDG actively foster a climate favorable to entrepreneurship and direct its policies toward the creation of reliable commercial dealers.

III.C. 3. Social Consequences and Benefit Incidence

It has been previously noted that present output price - input cost relationships work largely to the advantage of the larger, relatively well-to-do farmers. This section addresses the question of the role the proposed project will likely play in the social context. The answer appears largely favorable.

a. Access to Resources and Opportunities

As examined in III.B.1 above, the present situation of owner-cultivator farmers is sufficiently favorable to enable investment either in fertilizer itself or in HYV technology which includes fertilizer. The position of the tenant farmer is such that he probably cannot afford an HYV investment (and HYV's will account for the bulk of future fertilizer use) barring supportive policies in the areas of assured output prices and institutional credit. Even then, an investment in HYV technology will appear a marginal proposition to most sharecroppers.

The position of the sharecropper with respect to a purely fertilizer investment is more favorable. Given its lower (than the full HYV investment) cost, some sharecroppers can undertake and benefit from fairly sizable fertilizer investments even under present conditions, and would very clearly be able to do so given adoption of the full range of recommended policy measures.

The focus need not be on major investments. Fertilizer has the advantage of being a highly divisible input. Even just a pound or two can be purchased by the poorest of farmers and applied with the same effect per pound that a large quantity would yield. This can be done in many cases without any additionsl costs for other inputs. Therefore, what limited cash the tenant may have can still be used to his benefit on fertilizer.

The 1978 Land Occupancy Survey will attempt to determine the use of HYV inputs and fertilizer by land holding size and tenurial status. Such information will provide the baseline for subsequent measurement and evaluation of progress made in the project in reaching all farmers on an equitable basis.

b. Employment

HYV rice and wheat cultivation, the growth of which will account for the bulk of increased fertilizer use during the project period, is known to be more labor intensive than cultivation of traditional varieties, provided only that the introduction of HYV's does not bring with it a significant increase in mechanization. Fortunately, the BDG, being fully cognizant of the country's very serious agricultural unemployment problem, can be counted on to keep the country on a labor-intensive development course.

Granted that HYV cultivation is more labor intensive than traditional cultivation, the extent of the additional employment to be provided has been a matter of some debate. Studies undertaken by the UNDP/FAO and Edward Clay in 1977 (15) attempted to show that even a successful HYV growth strategy would not likely lead to a rate of increase in foodgrain-related employment equal to the prospective rate of increase in the rural labor force, let alone contribute to an improvement of the situation in other areas. A separate Mission assessment of the situation (16) was less pessimistic, concluding that the rate of increase in employment in foodgrain production (which accounts for about 60 percent of the rural labor force) should at least keep pace with the rate of growth of the rural labor force. The Mission arrived at the further tentative conclusion that employment of hired labor should increase at a faster rate than employment of labor as a whole (i.e. faster then family labor), which would have favorable implications for the country's landless.

The employment effect of purely fertilizer investments is even less clear than that of investments in the full HYV technology. Much depends on the scale of fertilizer application . A study of fertilizer use by the Economist Intelligence Unit, (17) based partly on findings by Dr. Hugh Brammer, (18) found a fairly significant increase in the amount of labor required in going from "farmer use" to "recommended use" levels of application. Those findings are summarized in Table 14, which also shows the average labor requirement on local variety crops.

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(15) Govt. of Bangladesh-UNDP/FAO Mission, Agricultural Employment in Bangladesh, Apr. 1977, and Edward J. Clay and M. Sekander Khan, Agricultural Employment and Underemployment in Bangladesh; the Next Decade, June 1977.

(16) USAID, Bangladesh, Employment Effects of The HYV Strategy, Jan.23, 1978.

(17) Economist Intelligence Unit, The Structure of the Fertilizer Market in Bangladesh, June 1977.

(18) H. Brammer, Cost of Production, Profits and Returns For Paddy and Wheat Cultivation at the New (July 1976) Fertilizer Prices, July 1976.

Table 14

Man Days of Labor Per Acre

Crop Varieties	Local Varieties	HYV Varieties With Fertilizer Use At : Farmer Use Levels	Recommended Levels
Aus	58	78	90
B. Aman	40	-	-
T. Aman	58	69	77
Boro	71	102	177
Wheat	-	55	67

Whether or not the promotion of fertilizer use can improve the rural employment situation, the spread of HYV cultivation (which, again, will account for the bulk of future fertilizer use) undeniably has a greater employment creation potential than any other present or foreseeable area of economic activity. The portion of the rural labor force engaged in foodgrain production numbers some 13 million. A successful HYV - based production strategy, resulting in a 2.2 percent rate of increase in employment,[19] would raise this figure to 14.5 million by 1982/83. While other avenues of rural employment creation must be explored (the USAID Rural Industries Project is one such effort), no other area offers the prospect of creating 1.5 million man-years of employment during this period.

c. Rural Displacement, Migration and Urbanization

Increased profitability of farming arising from additional fertilizer investments raises the possibility of takeovers of sharecropped land by owner-cultivators or owner-managers. Owner-managers may be further tempted to displace sharecroppers in favor of hired labor to the extent real agricultural wage rates continue their long-term downtrend.

Much will depend on the attitudes of owners which cannot be precisely foreseen. An owner may foresee a larger profit by taking over from his sharecropper and assuring a desired fertilizer investment. On the other hand, if the sharecropper were to make the investment anyway, the owner might do just as well, with less effort, by continuing to accept his half of a now larger crop. Nor can the possibility of owners making fertilizer investments on behalf of sharecroppers be entirely dismissed, even though this is now seldom done in practice.

19/ Based on findings of Mission study, Ibid.

On balance, the more likely outcome would seem to be that sharecroppers will increasingly adopt fertilizer use on their own, thereby strengthening their positions and enabling them to avoid entering the ranks of the landless.

As discussed in (b) above, the impact of fertilizer use on rural employment is expected to be favorable, though it probably cannot in itself effect a net improvement in the unemployment situation. This being the case, it cannot lead to a reduction in the rate of urban migration, but probably will keep it from rising faster than it otherwise would.

d. Changes in Power and Participation

This project will strengthen the private fertilizer retailers and will create a new group of private fertilizer wholesalers. These dealers may be formed into a trade association. The cumulative effect of these actions is considered to most likely be to create a power influence favorable to expanded fertilizer use.

III.D. Role of Women

Agriculture is by far the largest single sector in the economy of Bangladesh. Economic growth requires optimum utilization of agricultural resources, both human and physical.

The purpose of this project is to assist Bangladesh in increasing agricultural production by making available adequate fertilizer inputs. Although women in Bangladesh seldom work side by side with men and children in the fields, they do perform a significant role in agricultural production. There may be a great diversity, however, in the farm activities by women, depending on a family's economic status, the size of holdings, tenancy, and the nature of the particular community.

The women's busiest time is at the harvest and post-harvest season, as it is for all family members. Women have primary responsibility for winnowing and sieving newly threshed paddy, and parboiling, drying, husking and home milling of all rice used in home consumption. In addition, women perform some of the above processes for the paddy sold in the market. Women also assist with the threshing in many families. If there are not enough female family members to perform these processing functions , women day laborers are hired to assist the family members and are paid in cash or kind (often a portion of the processed paddy).

Also, the planting and maintenance of kitchen gardens located within or close to the bari (household compound) are the primary responsibility of female family members. For very poor and landless families, the surplus produce from these gardens which is not needed for family consumption is often sold for much needed cash. To the extent that the inputs of this project are available to women for use in such horticulture they will increase the yield of kitchen gardens and, as a result, also improve the nutritional and economic status of poor families.

In the realization of higher farm incomes, women and men will, of course, benefit equally from this project. Moreover, rural women could utilize part of the incremental household earnings for investments in further development of cottage industries, which provide sustenance to many a rural household, and thereby further improve their family's well-being. The opportunity for learning or improving the skills for such activity may be provided through a companion AID FY 1977 project for the National Women's Development Academy which is specifically directed to development of skills for rural women.

Although this project probably will not result in any major social change, attention will be given to the role of women in assessing the likely effectiveness of the project. Women are not only capable of harnessing their own talents, but guiding these of their children and other family members.

For any new employment created within BADC under this Project, the policy of this organization is that women will be given an equal opportunity for employment and will be given equal pay for equal work.

IV.A. Implementation Outline

Date	Action
June 1978	Grant authorized
June 1978	Project Agreement signed
July 1978	Initial conditions precedent satisfied
July 1978 to March 1983	Procurement process initiated for all fertilizer
September 1978	Contracts signed for BADC technical consultant and engineering consultant
December 1976 to June 1980	All fertilizer storage construction begun
June 1979	FY 1979 funding authorized
Each May 1979 to 1984	Annual joint AID-Government evaluations
June 1980	FY 1980 funding authorized
June 1981	FY 1981 funding authorized
June 1982	FY 1982 funding authorized
June 1984	Project Assistance Completion Date

IV.B. Bangladesh Government Administrative Arrangements

IV.B.1 Systems Improvements

The primary implementing of the project will be BADC. BADC will be assisted by a consultant organization as per the scope of work contained in Annex B.7 below. The consultant contract will be negotiated by BADC under AID competitive procedures.

During the first three months after the signing of the contract, the Consultant will work with BADC to develop a detailed work plan covering all items in the scope of work. Execution of the work plan will depend upon effective BADC implementation of the agreed actions for installing the new marketing system.

The systems improvements aspect of this project is far reaching, very complex, will be very time consuming and will require a considerable growing process on the part of may individuals. For success the deep commitment and frequent involvement of the Chairman and top staff of BADC will be needed and have been promised.

IV. B. 2 Storage

Implementation of this aspect will be considerably eased following as it does the successful experience under the Fertilizer Storage Construction Project. For this expanded effort, however, strengthening of the office under the present Manager (Storage) will be required. This strengthening will enable the office to better handle the demanding tasks of site selection and purchases.

Also for unity of direction, the Engineering Consultant will report to the General Manager (Supply) who will be in overall charge of all aspects of the storage construction including site selection and design approval.

Construction of bagged storage warehouses will be by local construction firms as under the current Fertilizer Storage Construction Project. Construction of bulk storage including bulk handling and bagging capacity will be completed on a fixed price basis, and will include provision for training of BADC operating personnel and management assistance during the first year of operation. AID grant financing for storage construction of bagged product warehouses will be at 80 percent of estimated cost as established under the fixed amount reimbursement system (FAR). Prior to AID approval of each award for construction, BADC shall be required to place in a special account the difference between the FAR amount and the contract amount. Upon approval of award, AID shall establish the FAR amount and from time to time make advances up to the FAR amount. Such advances shall be made into the same account as mentioned above and shall be as established in implementation letters. Payments from the account shall be made only to approved contractors upon completion of agreed upon stages of construction as certified by the Consultant. The amount of AID deposit shall be subject to refund (or deduction from other payments) if construction is not completed according to the agreed specifications.

IV. B. 3 Fertilizer

Implementation of this aspect of the Project will be based upon the successful procedures developed under the Agricultural Inputs III Project and upon the newly established fertilizer coordination procedure described in Part III. A. 1 Systems Improvements above.

Starting from the basic information contained in the Fertilizer Situation Reports and in accord with the conclusions reached in the Fertilizer Coordination Meetings, USAID will cable to AID/W BADC's proposal for fertilizer purchase specifying IFB number, date of issuance, bid closing date, types and quantities of fertilizer desired and shipping periods. After AID/W acceptance of BADC proposal, AID/W will contact the Bangladesh Embassy in Washington and assist them in issuing the IFB on the specified date. If time permits, BADC/Dacca may also issue duplicate copies of the IFB.

Bid opening will be in Washington by the Bangladesh Embassy or a BADC representative who will fly there for the purpose. Shipping tenders will be requested for those bids found to be responsive by the Embassy/BADC and AID/W. Awards for commodity and freight will be by BADC representative and/or the Bangladesh Embassy.

IV. C. AID Project Responsibilities

The Project Agreement will be drafted by the Regional Legal Advisor (RLA), negotiated by USAID and signed in Bangladesh. Review of conditions precedent will be by USAID with the assistance of the RLA.

Primary responsibility for all aspects of this project will be with the Project Officer assigned in the Agriculture Division. Engineering tasks will be performed by the Engineering Division. Financial matters including disbursements under the Grant will be the responsibility of the USAID Controller in coordination with SER/FM in Washington.

AID/W will process the project paper and authorize the grant. IFBs will be subject to final AID/W approval, and procurement will be monitored and approved by AID/W as discussed above. All procurement, will be by competitive bids and subject to AID regulations.

IV. D. Evaluation Arrangements

Joint AID-Bangladesh Government annual evaluations are planned beginning one year after signing of the Grant Agreement. These evaluations will cover both implementation items and progress towards purpose and goal. Implementation items will include all physical and administrative actions concerning inputs and outputs, and should be fairly straight forward.

Measure of purpose achievement involves the increased use of fertilizer on an equitable basis. BADC offtake data will be used to determine total usage levels. Usage by type of farmer will be estimated based upon field surveys conducted for the purpose beginning in the Spring 1978.

The project goal is increased foodgrain production. Ministry of Agriculture crop statistics will be used to determine estimated production. Participation by type of farmer in increased yields will be estimated by the same field surveys mentioned above in which data on acreage of various crops grown and agricultural inputs applied will also be collected.

Baseline data for purpose and goal will be established during the first surveys in the Spring 1978.

IV. E. Conditions Precedent, Covenants and Status of Discussions

IV. E. 1 Conditions Precedent to Initial Disbursement

a. Legal opinion as to the binding character of the Project Agreement.

b. Designation of authorized representatives of the Government.

c. Assurance that budgetary allocations will be established for FY 1978-79 through FY 1982-83 for BADC sufficient to carry out the project for each year, including an undertaking to increase such allocations if required to meet the requirements of the project.

d. Evidence of the intended fertilizer price structure which will prevail through FY 1978-79, in substance and form satisfactory to AID.

IV. E. 2 Conditions Precedent to Initial Disbursement for all Costs Except Consultant Costs

a. Issuance by the Bangladesh Government of the first Fertilizer Situation Report in a form and content acceptable to AID.

b. Convening of the first Fertilizer Coordination Meeting to include donors and appropriate Government agencies.

c. Action by the Government to finance an engineering study of the best way to make operable the bulk fertilizer storage warehouses at the Ghorasal and Fenchuganj Urea Factories.

IV.E.3 Conditions Precedent to Additional Disbursement

a. Evidence of arrival and out-turn reports and claims concerning any fertilizer under a preceding procurement financed by this project, when such fertilizer has already arrived in Bangladesh.

b. Establishment of the phased new system of private retail and wholesale dealers.

c. Action to make operable the Ghorasal and Fenchuganj bulk storage warehouses.

d. Signed copies of consultant contracts acceptable to AID for engineering and technical services required for the project.

IV.E.4 Covenants

a. The Government will take effective action to remove constraints to increased fertilizer use including the following constraints:

(i) Erratic and uncertain supply from local production and import.

(ii) Marketing constraints at the retail and wholesale levels, including inadequate financial incentive to the retail dealers and complete absence of private wholesale dealers.

(iii) Limited internal transportation and storage capability.

(iv) Inadequate farmer incentives.

b. The Government will take action to establish those principles described in Part II. B. 3(b) of this PP. (Note: This section will be stated in full in the Project Agreement).

c. The Government will assign an effective priority to fertilizer transport, establish rationalized rate structures for fertilizer movement, and take all other necessary measures to meet fertilizer transport needs.

d. The Government will consult with AID from time to time at the request of either with respect to the obligations accepted by the Government under this project and any question related thereto.

e. The Government shall make available promptly as needed, the land, funds, facilities, services, personnel and other resources, including funds for construction or acquisition of additional warehouse or storage space, which are required, in addition to the proceeds of the Grant, for carrying out the project.

f. The Government will cause BADC and BCIC to carry out the project with diligency and efficiency, and in accordance with sound administrative, financial and agricultural practices, and shall not take nor permit any action to be taken which would interfere with the effective implementation of the project.

g. The Government will cause BADC and BCIC to operate the project in such manner as to ensure the continuing and successful achievement of the project purpose.

h. The Government shall implement those obligations of the Government under the Loan Agreement between the Government and AID for the Ashuganj Fertilizer Project which effect or have relation to the implementation of this project, including, but not limited to those requirements for the efficient operation of the fertilizer plants producing fertilizer in Bangladesh.

IV. E. 5 Terminal Date for Conditions Precedent and the Project Assistance Completion Date

a. The conditions precedent to initial disbursement shall be met within one month from the date of signing of the Project Agreement.

b. The Project Assistance Completion Date will be six (6) years from the date of signing of the Project Agreement.

IV. E. 6 Status of Discussions

Detailed discussions have been conducted with the Government on all substantial issues in the project. Agreement in principle has been reached on all issues as is reflected in the Government's request for assistance contained in Annex G.

Fertilizer Distribution Improvement Grant

Draft Project Paper

Annexes

A. AID/W PRP Approval Message

B. Project Technical Details

C. Environmental Assessment

D. Logical Framework Matrix

E. Statutory Checklist

F. USAID Director's Certification

G. Government Application for Assistance

H. Project Description to be Used in the Project Agreement

I. Draft Grant Authorization

AID/W PRP APPROVAL MESSAGE

R 152131Z FEB 77
F SECSTATE WASHDC
TO AMEMBASSY DACCA 0505
BT
UNCLASSTATE 034394

AIDAC

E.O. 11652: N/A

TAGS:

SUBJECT: FERTILIZER DISTRIBUTION IMPROVEMENT

1. APAC IN MEETINGS HELD NOVEMBER 16 AND NOVEMBER 24, 1976 REVIEWED THE PROPOSED PROJECTS FOR AG INPUTS, FERTILIZER STORAGE II AND FERTILIZER BULK HANDLING. ALL THREE WERE APPROVED FOR INCLUSION IN THE FY 78 CP ON THE BASIS THEY WOULD BE CONSOLIDATED INTO A SINGLE PROJECT QUOTE FERTILIZER DISTRIBUTION IMPROVEMENT UNQUOTE. TOTAL FUNDING PROPOSED IN FY 78 CP IS DOLS 34 MILLION.

2. THE COMBINING OF THE THREE PROJECTS, PRESENTS A MORE UNIFIED SECTOR APPROACH, SIMPLIFIES THE CONGRESSIONAL PRESENTATION AND PROVIDES NEEDED FLEXIBILITY IN FUNDING THE INDIVIDUAL COMPONENTS. IT ALSO PROVIDES MORE INCLUSIVE AND COHERENT BASIS FOR DIALOGUE WITH THE BDG ON POLICIES AND STRATEGIES FOR MANAGEMENT PURPOSES. THE THREE PROJECTS WHILE COMBINED INTO ONE PP WOULD NEVERTHELESS BE SET UP AS SEPARATE COMPONENTS WITH INDIVIDUAL CONDITIONS PRECEDENT SO THAT DELAYS IN ONE ELEMENT UNIQUE TO THAT ELEMENT NEED NOT DELAY ENTIRE PROJECT.

3. THE AMOUNT PROGRAMMED FOR AG INPUTS III FOR FY 77 IS DOLS 9 MILLION. THE PP SHOULD ADDRESS THE FOLLOWING ISSUES TO THE EXTENT FEASIBLE:

(A) THE RELATIONSHIP OF FERTILIZER USAGE TO THE PRICE OF INPUTS WITH A BREAKDOWN OF FERTILIZER REQUIREMENTS BY CROP AND SEASON.

(B) METHOD TO BE USED BY MISSION IN DETERMINING WHAT PERCENTAGE OF FERTILIZER REQUIREMENTS IT WILL FINANCE.

(C) THE SOCIAL SOUNDNESS ASPECTS OF PROJECT AS IT IMPACTS ON BENEFICIARIES, INCLUDING AN ASSESSMENT OF THE LIKELIHOOD THAT PROJECT WILL INCREASE FERTILIZER USE BY SMALL FARMERS, MEASURES TO MAXIMIZE FERTILIZER USE WITHIN TARGET GROUP AND RELEVANT INFORMATION GATHERED BY JANUZZI STUDY.

(D) A DESCRIPTION OF THE FERTILIZER DISTRIBUTION SYSTEM AND ITS RELATIONSHIP TO EXTENSION, IRDP AND OTHER GOVERNMENT AGENCIES SERVING SMALL FARMERS.

(E) AN ASSESSMENT OF THE CAPACITY OF THE BADC AND OTHER PARTICIPATING INSTITUTIONS TO EFFECTIVELY MANAGE THE PURCHASE OF REQUIRED FERTILIZER IMPUTS, THANA AND UNION DISTRIBUTION SYSTEM.

4. THE FY 77 AG INPUTS GRANT PP SHOULD INCLUDE AN ANALYSIS OF THE 40-THANA FERTILIZER DISTRIBUTION IMPROVEMENT PILOT ALONG WITH A DESCRIPTION OF THE QUOTE REFORMS UNQUOTE OR SYSTEM MODIFICATION WHICH BDG IS ADOPTING IMMEDIATELY (OR HAS ADOPTED WITHIN PAST YEAR) ON WHAT WE COULD EXPECT TO BE APPLIED MORE BROADLY IF NOT ON A NATION-WIDE BASIS. AID/W WOULD NOT ANTICIPATE THAT BDG COULD INTRODUCE FURTHER NATIONAL REFORMS BASED ON BASIS OF WHAT MIGHT BE ADDITIONAL RECOMMENDATION OF FERTILIZER SECTOR STUDY COMMISSIONED UNDER ASHUGANJ PROJECT AGREEMENTS. THE RECOMMENDATIONS OF THIS (I. E. THE ASHUGANJ) STUDY -- WHICH WE HOPE AND EXPECT WILL BE QUITE COMPREHENSIVE -- MIGHT WELL BECOME, HOWEVER, THE BASIS FOR NEGOTIATION WITH BDG IN REGARDS TO THE FY 78 FERTILIZER DISTRIBUTION IMPROVEMENT PROJECT. WITH REGARD TO THE FY 77 GRANT, AID/W WOULD VERY MUCH APPRECIATE INDICATION OF THE NATIONAL QUOTE REFORMS UNQUOTE THE BDG HAVE ADOPTED OR YOU ANTICIPATE WILL BE ADOPTED ASAP BUT AT LEAST PRIOR TO SUBMISSION OF PP ITSELF.

5. THE 1978 PP FOR FERTILIZER DISTRIBUTION IMPROVEMENT SHOULD ADDRESS IN ADDITION TO THOSE ITEMS LISTED IN PARA 3 ABOVE THE FOLLOWING:

(A) IT WOULD BE BENEFICIAL IF PP INCLUDED A DESCRIPTION OF THE FERTILIZER STORAGE SYSTEM BY SIZE, LOCATION, AND AMOUNT INCLUDING EXISTING AND REQUIRED FACILITIES AS REPORTED IN ASHUGANJ STUDY.

(B) THE WAREHOUSE CONSTRUCTION PERIOD WHICH WE CONCUR WITH MISSION SHOULD BE EXTENDED AN ADDITIONAL YEAR INTO 79/80 CROP YEAR.

(C) MEASURES TAKEN TO MOVE SOME FERTILIZER DISTRIBUTION INTO THE PRIVATE SECTOR AND THE POSSIBILITY OF CONTINUING RELIANCE ON SOME RENTED STORAGE CAPACITY. ACCORDING TO PRP, FERTILIZER STORAGE II OF 10/28/76, P. 2, FERTILIZER STORAGE REQUIREMENTS, USING THE MEDIUM DEMAND PROJECTIONS FOR 1979-80 WILL BE 350,000 MT. WHILE THIS PROJECT COMBINED WITH FERTILIZER STORAGE I WILL INCREASE GOVERNMENT OWNED CAPACITY TO 337,000 MT. LEAVING 13,000 MT. TO BE FURNISHED BY THE PRIVATE SECTOR. AS OF OCTOBER 1976, RENTED WAREHOUSE CAPACITY WAS 218,000 MT.

(D) THE EXACT LOCATION OF THE PROPOSED BULK HANDLING FACILITY.

