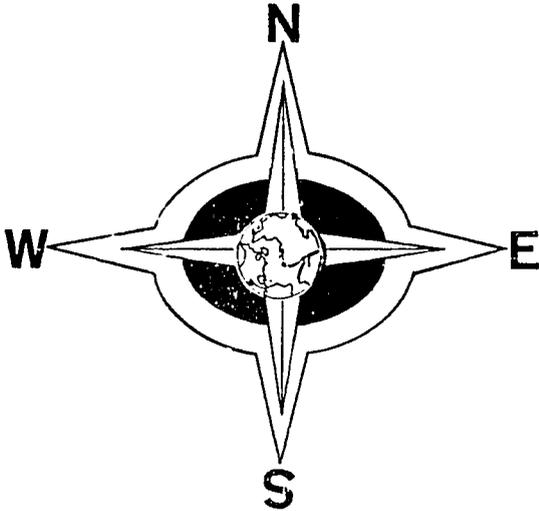


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# International Fertilizer Market Information Sources

INTERNATIONAL FERTILIZER DEVELOPMENT CENTER

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## ABBREVIATIONS USED IN THIS PUBLICATION

### FERTILIZERS AND CHEMICAL FORMULAS

AS	ammonium sulfate
AN	ammonium nitrate
CAN	calcium ammonium nitrate
TSP	triple superphosphate
DAP	diammonium phosphate
MOP	muriate of potash or potassium chloride
SOP	sulfate of potash or potassium sulfate
LPG	liquefied petroleum gas
LNG	liquefied natural gas
BPL	bone phosphate of lime
$P_2O_5$	phosphate; expressed as phosphorus pentoxide
$Fe_2O_3$	ferrous oxide
$Al_2O_3$	aluminum oxide
MgO	magnesium oxide
Cl	chlorine
N	nitrogen
$K_2O$	potassium; expressed as potassium oxide
MAP	monoammonium phosphate
ASN	ammonium sulfate nitrate
CN	calcium nitrate
SN	sodium nitrate
CC	calcium cyanamide
AC	ammonium chloride
SSP	single superphosphate
NOP	nitrate of potash or potassium nitrate
$NH_3$	anhydrous ammonia
NPK	compound fertilizer containing three primary nutrients, N, $P_2O_5$ , and $K_2O$
NP	compound fertilizer containing N and $P_2O_5$
15-15-15	a compound fertilizer grade containing 15% N, 15% $P_2O_5$ , and 15% $K_2O$ in the total product weight

### ECONOMIC AND MONETARY

f.o.b.	free on board
c.i.f.	cost, insurance, and freight
DWT	dead weight
GDP	gross domestic product
£	British pound
\$	United States dollar
GNP	gross national product
Rs	rupees

## ABBREVIATIONS USED IN THIS PUBLICATION (Continued)

### ABBREVIATIONS FOR COUNTRIES

U.S. . . . .	United States
U.S.A. . . . .	United States of America
U.S.S.R. . . . .	Union of Soviet Socialist Republics

### ACRONYMS OF ORGANIZATIONS

ARSAP . . . . .	Agricultural Requisites Scheme for Asia and the Pacific
ESCAP . . . . .	Economic and Social Commission for Asia and the Pacific
ESPINDESA . . . . .	Española de Investigación y Desarrollo, S.A.
FADINAP . . . . .	Fertilizer Advisory, Development, and Information Network for Asia and the Pacific
FAI . . . . .	Fertiliser Association of India
FAO . . . . .	Food and Agriculture Organization of the United Nations
FERTECON . . . . .	Fertilizer Economic Studies, Ltd.
FMA . . . . .	Fertilizer Manufacturers Association
IADB . . . . .	Inter-American Development Bank
IFDC . . . . .	International Fertilizer Development Center
IPI . . . . .	International Potash Institute
ISMA . . . . .	Originally "International Superphosphate Manufacturers Association"
MARDATA . . . . .	Maritime Data Network, Ltd.
NFDC . . . . .	National Fertilizer Development Center
OECD . . . . .	Organization for Economic Cooperation and Development
TFI . . . . .	The Fertilizer Institute
TVA . . . . .	Tennessee Valley Authority
UNIDO . . . . .	United Nations Industrial Development Organization
USDA . . . . .	United States Department of Agriculture
USAID . . . . .	U.S. Agency for International Development

## INTRODUCTION

The ability to monitor the international market conditions of key fertilizer products, raw materials, and intermediates and to assess the situation a year or more in advance is vitally important to the decisionmakers of fertilizer supply and marketing strategies in the developing countries.