(E) THE PROPOSED SPARE PARTS REQUIREMENTS FOR BULK HANDLING EQUIPMENT RAISES SEVERAL QUESTIONS REGARDING OVERALL MANAGEMENT AND WAREHOUSING OF PARTS. ONE SOLUTION WORTHY OF MISSION CONSIDERATION IS A TIME PHASED DELIVERY SCHEDULE FOR SPARE PARTS COVERING A FIVE YEAR PERIOD, THEREBY AVOIDING DELIVERY OF A LARGE QUANTITY SPARE PARTS AT ONE TIME WHICH WOULD PROBABLY CREATE PROBLEMS IN AREAS OF WAREHOUSING AND STOCK CONTROL. (BELIEVE MISSION MAY HAVE ALREADY ANTICIPATED THIS APPROACH ON ASHUGANJ PROJECT WITH USE OF QUOTE UNPRICED PURCHASE ORDERS UNQUOTE.) PP DOCUMENTATION SHOULD ADDRESS MINIMUM SYSTEM ACCEPTABLE TO MISSION FOR PROCURING SPARE PARTS, STOCK MANAGEMENT PROCEDURES TO CONTROL INVENTORY AND ISSUANCE OF SPARE PARTS AS WELL AS INDIGENOUS ADMINISTRATIVE CAPACITY FOR MANAGING STOCK INVENTORY.

6. IF THE PROJECT IS TO CREATE EMPLOYMENT AND/OR PROVIDE TRAINING, WILL WOMEN HAVE AN EQUAL OPPORTUNITY TO PARTICIPATE? IF EMPLOYMENT IS CREATED, WILL WOMEN RECEIVE EQUAL PAY FOR EQUAL WORK?

HARTMAN

Project Technical Details

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Actual Fertilizer Offtakes from BADC
(Thousands of Long Tons)

Year	Urea	TSP	MP	AS*	SP	HP	NPK	Total
1962-63	41	3	2	25	3	-	-	74
1963-64	75	23	4	8	2	-	-	112
1964-65	71	19	4	7	-	-	-	101
1965-66	83	20	4	21	-	-	-	128
1966-67	121	35	8	6	-	-	-	170
1967-68	152	48	11	15	-	-	-	226
1968-69	160	53	12	12	-	-	-	237
1969-70	196	66	15	14	-	-	-	291
1970-71	212	76	18	-	-	-	-	306
1971-72	170	60	14	-	-	-	-	244
1972-73	277	89	18	-	-	-	-	384
1973-74	268	94	18	-	-	-	-	380
1974-75	176	76	18	-	-	14	1	282
1975-76	312	111	22	-	2	4	7	458
1976-77	349	124	22	-	2	4	6	507
Jul-Dec 77	205	102	20	-	0.5	2	0.5	330
Jan-Mar 78	139	44	12	-	0.4	0.7	0.2	196

*Since 1970-71 Ammonia Sulphate Sales have been direct from the Fenchuganj Factory or through other separate import arrangements for the tea gardens.

USAID Projected Fertilizer Offtakes

(000's Long Tons)

Year	Urea	TSP	MP	Total
1977-78	452	173	40	665
1978-79	520	199	45	764
1979-80	598	229	51	878
1980-81	687	263	60	1010
1981-82	790	302	69	1161
1982-83	908	347	80	1335

Total offtakes for 1977-78 are estimated based on actual sales for July 1977-March 1978 plus BADC targets for April-June 1978. Total offtakes 1978-79 to 1982-83 are projected on the basis of 15 percent annual increases from the 1977-78 total. Urea, TSP, and MP offtakes are projected at 68, 26, and 6 percent of the total offtakes respectively as is presently the case.

Fertilizer Offtake Projections in the Final Draft of the "Ashuganj Study"

(000s Long Tons)

Year	UREA High	UREA Medium	UREA Low	TSP High	TSP Medium	TSP Low
1977-78	396	371	341	157	147	136
1978-79	445	403	355	184	167	147
1979-80	500	439	370	215	189	161
1980-81	561	477	386	252	214	175
1981-82	637	527	407	294	243	192
1982-83	723	582	433	343	275	212

	MP High	MP Medium	MP Low	TOTAL Urea, TSP, and MP High	TOTAL Urea, TSP, and MP Medium	TOTAL Urea, TSP, and MP Low
1977-78	42	39	36	613	557	513
1978-79	54	49	44	683	619	546
1979-80	70	61	53	785	689	584
1980-81	91	76	63	904	767	624
1981-82	109	88	72	1040	858	671
1982-83	130	102	81	1196	959	726

Actual Local Fertilizer Production
(Thousands of Long Tons)

Year	Fenchuganj Urea	Fenchuganj AS	Ghorasal Urea	Chittagong TSP
1962-63	72	-	-	-
1963-64	100	-	-	-
1964-65	76	-	-	-
1975-66	91	-	-	-
1966-67	94	-	-	-
1967-68	109	-	-	-
1968-69	87	-	-	-
1969-70	94	5	-	-
1970-71	55	6	44	-
1971-72	46	3	-	-
1972-73	39	6	172	-
1973-74	60	10	218	-
1974-75	58	5	11	30
1975-76	52	6	225	48
1976-77	77	9	208	46
Jul-Dec. 77	28	5	85	16
Jan-Mar. 77	17	1	52	15
Capacity (330 days operation)	107	11	335	150
Average Operating Rate	73	6	214 (4.5 yrs)	40
	68%	55%	63%	27%

Historical Costs and Revenue of the Fertilizer Distribution Scheme
(Tk. 000s)

Costs	1962/63	1963/64	1964/65	1965/66	1966/67	1967/68	1968/69
Purchase of fertilizer	51,520	31,120	48,079	87,023	102,234	109,102	130,232
Opening stock-closing stock	(21,921)	21,472	1,213	(24,568)	(23,847)	(3,346)	(14,147)
Total cost of sales	29,599	52,592	49,292	62,455	78,387	105,756	116,085
Transport, freight, handling, etc.	4,274	4,702	10,068	9,725	12,272	14,262	28,505
Rent of godowns	140	149	285	477	690	904	903
Depreciation of godowns	-	-	-	-	101	165	509
Pay & allowances	129	161	694	1,192	2,070	2,654	3,678
Contribution to overheads	-	-	1,462	2,767	2,583	3,611	4,163
Other costs	117	870	1,144	1,393	2,336	1,775	17,094
Total costs	34,259	58,474	63,145	77,009	98,439	129,127	171,937
Revenue							
Sales (net of discount)	20,064	28,375	24,689	37,973	47,465	63,503	58,931
Other revenue (including P & L adjustments)	-	-	38	2	1,187	2,309	65
Subsidy	17,599	31,743	33,043	39,855	59,960	79,264	94,747
Total Revenue	37,663	60,118	57,770	77,830	108,612	145,076	153,743
Net Profit (loss)	3,404	1,644	(5,375)	821	10,173	15,949	(18,194)

Costs	1969/70	1970/71	1971/72*	1972/73*	1973/74*	1974/75*	1975/76*	1976/77**
Purchase of fertilizer	126,981	123,036	50,459	108,004	209,967	331,214	935,769	743,369
Opening stock-closing stock	8,954	11,742	49,500	(8,500)	(14,500)	37,500	(254,000)	83,205
Total cost of sales	135,935	134,778	99,959	99,504	195,467	368,714	681,769	826,574
Transport, freight, handling, etc.	17,759	30,253	19,719	33,055	43,608	72,039	120,241	173,187
Rent of godowns	1,739	2,276	1,890	1,540	802	1,936	3,333	4,909
Depreciation of godowns	598	782	830	790	770	730	700	670
Pay & allowances	4,705	4,657	6,358	7,282	7,193	11,875	12,312	14,355
Contribution to overheads	4,606	6,564	4,238	5,095	6,458	11,481	22,066	40,633
Other costs	4,230	5,424	24,631	109,047	23,028	22,547	42,175	36,486
Total costs	169,572	184,734	157,625	256,313	227,326	489,322	882,596	1096,814
Revenue								
Sales (net of discount)	71,568	72,832	50,985	97,842	199,050	339,140	397,202	452,611
Other revenue (including P & L adjustments)	17,700	1	-	-	-	-	-	-
Subsidy	100,000	126,012	65,412	160,000	74,400	205,000	520,000	721,570
Total Revenue	189,268	198,845	116,397	257,842	273,450	544,140	917,202	1174,181
Net profit (loss)	19,696	14,111	(41,228)	1,529	(3,876)	54,818	34,606	77,367

* No accounts have been published by BADC since 1970/71. Data for the following years have been calculated and estimated by the Consultants from information provided by, and in consultation with, BADC.

** BADC and AID estimated calculation.

Source: Final Draft of the Ashuganj Study; taken from BADC Annual Accounts and Consultants' estimates, for all years except 1976-77.

Crop Response Ratios and Application Rates

A. Crop Response Ratios

With the data presently available it is not possible to give a satisfactory picture of the general shape of response curves either regionally or nationally with respect to the crop yield response to fertilizer use as it is now practised in Bangladesh. The main reason for this is that field trials which have been conducted so far are almost exclusively at application rates above those actually practiced by the farmers.

Nevertheless, the following analysis based on trials conducted by the Soil Fertility and Soil Testing Institute of Bangladesh is indicative of the response ratios which can be obtained in Bangladesh.

Table (1)

Crop Response Ratios

Crop	Application Rate lbs NPK per acre	Yield maund per acre (paddy)	Response Ratio lbs of increased yield per lbs of nutrient
Rainfed aus			
IR 8	0 - 0 - 0	22.82	-
	40 - 40 - 0	30.04	7.4
	60 - 60 - 40	43.98	9.4
BR 1	0 - 0 - 0	18.19	-
	80 - 60 - 40	34.98	7.6
Irrigated aus			
BR 2	0 - 0 - 0	24.52	
	60 - 60 - 40	33.74	4.7
	80 - 60 - 40	36.51	5.5
	100 - 80 - 60	42.07	6.0
	0 - 0 - 0	26.30	-
	100 - 80 - 60	51.16	10.2
T. Aman			
IR 20	0 - 0 - 0	23.66	-
	80 - 60 - 40	36.35	5.8
	100 - 60 - 40	38.41	6.2
	120 - 60 - 40	40.97	6.5
	100 - 80 - 60	41.72	6.2

BR 4	0	-	0	-	0		22.17	-
	40	-	0	-	0		29.87	15.8
	80		60		40		46.76	11.2
Boro								
IR 8	0	-	0	-	0		28.22	-
	80	-	60	-	40		47.12	8.6
	100	-	80	-	60		58.28	10.3
BR 3	0	-	0	-	0		23.52	-
	40	-	40	-	40		34.59	7.6
	100	-	60	-	40		43.69	8.3
Local aus	0	-	0	-	0		14.51	-
	30	-	40	-	20		21.76	6.6
Local T. Aman	0	-	0	-	0		17.40	-
	40		40		20		25.21	6.8
Local Boro	0	-	0	-	0		21.00	-
	30	-	30	-	20		26.84	5.3
	40	-	40	-	20		28.89	6.5
Rainfed wheat								
HYV	0	-	0	-	0		13.19	-
	60	-	60	-	60		28.08	7.6
Irrigated Wheat								
HYV	0	-	0	-	0		13.28	-
	100	-	80	-	60		31.66	6.3
Potato	0	-	0	-	0		63.25	-
	150	-	100	-	100		97.54	8.1
Sugarcane	0	-	0	-	0		467	-
	150	-	80	-	80		836	97.8
Mustard	0	-	0	-	0		3.90	-
	20	-	240	-	30		6.39	2.3
Lintil	0	-	0	-	0		5.27	-
	30	-	45	-	30		7.14	1.5
Gram	0	-	0	-	0		7.41	-
	30	-	60	-	45		10.58	1.9

It is of course recognized that fertilizer does not act in isolation, and that its best effect is likely to occur when it is used with a package of inputs including improved seed, plant protection, reliable irrigation and improved management and cultivation techniques. However, for the purposes of this paper, it is desirable to isolate the notional fertilizer contribution under circumstances where all other inputs are held constant for control purposes.

The crop response ratios given above range from 4.7 to 15.8 for cereals and from 1.5 to 97.8 for other crops. Under local conditions and with the application rates as summarized in Section B below, it appears that actual crop response ratios probably average somewhere in the neighborhood of 7.0 pounds food produced per one pound nutrient applied. This equates to 3.5 pounds food produced per one pound product applied given the current pattern of product use in Bangladesh.

B. Application Rates

(i) Recommended Rates

Recommended rates for fertilizer application in Bangladesh differ somewhat from one source to another. In the Project Paper on Agricultural Inputs III, application rates recommended by the Bangladesh Soil Fertility and Soil Testing Institute, the Bangladesh Rice Research Institute, the FAO and some independent analysts were reproduced. The BADC recommended rates, reproduced below, are not necessarily any better than the other recommendations but do have the possible virtue of simplicity and are within the general range of the other recommendations.

Table 2 - BADC Fertilizer Recommendations

(1) General (Rice):

a. Urea - 1 md/acre
b. TSP - 1 md/acre
c. MP - 20 seers/acre

(2) Barind Tract Rice: Some parts of Dinajpur, Bogra and Rajshahi and red soil area - southern part of Mymensingh, eastern part of Tangail, northern part of Dacca, east Comilla and Chittagong Hill Tracts.

a. Urea - 1 md/acre
b. TSP - 1 md/acre
c. MP - 1 md/acre

(3) Saline Tract Rice: Satkhira and Bagerhat Sub-Division of Khulna District, coastal areas of Chittagong and Noakhali District, Bhola and Pirojpur of Barisal District and Patuakhali District.

a. Urea - 1 md/acre
b. TSP - 1 md/acre
c. MP - 10 seers/acre

(4) For Aus and B. Aman

a. Urea - 1 md/acre
b. TSP - 1 md/acre
c. MP - 20 seers/acre

(5) For HYV Paddy

a. Urea - 1 md 32 srs/acre
b. TSP - 1 md 30 srs/acre
c. MP - 35 seers/acre

(6) For Jute

a. Urea - 1 md/acre
b. TSP - 20 seers/acre
c. MP - 30 seers/acre

(7) For Wheat

a. Urea - 1 md/acre
b. TSP - 1 md/acre
c. MP - 30 srs/acre

(8) For Sugarcane

a. Urea - 2 mds/acre
b. TSP - 1 md. 20 srs/acre
c. MP - 1 md/acre

(9) For Potato

a. Urea - 1 md/acre
b. TSP - 1 md/acre
c. MP - 1 md/acre

(10) For Tobacco

a. Urea - 1 md 10 srs/acre
b. TSP - 10 seers/acre
c. MP - 35 seers/acre

(ii) Actual Application Rates

In comparison with the above, actual applications rates are much lower. On a national basis, information from BADC and the Ministry of Agriculture indicates that the average intensity of fertilizer use per net cropped acre is as follows:

Table (3) Fertilizer Nutrient Use in Bangladesh

Year	Fertilizer Sales in Nutrient Tons	Net Cropped Area	Pounds of Nutrient Per Acre
1965-66	50,000	22,500,000	5.0
1966-67	77,000	22,500,000	7.7
1967-68	98,000	22,500,000	9.8
1968-69	105,000	22,500,000	10.5
1969-70	130,000	22,500,000	12.9
1970-71	143,000	22,500,000	14.2
1971-72	114,000	22,500,000	11.3
1972-73	179,000	22,500,000	17.8
1973-74	177,000	22,500,000	17.6
1974-75	130,000	22,500,000	12.9
1975-76	212,000	22,500,000	21.1
1976-77	235,000	22,500,000	23.4

Using figures provided by BADC and the IBRD study entitled "Development in a Rural Economy", the Final Draft of the Ashuganj Study (Volume 2, page 99) contains the following estimate of fertilizer use by crop during the year 1975-76.

Table 4 Estimated Use of Fertilizer by Crop

Crop	Average intensity of use (Lbs.prod./acre)	Total Use (000 tons prod.)
Aus Local	11.5	36
HYV	138	54
Broadcast aman	-	-
Transplant aman local	15.6	58
HYV	118	72
Boro local	59	32
HYV	198	140
Total rice	35	392
Wheat HYV	54	5
Total cereal	35	397
Jute	27	20
Sugarcane (mill areas only)	147	10
Miscellaneous crops 1/	20	27
Total	34	454 2/

1/ including sugarcane outside mill areas, local variety wheat, but excluding tea.

2/ Small quantities of HP, NPK, SP in use have been expressed in terms of their nutrient equivalent as Urea, TSP or MP (product).

With respect to fertilizer application rates by types of farmers the information available is very incomplete. The Land Tenure Study currently being conducted by the Bangladesh Government with USAID funding assistance has revealed that the types and classes of farmers are so varied as to make the terms "large farmer" and "small farmer" much less accurate than they were originally thought to be. Nevertheless, during the course of the 1976 Pilot, USAID has collected data from 40 thanas with respect to fertilizer use by small farmers defined as those who farm two acres or less, medium farmers (2-5 acres), and large farmers (over 5 acres).

It was learned conclusively that almost all farmers of all sizes are aware of what fertilizer is and use it to some degree or have used it to some degree in the past. The general use level for small farmers, who purchase at all, varied from 30 seers to 1 maund of urea, 20 seers to 30 seers of TSP, and 10 to 15 seers of MP per acre. The general use level for medium farmers, who purchased at all, varied from 25 to 30 seers of urea, 20-25 seers of TSP and 10-15 seers of MP per acre.

In comparing the small, medium and large farmers, it was found that the medium farmers were over all the most motivated group and usually tried to use the recommended doses of fertilizer in HYV paddy and wheat. The small farmers were more often unable to use fertilizer for lack of cash or were discouraged for some other reason. The large farmers were found to be the least motivated towards fertilizer use and usually applied considerably less than the recommended dose, except on HYV.

Under the Land Occupancy Study agricultural inputs use by types of farmer will be collected during 1978. In the first phase of this study, during 1977, information was collected on the source of inputs by type of farmer as follows:

Table 5. Source of Agricultural Inputs as Reported by Tenants

	Provided by Landowner		Provided by Tenant	
	Number of Households (000's)	Percent of Total	Number of Households (000's)	Percent of Total
Seed	18.8	0.59	3,159.3	99.41
Fertilizer	11.4	0.36	3,166.7	99.64
Pesticides	7.0	0.22	3,171.1	99.78
Irrigation facilities	1.1	0.03	3,177.1	99.97

Data are for both tenant and owner-cum-tenant households. For an accurate estimate of proportions of this magnitude, a considerably larger size is required.

Under the Agricultural Inputs III Project, provision has been made for the collection of data on fertilizer use by sharecroppers in the Spring of 1978 and the Spring of 1979. This survey will be expanded under this Project to obtain a more accurate picture of the pattern of fertilizer use and applications rates by types of farmers (see also Evaluation Arrangements under Part IV Implementation Planning).

Draft Scope of Work for Fertilizer Marketing Consultant

1.0 General

1.1 The services under this Agreement are provided under a grant by AID to the Government, AID Grant 388-0024, which provides in part for technical advice, training, and assistance in all areas relating to fertilizer distribution and marketing by the non-public sector. The implementing agency for this portion of the Project is the Bangladesh Agricultural Development Corporation (BADC). BADC will supply counterparts, clerical help and additional necessary support personnel.

1.2 Training, technical assistance, other activities and commodities for the Project funded under this contract will be reimbursed from the above AID grant on the basis of 100 percent of allowable costs. The contract will cover a five year period beginning from the date of signing, but will be valid initially for a one year period towards the end of which an evaluation will be performed to decide upon the continuation of the contract.

1.3 The Consultant will be expected to provide a qualified team fully capable of performing the services outlined below. During the first three months of the contract, the Consultant will be expected to send the majority of this team to Bangladesh to develop a detailed work plan to cover all areas listed below. This plan will be subject to BADC approval and USAID concurrence.

2.0 Specific

In performing the services under this Agreement the Consultant shall assist the BDC (1) formulate new fertilizer pricing and sales structures, (2) transfer orderly and efficiently thana fertilizer warehousing to the non-public sector, and (3) strengthen the private dealers.

These services shall be performed through the following.

2.1 Marketing

The Consultant will work with BADC to introduce, initially in Chittagong Division and then in the entire country, the new retail and wholesale system with the private sector. This will include devising effective and equitable pricing and sales policies and formulating criteria for selection of dealers. The Consultant will demonstrate to wholesalers and dealers the role of all elements of marketing.

2.2 Credit

The Consultant will help formulate and implement a scheme to provide credit to private sector fertilizer dealers for fertilizer, transport equipment, and warehouses.

2.3 Dealer Associations

To the extent private fertilizer dealers show an interest in forming associations, the Consultant shall assist them in doing so and in making their associations practical and functional.

2.4 Marketing Training

The Consultant will assist in providing training to non-public wholesalers and dealers in all elements of marketing including sales, distribution, handling, finance, etc. The emphasis of the Consultant will be to train trainers and assist them in gaining experience and confidence.

2.5 Distribution and Handling

The Consultant will help non-public sector wholesalers and dealers to identify and solve problems with storage, inventory control, transportation and cost analysis. The emphasis will be on training them in problem analysis and selecting the best alternative solution.

2.6 Fertilizer Situation Reports

The Consultant will assist BADC in the evolution of the monthly fertilizer situation reports both with respect to technical content and format. The Consultant will seek to assure that these reports are sufficient for their purpose both for the BDG and the donors. These reports will describe both the world fertilizer situation as well as that in Bangladesh.

2.7 Fertilizer Coordination Meetings

The Consultant will provide technical advice for timely convening of periodic fertilizer coordination meetings to include the BDG and the donors.

2.8 Fertilizer Use Information

The Consultant will arrange for collection and compilation of data on fertilizer use as required in the evaluation portion of the Project Paper.

3.0 Personnel Requirements

3.1 The Marketing Expert in addition to being team coordinator, will supply technical consulting on sales promotion and advertising; credit arrangement; pricing; finance; organizational planning; field supervision; collection and analysis of marketing and cost information; and sales forecasting. This person will work directly with the dealers and his BADC counterparts (i.e. District Managers and Manager of Sales). The majority of his time will be direct assistance for private sector wholesalers and dealers. His planned term in residence will be one year initially and may be extended up to five years.

3.2 The Training Expert will work to identify training needs and plan, organize, and conduct training, and promotional programs of various types. He will also help BADC to identify and will then purchase fertilizer materials for the BADC Reference Center. The majority of his time will be devoted to the training needs for private sector wholesalers and dealers. His term in residence will be one year initially and may be extended up to five years.

3.3 Distribution Expert will supply technical consulting on warehousing, stock levels and inventory control; transportation; field supervision; and the collection and analysis of warehouse and movement cost information. The majority of this person's time will be devoted to direct assistance and training for private sector wholesalers and dealers. His term in residence will be one year initially and may be extended for up to four years.

3.4 Short-Term Specialists - Short-term back-up consulting is likely to be needed in the areas of finance (such as cost accounting system); credit; product handling; transportation equipment; warehouse design; farmer surveys; communications (such as information system); project evaluation; organizational planning and other specialized training. Total short-term back-up consulting is estimated at 72 work months.

4.0 Reports

4.1 Work Plan - During the first three months after the signing of this contract, the Consultant will work with BADC central and local offices to develop a detailed work plan to cover all items listed above. BADC approval of the work plan should be accomplished within the three month period. USAID will concur or otherwise comment on the work plan within 10 working days of receipt of the work plan and BADC approval.

4.2 Quarterly Progress Reports - Each quarter after approval of the work plan, the Consultant should prepare a progress report giving progress against work plan, listing any problems encountered, providing information of general interest and making recommendations.

FERTILIZER SUBSIDIES IN BANGLADESH

Summary

Fertilizer subsidies, defined as the difference between the sale price to the farmer and BADC's costs of production import, transportation, handling and other costs, amounted to 59 percent of costs in 1976/77. Stated in taka terms, the overall subsidy cost was Tk. 644.2 million, or 4 percent of total Government expenditures. Viewed on this full-cost basis and assuming no change in the farmgate price of fertilizer, the subsidy cost could be expected to rise at a rate equal to the rate of increase in fertilizer offtakes (assumed for the purposes of this paper as 15 percent per annum), with the result that by 1982/83 fertilizer subsidies would amount to from 5½ to 6 percent of overall BDG expenditures, depending upon the rate of increase in the latter.