Countries lacking this ability and relying heavily on imports to meet requirements will find it difficult to acquire needed products to ensure an adequate supply, purchase with best possible timing and prices, or arrange for vessels for timely and economical delivery. Consequently, they would not be able to provide adequate and timely availability of fertilizer to farmers or would have to incur unnecessarily large costs. The countries which must seek export outlets to augment their domestic market in order to utilize fully production capacities of their own fertilizer plants would find it hard to capitalize on export opportunities, lower costs of production per unit of product, and, thus, strengthen the economic viability of their industry. Likewise, the countries which strive to develop their domestic production capabilities will have difficulties in optimizing the size and timing of their plant investment.

To enable these countries to monitor and assess the international market conditions continuously, the decisionmakers must know where to locate needed information, identify a mechanism for faster access, and strengthen their information analysis capabilities.

This paper attempts to (1) identify the types of information which are considered essential for the decisionmakers to make investment, procurement, or export decisions and (2) highlight the available published and unpublished information sources presently known to the author.

## INFORMATION NEEDS

To assess the future international market conditions of key fertilizer products, raw materials, and intermediates, the decisionmakers must monitor what is happening to the production capacities and the supply and demand balances of these products and materials in the major exporting and importing countries and for the world. They also must know what is happening to the international price movements and ocean freight market for these products and materials. Additionally, they must be cognizant of what is happening to the annual rates of inflation in the major exporting countries. Ocean freight is a significant element of the

total fertilizer acquisition cost from the international market for most countries. Freight cost savings, therefore, can be sizable if fertilizer procurement is properly planned and executed. The rates of inflation in the major exporting countries represent important factors to consider for the assessment of international price outlook. Continuous escalation of inflation rates in the major exporting countries inevitably increase the international prices of fertilizer products and materials.

### Products and Materials

The finished fertilizer products which are routinely traded regionally or worldwide include urea, ammonium sulfate (AS), ammonium nitrate (AN), calcium ammonium nitrate (CAN), triple superphosphate (TSP), diammonium phosphate (DAP), potassium chloride (commonly referred to as muriate of potash [MOP]), potassium sulfate or sulfate of potash (SOP), and some NPK fertilizers such as 15-15-15. Key raw materials and intermediates which go into one or more of the said fertilizer products and which are internationally traded are phosphate rock, sulfur, natural gas, liquefied natural gas (LNG), naphtha, heavy fuel oil, liquefied petroleum gas (LPG), anhydrous ammonia ( $\text{NH}_3$ ), sulfuric acid, and wet-process phosphoric acid. Natural gas, LNG, naphtha, heavy fuel oil, and LPG are important alternative feedstocks for  $\text{NH}_3$ .  $\text{NH}_3$ , in turn, is a basic ingredient for products such as urea, AS, AN, CAN, and DAP. Phosphate rock, sulfur, sulfuric acid, and phosphoric acid are essential direct or indirect raw materials for phosphate products such as TSP and DAP.

Natural gas is a gaseous hydrocarbon while LNG, LPG, naphtha, and heavy fuel oil are liquid hydrocarbons. LNG is the liquefied form of natural gas while naphtha and heavy fuel oil are refined products of crude oil. LPG is mainly a mixture of propane and butane. Natural gas is traded internationally in a gaseous form via pipelines or in the form of LNG via special tankers. These hydrocarbons differ in relative value as the ammonia feedstock because they vary in heating value, viscosity, and composition, (particularly, with respect to the relative content of carbon, hydrogen, and sulfur). Even for the same kind of hydrocarbons, product quality varies from producing location to producing location, attributed mainly to the hydrocarbon source. Natural gas can be associated gas or nonassociated gas. Naphtha and fuel oil have many grades. The naphtha grade best suited for the ammonia feedstock is straight-run light naphtha. Almost any type of heavy fuel oil can be used as the ammonia feedstock. However, Bunker C grade is the commonly used grade.