A desire to relieve anticipated budget pressures through an increase in the fertilizer price is understandable, but A.I.D. believes that in view of the marginal financial position of small and landless farmers, such a measure may be unnecessary and unwise at least in the short-run. Our calculations show that nearly 85 percent of the Government's subsidy outlays for fertilizer may be covered by the cash value of grant fertilizers thus relieving the Government of the bulk of the subsidy burden. Moreover, improvements in the distribution of fertilizer through the expansion of bulk handling facilities and the introduction of DAP would reduce fertilizer subsidies by an amount equal to that achievable through a 25 percent increase in the farmgate price of fertilizer.

A significant increase, now, in the price of fertilizer would be untimely as it would come just when many new farmers, particularly small and borga farmers, are becoming acquainted with fertilizer and HYV use. An increase in prices could take away the profit incentive of such farmers at the moment they are learning to use fertilizers effectively and cause a reduction in the rate of growth in fertilizer use and foodgrain output which would jeopardize achieving the country's long-range food self-sufficiency goals. The BDG might better think in terms of offsetting any fertilizer subsidy costs it must bear by a reduction in the even more burdensome foodgrain subsidy, which would involve a phasing down of its foodgrain distribution system.

The Mission, of course, feels that as the BDG builds up its domestic fertilizer production capacity and reduces its requirements for imported grant fertilizers, the burden of fertilizer subsidies should also be reduced by introducing gradual increases in farmgate fertilizer prices to levels which approach its true economic costs. Fertilizer price increases should be phased in, however, as better domestic fertilizer production and distribution is achieved so farmers don't end up subsidizing these presently inefficient practices. Once the project is underway, therefore, periodic reassessment of the fertilizer price situation will be in order, taking due account of world fertilizer supply and price conditions, of the trends in domestic fertilizer sales, and of particular importance in the latter regard will be the assurance of an adequate output price and the increasing availability of institutional credit.

The "Full-Cost" Calculation of Fertilizer Subsidies

Since its introduction into Bangladesh, fertilizer has been subsidized to keep its price to farmers attractive enough to encourage adoption. The effectiveness of the BDG's subsidy policy is manifested by the rapid growth in fertilizer sales over the past two decades (see Table B.2 below). At the same time fertilizer subsidies have grown to the point where they are now seen by some as placing a significant burden on government resources.

The fertilizer subsidy burden is evident in the growing gap between the total annual costs of importing, producing and distributing fertilizers and the total revenue generated from fertilizer sales to farmers. Table B.8.1 presents for the period 1972/73 to 1976/77 total costs, total revenues and subsidy requirements under the fertilizer distribution scheme which ranged from 12 percent in 1973/74 to 62 percent in 1972/73 and averaged 50 percent of costs for the five-year period. During this period the BDG's subsidy bill on a "full-cost" basis rose four-fold from Taka 158.5 million in 1972/73 to Taka 644.2 million in 1976/77.*

*/ The "full-cost" subsidy calculated in Table B.8.1 takes into account not just the subsidy payments actually received by the BADC from the Central Government but the total losses incurred annually in production, import, and distribution of fertilizers.

Table B.8.1 Costs, Revenues and Subsidies of the BDG Fertilizer Distribution Scheme

(Values in Million Taka)

	1972/73	1973/74	1974/75	1975/76	1976/77	1972/73 to 1976/77
A. Total Costs of Operation	256.3	227.3	489.3	882.6	1,096.8	2,952.3
B. Total Revenues from Sales	97.8	199.1	339.1	397.2	452.6	1,485.8
C. Subsidy (A minus B)	158.5	28.2	150.2	485.4	644.2	1,466.5
D. Subsidy as % of Total Costs	62%	12%	31%	55%	59%	50%

Source: Annex Table B.5

The rise in subsidies can be traced both to international fertilizer price increases and rising domestic production and marketing costs. The upward surge in international fertilizer prices in 1974/75 was the principal factor in the sharply higher subsidy for that year, accounting for 84 percent of the total by our calculations. When international fertilizer prices settled down in 1976/77 -- though at higher levels -- imported fertilizer's share of subsidies dropped back to 40 percent of the total. Despite an increase in farmgate prices in 1976/77 and the reduction of fertilizer import prices, the total subsidy bill has continued to rise due largely to the growing volume of fertilizer offtakes.

The Mission views its estimate of fertilizer subsidies based on the Ashuganj Study data as conservative. The above cost calculations are drawn from BADC's records of the fixed "ex-factory" domestic production or C&F import price it pays for its fertilizer plus its "incidental" charges of demurrage (for imports), internal transportation, salaries, warehouse rental, operating overhead, dealer commissions, insurance and other expenses incurred in handling and distribution. BADC's records, therefore, tend to understate the total subsidy costs to the country of its fertilizer program because they do not include two important considerations:

1. Economic Losses of Fertilizer Factories: The fixed prices of locally produced fertilizer are calculated assuming full capacity operation of the domestic factories. In practice the factories have operated well below full capacity (see Annex Table B. 4) with actual unit costs therefore probably much higher than their "ex-factory" sales prices to BADC.

2. Under-valued Freight Rates: Some domestic transport rates for the movement of fertilizer are fixed in Bangladesh and to the extent they are below true operating costs they represent a subsidy to BADC and to the farmer. The same applies to other services for which rates are fixed below cost including demurrage at ports, the cost of capital borrowed by BADC, fuel and the rental of publicly owned warehouses.

In this analysis these "indirect" subsidy costs have been omitted from the subsidy calculation for lack of data. It is expected, in any case,

that subsidies to the fertilizer factories will decline as their production picks up and, in the case of TSP, as inefficient plant and equipment are phased out. The subsidies associated with other underpriced services to BADC can be assumed to continue as a constant share of the total and hence not affect the trend in total subsidy growth from year to year.

The "Foreign Grant" Component of Fertilizer Subsidies

In setting its domestic fertilizer price levels and determining the levels of subsidies required to compensate BADC for losses that result from sales at these prices, the BDG uses the full C&F cost of imported fertilizers both grant and purchased.* This procedure greatly overstates the BDG's true "cash" subsidy burden because when the value of grant fertilizer imports is included in government receipts on a "cash" basis, the resulting fertilizer subsidy burden on the treasury is seen to be far lower (and in some years non-existent) than when it is accounted on the customary full-cost basis.

Table B.8.4 at the end of this annex illustrates for each of the principal fertilizers and for all fertilizers combined the value of grant fertilizers and its share of total fertilizer imports yearly between 1972/73 and 1977/78. Except for the fertilizer-scarce period of 1974/75, the bulk of the country's fertilizer imports have been grant financed. For all the fertilizers combined, in no year did the grant component of the import bill fall below 69%.

How far, then, does the cash revenue generaged from the sale of imported grant fertilizer go in offsetting the operating lossess -- and hence reducing the BDG's effective subsidy bill -- of BADC's fertilizer distribution program? Our calculations are expressed only in percentage terms because incomplete information exists on when

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*C&F Cost = cost in country of origin at prices and exchange rates prevailing at time of purchase plus freight charges for transporting fertilizer to Bangladesh ports, Port handling and marine insurance charges are accounted separately.

and at what exchange rate grant fertilizers were procured and hence against which year to credit them toward the costs of BADC's fertilizer distribution bill. Our estimates suggest, however, that in years of major imports of grant fertilizers 1975 and 1976 particularly -- their value came close to covering 100 percent of the subsidy costs of BADC's fertilizer program as calculated by the Mission. In years when little grant fertilizer was imported, as in 1976/77, their value understandably did not greatly offset the government's subsidy bill.

The substantial amounts of grant fertilizer imported under this project, therefore, can be expected to contribute significantly to offsetting the government's fertilizer subsidy expenditures. In the Annex Tables B.8.5 to B.8.8 an attempt has been made to estimate the fertilizer subsidy requirements for 1977-78, 1978-79 and 1979-80 and the extent to which these subsidies may be met by grant financing. Certain assumptions have been made (as listed after the tables) including unchanged domestic fertilizer prices during the next two years and a continuation of the present 90 percent grant element of fertilizer imports estimated for 1977/78 in Table B.8.2.

The results of the Mission's analysis are summarized in Table B.8.2 below. While subsidy requirements are expected to rise with increasing offtakes, the BDG's cash subsidy costs are seen to remain constant so that the percentage of total subsidy requirements covered by the BDG actually declines.

TABLE B.8.2 The Grant Component of BDG Fertilizer Costs

(Values in Million Taka)

Year	Subsidy Requirements	Grant Imports	BDG Subsidy Expenditures	Percent Grant Funded	Percent BDG Funded
1977-78	1,122	932	190	83 %	17 %
1978-79	1,288	1,103	185	86 %	14 %
1979-80	1,472	1,283	189	87 %	13 %

As noted, to facilitate the calculations, costs of production and distribution, import costs, and fertilizer prices have been assumed to remain constant during the three year period. With regard to these assumptions:

(1) Constant costs of domestic production and distribution (meaning declining per unit costs) would be consistent with the measures to achieve a more efficient distribution system assumed under the project;

(2) Fertilizer import costs may rise to levels above the average for the three years assumed in the calculations. To the extent they do, and provided the rise were modest in its extent, i.e. at not more than 10 percent per year it might be appropriate to raise fertilizer prices by an equivalent amount.

Assuming constant costs of domestic production, and fertilizer prices rising at the same rate as import costs, the consequences in terms of the subsidy would be :(a) virtually no change from the overall subsidy (full cost basis), as shown in Table B.8.2: and (b) a reduction in the projected cash subsidy, as calculated in Table B.8.2 (since the increase in import costs would apply to only 10 percent of projected imports).

Ofcourse, the actual trend of fertilizer subsidies over the full life of the project will depend on a number of other largely unpredictable developments as well, e.g. the international fertilizer supply and price situation, domestic fertilizer production performance, and the trend of fertilizer offtakes, as well as BDG policy with respect to fertilizer prices. In the absence of any cost cutting measures and if the fertilizer prices were to remain unchanged, the "real" increase in the subsidy (that is net of increases in import, manufacturing and handling costs) would be equal to the rate of increase in fertilizer offtakes, i.e. 15 percent per annum on the basis of the offtake : targets assumed under the project.

The prospective 15 percent rate of increase in the real subsidy cost, in turn, exceeds by a considerable margin the recent or prospective rate of increase in real government expenditures. The latter rose at an annual rate of about 8 percent during 1973/74 - 1976/77 and are not likely to grow at a significantly faster rate during the next five years. Assuming the projected 15 percent rate of increase in the real fertilizer subsidy and a continued 8 percent rate of rise in real government expenditures, the share of government expenditures accounted for by the fertilizer subsidy would rise from the current 4 percent to 6 percent in 1982/83.*

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* Since these measurements are in "real" terms they carry the implicit assumption that the inflation component of future subsidy increases will be equal to the inflation component of future increases in the overall budget.

Selective Measures for Reducing Fertilizer Subsidies

In the design of this project the Mission has investigated whether sufficient opportunity exists for reducing the costs of fertilizer import, production and distribution that there would be no need to raise farm-level fertilizer prices as a means of further reducing subsidies in the near future. Table B.8.3 illustrates that by the adoption of certain cost reduction measures the subsidy burden could be reduced for the BDG and fertilizer donors.

1. The Introduction of Bulk Handling Facilities at Chittagong and Chalna:

We estimate an average $20 per metric ton can be saved from the bulk handling of imported fertilizer which the project proposes to introduce. If all the fertilizer imports projected in Table B.8.5 were bulk handled by 1978/79 the reduction in costs would amount to Taka 145 million or the equivalent of an eleven percent reduction in the fertilizer subsidy otherwise estimated for that year.* (The savings would be Taka 168 million with the same percentage reduction in subsidies if fully introduced in 1979/80). When compared with expected sales revenues for 1978/79 or 1979/80, this cost saving would have an impact on reducing the Government's subsidy bill equivalent to a 13 percent increase in prices.

2. The Conversion from Domestic and Imported TSP to Imported DAP

Nearly equal savings are possible from the suspension of TSP production and the substitution of DAP to meet the country's phosphate requirements. Savings derive from a combination of reduced costs from inefficient TSP production, from the lower handling costs - equivalent to at least $30 per metric ton -- and from the higher nutrient value per unit of weight -- equivalent to at least an added $10 per metric ton of

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*These savings should be considered as maximum. Realistically, bulk import could only be introduced in Chittagong immediately and perhaps at somewhat less then the full import level. Full development at Chittagong and initial development at Chalna would require additional time.

Table B.8.3 Potential Subsidy Savings Under the Proposed Project

(Values in Million Taka)

	1978/79	1979/80
Total Subsidy Requirement 1/	1,288	1,472
Total Sales Revenues 1/	1,129	1,296
Savings from Conversion to Bulk Handling of Imports 2/	145	168
% Subsidy Saving	11	11
% Equivalent Price Increase	13	13
Savings from Conversion to DAP Importation 3/	133	153
% Subsidy Saving	10	10
% Equivalent Price Increase	12	12
Combined Savings from Bulk & DAP Conversion	278	321
% Subsidy Savings	21	21
% Equivalent Price Increase	25	25

1/ From Table B.8.5

2/ Assumes a savings of Taka 300/MT on total of fertilizer imports projected in Table B.8.5

3/ Assumes a savings of Taka 600/MT on total TSP imports projected in Table B.8.5.

DAP substituted for local or imported TSP. The value of cost savings is an estimated Taka 133 million for 1978/79 and Taka 153 million for 1979/80. This is equivalent to a 10 percent subsidy saving in each of the two years and equivalent to the impact on subsidies of a 12 percent increase in prices.

The combined conversion to bulk handling and DAP imports has a potential savings in 1978/79 and 1979/80 for the Government of 21 percent of the "full-cost" subsidy and exceeds the amount of the cash subsidy that would have to be budgeted above the grant-funded portion of fertilizer subsidies. These combined measures also have the same effect on fertilizer subsidies as a farmgate fertilizer price increase of 25 percent. In short, there is plenty of latitude to reduce the fertilizer subsidy burden within the present farmgate price structure.

The Mission's Position

Domestic farm-level fertilizer prices in Bangladesh historically have been held below prices prevailing on world markets -- plus transportation costs; in the long-run they must eventually be allowed to seek more realistic levels or the BDG will be burdened with an endless and rising subsidy bill. Of concern to the Mission, however, is: a) the timing of any rise in the fertilizer price to farmers in the context of the country's overall HYV strategy; and b) measures that can be taken in the short-run, concurrent with changes in fertilizer subsidy levels to facilitate that strategy.

We have established elsewhere in this paper (See Annex B.13) that while fertilizer is an important ingredient in the country's HYV formula, it is not a major burden among farmers' production costs. In 1976 when fertilizer prices were last raised by 25 percent the overall cost of producing a unit of grain rose only 5 percent.*

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*H. Brammer, "Cost of Production, profits and Returns for Paddy and Wheat Cultivation at the New (July 1976) Fertilizer Prices, UNDP/FAO, 1976.

Demand for fertilizer, as evidenced by the trend in offtakes, continued to rise. However, given the marginal position of many farmers who stand a chance of improving their living standards by participation in the country's HYV programs, the Mission does not wish to see any short-run increase in the price of fertilizer that might be a disincentive to adoption and hence delay boosting agricultural output and compromise the equity goals of the project.

To increase domestic foodgrain output, the BDG must adopt measures that will provide added incentives and benefits to small producers. With the security of higher domestic foodgrain output possible from increased fertilizer HYV use, the BDG will be in a better position to phase down its foodgrain distribution system - by raising ration prices and phasing out the less needy urban participants - with a resulting budgetary subsidy saving that would offset any fertilizer subsidy increase. (See the "Note" at the end of this annex on the subsidy savings possible from a shift from foodgrain to fertilizer imports).

Reduction of the ration system will have the added effect of channeling purchasing power to the open market for grain, thus strengthening demand for domestic grain output. Eventually, the benefits accruing to farmers from a reduced ration system together with greater BDG efforts to reach farmers with more abundant low-interest production credit and assured procurement prices -- both measures supported by the Mission -- will enable a rise in farmgate fertilizer prices without a net adverse impact on the farmer's position. Of course, the longer-run increase in the price of fertilizer to farmers should be concurrent with efforts to reduce unnecessary costs in the domestic production and distribution of fertilizer. Otherwise an increase in farmgate fertilizer prices would have the effect of shifting the subsidy burden of inefficient fertilizer production and marketing from the government to small producers. Therefore, this project seeks to reduce wasteful costs in the domestic fertilizer system as the initial means of reducing fertilizer subsidies to be followed by a relaxing of controls on the price of fertilizer once more efficient distribution is underway.

The Mission, therefore, seeks a stable fertilizer price over the short-run (next two-year period) followed by joint reviews with the BDG on the proper level of fertilizer prices and subsidies, using as criteria progress toward: a) more efficient domestic fertilizer distribution and production and; b) a reduction in the food ration system. Achievement of more effective domestic fertilizer production and distribution will be assisted by the commodity aid and technical assistance provided under

this project. Encouragement in reforming the ration system will come from the self help provisions of AID Title I commodity assistance and the provisions of a future Title III agreement.

A Note On The Fertilizer/Foodgrain Subsidy Trade-Off

Although the magnitude of subsidy savings from a phased-down foodgrain ration system eludes accurate calculation, the rate of subsidy savings can be calculated using the 3.5 : 1 grain-to-fertilizer output ratio and knowing the subsidy shares of fertilizer costs and grain prices.

Consider the case on one ton of fertilizer and one ton of rice each costing about $175/MT and $350/MT respectively. Assuming a 60% fertilizer cost subsidy and 20% foodgrain price subsidy, and that 3.5 tons of grain can be produced from one ton of fertilizers, the net subsidy savings from importing one ton of fertilizer and reducing grain imports by 3.5 tons would be $140 per ton of fertilizer sold.[1/] The larger the foodgrain price subsidy the greater the savings from the subsidized sales of fertilizer. From added fertilizer sales of roughly 670,000 MT in 1982/83 -- the increase over 1977/78 levels -- this represents a subsidy savings potential of US $93.8 million for that year alone. The rates of subsidy would have to drop to 9% on grains or rise to 140% on fertilizer in order for there to be no net reduction in government subsidy expenditures from the import and sale of fertilizer instead of grains.

1/ Total grain price subsidy saved (3.5 x 20% x $350/MT = $245.00) less total fertilizer subsidy cost (1.0 x 60% x $175 = $105.00) equals $140/Ton.

TABLE B.8.4: Value of Fertilizer Grant and Cash Imports 1972/73 through 1977/78

(1,000's of $ US)

PRODUCT	1972/73	1973/74	1974/75	1975/76	1976/77	1977/78
Urea:						
A. Grant	8,276		43,605	18,083	3,255	44,293
B. Other	-		14,086	-	2,750	2,986
C. Total	8,276		56,691	18,083	6,005	47,079
D. % Grant	(100%)		(75%)	(100%)	(54%)	(94%)
TSP:						
A. Grant	8,644	15,776	4,761	44,751	2,080	21,189
B. Other	5,670	-	4,160	2,150	-	5,400
C. Total	14,314	15,776	8,921	46,901	2,080	26,589
D. % Grant	(60%)	(100%)	(53%)	(95%)	(100%)	(80%)
MP, NPK, & HP:						
A. Grant		4,183	5,128	7,182	1,570	4,688
B. Other		-	5,013	-	-	-
C. Total		4,183	10,141	7,182	1,570	4,688
D. % Grant		(100%)	(51%)	(100%)	(100%)	(100%)
All Fertilizer:						
A. Grant	16,920	19,959	52,494	70,016	6,905	70,170
B. Other	5,670	-	23,259	2,150	2,750	8,386
C. Total	22,590	19,959	75,753	72,166	9,655	78,556
D. % Grant	(75%)	(100%)	(69%)	(97%)	(72%)	(90%)

Source: BADC Import records; imports on arrivals basis; 1977/78 estimated on the basis of projected offtakes for Jan/June 78 and per ton C&F prices of $175 (Urea) $180 (TSP) and $125 (MP).

"Grant"- Donation or concessional loan financed fertilizer
"Other"- Cash purchases, barter or short-term loan-financed fertilizer

Annex Table B.8.5: Projection of BDG Production, Import and Distribution Costs

(Values in million Taka)

PRODUCT	Taka Cost per ton	1977-78		1978-79		1979-80	
		Tons (1,000)	Costs (million Tk)	Tons (1,000)	Costs (million Tk)	Tons (1,000)	Costs (million Tk)
Urea (I)	2625	194	509	232	609	265	696
Urea (D)	1734	218	378	242	420	279	484
TSP (I)	2700	153	413	182	491	215	581
TSP (D)	4350	40	174	40	174	40	174
MP (I)	1875	60	113	68	128	79	148
Distribution (I)	816	407	332	482	393	559	456
Distribution (D)	718	258	185	282	202	319	229
Totals	–	665	2104	764	2417	878	2768

Source: See assumptions at end of this Annex.

(I) = Imported; (D) = Domestic

Table B.8.6 : Calculation of BDG Fertilizer Sales Revenues

1977 - 78	Tons in 1000s	Takas Per Ton	Sales Revenues (million Taka)
Urea	412	1620	667
TSP	193	1296	250
MP	60	1080	65
Total			982
1978 - 79			
Urea	474	1620	786
TSP	222	1296	288
MP	68	1080	73
Total			1129
1979 - 80			
Urea	544	1620	881
TSP	255	1296	330
MP	79	1080	85
Total			1296

Table B.8.7 Calculation of Costs Met by Grants
(In Million Taka)

Import Costs	1977 - 78	1978 - 79	1979-80
Urea	509	609	696
TSP	413	491	581
MP	113	128	148
Total Import costs	1035	1228	1425
Grant Component *	932	1103	1283

* 90% of Import Costs assumed to be grant financed.

Table B.8.8: Calculation of total subsidy and estimated BDC cash subsidy expenditures

(In Million Takas)

Year	Total Costs 1/	Sales Revenues 2/	Total Subsidy 3/	Share of Subsidy met by: Grants 4/ Total	%	BDC 5/ Total	%
1977-78	2,104	982	1,122	932	83	190	17
1978-79	2,417	1,129	1,288	1,103	86	185	14
1979-80	2,768	1,296	1,472	1,283	87	189	13

1/ From Table B.8.5
2/ From Table B.8.6
3/ Total Costs minus Sales Revenues
4/ From Table B.8.7
5/ Subsidy Requirements minus grants

Assumptions

A. Procurement Costs Per Ton (as provided by BADC in March 1978) remain constant over the three-year period at the following levels:

	Local	Imported
Urea	Tk. 1734	$ 175
TSP	Tk. 4350	$ 180
MP	-	$ 125

B. Distribution Costs Per Ton (as provided by BADC in March 1978) remain constant over the three-year period at 1977/78 levels of:

Domestic: Tk. 718 Imported: Tk. 816

C. Current Average Sale Price to Farmers (Per Ton) remains constant at the 1976/77 price

Urea	TSP	MP
Tk. 1620	Tk. 1296	Tk. 1080

D. Fertilizer Offtake Projections (000's Tons)

		Urea	TSP	MP	Total
1977-78	Domestic	218	40	-	258
	Imported	194	153	60	407
	Total	412	193	60	665
1978-79	Domestic	242	40	-	282
	Imported	232	182	68	482
	Total	474	222	68	764
1979-80	Domestic	279	40	-	319
	Imported	265	215	79	559
	Total	544	255	79	878

- Total offtakes are as projected in this Project Paper.
- Proportion of Urea, TSP, and MP is 62, 29 and 9 percent respectively in all three years as is presently the pattern.
- "Domestic" offtake is estimated at equal to estimated production as projected above in the Project Paper and "Imported" offtakes is estimated at the remainder.

E. Fertilizer Imports continue at 90 per cent grant as during 1977-78.

Draft Scope of Work for
The Construction Engineering Consultant

1.0 Specific Services

1.1 Inspect sites proposed by BADC for the construction of warehouses under the project and advise BADC as to the technical suitability of such sites in a site review study to include cost factor, accessibility, flood levels, utilization, site preparation, construction difficulties and other appropriate factors and recommend if the warehouse selected for the site should be modified either in size or structural elements. If the original proposed site is not suitable, suggest alternate sites within the area which appear technically suitable for construction.

1.2 Provide all necessary modifications to existing designs and perform all new designs of warehouses and ancillary buildings.