Phosphate rock is traded internationally in several grades, each with a different percent bone phosphate of lime (BPL) or percent  $P_2O_5$  content. Two main traded groups in the international market are 68%-70% BPL and 70%-72% BPL. Export prices are usually quoted publicly based on 68% BPL and 72% or 75% BPL.

Sulfur comes from different sources. It is found as elemental sulfur (also called brimstone), metal sulfides in coal and mineral ores (such as pyrites), sulfates, hydrogen sulfide in natural gas, and organic sulfur compounds in crude oil. It is also recovered at oil refineries and in many industrial processes using fuel oil. By far, the two major sources of elemental sulfur for international market are Frasch sulfur directly extracted from mines and recovered sulfur from desulfurization of oil and gas. Sulfur is sold in dry bulk and in the liquid (molten) form. Dry bulk sulfur may be "formed" (slated, prilled, or granular), or it may be in random lump sizes ranging to powder.

### Prices

Fertilizer products, raw materials, and intermediates are sold internationally on a contract or spot basis. Published prices serve only as an indicator of recently finalized deals in the international market. To interpret these published prices for specific use, a decisionmaker needs to take into account several factors. These factors include quantity and timing of purchase, basis for transaction (f.o.b., c.i.f., or landed), method of payment, and other terms and conditions of sale.

### Ocean Freight

The ocean freight market is too complex to describe briefly. Nevertheless, basically there are two types of international shipping arrangements for fertilizer products and materials, and, therefore, there are two types of ocean freight rates. For shipping arrangements, a shipper may contact a steamship company to haul its cargo from one port to another by a regularly scheduled liner on a given route or charter a vessel from a shipowner directly or indirectly through a ship broker (or a chartering broker) for a particular voyage on a trip or time basis. In the case of the former, a shipper pays a freight rate called a "conference rate" or liner terms. In the case of the latter, the shipper pays a "trip charter" rate or a "time charter" rate.

Most fertilizer products and materials are moved by chartered vessels on a trip basis. This is especially true for dry bulk and

liquid shipments. Shipments by regularly scheduled liners are made when a shipper either has only a small quantity of bagged fertilizer to ship or has a large volume of bagged materials to move regularly between the same two ports. In the latter situation, the shipper would try to negotiate with member lines of a freight conference to establish a conference rate lower than the charter rate. A freight conference is a group of two or more vessel-operating carriers which provide international liner services for the carriage of cargo on a particular route or routes within specified geographical limits and which has an agreement or arrangement to operate under uniform or common freight rates. There are numerous freight conferences in the world. The freight rates established by a conference are called conference rates. Almost all of the chartered shipments are arranged through ship brokers since shipowners reportedly charge the same charter rates to a shipper whether the vessels are chartered through the ship broker or not. Ship brokers normally charter the so-called tramp steamers. They are the vessels not making regular trips but taking cargo when and where it is offered and to any port. The charter rates for tramp steamers are usually cheaper.

Charter rates for dry cargo are normally established in London while charter rates for tankers are normally fixed in New York.

### Inflation

The rate of inflation in a country is indicated in various ways, depending on intended uses. For example, consumer price index, cost of living index, wholesale price indices for all goods manufactured or for only a certain product group, and the deflator of gross national or domestic product have been used as indicators. For assessing international fertilizer price outlook, the use of wholesale price index, the deflator of gross domestic product (GDP), or other appropriate indices is recommended. The World Bank uses a weighted average international price index (based on selected base years) for estimating future international fertilizer prices. This index is derived from the c.i.f. indices of U.S. dollar prices of manufactured exports for all manufactured goods from industrialized countries to the developing countries.