1.3 Carry out soil investigation at each site prior to final selection, and modify the foundation design and other designs as may be considered necessary. Perform all required site surveys and site drawings.

1.4 Prepare the bill of quantities for construction at each site and the cost estimates for each site.

1.5 Provide the contract documents and procedures for BADC approval.

1.6 Assist and advise BADC in contract awards and in supervision of the construction contractors working under the project to ensure that construction is carried out in compliance with the specifications and costs as approved. The supervision and inspection by the Consultant at each site will be continuous during construction.

1.7 Inspect and certify whether construction at each site under the project has been completed in accordance with the approved contract specifications.

1.8 Procure and arrange for shipping, in accordance with AID source and origin requirements, motor vehicles with spares, motorcycles with spares, transcievers with spares, and other equipment and materials as needed to assist in performance of the services under this Agreement. Assist BADC in receipt of the above in Bangladesh and in port and customs clearance, inspection and transport to sites

of work under the project and assist BADC in the processing of any claims in connection therewith. BADC shall obtain from Chief Controller of Imports and Exports prior permission to import the items. All items procured shall be retained and used exclusively by the Consultant in the performance of the work until the completion of the project. The Consultant shall be reimbursed for all allowable costs incurred for procurement, arrangement and assistance.

2.0 Reports

The Consultant shall submit reports to BADC and simultaneously to USAID/Dacca as follows:

a) Within 30 days of the effective date of the Agreement a detailed work plan in five copies to BADC of which two copies will be provided to AID.

b) Monthly progress reports in five copies to BADC of which two copies will be provided to AID. These reports shall cover progress during the preceding month, including problems encountered, recommendations and costs incurred.

c) Upon completion of construction at each site under the project a certification in accordance with paragraph 2.8 above with respect to compliance with approved specifications.

3.0 Technical Direction

Performance of this contract shall be under the technical direction of the General Manager (Supply), BADC.

Fertilizer Transport in Bangladesh

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1.0 Introduction

The fertilizer transportation network can be interpreted as a function of the infrastructure and vehicles and/or as the associated logistics. This annex focuses on both aspects in an attempt to develop supported recommendations for fertilizer transport under this project.

The approach taken is to limit the analysis primarily to fertilizer movement, although many of the observations and recommendations are not confined in applicability to only fertilizer.

2.0 Interrelationships Between Transportation, Storage, and Communication in the Fertilizer Distribution System.

The transportation component of the fertilizer distribution system, in relation to the storage and communication components, is crucial in planning and investment strategies for the overall fertilizer distribution system. The current fertilizer distribution system has an unreliable and inflexible transportation component. The reasons for this situation and some solutions are discussed in Sections5, 6 and 7. However, at this stage of the discussions we will take this as given. If the low efficiency level of the transport sector is assumed to be permanent, then increasing storage capacity is a means to compensate for the erractic nature of the transport. If demand fluctuates, then the storage might to some extent overcome the deviations in both transport capacity and demand. This alternative is of course costly and undesirable in terms of excess storage capacity and excess fertilizer inventory.

As discussed in the body of this project paper, both fertilizer supply and demand have been erratic leading at times to both local and even national fertilizer shortages. Under such conditions, the unreliable and inflexible transportation system has tended to prolong such shortages. Even in "normal" conditions, but especially to avoid shortage, a good communications system could allow additional lead time for planning an optimum fertilizer distribution. The effect would therefore be both lower transport and lower storage needs.

The interrelationships between transportation, storage, and communications are therefore clearly close ones. The issue is: what balance between them and what pattern of ownership and control over them will provide the highest benefit/cost ratio for fertilizer distribution in Bangladesh.

3.0 The Current Distribution System Characreristics

To provide a background for understanding the key transportation elements of the distribution system, the following issues are presented and discussed:

(a) The major interregional flows
(b) The breakdown of these flows by mode and the degree of interchangeability between modes:
(c) Costs by mode: and
(d) The degree of multiple handlings and the ensuing costs.

But certain qualifications are in order.
First, as discussed in Section 2.0, the transportation requirements are highly dependent on the supply and demand characteristics. Therefore, it is important to note that the current patterns are a result of both erractic demand and erractic supply. This implies that the current movement would be different if some of the uncertainty was removed from the end points of the flow.

Second, the logistics of the distribution system, (see Section 5) create a situation where traffic cannot easily be diverted from one mode to another as the availability of equipment changes. Therefore, if a railcar (for instance) which has been allocated does not appear at the transhipment depot, the fertilizer often must remain in storage. This kind of delay has often caused or aggravated local shortages.

Third, the efficiency of the transportation system also sometimes influences the production at the factories. Each has limited storage capacity: approximately one month's production each. When the storage facility is full, then the production stops. This has happened several times with very costly results.

Finally, it should be noted that although the transport element of the distribution system is vitally important, fertilizer transportation is not a major portion of the total freight movement. In recent years, according to the Ashuganj Study, fertilizer accounts for 8.5% of the rail freight movements and 8% of the inland water cargo movements.

3.1* The Major Interregional Flows

The fertilizer flow is initially defined by the major transhipment points, through which the fertilizer enters the internal distribution system. These include the ports of Khulna and Chittagong for urea, TSP and MP imports, the Chittagong TSP Factory, the Fenchuganj and Ghorasal Urea factories, and lastly a major redistribution center, the Narayanganj Port. Table 3.1 presents a summary of the fertilizer distribution from the major transhipment points to the regional areas. The character of the transportation infrastructure of each of these regions is developed more fully in Section 4. The tons have been normalized to 100 in order to illustrate more clearly the relative magnitude of different movements.

The Northwestern Region receives the bulk of its fertilizer from Khulna. Relatively minor amounts arrive from Narayanganj, Ghorasal, and Chittagong, in descending order of importance.

The Northeastern Region, since it contains the two urea factories at Ghorasal and Fenchuganj, gets its entire urea requirement from them. Therefore, only phosphate and potash fertilizers (historically at about 25 and 5 percent of the offtake) arrive in the region from outside through Chittagong and Narayanganj.

The Southeastern region receives the majority of its fertilizer from Chittagong. Of lesser (though substantial) importance is urea supplied from Ghorasal and Fenchuganj.

Flows to the Southwestern Region are largely from Khulna; Ghorasal and Chittagong are ranked in desending importance.

3.2 Modal Analysis of the Flows and Times

Section 3.1 identified the basic flows involved in the distribution system and the times associated with them. Table 3.2 and 3.3 provides summaries of the fertilizer movement (1977-1978) from major points by mode in tons. The figures were derived from the tentative movement program of fertilizer from these main distribution points for 1977-78 and as such vary from statistics used in Section 4.0. The tentative program appears to have a more even distribution of tons carried by mode than the 1976-77 actual movement*.

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* Ton-mile statistics were not available for the FY 1977 data base.

TABLE 3.1

BADC 1977-78 Interregional Fertilizer Flow Plan

In Percent of Total

	NW	NE	SE	SW	Total
Chittagong Port & TSP Factory (SE)	1.2	12.1	17.9	2.6	33.8
Khulna Port (SW)	10.9	0.0	-	10.0	20.9
Fenchuganj Urea Factory (NE)	.3	3.9	3.4	-	7.6
Ghorasal Urea Factory (NE)	1.5	15.2	2.5	5.6	24.8
Narayanganj Port (NE) (Redistribution Center)	3.5	7.9	1.0	0.5	12.9
TOTAL	17.4	39.1	24.8	18.7	100

TABLE 3.2

Summary of Fertilizer Movements (1977-78)
From Major Distribution Points by Mode 1/
(000) Tons

	Truck	Water	Rail 2/	Total	
Chittagong Port and TSP Factory	122.4	105.8	83.8	312.0	(34 %)
Khulna Port	40.0	15.0	138.4	193.4	(21 %)
Fenchuganj Urea Factory	-	16.0	54.0	70.0	(7 %)
Ghorasal Urea Factory	-	178.0	52.0	230.0	(25 %)
Narayanganj Port (Redistribution Center)	33.0	26.1	59.7	118.8	(13 %)
TOTAL	195.4 (21%)	340.9 (37%)	387.9 (42%)	924.2	(100 %)

1/ BADC Tentative Movement Programs of Fertilizer from ports and factories During 1977-78.

2/ Assumes that adequate railway cars are available. Otherwise the movement is diverted to water and truck if applicable.

TABLE 3.3

Summary of Fertilizer Distribution (1977-78) from Major Transshipment Points to Regional Areas by Mode

(000)

	NW	NE	SE	SW
Chittagong Port & TSP Factory (SE)	11.2 (Rail)	29.7 (Rail) 81.9 (Water)	42.9 (Rail) 122.4 (Truck)	23.9 (W)
Khulna Port (SW)	100.7 (Rail)	- -	-	40 (Truck) 15.0 (Water) 37.7 (Rail)
Fenchuganj Urea Factory (NE)	3.0 (Rail)	21.0 (Rail) 14.9 (Water)	30.0 (Rail) 1.1 (Water)	- (Rail) -
Ghorasal Urea Factory (NE)	14.0 (Rail)	29.0 (Rail) 112.0 (Water)	9.0 (Rail) 14.4 (Water)	- (Rail) 51.6 (Water)
Narayanganj Port (NE) (Redistribution Center)	23.3 (Rail) 9.6 (Water)	37.4 (Rail) 33.0 (Truck) 2.5 (Water)	- - 9.0 (Water)	- - 5.0 (Water)
TOTAL	161.8	361.4	228.8	173.2

Chittagong Port and TSP factory which are responsible for 34% of the tons moving through the transshipment points, utilize all three modes in their distribution of the product. 39% of the tons are to be carried by truck, 34% by water, and 27% by rail. From Chittagong, the most tons are despatched by truck - 63% of the total tons carried by truck. 31% of the total tons despatched by water were from Chittagong and 22% of the total rail.

Khulna is responsible for approximately 20% of the total tonsmoving through transshipment points. Of this, the majority, 72%, are carried on the rail system. Most dispatches from Fenchuganj are by rail. There are none by road since there is no road connection to Fenchuganj. The proposal to build one there appears deserve consideration.

Ghorasal Urea Factory utilizes the water system more. A little more that 75% of the tonsdespatched from Ghorasal were carried by water. One reason for this is that rail wagons are seldom made available at Ghorasal as this requires an empty trip in. This however does not appear to be sufficient reason and the Ashuganj Study has recommended Ghorasal be given priority allocation of rail wagons. Ghorasal also suffers from lack of adequate road connections although the paved road is only four miles distant.

The final transshipment point is the redistribution center of Narayanganj Port. 13% of the total transshipment tons travel through this port. Each of the modes are utilized, with rail carrying the most.

Time

USAID conducted a survey of godowns in order to establish the times by mode of movements between godowns. A summary of the survey is shown in Table 3.4. Rail while not only having the highest average of 18 days, also has the most erractic. The movement average for the system is 10 days. A closer analysis of the coaster movement using the Chittagong, TSP factory to Khulna route revealed that a great deal of the time (and therefore costs) are involved in the activities outside of the actual movements:

	Days	% of Total
Average loading time	2.5	19%
Average carrying time	4.6	36%
Average waiting at Khulna	2.6	20%
Average unloading time	3.3	25%
Total	13.0	100%

Therefore on this route 64% of the time is spent on loading/unloading and waiting activities.

TABLE 3.4

Average Time of Godown Movement by Mode

(In Days)

Movement Points	Rail	River	Road
TP to TP	22 1/	12	-
TP to IG	13	12	2
TP to TLG	18	8	1
IG to TLG	20	9	1
Average Movement by Mode	18	10	1
Average Movement for System		10	

Source: USAID Survey of Fertilizer Godowns 1976-77

3.3 Modal Costs

The entire transportation distribution cost of fertilizer for 1976-77 was 183.2 million takas or approximately 11.5 million dollars, approximately 16% of the total costs according to Annex B.5. USAID undertook a survey which identified the carrying costs for rail and river and the C & F costs for road (which includes associated handlings as discussed in Section 4.1). These movement costs for 1976-77 were as follows:

1/ Only one sample point

	Takas (Millions)	Dollars (Millions)
Rail	26.5	1.8
River	37.8	2.5
Road	31.3	2.1
Total 2/	97.1	6.5

Table 3.4 indicates the average cost of transit by mode based on the average miles involved in each type of movement. At present there is no transit-to-transit movement by road. The costs are based on the 'Ashuganj Study' data.

TABLE 3.5

Comparative Average Cost of Transport 1/
BADC Fertilizer Movements 1976-77

Movement	By Rail Average		By Water Average		By Road Average	
	Miles	Cost Tk/Ton/Mile	Miles	Cost Tk/Ton/Mile	Miles	Cost Tk/Ton/Mile
Transit to Intermediate Warehouse	193	.39	119	.43	81	.65
Transit to Thana Warehouse	174	.43	116	.43	68	.68
Intermediate Warehouse to Thana Warehouse	65	.75	39	1.00	21	.96
Intermediate Warehouse to Intermediate Warehouse	83	.64	107	.51	64	.68
Transit to Transit	216	.39	160	.35	-	-

2/ Total varies due to inclusion of additional costs

1/ Carrying cost only

Source : - Aid study of BADC Fertilizer Movement.
- Ashuganj Study

3.4 Multiple Handlings

The fertilizer transportation network for Bangladesh stretches from five major transshipment points - the three major ports and two urea factories - through each district to the thana level. The 1977-78 BADC Tentative Movement Program estimates that 805.4 thousand tons will be moved from ports and factories. However, each ton of fertilizer actually goes through multiple handlings as it progresses to the farm level. These handlings could only be properly identified by nationwide on the spot observation in each thana. Such an effort is beyond the scope of this PP. However, some rough idea of multiple handlings can be obtained in terms of movements between different types of godowns. The following table shows for each such type of movement the tons and ton-miles associated with it for 1976-77:

TABLE 3.6

Summary of Godown Movement

	Tons	%	Ton-miles	%
Transit to transit	201,213	20%	33,102,865	32%
Transit to Intermediate	340,895	34%	47,490,322	46%
Transit to thana	82,921	8%	11,839,386	11%
Intermediate to Intermediate	15,402	2%	1,173,893	1%
Intermediate to Thana	354,286	36%	9,804,919	10%
TOTAL	994,717	100%	103,410,000	100%

It is especially important to note that 20% of the tons and 32% of the ton-miles are involved in movements between ports and factories as opposed to flows down to the next level of the distribution godowns into the hinterland. This flow constitutes the redistribution of fertilizer between the major entrance points of Bangladesh.

Multiple handlings translate into increased costs for the consumer. The costs involved are more than just the labor and storage fees. They also include the loss of time and the loss and damage involved in each handling. According to the Ashuganj Study the percentaged of loss for each handling on rail, road and river are

2%, .5% and, .5% respectively. However, decreasing the number of handlings will effectively lower, the total losses incurred in transit. The average handling cost varies significantly by mode as indicated by Table 3.6. These figures compare quite reasonably with the Bangladesh Transport Survey's estimate that 2i% - 32% of the total transport cost is handling cost.

Therefore, when looking for possible cost savings, reducing the number of handlings is a prime consideration. In the site selection of godowns, a review and analysis of the anticipated change in the flow characteristics should specifically address the handling issue.

TABLE 3.7

Average Handling Costs by Mode

	ROAD		RAIL		WATER	
	Handling Cost					
	Tk/Ton	% of total transport	Tk/Ton	% of total transport	Tk/Ton	% of total transport
Intermediate Godown to Thana Godown	10	(33%)	25.8	(47%)	17.9	(31%)
Transit Godown to Thana Godown	10	(20%)	17.9	(21%)	17.9	(31%)

Source: - AID Study of 1976 BADC Movement Data.

- Ashuganj Study

4.0 Limitations of the Existing Infrastructure

During 1976-77 all three modes; water, rail, road, played key complementary roles in the distribution from the transit points by mode, as shown below:

TABLE 4.1

Summary of Movement from Transit Points by Mode

	Tons	%	Ton-Miles	%
Rail	203230	32%	38,597,005	42%
River	330568	53%	47,123,632	51%
Road	91231	15%	6,711,936	7%
Total	625029	100%	92,432,573	100%

The transportation infrastructure is quite limited when the actual modal networks are examined. The following table signifies the degree of infiltration of each mode. Although the inland waterways system appears to offer the most ubiquitous access, only a small portion of the rives are navigable by barges the entire year because of depth restrictions. As for rail service, although the aggregate mileage of track is large, the system is divided into 2 smaller systems of broad and meter gauge, which are not compatible.

TABLE 4.2

Inventory of Transportation Infrastructure

	Total Mileage	Additional Information
Road	2,000	1562 are 12' or less in width
Rail	1,740	590 broad gauge 1150 meter gauge
Water	3,300	2300 Navigable in Dry season

For purposes of discussing the infrastructure, Bangladesh is divided into 4 regions separated by Padma, Jamuna and Meghna Rivers as shown on page iii. Distribution of fertilizer with respect to infrastructure and model options within/between the regions is then highlighted.

4.1 The Northwestern Region

The Northwestern Region, which includes much fertile and relatively elevated land, is served mainly by a rail network, because the Hardinge Rail Bridge is the only solid link with the rest of the country. However, the rail system although providing year round service, is constrained by the fact that the system must be considered as two separate systems: broad and meter gauge. Each system has different interregional access. The meter gauge is linked to the Northeastern Region by a rail ferry at the Bahadurabad Ghat. The other rail ferry at Jagannathganj Ghat involves a meter to broad gauge transfer. The costs of rail ferry crossings include not only the commercial costs as estimated by the 1977 update of the Bangladesh Transport Survey as 220 taka per wagon but also the time lost in transit. The value of this naturally varies by the commodity and the nature of its demand. The Hardinge rail bridge which links the Northwestern and Southwestern regions of the country is broad gauge along with the 3 routes to Rajshahi, Serajganj and Nilphamari. The rest of the interconnecting lines to Bogra, Rangpur, Dinajpur, etc. are all meter gauge. Therefore, any product traveling to Bogra must go through the extra handling involved in the transshipment. The 1977 Update of the Bangladesh Transportation Survey estimated that the following cost for gauge transfer of goods in either direction is attributable to the movement: a cost of 100 taka per wagon plus 3.0 taka per ton. The costs of transferring freight from one gauge to another at Santahar or Parbatipur arise mainly from the wagon marshalling required. The remaining costs are for the sidings and the actual transfer of goods.

The inland waterway system of the Northwestern Region has no rivers which are guaranteed to have more than three feet of water during the winter months. Most of the area is inaccessible by water even during monsoon and of course the dirt roads are not passable by trucks during the rains. Therefore, there are areas which are not accessible by any mode during monsoon. Although the Jamuna and Ganges Rivers border the region, there are so many extremely shallow areas and sand bars that they are not used as a major link in the transportation network. The Bangladesh Inland Water Transport Authority (BIWTA) is currently involved in a number of dredging projects to maintain the constantly changing rivers. The major project in this region is the dredging of the Hurasagar River a distance of approximately 10 miles to Baghabari at a year round minimum depth of 6 feet. Baghabari could, therefore, become the first major river port of this region. With an existing road connection, this will in all probability be the major transshipment point of the region. At the present time there are no precise plans to build a rail spur down from Ullapara. However according to BIWTA, it is being seriously considered.

The road system of the Northwestern Region provides complementary interregional access to the rail and water system. However, at the present time there are no road bridges between this region and the Northeastern or Southwestern regions. Therefore, all interregional truck traffic must include ferry crossings. Ferry costs, when applicable, are a most important item of cost. The two major ferry links for the Northwestern Region are Aricha-Nagarbari and Kustia-Ishurdi on the Jamuna and Ganges Rivers respectively. The former links the Northwest with the Northeast, especially the Dacca area, and the latter links the Northwest with the Southwest Region. This latter ferry route parallels the rail bridge mentioned above. The 1977 update of the Bangladesh Transport Survey estimates that the commercial cost per truck for the Aricha crossing is 202 taka with an economic cost of 54 taka per ton (assuming a standard load of 7.35 tons for double journey mainhaul onward and empty return); for the Kustia crossing 36 taka per truck and an economic cost of 9 taka per ton. The large variation is due to the length and character of the river at the crossings. With no natural gas or urea factory and no transportation link except the rail line to the Southwestern region of Khulna, this region is the most remote and difficult part of the country to supply with fertilizer.

4.2 The Southwestern Region

The Southwestern Region as defined by the Ganges and lower Meghna Rivers includes the major port and transshipment point of Khulna, discussed earlier in Section 3.1 as one of the 5 transshipment points through which fertilizer enters the internal distribution system. At present, Khulna receives imported fertilizer that has been to Chittagong and either lightered there or transferred to bay crossing vessels and then lightered again at Chalna Anchorage which is located 26 miles south of Khulna. However, this situation may change with completion of Chalna Port and the possible associated dredging. Presently vessels of 23-26 foot draft can enter the anchorage and possible dredging has been proposed which would permit entry of vessels with a draft of up to 35 feet. Dredging has yet to begin however. However, inspection of the ongoing construction and plans show there are two access issues which must be addressed by the BDG: (1) Chalna Port is on the opposite side of the river from Khulna- at present no road or rail bridge is planned; and (2) The current road construction between Chalna and Dacca includes 3 ferry crossings. The plan is to wait until enough traffic is generated to justify construction of bridges neglecting the fact that this will be a costly inhibitant to growth of the port.

The degree of influence Chalna Port will have on the fertilizer flow patterns is also dependent on these two considerations:

(1) As the jetty and storage area is being built and allocated, no provision has been made for a fertilizer jetty. With imports and exports into the inland waterway system, fertilizer will monopolize a jetty. Unless BADC it has priority allocation of a jetty, delays such as are currently occurring in Chittagong, will also occur at Chalna.

(2) The location and timing of construction of the bulk storage and bagging facilities at Chittagong and Chalna and the concurrent import patterns of bulk versus bagged fertilizer.

The rail system in the Southwestern Region provides crucial links from Khulna to Jessore, Kushtia and Faridpur. As it is all broad gauge, there is no gauge transfer required by the rail system as in the Northwestern Region. The rail system in the Southwestern Region provides few unique links but rather parallels the road system - placing the two modes in competitive rather than complimentary positions. The general pattern of distribution is for dispatches from Khulna by rail to North Bengal (Northwestern Region) and by road for the Khulna and Jessore Districts.

The Southwestern Region has the most extensive waterway system of the four sections. The southern portion of this region, bordering the Bay of Bengal has virtually no roads or rail tracks and is therefore entirely dependent on the waterways. By far the majority of rivers in this area are reported to have more than a 13 foot depth at the lowest water during the dry season. However, although there is little problem with the depth of the rivers, the monsoons create rather treacherous waters. This however occurs during the period when the land is flooded and fertilizer sales in this southern portion of the region are nil.

The road system provides the most ubiquitous access, except in the southern riverine area. Approximately 43% of all the tons from Khulna which remained within the Southwestern Region were carried by truck (Section 3.2). In the eastern sector of the region, the road system provides land access from Faridpur to Barisal.

4.3 The Southeastern Region

The Southeastern Region includes Chittagong Port which handles 34% of the traffic of the major fertilizer distribution points. Rail and road are the key modes as the inland waterway system is quite sparse. Only a small portion of the Karnaphuli River from Chittagong to Kaptai is monitored by the BIWTA. The route between Chittagong and Cox's Bazar is estimated to have a minimum year round depth of 6-8 feet and could thus be used to good effect if adequate barge services were arranged. The inland water route between Dacca and Chittagong has a constant minimum depth of more than 13 feet.

The road system parallels to a degree the rail system along the Chittagong to Comilla routing. However, it serves two areas which are relatively isolated in terms of alternative modes: the Chittagong Hill Tracts; and the southern part of the region. This southern road is in relatively poor condition. As noted in an earlier section, approximately 74% of the total tons from Chittagong Port and Chittagong TSP factory are carried by truck.

The rail infrastructure provides excellent access between Chittagong, Comilla, Noakhali and Chandpur. The entire system is meter gauge eliminating the gauge crossing problem. Although these links exist, the system is being under-utilized with regard to fertilizer movement as discussed in Section 3.3.

4.4 The Northeastern Region

The Northeastern Region contains three of the five major transit points: Narayanganj Port; Ghorasal Urea Factory; and Fenchuganj Urea Factory. The proposed Ashuganj Urea Factory is also located in the region. Therefore 45% of the fertilizer tonnage is handled at least once in this region. The entire region is serviced by all three modes.

There are two water routes which provide crucial links for fertilizer distribution in the Northeastern Region. The first; is the Lakya River from Ghorasal to Dacca. Approximately 80% of the tonnage which remains in the Northeastern Region is carried by water. The second route is the route between Fenchuganj and the Meghna River. Currently, the initial portion of the route, the Kushyara River, has several stretches of water where the silt has created shallow patchs of below 4 feet. According to BIWTA, that area is being dredged in order to provide a minimum depth of 6 feet.

The rail system provides excellent linkage from the two major urea factories: Fenchuganj and Ghorasal, and the rest of the region. Approximately 35% of the fertilizer from the three northeastern transit points which remains in this region, is carried by rail as opposed to 52% by water and 13% by road.

Although there is a large road network, it basically follows two routes: Dacca-Sylhet or the eastern border and Dacca-Mymensingh or the western border of this region. The road system connects with Narayanganj, but as mentioned above, it does not presently connect with Ghorasal or Fenchuganj.

5.0 Characteristics of Modes Involved

Each mode displays varying degrees of reliability and flexibility in serving current levels of demand, and deviations from those levels. This variation can be partially explained by the following characteristics: freight rates, contracting procedures and equipment availability. Although the structure of the industry varies from private to public sector, similar problems and system failures can be seen in both sectors. The Ashuganj Study recommends against developing BADC's transport operations on the basis of cost and efficiency criteria. However, the key issue as confirmed by BADC, is the availability of equipment and service at time of request.

5.1 Road

BADC presently owns and operates a 67 truck fleet for emergency movement within districts.

The Bangladesh Bulk Fertilizer Handling and Site Selection Report indicates that the trucking industry has exhibited the most responsiveness to changes in demand in terms of tons carried over the several years. If the infrastructure exists, freight could be diverted from rail to truck when railcar allocation problems arise. However, for various reasons including contractual and equipment availability once, truck movement presently has limited use as an emergency alternative. Contracting for BADC fertilizer shipments by road is carried by BADC through movement contractors. BADC invites bids from interested qualified contractors for the services of unloading, loading, handling and road transport within designated areas.

Two types of contractors are utilized. At the ports, the contractors are known as a "C & F" contractors. Their responsibilities include receiving fertilizer from shipside and delivery to port godown or by truck to other godown or to coaster or barge. Their bids include offered rates for loading and unloading, and rates for truck transport to designated destinations. It is then their responsibility to find trucks willing to make the hauls. As the C&F contractors have already quoted their rates to BADC, they are not anxious to use trucks at costs higher than the established rates. Thus, fertilizer haul will be a last resort if the rate offered is less than other freight available. It should be noted that BADC is not necessarily directly involved in contracting with the truck owner. It is BADC's C&F contractor who controls this. BADC's control over

failure to provide trucks lies only through its contract with the C&F contractors.

At district godowns, the same system is utilized, with BADC contracting for district and transport contractors. These contractors bid for barge, railcar and truck unloading (or loading) and for trucking to designated facilities in the district. It is also their responsibility to unload at district destinations. Here again, since the truck rates are as quoted in the district contractor's contract, BADC has no direct control over the trucking arrangements. The contracts with these C&F and transport contractors are also for fixed term, and provide demurrage penalties, shrinkage allowance and other protective clauses. The BADC contract conditions with district contractors also include a maximum allowable truck freight rate schedule, or in some cases the trucking and handling rate may be combined, but subject also to a maximum. Elimination or modification of these maximum rates from the bidding procedure should result in increasing truck availability.

As for contract enforcement under present conditions, in event of failure of a contractor to perform, BADC has little choice but to attempt to find another contractor. Therefore, the key issue with regard to the truck model option for BADC is that although BADC is contracting with private sector, it has no control over the actual trucking arrangement. Thus it is often not possible to insure reliable service from the private sector.

A number of other difficulties exist with truck transport of fertilizer in Bangladesh: (1) fertilizer is a corrosive material and is therefore perceived as a less desirable material for transport than most other commodities; (2) many major arteries are quite narrow (9-10 feet wide) causing a considerable passing problem; (3) numerous bridges are still out requiring detours, fording, or ferry services; (4) in numerous places there never was any bridge and a ferry service must suffice often involving considerable waiting and expense. Many of the improvised ferry's (consisting of country boats bridged by bamboo platforms) cannot hold a loaded truck; (5) road transport freight rates are unregulated and according to the 1977 update of the Bangladesh Transport Survey, operators appear to be charging

rates which correspond broadly with commercial variable costs. If this is true, it means the truckers are either losing money or finding some other means to meet their replacement and maintenance costs; (6) according to an interview with a Dacca area trucker, truck owners are reluctant to venture beyond the metropolitan area for fear of a flat tire or other breakdown which they would be unable to fix due to non availability of spare tires and parts. Apparently there is an acute shortage of such things and when available they are very expensive (e.g., $400 for one tire). It is reportedly BDG policy to tax spare parts more heavily than original equipment.

The road system is currently being extended but at a relatively slow rate. The rate of this expansion will place a ceiling upon fertilizer movement by this mode. However, considerable scope appears to exist for improvement within that ceiling.

5.2 Water System

The water movement of fertilizer is a combination of public (about 25%) and private (about 75%) sector activities and as such exhibits the weaknesses of both. There are two basic issues which BADC must contend with in the water sector: (1) the contracting procedures and (2) the type of water distribution system. BADC reports that the public and the private sector often do not provide the barges requested and/or allocated.

The freight rate, however, is fixed by regulation at the level stated in the tariff of the government owned Inland Waterways Transport Corporation (IWTC). This rate is applicable to both IWTC vessels and to private operators. Government cargoes (such as wheat and fertilizer) must move at these fixed rates. However, private sector cargoes such as general cargo and cement are not regulated. The latter two are in the private sector and as such offer a higher freight rate. The split between all private and public sector water cargo in Bangladesh is approximately 50-50. Therefore, first on a pure rate basis approximately 50% of the cargo is more profitable to carry than fertilizer. (Government

rates for fertilizer movement are set at 0.36 Taka per ton mile. Private movers indicated in interview that 0.68 Taka per ton mile would be fair. Some intermediate rate may be most appropriate.)

The 1977 update of the Bangladesh Transport Survey indicates that the inland water freight tariff is not cost-based and has likewise failed to keep up with recent cost escalation. At present, according to the survey, the inland water transport industry has a surplus of effective carrying capacity. It recommended that a cost related tariff be introduced. This would require rates to more than double in many instances. Table 5.1 shows a comparison of the standard costs with freight rates.

To avoid this problem BADC has a practice of renting barges for a fixed period through a competitive biding process. Where a shortage of barges exists for fertilizer movement, this is the most readily available method of eliminating it.

Loading and unloading of coasters and barges is carried out under contract to "C & F" contractors at the port, and to district transport contractors in the regions, as described above.

BADC Dacca arranges fixed term contracts with qualified coaster and barge operators, under a government approved standard contract form. Allocation of available marine equipment to fertilizer movement is made by the Centr . Transport Coordination Committee, as described in Section 5.3. Terms of the water movement contracts include specifics regarding service conditions such as failure to report, time allowed for loading and discharge, handling losses and damage. Also included are demurrage and other penalties assessed. A review of the contract yielded the following observations. First, the contract

calls for supplying services "on demand" but demand is never clearly defined. Second, the contract calls for 100% weighment at unloading point. This requirement may be waived or reduced. Field visitors have not observed weighing being undertaken during unloading. Such an action would greatly slow down discharge. Third, the contractor is held responsible for shortages above .25% or .20% and is also liable for damages. Enforcement of such provisions is difficult. The result is that BADC is both unable to reward a high level of performance (since rental is on a fixed term basis plus gas costs, etc.) and is also in a poor position to enforce penalty provisions within existing contracts for a low level of service.

The second issue concerns the alternative types of water distribution systems available. The major variables here include (1) the location size and demand characteristics of warehouses to be serviced (2) the seasonal fluctuation in water depth (3) the barge size and draft alternatives and single tow or lash tow alternative and (4) propulsion alternatives including tugs, tow boats, and self propelled barges. Modern lashing operations are not practiced even on the major Chittagong-Dacca haul. During the dry season, shallow (say 3 or 4 foot) draft areas are unserviced for lack of suitable barges. This is a complex question which requires careful attention during the project period.

Table 5.1

Comparison of Standard Costs With Freight Rates, 1976

Route	Costs		Rates Charged	
	Commercial	Economic	Foodgrain	Cement
Chittagong-Narayanganj	175	230	52	93
Chittagong-Dacca	178	234	55	93
Chittagong-Khulna	194	254	75	110
Chalna-Khulna	93	122	29	26
Chalna-Narayanganj	121	159	53	68
Chalna-Dacca	123	161	55	68

Source: 1977 Update of Bangladesh Transport Study, Economic Intelligence Unit Ltd.

EXHIBIT 5.2

Summary of USAID Survey of Transit Godowns

Distribution Point	Comment on General Transportation Available [2/]	Rail Wagon Availability [1/] 1975 - 76 Requested	1975 - 76 Received	1976 - 77 Requested	1976 - 77 Received
Chittagong Port	"Experiences a lot of difficulties due to non-availability of the transportation at the time of requirement. Compared to the movement, the supply of trucks, wagons, coasters and barges is insufficient"	1782	1064 (60%)	2409	1134 (47%)
Chittagong TSP	"Due to unavailability of wagons and coasters, fertilizer movement suffered badly. In 76-77 over 20% of wagons received were rejected because of condition."	3600	829 (23%)	3900	971 (25%)
Khulna Port	"Sometime face difficulties in moving fertilizer timely due to non-availability of railway wagons and barges which is not the negligence of the contractors."	7200	2908 (40%)	7200	1475 (20%)
Ghorasal Urea Factory	"If BIWTC and Railways can provide the required barges and wagons in time then the question of having extra coasters and barges (for Ghorasal godown) does not arise. Coasters are seldom available for transport of fertilizer to Chittagong."	7320	1013 (14%)	7320	267 (4%)

EXHIBIT 5.2
Page 2

Distribution Point	Comment on General Transportation Available 2/	Rail Wagon Availability 1/ 1975 - 76 Requested	1975 - 76 Received	1976 - 77 Requested	1976 - 77 Received
Fenchuganj Urea Factory	"If received all wagons requested, all fertilizer from the factory would be shipped by rail."	N/A	-	7025	3634 (52%)
Narayanganj Port (Redistribution Center)	"Generally contractors cannot supply trucks as required to cope with the requirements for transportation to different points."	7300	2955 (40%)	7300	2807 (38%)
TOTAL		27,202	8769 (32%)	36,154	10,288 (29%)

1/ Consultants review indicates that these requests are within a reasonable range.

2/ Comments made by Movement Officer in charge of Transit Godown in interview with USAID representative.

6.0 The Recommended Fertilizer Movement Strategies under This Project.

There are several directions the BDG can pursue in attempting to improve the fertilizer distribution system. These options are outlined in Exhibit 6.1. The three general directions are the development of compensatory storage, the development of a BADC fleet, or the encouragement of private sector movement. For illustrative purposes, these three are assumed to be mutually exclusive although in reality the BDG might pursue some combination of the three.

The strategy recommended for fertilizer movement is to encourage private sector transport development both under BADC movement contracts and for the movement requirements of private fertilizer wholesaler and retailer dealers. In the later case there dealers may own their own transport equipment or may contract for it or both.

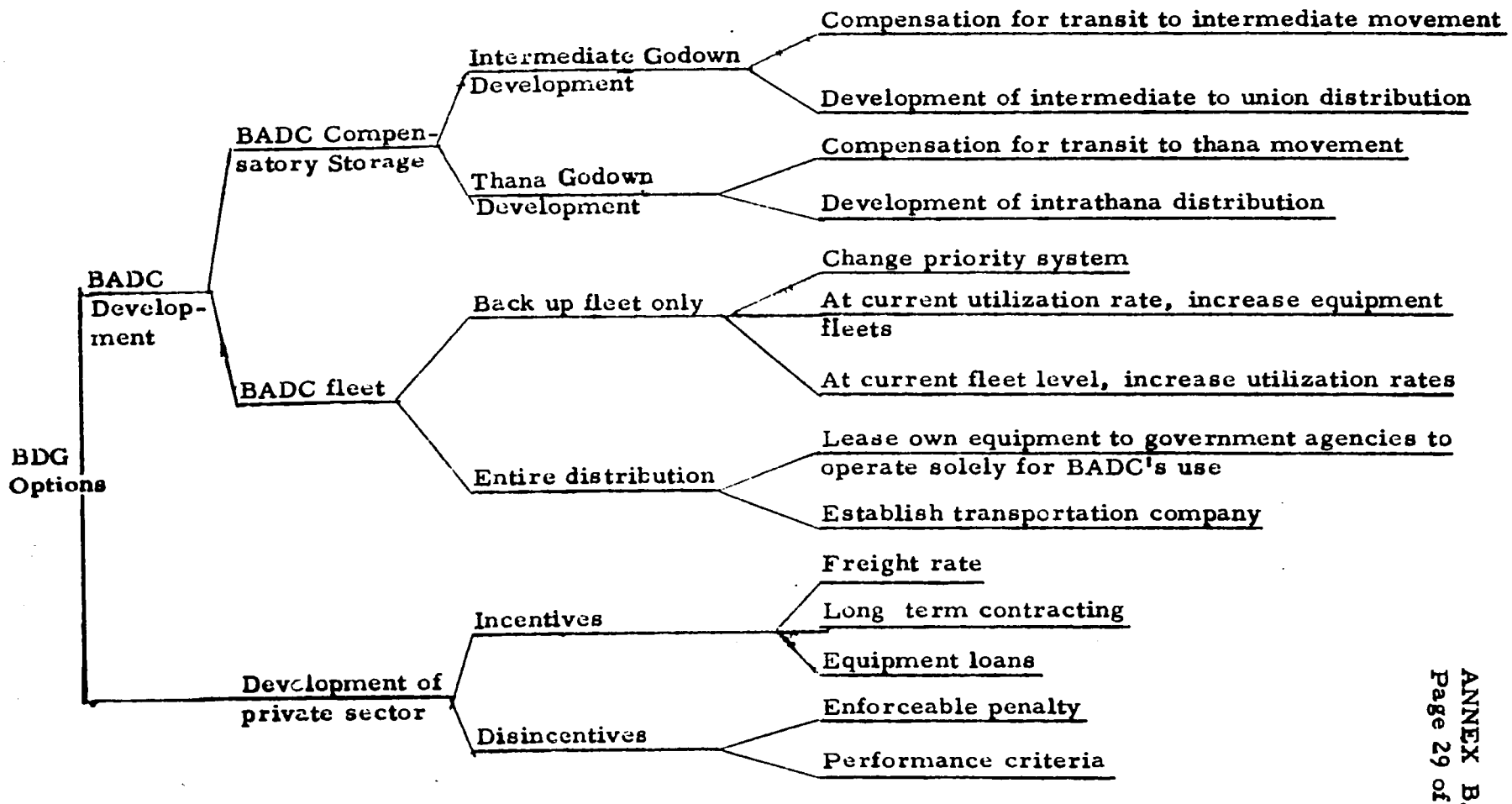
To some extent, fertilizer flow will differ when the private sector is more actively involved. Initial analysis shows that there will be more emphasis placed on truck as it provides a more ubiquitous mode with the longest range. A distance which would be prohibitive to a country boat would often not be for a truck. If funds are available powered launches may also play a larger role.

The encouragement of the private sector has several complex implications. The private sector will tend or gravitate toward the mode which offers the best balance between speed, cost and reliability. With regard to speed and reliability the private sector should react in an economically rational manner. However, the private sector will be dealing with freight rates which may not reflect national economic costs. Therefore, the modal choices may not be the rational ones for equilibrium or balance to occur. This is especially true in the trucking sector. The social costs are not included in the cost to trucker. Social costs includes such items as increased congestion, road construction and maintenance, safety, and pollution. Considering the stage of advancement of the road network (Section 4.0), these costs are very high. Under the current costing system, these are not accounted for.

The complexity of the issue of development of the private sector derives from the fact that the location of storage facilities and the zone of influence associated with each facility must take into account

EXHIBIT - 6.1

BDG Options With Regard To Distribution System



not only the capability of the private sector to handle the trade but also the extent to which the transportation infrastructure and growth of the transportation industry along private sector desires approaches the optimal eventual transportation system for the nation.

The overall strategy, therefore, recommended for BDG is a combination of policy changes, transportation infrastructure, vehicle requirements. The infrastructure will only be briefly mentioned as it goes beyond the scope of this project.

6.1 BADC Recommended Policy Changes

The first and foremost recommendation is an immediate change in the manner through which BADC contracts for movement. The current contracting procedures have already been described in Section 5 in detail with regard to each mode.

There is a need for contracting arrangements providing an attractive freight rate on a guaranteed basis with enforcable penalty provisions. Technical assistance could be used in the preparation of a contracting procedure which would assure BADC the needed service by providing the contractor with the necessary financial incentives. The contracting procedure would provide deterrants for non-performance. Linked to this procedure might be an arrangement (which could possibly be best arranged on a national basis for the entire transport sector) to provide credit financing to the movement contractors for foreign exchange costs of imported equipment and spare parts. The availability of a foreign exchange funds for purchase of marine and highway equipment by contractors to be loaned in connection with a BADC contract, would compliment a rate structure adequate to repay the loan, would provide BADC with the necessary service, and at the same time would aid the development of the private sector.

The contracting revisions should be along the following lines:

1. Introduction of a performance criteria into the bidding procure is mandatory. Currently, there is no reference to the past performance of a movement contractor. The performance criteria could be part of the pre-qualifying tender. Under the present system there is little or no incentive to provide a consistently good level of service to BADC since there are no rewards for such service built into the contracting system.

Although the penalty clauses are very stringent in the contracts, they are not enforced. BADC explained that the it often feels that enforcement for erratic performance would decrease the level of service rather than upgrade it. Under the present environment, the loss of a contractor, because of penalization, is too high a price to pay for the possibility of improving the response of the industry.

2. Presently the contracts are renewed on a yearly basis. Contract renewal requires the entire contracting procedure to be repeated including calling for bids. This situation does not provide the contractor with enough stability in business to encourage the development of the transportation industry. Therefore, a policy of offering some longer term contracts (such as 5 year contracts) could provide an incentive for investing in equipment and serve as collateral for bank loans.

3. A new route bidding system is required. The contracts are currently awarded on a multiple route lowest bid system which allows for over bidding on some routes and under bidding on other routes leading to contracts under which contractors are only willing to work those routes they have over bid.

The second recommendation is to improve BADC's communications system. If BADC is to develop a more pre-planning orientation, this will require current information concerning inventory levels, sales, projected sales, transportation, etc.

The third recommendation is that warehouse location should be selected using the transportation infrastructure as the main guide.

6.2 BDG Policy Changes

In order for any changes to be successfully introduced into the fertilizer distribution system, the BDG must acknowledge the importance of the fertilizer distribution and effect the following changes:

First, an overall change in the rate structure which would relate costs to rates as discussed in Section 5. There is a cross subsidization occuring within the BDG in regard to the transportation. The rates do not appear to include the cost of replacement. Therefore, loans or grants are required to overcome this discrepancy. This flow of funds is not easy to identify.

Second, in the rail sector, several steps should be taken to insure a more efficient fertilizer flow as follows:

1. Priority within the Central Transport Coordination Committee (5.3) should be placed on fertilizer.

2. Provision should be made to allow empty backhauls or front-hauls if the fertilizer transport requirement does not mesh with other commodity transport requirements.

3. Further development of the rail classification system, as wagons are currently excessively delayed due to the mislaying of wagons; and

4. Development of a wagon maintenance program so the fertilizer wagons presented in disrepair can be used (Exhibit 5.2).

Third, in the water mode, several similar recommendations are as follows:

1. Create a more cost-related freight rate;

2. Charge the priority of fertilizer within the BIWTA;

Fourth, in the road mode, the following recommendations are made:

1. Decrease the tax on spare parts, (Section 5.1); and

2. Provide more ready access to financing for new equipment;

6.3 Infrastructure Recommendations

Although general infrastructure improvements are beyond the scope of this project, some key potential projects are listed to complete the recommendations:

1. At a number of ports, the development of jetties;
2. Road and rail links from Chalna to both Dacca and Khulna;
3. Plank over the Hardinge Bridge to allow both truck and rail utilization;
4. Development of the river port at Baghabari on the Hurasagar River in the Pabna District;
5. Development of rail wagon, rail track, engine maintenance programs;
6. Increase fleet of rail engines, especially shunting engines;
7. Installation or replacement of a number of small and large bridges on existing road systems;
8. Broadening to double lane the numerous major road arteries which are only single lane;
9. Extension of the rural roads systems;
10. River and port dredging, especially in the vicinity of fertilizer factories and fertilizer warehouses.

7.0 The Fertilizer Movement Equipment Needs Under this Project.

Although the strategies discussed in Section 6 emphasize the need for improving the logistics involved in the distribution system, there will be a requirement for additional equipment. TABLE 7.1 gives the estimated fertilizer distribution characteristics for road and water. (The rail analysis is not included because this activity takes place entirely in the government sector and as such is more related to government priority than fertilizer transportation. Beyond this the Bangladesh Transport Survey indicates the major rail problems do not primarily stem from shortage of equipment but relate to scheduling, management, and repair of equipment. Specialized fertilizer trains have been proposed under a Saudi grant and such proposals deserve further consideration, but within the overall context of the rail problem, which is considered beyond the scope of this paper.)

In order to generate the estimated equipment needs, the utilization rates of the Ashuganj Study were used*. The implications and assumptions associated with using these rates are as follows:

Road. All movement is by 6.5 ton capacity truck overloaded to 7.35 tons (200 maunds) in accordance with normal practice. For main haul movement an annual utilization (as per Ashuganj Study) of 25,000 miles loaded is assumed. This provides an annual capacity of 183,750 ton-miles per truck on main hauls.

Inland Water. Minor inland routes (intermediate to thana) are assumed to be by vessles with an average capacity of 80 tons, assuming a mixture of cargo launches and country boats, loaded to capacity and making 40 voyages per year. This provides an annual capacity of 3,200 tons per vessel. For bay crossing by coasters of 900 tons capacity a 90 percent load factor making 25 voyages per year is assumed. For the major inland routes, this translates to an average capacity of 280 tons per barge with 10 barges to a tug of approximately 900 bhp each. This provides an annual capacity of -

6,300 tons per barge
63,000 tons per tug

The requirements for transport were based directly on the assumed annual capacities for each item of equipment as appropriate to the mode specified for each movement. Table 7.2 shows the additional requirements. The total costs involved in the acquisition of transportation equipment have been calculated using the additional requirements in table 7.2 and the unit costs of the Ashuganj Study. The unit costs are based on 1976/77 prices with an exchange rate of US $1.00 = Taka 15.00 for the foreign exchange component.

The vehicle and vessel sizes assumed above are not meant as suggested sizes. Larger and smaller barges and tugs will be needed for various routes and times of year. Also, careful consideration needs to be given to the most appropriate new truck sizes. The most economical vessel and vehicle size and type is usually the first and primary factor considered by a modern profit making firm in determining how to meet its transport needs.

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* These rates appear to be approximately correct and therefore acceptable, but the actual equipment recommendations contain many internal inconsistencies, requiring revision in the Final Report. Therefore, the Ashuganj Study equipment figures are not repeated here.

In order to generate the estimated equipment needs, the utilization rates of the Ashuganj Study were used*. The implications and assumptions associated with using these rates are as follows:

Road. All movement is by 6.5 ton capacity truck overloaded to 7.35 tons (200 maunds) in accordance with normal practice. For main haul movement an annual utilization (as per Ashuganj Study) of 25,000 miles loaded is assumed. This provides an annual capacity of 183,750 ton-miles per truck on main hauls.