### Specific Data Suggested

Specific types of international market-related information for key fertilizer products, raw materials, intermediates, ocean freights, and rates of inflation, which the decisionmakers should seek to access and monitor are listed as follows:

### Phosphate Rock

1. Reserve size, annual production capacity, and percent of BPL content--world total and by major exporting country.
2. Annual export quantity by percent of BPL (68%-80% BPL)--world total and by major exporting country.
3. Annual import quantity by percent of BPL--world total and by major importing country.
4. Annual consumption by country for direct application and for all applications.
5. Weekly or monthly export prices from major exporting countries for 68%, 72%, and 75% BPL calcined and noncalcined.
6. Long-term contracts.
7. Specifications (percent ferric oxide [ $\text{Fe}_2\text{O}_3$ ], percent aluminum oxide [ $\text{Al}_2\text{O}_3$ ], percent magnesium oxide [ $\text{MgO}$ ], percent chlorine [Cl], moisture, and particle size).

### Sulfur

1. Annual production capacity and product source (Frasch sulfur, recovered sulfur)--by major exporting country.
2. Annual export quantity--world total and by major exporting country.
3. Annual import quantity--world total and by major importing country.
4. Annual consumption--by country and for world total.
5. Weekly or monthly export prices for dry bulk and for liquid--by major exporting country.
6. Long-term contracts.
7. Specification (percent carbon and ash).

### Natural Gas

1. Reserve size, annual production capacity, heating value, and percent of composition (of sulfur and methane)--world total and by major exporting country.
2. Annual export quantity by pipeline--world total and by major exporting country.

3. Weekly or monthly pipeline export prices--by major exporting country (contract, spot).
4. Annual pipeline import quantity--by major importing country.
5. Long-term contracts.

#### Liquefied Natural Gas

1. Annual production capacity, heating value, and percent of composition (of sulfur and methane)--world total and by major exporting country.
2. Annual export quantity--world total and by major exporting country.
3. Annual import quantity--world total and by major importing country.
4. Annual consumption--world total and by country.
5. Weekly or monthly export price by major exporting country.
6. Long-term contracts.

#### Naphtha

1. Annual production capacity, heating value, and percent of composition (of carbon and sulfur)--world total and by major exporting country.
2. Annual export quantity--world total and by major exporting country.
3. Annual import quantity--world total and by major importing country.
4. Annual consumption--world total and by country.
5. Weekly or monthly export price by major exporting country (preferably based on light naphtha).

#### Fuel Oil

1. Annual production capacity, heating value, percent of composition (of carbon and sulfur), specific gravity, and viscosity--world total and by major exporting country.
2. Annual export quantity--world total and by major exporting country.

3. Annual import quantity--world total and by major importing country.
4. Annual consumption--world total and by country.
5. Weekly or monthly export price (based on Bunker C grade) by major exporting country.

#### Anhydrous Ammonia

1. Annual production capacity and production by feedstock--world total and by major exporting country.
2. Annual export quantity--world total and by major exporting country.
3. Annual import quantity--world total and by major importing country.
4. Annual consumption--world total and by country.
5. Weekly or monthly export price by major exporting country.
6. Availability of vessels (size and number).

#### Sulfuric Acid

1. Annual production capacity and production by product source (primary production, by product)--world total and by major exporting country.
2. Annual export quantity--world total and by major exporting country.
3. Availability of vessels (size and number).
4. Annual import quantity--world total and by major importing country.
5. Annual consumption--world total and by country.
6. Weekly or monthly export price--by major exporting country (based on 98% acid).
7. Long-term contracts.

#### Phosphoric Acid (Wet Process)

1. Annual production capacity and production--world total and by major exporting country.

2. Annual export quantity--world total and by major exporting country.
3. Annual import quantity--world total and by major importing country.
4. Annual consumption--world total and by country.
5. Weekly or monthly export price--by major exporting country (based on 52%-54% P<sub>2</sub>O<sub>5</sub>).
6. Long-term contracts.
7. Availability of vessels (size and number).

#### Finished Fertilizer Products<sup>1</sup>

1. Annual production capacity and production--world total and by major exporting country.
2. Annual export quantity--world total and by major exporting country.
3. Annual import quantity--world total and by major importing country.
4. Annual consumption--world total and by country.
5. Weekly or monthly export prices--by major exporting country.
6. Year-end inventory--world total and by country.
7. Physical properties and chemical composition.