Inland Water. Minor inland routes (intermediate to thana) are assumed to be by vessles with an average capacity of 80 tons, assuming a mixture of cargo launches and country boats, loaded to capacity and making 40 voyages per year. This provides an annual capacity of 3,200 tons per vessel. For bay crossing by coasters of 900 tons capacity a 90 percent load factor making 25 voyages per year is assumed. For the major inland routes, this translates to an average capacity of 280 tons per barge with 10 barges to a tug of approximately 900 bhp each. This provides an annual capacity of -

6,300 tons per barge
63,000 tons per tug

The requirements for transport were based directly on the assumed annual capacities for each item of equipment as appropriate to the mode specified for each movement. Table 7.2 shows the additional requirements. The total costs involved in the acquisition of transportation equipment have been calculated using the additional requirements in table 7.2 and the unit costs of the Ashuganj Study. The unit costs are based on 1976/77 prices with an exchange rate of US $1.00 = Taka 15.00 for the foreign exchange component.

The vehicle and vessel sizes assumed above are not meant as suggested sizes. Larger and smaller barges and tugs will be needed for various routes and times of year. Also, careful consideration needs to be given to the most appropriate new truck sizes. The most economical vessel and vehicle size and type is usually the first and primary factor considered by a modern profit making firm in determining how to meet its transport needs.

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* These rates appear to be approximately correct and therefore acceptable, but the actual equipment recommendations contain many internal inconsistencies, requiring revision in the Final Report. Therefore, the Ashuganj Study equipment figures are not repeated here.

A number of recommendations have been made by transport consultants (EIU, Frankel, etc.) concerning more cost effective water transport. These include push tow instead of tug tow, increased barge size, and front to back fitting barges for lashing. These and a number of other efficiencies are believed to be quite feasible in Bangladesh waters for a properly motivated private sector. If effected they would have a considerable impact on fertilizer movement.

The total transport capacity in the country, the other demands on that capacity and the extent to which those with fertilizer movement requirements are effective in competing for that capacity, will determine whether sufficient equipment will be available for fertilizer movement. Table 7.4 summarizes the rail road and water equipment availability and capacity and utilization in Bangladesh.

This table does not attempt to estimate what capacity would be at higher than present utilization rates. It is considered, however, that considerably higher utilization rates are possible. For rail, for instance, the utilization rate could probably be more than doubled, considering that 6.8 million tons were moved in 1964 with approximately the same equipment availability.

One conclusion to be drawn from Table 7.4 is that sufficient capacity probably already exists to absorb the fertilizer movement needs of this project under all three modes provided other demands do not also increase and provided effective priority allocation, contracting and other improvements, etc as recommended in this annex are made. However, other requirements (e.g. foodgrain movement) do fluctuate and may significantly increase. For instance, fertilizer imports, though decreasing the need for foodgrain imports, are also likely to increase jute, sugar and other exports.

Therefore, the basic conclusion of this annex with respect to equipment needs under this project is that for the BADC movement contractor's and the private fertilizer dealers, effective means should be found. Within the ranges identified above, this will mean the acquisition of new equipment by fertilizer movers. To the extent that utilization rates can be improved, however, this may not require additional basic equipment purchases in a national sense. But minor equipment purchases (e.g. spare parts, shunting engines, and specialized craft such shallow draft barges) will definitely be required.

Table 7.1

1981-82 Estimated Fertilizer Distribution Characteristics

	Low	High
Average Miles Per Ton	200	250
Average Ton-Miles	240 Million	300 Million
1.2 Million Tons		
% Water	45%	55%
Water Ton-Miles	108 M	165 M
% Road	10%	15%
Road Ton-Miles	24 M	45 M
# of Trucks 6.5 Tons	131	245
# of Other Vessels Av. Capacity 80 Tons	154	236
# of Barges Average 280 Tons	231	353
# of Tugs	24	36
TOTAL WATER VESSELS	409	625

Table 7.2

Estimated Additional Requirements For Road and Water Transport Equipment

	1976-77 (Approximate)	1982-83 LOW	1982-83 HIGH
Trucks	94	37	151
Barges	146	85	207
Other Vessels	98	56	138
Tugs	15	9	21

Source: Frederic R. Harris, Inc. Consultant Team

Table 7.3

Estimated Costs of Additional Transport Equipment

	Low F.E. 2/	Low Total	High F.E. 2/	High Total
Trucks	3,885	7,770	15,855	31,710
Barges 1/	-	238,000	-	579,600
Other Vessel	8,400	30,128	20,700	74,244
Tugs	36,000	91,800	84,000	214,200
Total Taka	48,285	367,698	120,555	899,754
Total U.S. Million	$3.2	$24.5	$8.0	$60.0
% of Foreign Exchange	13%		13%	

Source: Consultant

1 Estimated does not define the cost of steel etc. as foreign exchange.

2/ Foreign Exchange Requirement.

Table 7.4

Equipment Availability, Capacities, and Utilization For Total Movement Requirements in Bangladesh

	Rail	Road	Water (Dry Cargo)
Average Unit Capacity (Tons)	20.5 1/	7.35 2/	251.4 3/
Number of Vehicles	9,650 4/	8,250 5/	1,169 3/
Total Annual Capacity at Present Utilization Rates	2.33M 6/	.69 M 7/	5.29 M 8/
Actual Utilization for 80 Major Commodities			
73/4	2.77 M 9/	Not Available	2.57 M 9/
74/5	2.90 M 9/	Not Available	2.77 M 9/

1/ Arithmetic average of meter gauge at 17 tons and broad gauge at 20 tons.

2/ Ashuganj Study - 6.5 ton truck overloaded to 7.35 tons.

3/ BIWTA internal document.

4/ Government Publication entitled Railway Rehabilitation Program, May, 1976.

5/ Ashuganj Study

6/ Based upon unit capacity and number of vehicles as per above plus figures from the Bangladesh Transport Survey Update (1977) for percentage of serviceable wagons and the average number of annual loadings per wagon.

7/ 8,250 trucks X 25,000 ton miles from Ashuganj Study divided by an assumed average 30 miles per trip.

8/ 251.4 Tons capacity/Vessel X 1,169 vessels X 0.9 load factor (as per Ashuganj Study) X an assumed 20 voyages per year.

9/ Ashuganj Study

Storage Construction Plan and Cost Estimate

A. Cost Estimate

The cost estimate was computed as follows:

The engineering consultant Ammann and Whitney, Inc. has developed detailed standard cost estimates for the 2000 and 3000 ton capacity warehouses being constructed under the current Fertilizer Storage Construction Project. Based upon these, the consultant has provided USAID with preliminary standard estimates of costs for 4000 and 6000 ton capacity warehouses. The concept of these standard cost estimates assumes near (in Bangladeshi terms) ideal conditions with respect to site conditions, accessability and availability of materials in the area.

For the sites tendered thus far, the consultant has performed a detailed estimate of the cost increases to compensate for such factors as a low lying and flooded site, poor soil conditions, inaccessability and non-availability of construction materials in the area. Thus far individual site estimates have averaged 15 percent above the standard cost estimates due to such factors. In addition, for the 20 construction awards made thus far, the actual contract award amount has averaged six percent above the individual site estimate.

Considering the above, a factor of 1.219 of the standard cost estimate was used to determine the present estimated cost of construction. (1.15 x 1.06 = 1.219)

20 of the planned 50 locations are on a waterway and will require a jetty or floating steel wharf. The estimated costs of these structures is 525,000 takas each.

Inflation is estimated at 10 percent per year. 25 Construction starts are planned during the two dry seasons of 1978-79 and 25 during 1979-80. 10 percent inflation is allowed for the first 25 construction starts and 21 percent for the second 25 starts, for an average inflation of 15.5 percent.

Estimated construction costs, in taka, are recapitulated as follows:

Warehouse Capacity (tons)	No. of Warehouses	Standard Estimate of Construction Cost	Factor	Estimated Cost
2,000	10	2,845,718	1.219	34,689,000
3,000	17	3,738,694	1.219	77,476,000
4,006	18	5,365,444	1.219	117,728,000
6,000	5	7,310,126	1.219	44,555,000
Sub-total	50			274,448,000
Marine Structures 20 x 525,000				10,500,000
				284,948,000
Inflation 15.5%				44,167,000
Total Estimated Cost of Construction				329,115,000

The dollar equivalent of the total estimated cost is $21,941,000.

B. AID Grant for StorageConstruction

It is planned that AID will reimburse the BDG for the consultants cost plus 80 percent of the construction costs. The AID contribution in dollars for storage construction is:

Construction 21,941,000 x 0.80	17,552,800
Consultant Costs	1,600,000
Sub-total	19,352,800
Contingency (15.5% of consultant & construction costs)	3,647,200
Total	23,000,000

AID funding for the above costs is planned at $11.5 million each in FY 1978 and FY 1979.

C. Plan for Construction Under AID Grant Financing

Subject to review by the consultant and the positive findings of the consultant for engineering feasibility of the site selected BADC and AID have planned the following list of locations for construction:

Serial No.	District	Location	Tons Capacity
1	Dacca	Narayanganj	6000
2	"	Narshingdi	4000
3	"	Manikganj	2000
4	"	Mirkadim	3000
5	"	Joydevpur	4000
6	Tangail	Madhupur	3000
7	Mymensingh	Kotwali	4000
8	"	Sherpur	3000
9	"	Jamalpur	3000
10	Kishoreganj	Kotwali	4000
11	"	Thakurkona	3000
12	Faridpur	Kotwali	4000
13	"	Takerhat	2000
14	Chittagong	Dohazari	4000
15	"	Chokaria	4000
16	"	Cox's Bazar	6000
17	Noakhali	Choumuhani	3000
18	Comilla	Kotwali	4000
19	"	Chandpur	6000
20	"	Daudkandi	4000
21	"	Brahmanbaria	3000
22	Sylhet	Kotwali	3000
23	"	Sunamganj	2000
24	"	Habiganj	3000
25	"	Chattak	2000
26	Rajshahi	Kotwali	4000
27	"	Natore	2000
28	"	Naogaon	3000
29	"	Rohanpur	2000
30	Dinajpur	Kotwali	4000
31	"	Parbatipur	3000
32	"	Shibganj	4000
33	"	Hilli	2000
34	Rangpur	Kotwali	3000
35	"	Nilphamari	3000

Serial No.	District	Location	Tons Capacity
36	Rangpur	Gaibandha	2000
37	Bogra	Kotwali	3000
38	"	Joypurhat	2000
39	Pabna	Nagarbari	6000
40	"	Baghabari	4000
41	Khulna	Kotwali	6000
42	"	Satkhira	3000
43	Kushtia	Kotwali	4000
44	"	Chuadanga	4000
45	Jessore	Kotwali	4000
46	"	Kaliganj	4000
47	"	Magura	2000
48	Barisal	Bhola	3000
49	"	Kowkhali	4000
50	Patuakhali	Borguna	3000
			173000

ESTIMATED AGRONOMIC DEMAND FOR FERTILIZER IN BANGLADESH

The agronomic demand for fertilizer can be defined as that level of fertilizer use at which the crop response curve (in optimum combination with other inputs) begins to level off. Stated in economic terms, it is the point of zero marginal return; i.e. the point at which the cost of an added unit of fertilizer equals the value of added output resulting from its application.

Thus considered, the agronomic demand represents the optimum level of fertilizer use in Bangladesh, the level of use which would obtain if all farmers were sufficiently perceptive, willing and able to invest in fertilizer in perfect accord with their own best interests. Since these conditions are not likely to obtain in the foreseeable future, the agronomic demand should not be considered a projection of future use. Rather it represents an ideal use level toward the achievement of which this project and related Mission endeavors should make progress.

One other qualification needs to be made concerning the agronomic demand levels shown here. Since not enough is known about the shape of fertilizer response curves in Bangladesh, our estimates of agronomic demand are based on recommended application rates, as determined by recognized authorities in the area of crop testing and research. Just as a farmer probably would not choose - or be advised - to apply fertilizer up to the point of zero marginal return on investment, so the "recommended rates" relied on here probably understate the true agronomic demand.

Agronomic fertilizer requirements should be based on existing.

1. Soil/Climate data;
2. Kinds and varieties of crop cultivated;
3. Acreage under each kind and variety of crop;
4. Types of land management practices, e.g. irrigation, flood control.

Fertilizer requirements for Bangladesh were first estimated by Islam and Ullah and 1969 as part of a study on application of modern technology in East Pakistan. On the basis of fertilizer trials with local varieties (no HYVs) cultivated without irrigation or flood control, Islam and Ullah estimated the country's fertilizer requirements at 2,782,000 tons as shown in Table B.12.A.

In the eight year period since this first estimate was made, the introduction of HYV's, irrigation and fertilizer has begun gradually to change the country's agricultural landscape. Irrigation and flood control measures have reached previously uncultivable land and permitted more land to be double cropped. The result was an effective increase in land under cultivation of nearly two million acres or 8% over the period. In the future, further introduction of HYV's with much greater fertilizer response ratios than local varieties promises to generate a much greater demand for fertilizer among farmers.

The net effect of these changes today is to place Bangladesh on the course of becoming a major chemical fertilizer consumer. Table B.12.B contains Mission estimates of current fertilizer requirements (i.e. agronomic demand) under 1976/77 cropping patterns for Bangladesh. This analytical table builds on that of Islam and Ullah by its introduction of acreage under HYV's as well as changes in the area planted in other major crops.

Table B.12.B also employes more disaggregated fertilizer usage recommendations by variety and crop prepared from farmers' field trails conducted by the Bangladesh Soil Fertility and Soil Testing Institute. These data were chosen by the Mission over the more "scientifically" calculated recommendations of Bangladesh Agricultural Research Institute (BARI) because they were more disaggregated by variety and region and because they are derived from trials conducted on farmers fields' under actual growing conditions while BARI recommendations are taken from test results on experimental farm plots. The Soil Testing Institute recommendations are also those employed by the Ministry of Agriculture Extension Service and hence more likely to be those adopted by farmers.

The Table below presents the changes in estimated agronomic demand for fertilizer between 1969 and 1978 for Urea, Tripple Super Phosphate (TSP) and Muriate of Potash (MP). The most notable expansion in agronomic demand appears to have been in potash due to its relatively greater recommended application with HYV's. Thus not only has there been a growth in the agronomic demand for fertilizer but also a change in the composition of that demand.

Fertilizer	Agronomic Demand		
	Islam & Ullah (1969)	USAID/Dacca (1977)	Percent Change
Urea - Amount	1,210.0	1,941.0	60.5%
(%)	(43.5%)	(41.9%)	
TSP - Amount	1,081.7	1,727.2	59.8%
(%)	(38.9%)	(37.3%)	
MP - Amount	489.7	960.6	96.2%
(%)	(17.6%)	(20.8%)	
Total - Amount	2,782.2	4,629.5	66.4%
(%)	(100.0%)	(100.0%)	

Admittedly, these recommendations are still highly estimative given the variety of crops and soil groups in the country and considering the less than ideal sampling techniques compared with BARI results. These deficiencies are recognized, however, and efforts are underway -- which will be monitored as part of project implementation -- to improve and refine them.

Overall, the estimates in Table B.12.B can be considered conservative based as they are on the 1976-77 cropping pattern. They do not assume any further change in technology, reclamation of additional land, more intensive land use or other changes over the life of the project which would tend to enhance the demand for fertilizer and raise the agronomic requirements even further upward. In fact, of course, such changes are implicit in the Mission's HYV strategy in general and this project in particular.

Table B. 12.A Fertilizer Requirements for East Pakistan - 1969

Major Crops	Area Cultivated (1,000 Acres)	Nutrient Recommendations (Lbs/acre)			Nutrient Recommendations (1,000 MT)			Fertilizer Requirements (1,000 MT)		
		N	P_2O_5	K_2O	N	P_2O_5	K_2O	Urea	TSP	Potash
Aus Paddy	7,362	40	40	20	131.5	131.5	65.7	292.1	292.1	109.6
Aman Paddy	14,584	40	40	20	260.4	260.4	130.2	578.7	578.7	217.0
Boro Paddy	1,425	40	40	20	25.4	25.4	12.7	56.5	56.5	21.2
Jute	2,106	40	20	40	37.6	18.8	37.6	83.6	41.8	62.7
Sugarcane	393	120	60	40	21.0	10.5	7.0	46.8	23.4	11.7
Wheat	186	30	30	20	2.5	2.5	1.7	5.5	5.5	2.8
Potato	171	150	100	100	11.5	7.6	7.6	25.5	17.0	12.7
Tobacco	110	70	20	40	3.5	1.0	2.0	7.6	2.2	3.3
Maize	9	90	40	60	0.4	0.2	0.3	0.8	0.4	0.4
Vegetables	283	150	30	30	18.9	3.8	3.8	42.1	8.4	6.3
Fruits	311	120	75	75	16.7	10.4	10.4	37.0	23.1	17.4
Tea	97	80	-	-	3.5	-	-	7.7	-	-
Cotton	36	30	15	25	0.5	0.2	0.4	1.1	0.5	0.7
Condiments	341	30	25	25	4.6	3.8	3.8	10.2	8.5	6.3
Oil seeds	787	20	30	30	7.0	10.5	10.5	15.6	23.4	17.6
TOTAL	28,201				545.0	486.7	293.8	1,210.0	1,081.7	489.7

Source: Amirul Islam and Wajih Ullah, - Table I - Agriculture Policy Study Group on Widespread Application of Modern Technology, Govt. of East Pakistan Agriculture Development Corporation, 1969.

Table B.12.B

Fertilizer Requirements for Bangladesh - 1976/77

Major Crops	(1,000 Acres) Area Cultivated	Nutrient Recommendations (Lbs/Acre)			Nutrient Recommendations (1,000 MT)			Fertilizer Requirements (1,000 MT)		
		N	P_2O_5	K_2O	N	P_2O_5	K_2O	Urea	TSP	Potash
Aus: i) HYV	901	80	60	40	32.8	24.6	16.4	71.3	53.5	27.3
ii) Local	7,050	60	60	40	192.3	192.3	128.2	418.0	418.0	213.7
Aman: i) HYV	1,046	100	80	60	47.5	38.0	28.5	103.3	82.6	47.5
ii) Local	13,308	60	60	40	362.9	362.9	242.0	788.9	788.9	403.3
Boro: i) HYV	1,338	100	80	60	60.8	48.7	36.5	132.2	105.9	60.8
ii) Local	744	40	40	40	14.1	14.1	14.1	30.7	30.7	23.5
Jute	1,602	40	20	40	29.1	14.6	29.1	63.3	31.7	48.5
Sugarcane	357	150	80	80	24.3	13.0	13.0	52.8	28.3	21.7
Wheat: i) HYV	288	80	60	40	10.5	7.9	5.2	22.8	17.2	8.7
ii) Local	107	40	40	40	1.9	1.9	1.9	4.1	4.1	3.2
Potato	385	150	100	100	26.2	17.5	17.5	57.0	38.0	29.2
Tobacco	116	70	20	40	3.7	1.0	2.1	8.0	2.2	3.5
Maize	6	90	40	60	0.2	0.1	0.2	0.4	0.2	0.3
Vegetables	310	150	30	30	21.1	4.2	4.2	45.9	9.0	7.0
Fruits	310	120	75	75	16.9	10.6	10.6	36.7	23.0	17.7
Tea	96	80	-	-	3.5	-	-	7.6	-	-
Cotton	17	30	15	25	0.4	0.2	0.2	0.9	0.4	0.3
Condiments	341	30	25	25	4.6	3.9	3.9	10.0	8.5	6.5
Oil Seeds	666	30	60	30	9.1	18.2	9.1	19.8	39.6	15.2
Others	1,149	60	40	20	31.3	20.9	10.5	68.0	45.4	22.7
TOTAL	30,167				892.7	794.6	571.3	1,941.7	1,727.2	960.6

Source: USAID/Dacca Estimates based on Bangladesh Bureau of Statistics, crop reports for 1976/77 and Bangladesh Soils Fertility and Soil Testing Institute recommendations for fertilizer.

Structure of Costs And Returns From Fertilizer Use At The Farm Level

Introduction

This Annex undertakes a measure of the returns on production to representative farmers of high yielding variety (HYV) rice and wheat crops in Bangladesh, first, under existing price and credit restraints, and second, under conditions that assume variations in those restraints in order to induce investment in fertilizer and HYV technology. The relative importance of output prices, fertilizer and credit costs is also briefly considered.

The situations of owner cultivators and of tenant farmers are treated separately. According to the 1977 USAID/BDG Land Occupancy Survey, owner-cultivators constitute 23.5 percent of the rural households and own 10.5 percent of the cultivable land. Tenants, or owner-cum-tenants, constitute 38.8 percent of the households. They own 23.2 percent of the land and lease or rent another 22.9 percent. Owner-managers, i.e. farms not worked by the actual owner, are not dealt with separately. Since their average land-holding is larger than that of an owner cultivator (2.7 acres vs. 1.0 acre), their returns are higher - their higher labor costs notwithstanding - than those of owner-cultivators, and they are therefore in at least as good a position to respond to price incentives. To the extent they may not, in fact, be innovative as a group - and there is evidence to that effect - the problem is not addressable in the terms that we are considering here.

The crops considered are the high yielding varieties of Boro, Transplanted Aman, and wheat. Boro and wheat have shown the most rapid rates of growth in HYV technology; T.Aman, by virtue of the predominant size of the crop in overall rice output, may have to contribute the bulk of future production increases if foodgrain self-sufficiency is to be achieved.

There is, of course, a certain danger in trying to generalize from a few input/output models. Output prices and input costs, notably wage rates, vary widely both between crop seasons and regionally.

These models are based primarily on field studies conducted by USAID research staff,* modified in some respects to ensure consistency as to comparative costs and output prices. Crop yields, relative to fertilizer inputs, are consistent with fertilizer response ratios as determined by the Bangladesh Soil Fertility and Soil Testing Institute. The average wage rate of 10 taka per day is at the high end of the recent labor cost spectrum. Since fertilizer and credit costs are relatively unvarying, this imparts, if anything, a low bias to the "Net Return" calculation. It remains to add that the models presented here, while believed typical of the most recent crop seasons, are meant to be illustrative and do not necessarily portray an "average" farmer's situation. Details regarding individual cost items have been confined to the General Notes at the end of this Annex, except for those deemed essential to an understanding of the Tables.

B. Case I - Existing Constraints

Table I summarizes the position of owner-cultivators and share-croppers cultivating HYV Boro rice, given the market price of rice and existing credit conditions. The owner-cultivator has access to institutional credit at 15 percent p.a.; the sharecropper must depend on money lenders who charge at least 100 percent p.a. (50 percent per crop season of five or six months, which has been assumed for these purposes). It may also be noted here that while neither the owner-cultivator nor the sharecropper typically uses recommended amounts of fertilizer, the owner-cultivator uses more than the sharecropper. This accounts for the difference in yield (output per acre) between the two. Finally, the concept of labor costs differs somewhat between the owner-cultivator and the sharecropper. In neither case do these costs include the imputed cost of family labor, since it is not believed that the farmer considers such costs as part of his own cost/benefit calculations. The labor costs shown for an owner-cultivator represent the cost of hired labor additional to family labor employed. For sharecroppers, who do not typically employ hired labor, labor costs are the imputed costs of "Badla" labor; that is, the borrowed labor of other sharecroppers which must later be repaid in-kind.

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*Nizam U. Ahmed, "Cost of Production of Jute, Wheat, and Boro Crops per Acre (in Mymensingh, Sylhet & Comilla District", dated Aug. 24, 1977); and Nizam U. Ahmed, "Cost of Production of T. Aman Paddy Per Acre", dated Jan. 20, 1976. Also, most helpful in resolving conceptual differences between these two studies was a July, 1976 study by Hugh Brammer, UNDP/FAO, "Cost of Production, Profits and Returns for Paddy and Wheat Cultivation at the New Fertilizer Prices", dated March 1976.

Case I - Rate of Return to HYV Boro Farmers

	Owner-Cultivator	Sharecroppers
Yield (Md/Acre (1))	47	40
Farmgate price (taka/md of Paddy) (2)	75	75
	(Taka Per Acre)	
A. Gross Return		
From sale of paddy	3525	3000
From sale of straw	220	180
Gross Return	3745	3180
Less: Landholder's share	-	- 1590
Gross to Farmer	3745	1590
B. Cost of Production		
1. Operating Costs:		
a. Seed	150	150
b. Fertilizer	205	125
c. Pesticides	64	32
d. Irrigation	450	450
e. Labor	370	370
f. Bullock Power	180	180
Sub-Total	1419	1307
2. Credit (seed, fertilizer, pesticides & Irrigation)	65	378
Total Costs	1484	1685
C. Net Return (A-B)	2261	(95)
D. Benefit/Cost Ratio (A - B)	2.5:1	0.9:1

Notes: (1) A maund (md) is equal to about 83 pounds.
(2) 15 Taka = $ U.S. 1.00.

As may be seen, the owner-cultivator nets about Tk. 2,200 per acre. His benefit/cost ratio of 2.5:1 is confortably in excess of the 2.0:1 ratio generally believed to be the minimum necessary to induce investment in HYV technology. If he did not have access to institutional credit, as is the case with many owner-cultivators, his benefit/cost ratio would be 2.0:1, or approximately the minimum desirable level. The sharecropper, on the other hand, given the requirement that he turn over to the landlord half the proceeds of the sale of his crop, and his inability to obtain institutional credit, cannot cover his input costs. Obviously he has no incentive to invest in HYV technology.

Table 2 summarizes returns and costs of production for farmers of HYV varieties of Transplant Aman and wheat.

Table 2

Case I - HYV T. Aman and Wheat

	T. Aman		Wheat	
	Owner Cultivator	Share Cropper	Owner Cultivator	Share Cropper
Yield (Md/Acre)	35	22	20	10
Farmgate Price (Tk/Md)	70	70	80	80
A. Gross Return				
Gross Return (incl. sale of straw)	2590	1630	1760	880
Less: Landholder's share	-	-815	-	440
Gross to farmer	2590	815	1760	440
B. Costs of Production				
1. Operating costs				
a. Seed	130	130	200	180
b. Fertilizer	135	Nil	160	nil
c. Pesticides	48	24	nil	nil
d. Irrigation	-	-	60	nil
e. Labor	350	320	120	90
f. Bullock power	180	180	150	150
Sub-Total	843	654	690	420
2. Credit	23	77	32	90
Total Costs	866	731	722	510
C. Net Return	1724	84	1038	(70)
D. Benefit/Cost Ratio	3.0:1	1.1:1	2.4:1	0.9:1

Owner-cultivators of T.Aman and wheat do not make as much per acre as in the case of Boro rice but their costs - and therefore their perceived risks - are also lower. Benefit/cost ratios are favorable with respect to both T. Aman and wheat, although the wheat farmer's benefit/cost ratio would fall marginally below 2:1 were he unable to obtain institutional credit. As in the case of Boro rice, the sharecropper is either unable, or only barely able, to recover his input costs.

C. Case II - Varied Constraints

In Case II, the output price and credit constraints are modified. For these purposes, the price is arbitrarily set for all crop varieties at a level 20 percent above the market prices assumed for Case I (in the case of T. Aman rice, the assumed price is equal to this year's Government procurement price of Aman paddy). The cost of credit to sharecroppers is set at 24 percent p.a., as compared with the 100 percent (50 percent per crop season) assumed in Case I. Costs of production and net return are shown both for typical farmer practices with respect to fertilizer use levels and for use levels as recommended by the Bangladesh Soil Fertility and Soil Testing Institute. The following is a summary of the key assumptions and findings for each crop variety.

Table 3

Case II - HYV Boro Rice

	Owner-Cultivator		Sharecropper	
	Current Practices	Recommended Practices	Current Practices	Recommended Practices
A. Assumptions				
Yield (Md/Acre)	47	58	40	58
Price (Tk/Md)	90	90	90	90
Fertilizer Use:				
Seers/acre (NPK)	90-40-20	100-80-60	60-20-10	100-80-60
Cost (Tk/Acre)	205	310	125	310
Cost of Credit	15%	15%	24%	24%
B. Results				
1. Gross Return to Farmer	4,450	5,490	1,893	2,745
2. Cost of Production (1)	1,484	1,671	1,398	1,717
3. Net Return (1-2)	2,966	3,819	495	1,028
4. Benefit/cost Ratio (1 ÷ 2)	3.0:1	3.3:1	1.4:1	1.6:1

Note: (1) See General Notes for breakdown of cost items.

Table 4

Case II - HYV T. Aman

	Owner-Cultivator		Sharecropper	
	Current Practices	Recommended Practices	Current Practices	Recommended Practices
A. Assumptions				
Yield (Md/Acre)	35	46	22	46
Price (Tk/Md)	84	84	84	84
Fertilizer Use: Seers/acre(NPK)	50-40-10	80-60-40	nil	80-60-40
Cost(Tk/acre)	135	255	nil	255
Cost of Credit	15%	15%	24%	24%
B. Results				
1. Gross return to Farmer	3080	4044	969	2022
2. Cost of Production (1)	866	1061	672	1082
3. Net Return (1-2)	2214	2983	297	940
Ratio (1 ÷ 2)	3.6:1	3.8:1	1.4:1	1.9:1

Table 5

Case II - Wheat

	Owner-Cultivator		Sharecropper	
	Current Practices	Recommended Practices	Current Practices	Recommended Practices
A. Assumptions				
Yield (Md/Acre)	20	30	10	30
Price (Tk/Md)	96	96	96	96
Fertilizer Use:				
Seers/acre (NPK)	60-40-20	100-80-60	nil	100-80-60
Cost (Tk/acre)	160	310	nil	310
Cost of Credit	15 %	15%	24%	24%

Table 5 (Cont.)

B. Results	Owner-Cultivator Current Practices	Owner-Cultivator Recommended Practices	Sharecropper Current Practices	Sharecropper Recommended Practices
1. Gross Return to Farmer	2080	3120	520	1560
2. Cost of Production	721	913	464	938
3. Net Return (1-2)	1359	2207	56	622
4. Benefit/cost Ratio (1 ÷ 2)	2.9:1	3.4:1	1.1:1	1.7:1

Note: (1) See General Notes for breakdown of cost items.

Case II - Summary

The Case II models indicate greatly improved returns and benefit/cost ratios for both owner-cultivators and sharecroppers. The owner-cultivator's benefit/cost ratio rises to a highly favorable range of 3.3 to 3.8:1, depending on crop variety, assuming recommended fertilizer use. The benefit/cost ratio of sharecroppers ranges from 1.6 to 1.9:1, assuming recommended practices. While this is below the 2:1 ratio believed necessary to induce HYV investment by a majority of sharecroppers, nevertheless it is close enough to it that doubtless a sizeable proportion would undertake such investments.

C. Relative Importance of Output Prices and Fertilizer Costs

The reader may have wondered why a reduction in the fertilizer price has not been considered either an an alternative to, or in conjunction with, changes in output prices and the cost of credit. In part, this was not considered because a reduction in fertilizer prices would impose an added budgetary cost (see Annex B.8 on Fertilizer Subsidies) while increasing the danger of smuggling. At the same time, it should be recognized that fertilizer price reductions simply do not produce the leverage, in terms of benefit to the farmer, that can be obtained through increases in the output price. This is especially true of the owner-cultivator, but obtains also for the sharecropper. Table 6 shows the reductions in fertilizer price necessary to provide the increase in net return obtainable through a 10 percent increase in the output price.

Table 6

Reduction in Fertilizer Price Related to Increase in Output Price

10 percent increase in output price leads to same increase in farmer's net return as:

	Fertilizer Price decline (%) of:	
	Owner-cultivator	Sharecropper
HYV Boro	122	47
HYV T. Aman	67	26
Wheat	110	42

Thus, an HYV Boro tenant farmer would obtain the same benefit from a 10 percent increase in the output price as he would from a 47 percent reduction in the price of fertilizer. In the case of owner-cultivators of HYV Boro and wheat, even were fertilizer made cost-free, the farmer would not benefit as much as he would from a 10 percent increase in the output price.

(1) General Notes Regarding Cost Items on Tables 1 + 2 :

(a) Seed: Owner-cultivators usually save their seed from one harvest to the next sowing period, whereas sharecroppers, being pressed for cash, are unable to save seed and must purchase their requirement at planting time. While this gives the owner-cultivators some cost advantage (limited by the fact that the saving itself involves a cost), for purposes of simplification and comparability seed costs are assumed to be the same for owner-cultivators and sharecroppers.

(b), (c) Fertilizer/Pesticides: Official prices have been used in costing fertilizer and pesticide. It should be recognized, however, that at times of scarcity many farmers must pay higher black market prices to obtain these inputs. "Farmer practice" use levels are those observed in field surveys. "Recommended use" levels are those recommended by the Bangladesh Soil Fertility and Soil Testing Institute for the crop varieties involved.

(d) Irrigation: Irrigation costs are those of renting mechanical equipment and the labor required to operate it, or hiring larger amounts of labor to irrigate by traditional, non-mechanized means, as the case may be. Overall costs are roughly the same as between the two methods.

(e) Labor: Calculations include only labor costs incurred during planting, weeding and harvesting period. Owner-cultivator's costs are the actual cost of hired labor additional to family labor employed. Sharecropper's costs are the costs of "Badla" labor (i.e. borrowed labor that must later be rapaid in kind), additional to family labor employed. Daily labor cost is assumed as 10 Taka.

(f) Bullock cost: Bullock power is costed at the assumed daily wage rate of 10 Taka per day, this being approximately the cost of feeding and otherwise maintaining the animal.

(2) Cost of Production - Case II Models

Following are the detailed cost of production underlying the Case II Models, Table 3, 4,& 5.

Cost of Production

	Owner-Cultivator		Sharecropper	
	Current Practices	Recommended Practices	Current Practices	Recommended Practices
Table 3 - HYV Boro				
1. Operating Costs:				
a. Seed	150	150	150	150
b. Fertilizer	205	310	125	310
c. Pesticides	64	96	32	96
d. Irrigation	450	450	450	450
e. Labor	370	400	370	400
f. Bullock-power	180	190	180	190
Sub-Total	1419	1596	1307	1596
2. Credit	65	75	91	121
Total Costs	1484	1671	1398	1717
Table 4 - HYV T. Aman				
1. Operating Costs:				
a. Seed	130	130	130	130
b. Fertilizer	135	255	nil	255
c. Pesticides	48	72	24	72
d. Irrigation	-	-	-	-
e. Labor	350	380	320	380
f. Bullock power	180	190	180	190
Sub-Total	843	1027	654	1027
2. Credit	23	34	18	55
Total Costs	866	1061	672	1082

	Owner-Cultivator		Sharecropper	
	Current Practices	Recommended Practices	Current Practices	Recommended Practices
Table 5 - Wheat				
1. Operating Costs				
a. Seed	200	200	200	200
b. Fertilizer	160	310	nil	310
c. Pesticides	nil	nil	nil	nil
d. Irrigation	60	60	nil	60
e. Labor	120	140	90	140
f. Bullock power	150	160	150	160
Sub-Total	690	870	440	870
2. Credit	31	43	24	68
Total Costs	721	913	464	938

Preliminary List of Public Sector Storage Locations by End of Project

Districts (20)	Primary Distribution Points (88)	Remote Thanas (121)
1. Dacca	1. Narayanganj	1. Dohar
	2. Narshingdi	2. Nawabganj
	3. Raipura	3. Sreenagar
	4. Manikganj	4. Lohajong
	5. Munshiganj	
	6. Joydevpur	
	7. Ghorasal (BCIC)	
2. Tangail	8. Tangail	5. Basail
	9. Madhupur	6. Bhuapur
	10. Mirzapur	
3. Mymensingh	11. Kotwali	7. Bhaluka
	12. Jamalpur	8. Sharishabari
	13. Sherpur	9. Nandail
	14. Malendah	
	15. Gaforgaon	
	16. Goespur	
4. Kishoreganj	17. Bhairab	10. Bajitpur
	18. Kuliarchar	11. Mitamain
	19. Kishoreganj	12. Barhatta
	20. Thakurkona	13. Kalmakanda
5. Faridpur	21. Kotwali	14. Alfadanga
	22. Madaripur	15. Shibchar
	23. Gopalganj	16. Jajira
	24. Takerhat	17. Bhedarganj
		18. Goshirhat
		19. Naria
		20. Moksedpur
6. Chittagong	25. Kotwali	21. Sandwip
	26. Dohazari	22. Kutubdia
	27. Chakaria	23. Teknaff
	28. Cox's Bazar	24. Moheskhali

Districts	Primary Distribution Points	Remote Thanas
7. Chittagong Hill Tracts	29. Rangamati 30. Bandarban 31. Ramgarh	25. Chandraghona 26. Barkal 27. Lungudhu 28. Bagaichair 29. Luma 30. Ruma 31. Naikhanchari 32. Khagrachari 33. Dighinala 34. Mohalchari
8. Noakhali	32. Feni 33. Choumuhini 34. Luxmipur	35. Ramgati 36. Chatkhil 37. Hatiya
9. Comilla	35. Kotwali 36. Brahmanbaria 37. Chandpur 38. Laksham 39. Daudkandi	38. Nasirnagar 39. Nabinagar 40. Bancharampur 41. Homna 42. Motlab
10. Sylhet	40. Kotwali 41. Sherpur 42. Sunamganj 43. Habiganj 44. Sreemangal 45. Chattak 46. Fenchuganj (BCIC)	43. Ajmiriganj 44. Baniachang 45. Sullah 46. Dharmopasha 47. Derai 48. Jamalganj 49. Taherpur 50. Jagannathpur 51. Goenghat
11. Rajshahi	47. Boalia 48. Nawabganj 49. Rohanpur 50. Natore 51. Atrai 52. Noagaon	52. Porsa 53. Niamatpur 54. Dhamurhat 55. Shibganj 56. Nachole 57. Manda

Districts	Primary Distribution Points	Remote Thanas
12. Dinajpur	53. Kotwali 54. Hakimpur 55. Parbatipur 56. Shibganj 57. Pirganj	58. Debiganj 59. Haripur 60. Ranisankail 61. Ghoraghat 62. Baliadanga 63. Nawabganj
13. Rangpur	58. Kotwali 59. Nilphamari 60. Lalmonirhat 61. Gaibandha 62. Kurigram	64. Roumari 65. Bhurungamari 66. Nageswari 67. Shaghata 68. Kaliganj 69. Kishorganj 70. Jaldhaka 71. Chilmari 72. Dimla 73. Hatibanda 74. Patgram
14. Bogra	63. Kotwali 64. Sukhanpukur 65. Joypurhat	75. Dhunat
15. Pabna	66. Ishurdi 67. Kashinathpur 68. Bagabari 69. Ullapara 70. Serajganj	76. Faridpur 77. Belkuchi 78. Kazipur 79. Raiganj 80. Tarash
16. Kushtia	71. Kotwali 72. Chuadanga	81. Kumarkhali 82. Mirpur
17. Jessore	73. Kotwali 74. Kaliganj 75. Magura 76. Narail	83. Mohammadpur 84. Sreepur 85. Sailkupa 86. Harinakundu 87. Kalia 88. Salikha

Districts	Primary Distribution Points	Remote Thanas
18. Khulna	77. Kotwali	89. Paikgacha
	78. Bagerhat	90. Sanakhola
	79. Satkhira	91. Shamnagar
	80. Jhikargacha	92. Morelganj
	81. Chalna	93. Kaliganj
19. Barisal	82. Kotwali	94. Bakerganj
	83. Jhalakati	95. Gournadi
	84. Kowkhali	96. Babuganj
	85. Perozpur	97. Hizla
	86. Bhola	98. Muladi
		99. Mehendiganj
		100. Nalcity
		101. Kathalia
		102. Rajapur
		103. Bhandaria
		104. Nazirpur
		105. Mathbaria
		106. Banaripara
		107. Sarupkati
		108. Daulatkhan
		109. Charfession
		110. Uzirpur
		111. Chatmohar
		112. Borhanuddin
		113. Tajumuddin
		114. Bauphal
20. Patuakhali	87. Patuakhali	115. Galachipa
	88. Barguna	116. Khepupara
		117. Amtali
		118. Mirjaganj
		119. Bamna
		120. Patharghata
		121. Betagi

Environmental Assessment

Per State 112161 "No IEE's or EA's (are) necessary" for this project. The Fertilizer Distribution Improvement Grant consists of importing fertilizer, constructing warehouses and marketing consulting. The first two items are a continuance of previous programs and therefore no additional environmental statements are needed. An environmental statement is not considered necessary for marketing consulting.

AID 1020-28 (1-72)

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of Project:
From FY 78 to FY 82
Total U.S. Funding $250 Million
Date Prepared: April 29, 1978

Project Title & Number: Fertilizer Distribution Improvement Grant (388-0024)

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Program or Sector Goal: The broader objective to which this project contributes: Increased foodgrain production, especially by small farmers.	Measures of Goal Achievement: Minimum 4 percent annual increases in foodgrain production on all land. Minimum 4 percent annual increases in foodgrain production on land holdings of 2 acres or less.	- Ministry of Agriculture production figures - Sample surveys	Assumptions for achieving goal targets: - HYV seed available for moderate expansion - Plant disease and pest infection within normal bounds - Weather and flood conditions temperate throughout the year - Irrigation facilities available for moderate expansion
Project Purpose: Increased use of fertilizer on an equitable basis	Conditions that will indicate purpose has been achieved: End of project status. 15 percent annual increases in overall fertilizer sales Minimum 15 percent annual increases in fertilizer sales to cultivators of two acres or less	- BADC offtake data. - Sample surveys by consultant.	Assumptions for achieving purpose: - Crop/fertilizer price ratio encourages fertilizer use among non-owner cultivators - Institutional credit becomes available to a significant ratio of non-owner cultivators - BDG and donors fully realize fertilizer's vital role and provide determined support
Outputs: 1. Adequate fertilizers stock in country 2. Increased fertilizer storage capacity 3. Fertilizer Bulk Handling and Bagging 4. New marketing system for private dealers adopted	Magnitude of Outputs: 1. Five months inventory 2 173000 tons capacity constructed under USAID and an equal amount under other programs. 3. 500,000 tons annual bagging capacity installed. 4. By FY 79 for Chittagong Division and by FY 80 for entire country.	BADC, AID and dealer's records	Assumptions for achieving outputs: - Adequate other donor or BDG financing for storage construction and fertilizer import. - Domestic fertilizer production at projected levels. - Government counter-smuggling efforts continue to be effective.
Inputs: BDG - Budget to BADC to cover fertilizer production, salaries and other operating expenses. - Issuance of necessary implementing instructions. AID - Grant for systems improvements, storage construction and fertilizer imports. Other Donors Storage construction and fertilizer imports.	Implementation Target (Type and Quantity) BDG - Continuous arrivals of fertilizer sufficient to maintain 5 months stock. $655 million. AID - Systems Improvements $2.5 million. Storage and Bulk Handling $26.5 million. Fertilizer purchase $221 million. Other Donors - $460 million	- BADC reports and instructions - AID procurement and disbursement records - BDG budget materials - Sample Surveys	Assumptions for providing inputs: - Undertaking of Government to provide required budgetary support to BADC - AID Grant funding made available - Other donor contributions materialize

COUNTRY CHECKLIST

A. GENERAL CRITERIA FOR COUNTRY

1.	FAA Sec. 116. Can it be demonstrated that contemplated assistance will directly benefit the needy? If not, has the Department of State determined that this government has engaged in consistant pattern of gross violations of internationally recognized human rights ?	Yes, it can be demonstrated.
2.	FAA. Sec. 181. Has it been determined that the government of recipient country has failed to take adequate steps to prevent narcotics drugs and other controlled substances (as defined by the Comprehensive Abuse Prevention and Control Act of 1970) produced or processed, in whole or in part, in such country, from being sold illegally within the jurisdiction of such country to U.S. Government personnel or their dependents, or from entering the U.S. unlawfully ?	No, Department of State has not so determined.
3.	FAA. Sec. 620(b). If assistance is to Government has the Secretary of State determined that it is not controlled by the International Communist movement ?	Yes.
4.	FAA.Sec. 620(c). If assistance is to government, is the government liable as debtor or unconditional guarantor on any debt to a U.S. citizen for goods or services furnished or ordered where(a) such citizen has exhausted available legal remedies and (b) debt is not denied or contested by such government ?	No.

5.	FAA.Sec.620(e). If assistance is to a government, has it (including government agencies or subdivisions) taken any action which has the effect of nationalizing expropriating, or otherwise seizing ownership .or control of property of U.S. citizens or entities beneficially owned by them without taking steps to discharge its obligations toward such citizens or entities ?	In 1972 the BDG nationalized five firms which were fully or partially owned by U.S. entities. The BDG has announced a compensation policy and is taking steps to discharge its obligations toward U.S. citizens and entities.
6.	FAA Sec. 620(f); App.Sec 108. Is recipient country a Communist Country ? Will assistance be provided to the Democratic Republic of Vietnam (North Vietnam), South Vietnam, Cambodia or Laos ?	a) No b) No
7.	FAA.Sec.620(i). Is recipient country in anyway involved in (a) subversion of, or military aggression against, the United States or any country receiving U.S. assistance, or (b) the planning of such subversion or aggression ?	No
8.	FAA.Sec.620(l). Has the country permitted, or failed to take adequate measures to prevent, the damage or destruction, by mob action, of U.S. property ?	No
9.	FAA.Sec.620(l). If the country has failed to institute the investment guarantee program for the specific risks of expropriation, inconvertibility or confiscation, has the AID Administrator within the past year considered denying assistance to such government for this reason ?	OPIC bilateral agreement was signed January 15, 1975.
10.	FAA.Sec.620(o). Fishermen's Protective Act, Sec.5. If country has seized, or imposed any penalty or sanction against, any U.S. fishing activities in international waters.	Not applicable.

a. has any deduction required by Fishermen's Protective Act been made ?

b. has complete denial of assistance been considered by AID Administrator ?

11. FAA.Sec. 620(g):App.Sec. 504. (a) is the government of the recipient country in default on interest or principal of any AID loan to the country ? (b) Is country in default exceeding one year on interest or principal on U.S. loan under program for which App.Act appropriate funds, unless debt was earlier disputed or appropriate steps taken to cure default ?

a) No
b) No

12. FAA Sec. 620(s). What percentage of country budget is for military expenditures ? How much of foreign exchange resources spent on military equipment ? How much spent for the purchase of sophisticated weapons systems ? (Consideration of these points is to be coordinated with the Bureau for Program and Policy Coordination, Regional Coordinators and Military Assistance Staff (PPC/RC).)

Approximately seven percent. The Soviet Union has provided a limited number of aircraft for the BDG airforce. This non-sophisticated equipment was purchased on credit at reduced prices. The BDG is not diverting development assistance funds for military expenditures.

13. FAA Sec.620(t). Has the country severed diplomatic relations with the United States ? If so, have they been resumed and have new bilateral assistance agreements been negotiated and entered into since such resumption ?

No.

14. FAA Sec.620(u). What is the payment status of the country's U.N. obligations ? If the country is in arrears, were such arrearages taken into account by the AID Administrator in determining the current AID Operational Year Budget ?	Not in arrears.
15. FAA Sec.620A. Has the country granted sanctuary from prosecution to any individual or group which has committed an act of international terrorism ?	No
16. FAA. Sec.666. Does the country object, on the basis of race, religion, national origin or sex, to the presence of any offices or employees of the U.S. there to carry out economic development program under FAA.?	No
17. FAA Sec.669. Has the country delivered or received nuclear reprocessing or enrichment equipment materials or technology, without specified arrangements on safeguards, etc. ?	No
18. FAA Sec. 901. Has the country denied its citizens the right or opportunity to emigrate ?	No

B. FUNDING CRITERIA FOR COUNTRY

1. Development Assistance Country Criteria

a. FAA Sec.102(c),(d). Have criteria been established, and taken into account to assess commitment and progress of country in effectively involving the poor in development, on such indexes as : (1) small-farm labor intensive agriculture, (2) reduced infant mortality, (3) population growth, (4) equality of income distribution and (5) unemployment.	1. Yes 2. Yes 3. Yes 4. Yes 5. Yes
b. FAA Sec.201(b)(5),(7) & (8):Sec. 208;211(a)(4),(7). Describe extent to which country is :	Increasing foodgrain production is a major objective of the Bangladesh Five Year Development Plan (FYP). Included also in the FYP are programs for storage and distribution of food.
(1) Making appropriate efforts to increase food production and improve means of food storage and distribution.	
(2) Creating a favorable climate for foreign and domestic private enterprise and investment.	BDG policy encourages both foreign and domestic private enterprise and investment, and in January, 1975, an OPIC bilateral agreement was concluded. In addition, the new Martial Law Administration (since November 7, 1975) has particularly emphasised the role of private enterprise, is looking to the denationalization of a number of firms, and has announced a new private sector oriented investment policy.