#### Ocean Freight Rates

1. Conference rates for key fertilizer products, intermediates, and raw materials between ports in geographical areas of interest.

<sup>1</sup> Urea (agricultural grade), AS, AN (agricultural grade, 33.0%-34.5% N), CAN (20.5%-26.0% N), DAP, TSP (granular and powdered), MOP (standard, coarse, and granular grades), SOP (50% K<sub>2</sub>O), NPK, and other NP fertilizers. AN can be loaded and unloaded only at a limited number of specified ports because of explosion hazards. Some NPK compositions are also restricted due to safety hazards (such as those which are subject to propagated thermal decomposition when ignited).

2. Trip charter rates for key fertilizer products, intermediates, and raw materials between ports in geographical areas of interest.

### Inflation Rates

1. Annual rates of inflation in the major exporting countries of key fertilizer products, intermediates, and raw materials.

## INFORMATION SOURCES

Published and unpublished sources for the suggested types of information are numerous and ever increasing. The mushrooming number of information sources causes increasing difficulties for the decisionmakers to cope with and digest. To the best of the author's knowledge, there has not been a single source which is capable of meeting all of the information needs of the decisionmakers. All of the known information sources vary in the types of information available, the amount of data history kept, and in the scope and continuity of product and country coverage.

Basically, there are three broad categories of information sources available. The first category is the publications offered by commercial and noncommercial organizations for general public distribution. The second category is the computerized data services provided by commercial and noncommercial organizations to any interested user on a subscription basis. The third category is the data files maintained and the reports regularly or occasionally prepared by commercial and noncommercial organizations for internal use or for restricted distribution. The reports prepared and the data maintained by these commercial and noncommercial organizations, often, can be made available to outsiders on request.

Publications include periodicals and special or occasional reports distributed with or without a fee. Periodicals may be daily newspapers or newsletters, weekly reports, monthly bulletins, quarterly journals, or annual publications. Some publications highlight only fertilizer market-related news such as capacity change, capacity expansion, production, trade, and price movement while others may also report pertinent numerical data regularly or irregularly. Some organizations such as the British Sulphur Corporation, Ltd., issue more than one publication. Quite often, some publications do nothing more than present the same set of news and data with different twists. The information or data may be transformed, rearranged, aggregated, partitioned, or graphically presented in different manners. Data history may also vary in coverage.

The relatively better known organizations which have published international fertilizer market-related information regularly or irregularly for public use are the commercial information service firms such as the British Sulphur Corporation, Ltd. (United Kingdom), McGraw-Hill, Inc. (United States), Stanford Research Institute (United States), Fertilizer Economic Studies, Ltd. (United Kingdom), and International Trade and Mining News (Japan); United Nations (U.N.) organizations such as the Food and Agriculture Organization (FAO), U.N. Industrial Development Organization (UNIDO), and Economic and Social Commission for Asia and the Pacific (ESCAP); national and international research and service organizations such as the Fertiliser Association of India (FAI) and IFDC; international and regional lending organizations such as The World Bank and the Inter-American Development Bank (IADB); and national government agencies such as U.S. Department of Agriculture (USDA), U.S. Bureau of Mines, and TVA.

Computerized data services are the services provided by those organizations which build and maintain specific data banks on a computer and offer the updated computer reports (on data or processed information) to subscribers via telex or mail or for instant direct access from allowed cities in a given country or around the world via a keyboard-type telecommunications terminal. Currently, only three organizations are known to be offering computerized data services on international fertilizer market-related information; they are Fertilizer Economic Studies, Ltd. (FERTECON), the British Sulphur Corporation, Ltd., and TVA.

Trade associations and other organizations such as fertilizer manufacturers with global business activities, fertilizer traders and brokers, international development assistance agencies, international and regional lending institutions, international engineering consulting firms, international construction contractors, international research and service organizations, and national government agencies often maintain data files and develop reports for internal use or for restricted distribution. These data files and reports can be quite useful to the decisionmakers of fertilizer supply and marketing strategies in the developing countries. Good examples of this are the monthly, quarterly, annual, and special reports prepared and distributed by a trade association, such as the International Phosphate Industry Association (ISMA) to its member companies, and the annual reports prepared by fertilizer manufacturers for stockholders or regulatory agencies.