(3) Increasing the public's role in the development process.	Implementation of Bangladesh's development plans required a large public role in development. Cooperatives are encouraged by the Government, directly involving the public in a participation role, In addition, the national rural works program also requires a high decree of local decision-making and participation.
(4) (a) Allocating available budgetary resources to development.	Bangladesh's budgetary resources are overwhelmingly allocated to relief and development expenditures.
(b) Diverting such resources for unnecessary expenditures and intervention in affairs of other free and independent nations.	Bangladesh's military expenditures are very low in absolute and real terms. The level of of defense spending is not a diversion of development funds.
(5) Making economic, social, and political reforms such as tax collection improvements and changes in land tenure arrangements, and making progress toward respect for the rule of law, freedom of expression and of the press and recognizing the importance of individual freedom, initiative, and private enterprise.	Bangladesh is predominantly a nation of small farms, and while a large proportion of these are cultivated by shareholders and lease farmers as well as farmers who both own some land and lease or sharehold, the average area per family is under 2 acres and large holdings are the exception. Accordingly, land tenure changes while necessary in the long term equity question, are not as critical an element for the development of Bangladesh as for other IDCs. On the other question, the new

	Martial Law Administration has evidenced a concern for each of these; this has been manifested through tighter public administration return of newspapers to private control, and encouragement of private enterprise. Recognition of the importance of individual freedom and initiative also appear to be marks of the new Government. Martial Law has been extended to the country in what appears principally to to be an effort to clear up carry-over problems of corruption and abuse of power. Respect for the rule of law is stated as underlying the current measures.
(6) Otherwise responding to the vital economic, political, and social concerns of its people, and demonstrating a clear determination to take effective self-help measures.	The new Government evidences' a concern for these questions and has been taking action to improve the public service, to release economic activity from constraints formerly imposed by governmental intervention, and to alleviate conditions of the people through rural works programs, food for work and other self-help programs.
(c) FAA Sec.201(b),211(a). Is the country among the 20 countries in which development assistance loans may be made in this fiscal year, or among the 40 in which development assistance grants (other than for self-help projects) may be made ?	Yes .
(d) FAA Sec.115. Will country be furnished, in same fiscal year, either security supporting assis-	No

tance or Middle East peace funds? If so, is assistance for population programs, humanitarian aid through international organizations, or regional programs?

2. Security Supporting Assistance Country Criteria

a. FAA Sec.502B. Has the country engaged in a consistent pattern of gross violations of internationally recognized human rights ? Is Program in accordance with policy of this Section ?	No, Program is in accordance.
b. FAA Sec.531. Is the Assistance to be furnished to a friendly country organization, or body eligible to receive assistance?	Not applicable
c. FAA Sec.609. If commodities are to be granted so that sale proceeds will accrue to the recipient country, have Special Account (counterpart) arrangements been made?	Not applicable.
e. App. Sec.113 Will security Assistance be provided for the purpose of aiding directly the efforts of the government of such country to repress the legitimate rights of the population of such country to the Universal Declaration of Human Rights ?	Not applicable.

C. GENERAL CRITERIA FOR PROJECT.

1. App. Unnumbered; FAA Sec.653(b)

(a) Describe how Committees on Appropriations of Senate and House have been or will be notified concerning the project;	a) Grant project was included in Congressional Presentation
(b) is assistance within (Operational Year Budget) country or international organization allocation reported to Congress (or not more than $1 million over that figure plus 10%) ?	b) Yes

2. FAA Sec. 611(a)(1). Prior to obligation in excess of $100,000, will there be (a) engineering, financial and other plans necessary to carry out the assistance and (b) a reasonably firm estimate of the cost to the U.S. of the assistance?	Firm estimate of cost of each size of warehouse to be built has been prepared. Not applicable to other portions of project (Systems Improvements and Fertilizer)
3. FAA Sec. 611(a)(2). If further legislative action is required within recipient country, what is basis for reasonable expectation that such action will be completed in time to permit orderly accomplishment of purpose of the assistance?	All legislative actions are conditions precedent to disbursement under this project.
4. FAA Sec.611(b); App.Sec.101. If for water or water-related land resource construction, has project met the standards and criteria as per Memorandum of the President dated Sept.5, 1973 (replaces Memorandum of May 15, 1962; see Fed. Register, Vol 38, No. 174, Part III, Sept.10, 1973)?	Not applicable

5. FAA Sec. 611(e). If project is capital assistance (e.g. construction), and all U.S. assistance for it will exceed $1 million, has Mission Director certified the country's capability effectively to maintain and utilize the project ?	Yes, certificate included herein.
6. FAA Sec.209,619. Is project susceptible of execution as part of regional or multi-lateral project ? If so why is project not so executed? Information and conclusion whether assistance will encourage regional development programs. If assistance is for newly independent country, is it furnished through multi-lateral organizations or plans to the maximum extent appropriate ?	The total funding requirement is such that multi-lateral and other bilateral donors will hopefully participate. This project is not feasible on a regional basis.
7. FAA Sec.601(a);(andSec. 201(f) for development loans). Information and conclusions whether project will encourage efforts of the country to: (a) increase the flow of international trade; (b)foster private initiative and competition; (c) encourage development and use of cooperatives, credit unions, and savings and loan associations; (d) discourage monopolistic practices; (e) improve technical efficiency of industry, agriculture and commerce; and (f) strengthen free labor unions.	The project is not directly applicable to foreign trade. It will facilitate private initiative of farmers and will liberalize regulations, leading to a freer, more competitive marketing for fertilizer distribution. It does help cooperative development, since cooperatives are involved in distribution of fertilizers. Increased fertilizer use will improve the technical efficiency of agriculture sector. The project is not directed toward labor unions.

8. FAA Sec. 601(b). Information and conclusion on how project will encourage U.S. private trade and investment abroad and encourage private U.S. participation in foreign assistance programs (including use of private trade channels and the services of U.S. private enterprise).	Not applicable.
9. FAA Sec.612(b); Sec.636(h). Describe steps taken to assure that, to the maximum extent possible, the country is contributing local currencies to meet the cost of contractual and other services, and foreign currencies owned by the U.S. are utilized to meet the cost of contractual and other services.	The host country contribution is 100 percent local currency. All contractor services local cost will be paid with US owned TAKA
10. FAA Sec. 612(d). Does the U.S. own excess foreign currency and, if so, what arrangements have been made for its release ?	No.

FUNDING CRITERIA FOR PROJECT

1. Development Assistance Project Criteria

a. FAA Sec.102(c); Sec.111;Sec.281a. Extent to which activity will (a) effectively involve the poor in development, by extending access to economy at local level, increasing labor-intensive production, spreading investment out	Use of modern agricultural inputs and increased productivity should result in chance for improvement in incomes of the rural poor, thereby helping to

from cities to small towns and rural areas; and (b) help develop cooperatives, especially by technical assistance, to assist rural and urban poor to help themselves toward better life, and otherwise encourage democratic private and local governmental institutions ?

give them a basis for greater participation in development, including participation in the development of and through cooperatives. The urban poor are not really addressed by the project, except to the extent rural development takes place, migration of the rural poor to the cities may be reduced.

b. FAA Sec.103, 103A,104,105,106, 107. Is assistance being made available: (include only applicable paragraph -- e.g. a,b, etc.-- which corresponds to source of funds used. If more than one fund source is used for project, include relevant paragraph for each fund source).
(1) (103) for agriculture, rural development or nutrition; if so, extent to which activity is specifically designed to increase productivity and income of rural poor; (103A) if for agricultural research, is full account taken of needs of small farmers.

All aspects of the project are directed towards increasing fertilizer use and agricultural production in an equitable way. It is not possible to say what portion will accrue to the rural poor.

c. FAA Sec. 110(a);Sec 208(e).
Is the recipient country willing to contribute funds to the project, and in what manner has or will it provide assurances that it will provide at least 25% of the costs of the program, project, or activity with respect to which the assistance is to be furnished (or has the latter cost-sharing requirement been waived for a "relatively least-developed" country) ?

BDG will be providing for in excess of 25 percent of the project costs.

d. FAA Sec. 110(b). Will grant capital assistance be disbursed for project over more than 3 years? If so, has justification satisfactory to Contress been made, and efforts for other financing?

Yes over six years. Justification will be forwarded to Congress.

e. FAA Sec. 207; Sec. 113. Extent to which assistance reflects appropriate emphasis on; (1) encouraging development of democratic, economic, political, and social institutions; (2) self-help in meeting the country's food needs; (3) improving availability of trained worker-power in the country; (4) programs designed to meet the country's health needs; (5) other important areas of economic, political, and social development, including industry; free labor unions, cooperatives, and Voluntary Agencies; transportation and communication; planning and public administration; urban development, and modernization of existing laws; or (6) integrating women into the recipient country's national economy.

The project directly contributes to the country's self-help efforts to increase foodgrain production and meet its own food needs. Although it is not specifically directed to training of manpower or development of the institutions under (1) whatever rural income increase results from the project should assist in development or support of a rural standard of living; in augmented incomes lies the greater potential for encouraging such institutions. Similarly, health and increased roles for women, although not specifically addressed by the project, should benefit from any increase in rural income and living standards. For the items under (5), development of rural cooperatives can be expected to result from the success of this project; the other items under (4), are not sufficiently related to the project objectives to include comment.

f. FAA Sec. 281(b). Describe extent to which program recognizes the particular needs, desires, and capacities of the people of the country; utilizes the country's intellectual resources to encourage institutional development; and supports civic education and training in skills required for effective participation in governmental and political processes essential to self-government.

The project is specifically targeted to the basic rural development and foodgrain production needs of the country. The accomplishment of the objectives of the project may result in increased cooperative activity and greater participation by the poorer and rural population, thus involving greater participation in basic self-government type activities and development of institutions.

g. FAA Sec. 201(b)(2)-(4) and -8; Sec. 201(e); Sec. 211(a) (1)-(3) and -(8). Does the activity give reasonable promise of contribution to the development: of economic resources, or to the increase of productive capacities and self-sustaining economic growth; or of educational or other institutions directed toward social progress? Is it related to and consistent with other development activities, and will it contribute to realizable long-range objectives? And does project paper provide information and conclusion on an activity's economic and technical soundness?	The project contributes directly to increased agricultural production and indirectly to other aspects of rural development. It is related to and consistent with other projects, contributes to long range goals. The PP documents the project's economic and technical soundness.
h. FAA Sec. 201(b)(6); Sec. 211(a)(5), (6). Information and conclusion on possible effects of the assistance on U.S. economy, with special reference to areas of substantial labor surplus, and extent to which U.S. commodities and assistance are furnished in a manner consistent with improving or safeguarding the U.S. balance-of-payments position.	Not applicable

STANDARD ITEM CHECKLIST

D. Procurement

1. FAA Sec. 602. Are there arrangements to permit U.S. small business to participate equitably in the furnishing of goods and services financed?	Yes.
2. FAA Sec. 604(a). Will commodity procurement be financed from the U.S. except as otherwise determined by the President or under delegation from him?	Yes.

3. FAA Sec. 604(d). If the cooperating country discriminates against U.S. marine insurance companies, will agreement require that marine insurance be placed in the U.S. on commodities financed?	Yes, agreement will so provide.
4. FAA Sec. 604(e). If offshore procurement of agricultural commodity or product is to be financed, is there provision against such procurement when the domestic price of such commodity is less than parity?	Not Applicable.
5. FAA Sec. 608(e). Will U.S. Government excess personal property be utilized wherever practicable in lieu of the procurement of new items?	Yes.
6. MMA Sec. 901(b).(a). Compliance with requirement that at least 50 percent of the gross tonnage of commodities (computed separately for dry bulk carriers, dry cargo liners and tankers) financed shall be transported on privately owned U.S. flag commercial vessels to the extent that such vessels are available at fair and reasonable rates.	Project Agreement will so provide.
7. FAA Sec. 621. If technical assistance is financed, will such assistance be furnished to the fullest extent practicable as goods and professional and other services from private enterprise on a contract basis? If the facilities of other Federal agencies will be utilized are they particularly suitable, not competitive with private enterprise, and made available without undue interference with domestic programs?	Yes. Not Applicable.

8. International Air Transport Fair Competitive Practices Act, 1974

If air transportation of persons or property is financed on grant basis, will provision be made that U.S. flag carriers will be utilized to the extent such service is available?	Yes.

B. Construction

1. FAA Sec. 601(d). If a capital (e.g., construction) project, are engineering and professional services of U.S. firms and their affiliates to be used to the maximum extent consistent with the national interest?	Yes.
2. FAA Sec. 611(c). If contracts for construction are to be financed, will they be let on a competitive basis to maximum extent practicable?	Yes.
3. FAA Sec. 620(k). If for construction of productive enterprise, will aggregate value of assistance to be furnished by the U.S. not exceed $100 million?	Not applicable

C. Other Restrictions

1. FAA Sec. 201(d). If development loan is interest rate at least 2% per annum during grace period and at least 3% per annum thereafter?	Not Applicable
2. FAA Sec. 301(d). If fund is established solely by U.S. contributions and administered by an international organization does Comptroller General have audit rights?	Not Applicable.
3. FAA Sec. 620(h). Do arrangements preclude promoting or assisting the foreign aid projects or activities of communist-Bloc countries, country to the best interests of the U.S.?	Yes.

4. FAA Sec. 636(i). Is financing not permitted to be used, without waiver, for purchase, long-term lease, or exchange of motor vehicle manufactured outside the U.S. or guaranty of such transaction?	Such is not permitted.
5. Will arrangements preclude use of financing:	
a. FAA Sec. 114: to pay for performance of abortions or to motivate or coerce persons to pracrice abortions?	Yes.
b. FAA Sec. 620(a). to compensate owners for expropriated nationalized property?	Yes.
c. FAA Sec. 660. to finance police training or other law enforcement assistance, except for narcotics programs?	Yes.
d. FAA Sec. 662. for CIA activities?	Yes
e. App. Sec. 103. to pay pensions, etc., for military personnel?	Yes.
f. App. Sec. 105. to pay U.S. assessments?	Yes.
g. App. Sec. 106. to carry out provisions of FAA Sections 209(d) and 251(h) (transfer to multilateral organization for lending).	Yes.
h. App. Sec. 501. to be used for publicity or propaganda purpose within U.S. not authorized by Congress?	Yes.

BANGLADESH
FERTILIZER DISTRIBUTION IMPROVEMENT GRANT

CERTIFICATION PURSUANT TO SECTION 611(e) OF THE FOREIGN ASSISTANCE ACT OF 1961, AS AMENDED

I, Joseph S. Toner, Mission Director, the principal officer of the Agency for International Development in Bangladesh, having taken into account, among other things, the maintenance and utilization by the Bangladesh Government and its agencies of projects previously financed by the United States, do hereby certify that in my judgment Bangladesh has the financial and human resources capability effectively to utilize the project to be financed by this grant.

This judgment is based upon considerations discussed in the Project Paper to which this certification is attached.

Joseph S. Toner
Director

May 4, 1977
Date

From: M. Lutfullahil Majid
Joint Secretary

Ministry of Planning
External Resources Division
Govt. of the People's Republic of Bangladesh
Sher-E-Bangla Nagar, Dacca-15

No. ERD/USA(P)-31/78

Dated, May 3, 1978

Subject: Request for AID Assistance to Bangladesh
Fertilizer Distribution Improvement Grant

Dear Mr. Toner,

As you know, the Bangladesh Government has set, as one of its primary economic goals, foodgrain self-sufficiency by 1985/86. Fundamental to attainment of the goal is substantial increased use of fertilizer, particularly by small farmers who have y to benefit from the potential of High Yielding Variety technology.

Towards this end, the Government has drawn up plans for a number of actions in the fertilizer sector. In outline, it 's the Government's intention that the use of fertilizer increase as much as possible. For the purpose of fertilizer planning it is estimated to increase at about 15 percent per year for the next five years. This can be achieved, we believe, by building up and maintaining higher levels of fertilizer inventory within the country, so as to avoid shortage conditions such as exist at present; by improved fertilizer marketing; and by creating an environment conducive to increased fertilizer use. With respect to the latter, the Government will seek to maintain a favorable fertilizer cost/foodgrain price ratio which encourages maximum fertilizer use. The Government will continue to seek to provide increasing amounts of agricultural credit for fertilizer purchase and other farm needs, particularly among small farmers.

To build up and maintain adequate supplies of fertilizer within the country, the following decisions have been taken by the Government of Bangladesh.

1. Monthly programming of imports for two to three years in advance. Action will be taken to maintain a constant incountry stock of five months supply of each required fertilizer. Monthly fertilizer situation reports will be issued to all concerned donors within fifteen days of the closing of the previous month. Coordination meetings to

which all concerned donors will be invited will be held periodically. At these meetings, import scheduling will be reviewed to assure a five month/in-country buffer stock. In addition the BADC will hold monthly discussions with USAID and other interested donors to review the contents of the fertilizer situation reports.

2. Domestic production of fertilizer will be strengthened and made more efficient. The Government is committed to take effective measures to maintain adequate professional and skilled staff at all operating fertilizer factories and to take whatever other measures are necessary for the rapid completion of the Ashuganj Fertilizer Factory and the optimization of the existing fertilizer factories.

3. The Bangladesh Government seeks to undertake a comprehensive study for determining the best practicable fertilizer application programme for her soils, keeping in view the current and projected agricultural practice, and implications of switching over to new brands of complex fertilizer and inter alia, study of the best use of the TSP Factory facilities, whether it would be best to improve the facilities for TSP production, convert the factory to produce some other fertilizer, or to make partial or sole use of the facilities for fertilizer bulk imports. The Government is committed to make the best feasible use of the facilities considering all issues.

Marketing of fertilizer will be stimulated by encouragement of private sector involvement in retailing and wholesaling (initially on an experimental basis in a predetermined region of the country) as follows:

1. During the first year, a new system of fertilizer marketing will be introduced in Chittagong Division. This system will include: (a) complete freedom of private sector movement of fertilizer, except for the five mile border area; (b) the margin between the wholesale price and the administered maximum price to the farmers will be established at a level sufficient to allow a reasonable profit to both wholesale and retail dealers no control will be placed on the rate at which the wholesaler sells to the retailers; and (c) BADC will not sell fertilizer from its thana warehouses but will maintain them only as observation posts for a period, except in those cases where the private dealers fail to operate and fertilizer

prices rise well above the administered maximum price. Special attention will be given to remote areas where transportation is difficult. Instead, BADC will sell fertilizer from agreed primary distribution points. In addition Fenchuganj and Ghorasal Urea Factories will begin fertilizer sales direct to private dealers. To the extent this system is successful in Chittagong Division, it will then be extended to the entire country.

2. Fertilizer will be given an effective priority for allocation of transportation equipment within Bangladesh.

3. Effective action will be taken to make the bulk storage facilities of Fenchuganj and Ghorasal Urea Factories fully operative.

The Bangladesh Government intends, wherever possible, to reduce fertilizer subsidies by reducing fertilizer costs. Three important cases in point are the shift to bulk fertilizer imports, DAP imports and the optimal use of each factory facility. The Government will deal with the question of fertilizer subsidy in a manner that is consistent with the objectives of (a) making maximum sales of fertilizer to the farmers (b) keeping fertilizer within reach of small farmers and sharecroppers and (c) maintaining a proper relationship between input prices of agricultural products and their output prices, especially in support price operations.

To assist the Government in carrying out the five year fertilizer program, a grant of two hundred and fifty million dollars ($250,000,000) from the United States Agency for International Development is requested. It is requested the A.I.D. funds be made available over the five year term but that a first grant of fifty million dollars ($50,000,000), be extended in the current U.S. fiscal year. It is requested that the funds be available to assist in financing foreign exchange and local currency costs for the acquisition and importation of fertilizers and other agricultural inputs, and for fertilizer storage construction, training, technical assistance, materials and equipment and related services. Financing for such items would extend to the local and foreign exchange costs incurred in their acquisition, transportation, insurance, inspection and conduct of training. Other costs as agreed will be met by the Government, including the cost of inland distribution of the fertilizer.

Your favorable consideration is requested.

Yours sincerely,

Sd/-

M. Lutfullahil Majid

Mr. Joseph S. Toner
Director
USAID, Dacca

BANGLADESH
FERTILIZER DISTRIBUTION IMPROVEMENT GRANT
FY 1978, 1979, 1980, 1981
AND 1982

Project Description

The Government of Bangladesh has set, as one of its primary economic goals, foodgrain self-sufficiency by 1985/86. Fundamental to attainment of the goal is substantial increased use of fertilizer, particularly by small farmers who have yet to benefit from the potential of high yielding variety technology.

The project of which this grant is a part, consists of the manufacture of fertilizer in Bangladesh, the importation into and inland distribution within Bangladesh of necessary fertilizers and other activities related to the same purpose including especially the construction of fertilizer storage facilities. The total cost of meeting these needs for the 1978-79 to 1982-83 project period is estimated to be approximately $1365 million equivalent for fertilizer, distribution and related costs.

Subject to availability of funds, the AID grant for $250 million will provide a portion of the local currency and foreign exchange financing for the project over its five year period. In this first year of FY 1978 an initial grant of $50 million is extended. The funds are available to assist in financing foreign exchange and local currency costs for the acquisition and importation of fertilizers and other agricultural inputs, and for fertilizer storage construction, training, technical assistance, materials and equipment and related services as AID may agree in writing. Financing for such extends to the local and foreign exchange costs incurred in their acquisition, transportation, insurance, inspection and conduct of training. Other costs as agreed will be met by the Government, including the cost of inland distribution of the fertilizer.

PROJECT AUTHORIZATION AND REQUEST FOR ALLOTMENT OF FUNDS

PART II

Bangladesh

Fertilizer Distribution Improvement

AID Grant No. 388-0024

Pursuant to Part I, Chapter 1, Section 103 of the Foreign Assistance Act of 1961, as amended, I hereby authorize a Grant to Bangladesh the "Cooperating Country" of not to exceed fifty million United States Dollars ($50,000,000) the ("Authorized Amount") to help in financing certain foreign exchange and local currency costs of goods and services required for the project as described in the following paragraph.

The project provides sustained and substantial support to the fertilizer sector in Bangladesh while at the same time addressing major constraints to increased fertilizer use. AID funding will be in three areas : technical assistance plus related materials; storage and bulk handling construction; and import of fertilizer and other agricultural inputs.

I approve the total level of A.I.D. appropriated funding planned for this project of not to exceed two hundred and fifty million United States Dollars ($250,000,000), including the funding authorized above, during the period FY 1978 through FY 82. I approve further increments during that period of Grant funding up to $200,000,000, subject to the availability of funds in accordance with A.I.D. allotment procedures.

I hereby authorize the initiation of negotiation and execution of the Project Agreement by the officer to whom such authority has been delegated in accordance with A.I.D. regulations and Delegations of Authority subject to the following essential terms and covenants and major conditions; together with such other terms and conditions as A.I.D. may deem appropriate:

a. Source and Origin of Goods and Services

Except for ocean shipping, goods and services financed by A. I. D. under the project shall have their source and origin in the Cooperating Country and in countries included in A. I. D. Geographic Code 941 except as A. I. D. may otherwise agree in writing. Ocean shipping financed under the Grant shall be procured in any eligible source country except the Cooperating Country.

b. Prior to any disbursement, or the issuance of any commitment documents under the Project Agreement, Grantee shall furnish in form and substance satisfactory to A. I. D.:

1. assurance that budgetary allocations will be established for FY 1978-79 through FY 1982-83 for BADC sufficient to carry out the project for each year, including an undertaking to increase such allocations if required to meet the requirements of the project.

2. evidence of its intended fertilizer price structure which will prevail through FY 1978-79.

c. Grantee shall covenant to take effective action to remove marketing constraints at the retail level and wholesale level including inadequate financial incentive to the retail dealers and complete absense of private wholesale dealers.

Signature_____

Administrator

Date_____