However, to obtain information from the unpublished sources, one must identify and develop effective personal contact with the relevant individuals within the source organizations.

In the following section, sources of specific information are presented category by category:

A. Fertilizer Market News and Data

1. Publication--Relatively significant publications will be highlighted in more detail. For the less significant publications, publication title, publisher name, and annual subscription cost, or cost per copy will be listed only. Significant publications will be presented in Appendix A and less significant publications in Appendix B.
2. Computerized Data Services--The three known organizations are FERTECON; British Sulphur Corporation, Ltd.; and TVA. Types of service offered, the subscription costs, and the address for each of these organizations are briefly described as follows:

a. FERTECON

Type of Service--Three telex services and one report service are offered by mail. They are the sulfur/sulfuric acid telex, the phosphate telex, the nitrogen telex, and the quarterly U.S.S.R. review. The sulfur/sulfuric acid telex, sent every 2 weeks, covers up-to-date developments in prices, contracts, and deliveries. The phosphate telex, sent every 2 weeks, covers up-to-date market developments for phosphate fertilizers, raw materials, and intermediates. The nitrogen telex, sent every 2 weeks, covers up-to-date developments in  $\text{NH}_3$ , AS, AN, urea, and high-N compounds. The quarterly U.S.S.R. review, mailed four times a year, summarizes and interprets information from Soviet sources to reveal developments in plant construction and in fertilizer supply, use, and trade.

Subscription Cost--£900/year for each telex service, £750/year for the quarterly U.S.S.R. review.

Address--Fertilizer Economic Studies, Ltd.  
144, Buckingham Palace Road  
London, SW1W 9TR  
England

b. British Sulphur Corporation, Ltd.

Type of Service--Three telex services and two report services are offered by mail. The telex services are international market prices, European market prices, and sulfur market news. The report-by-mail services are plant lists and statistics. The international market prices telex gives f.o.b. price ranges of main export suppliers for each product. This telex is sent weekly for  $\text{NH}_3$ , phosphoric acid, DAP, TSP, urea, AS, and NPKs and every 2 weeks for sulfur, sulfuric acid, and potash. The European

market prices telex, telexed monthly, reports the current asking prices of imported fertilizer products and brief trade news for each common market country, except for Denmark. The sulfur market news telex, telexed monthly, covers the latest developments in sulfur/sulfuric acid market, including production, export, and stocks of the major suppliers, contract/spot sales and prices, and new supply/demand sources.

For the plant lists service, five standard reports (reports A, B, C, F, H) are optionally available and can be updated bimonthly, semiannually, or annually. Details of more than 8,000 plants of fertilizer products, raw materials, and intermediates are on file covering 1970-79. Earlier data history is also available. Materials covered are potash, recovered sulfur,  $\text{NH}_3$ , phosphoric acid, nitric acid, sulfuric acid, superphosphoric acid, elemental phosphorus, MAP (powdered), and finished fertilizers. Report A lists all information for each plant. Report B lists company, location, status, and capacities. Report C lists total capacities by country, region, and world for each product. Report F shows details of company, location, and capacity for new projects. Report H shows details of company, location, present capacity/expansion, feedstock source, and process type.

For the statistics service, several optional reports on production, consumption, imports by origin, and exports by destination by country are available. Products covered are AS, AN, CAN, ammonium sulfate nitrate (ASN), calcium nitrate (CN), sodium nitrate (SN), calcium cyanamide (CC), ammonium chloride (AC), urea, ammonia (anhydrous and aqua), nitrogen solutions, single superphosphate (SSP), TSP, DAP, basic slag, fused phosphates, ground phosphate rock, MOP, SOP, and nitrate of potash (NOP), potassium magnesium sulfate, crude potash salts, NPKs, phosphoric acid, phosphate rock, and all forms of sulfur. For finished products, supply/demand data are available from 1972/73 to the present and production and consumption data from 1955/56.<sup>2</sup> Statistics for intermediates and raw materials are available from 1966. Two computer printouts are given in a year.

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2. A reference to 2 consecutive years such as 1979/80 refers to 1 fertilizer year. All other references to years refer to calendar years.

Subscription Cost--For the international market prices telex, a minimum 10-week continuous subscription is required. The cost for this service is £8-£10 for a weekly telex for one standard report. The cost for the European prices telex is not known. For the sulfur market news telex service, the fee depends on report scope and telex transmission cost. Typically, it is £960 for 12 telexes. For the plant lists service, a basic charge plus a variable charge for each report is required. As an example, it would cost less than £500 to print out all ammonia plants shown with location and capacities. For the statistics service, it is not easy to quote the cost of any particular report type. For example, it may cost about £800 for the latest annual printout of nitrogen fertilizer exports by country of origin and destination and £1,000 for consumption statistics for each type of nitrogen, phosphate, and potash fertilizers in nearly 140 countries.

Address--Fertilizer Data Services

British Sulphur Corporation, Ltd.  
Parnell House  
25 Wilton Road  
London SW1V 1NH  
England

c. TVA

Type of Service--TVA has two fertilizer market-related data files on the General Electric time-sharing computer--the world fertilizer production capacity data file and the annual world fertilizer market statistics file. These data files, developed mainly for TVA's market development programs, are available for instant direct access by outsiders via a computer terminal. The files are accessible from 600 cities in the United States and over 90 cities in 22 other countries. The capacity data file covers data on current and future production facilities of fertilizer products, raw materials, and intermediates for 156 countries for 1967-85. It includes company name, plant location, products produced, contractor, process, feedstock, startup date (month and year), plant status, initial or ending year of production, and current and planned capacities. Products covered are NH<sub>3</sub>, AN, AN-lime, AS, nitrogen solutions, urea, nitric acid, CC, AC, phosphate rock, MAP/DAP, nitric phosphate, SSP, TSP, basic slag, phosphoric acid (wet

process and furnace), elemental phosphorus, super-phosphoric acid (wet process and furnace), fused magnesium phosphate, MOP, SOP, NOP, sulfur, and sulfuric acid. The market statistics file contains annual data history of production, consumption, and trade of finished fertilizers (in nutrient tons) for 158 countries for 1962-79. Nitrogen products include AS, urea, AN, ASN, SN, CN, CC, ammonium phosphate, other nitrogen and complex fertilizers. Phosphate products include SSP, TSP, basic slag, ammonium phosphate, and other phosphate and complex fertilizers. Potash products include SOP, MOP (over 45%  $K_2O$  and 20%-45%  $K_2O$ ), crude salts to 20%  $K_2O$ , and other potash and complex fertilizers. Ground phosphate rock for direct application is not included.

To access TVA data files, a user must obtain a "user number" from the nearest General Electric office. Each file can be printed out only in standard formats unless a user programs the computer to do otherwise. Two optional standard formats for the capacity data file and three optional standard formats for the market statistics file are available.

Subscription Cost--TVA receives a royalty for file access and computer time used. The royalty helps to defray data and computer program storage costs but does not cover file maintenance or development costs. The cost of using the data file varies, depending on access location, report format, data amount extracted, and communication time with the computer. An interested user should contact the nearest General Electric office for more accurate information. To access the data files in the United States, a user pays \$100 to obtain a user number and a minimum charge of \$20/month whether a file is actually used or not. The user further pays TVA \$8.40 for accessing a file each time and pays General Electric for computer time used. Computer terminal rental depends on communication speed and other features of a computer terminal. In the United States the monthly rental may be about \$100-\$350. There are other costs such as use of telephone lines and/or other telecommunication channels. The cost of data printout varies. For example, to print out capacity data for all products in a country like Indonesia for 1967-85, it would cost \$10-\$15 each time. To print out all market statistics for 1962-79 for a country, it would probably cost \$1 each time.

Address--National Fertilizer Development Center  
Tennessee Valley Authority  
Muscle Shoals, Alabama 35660  
U.S.A.

Attn: E. H. Harre or J. D. Bridges

3. Unpublished Sources--Some examples of organizations with unpublished data or reports which might be useful to the decisionmakers of the developing countries follow:

a. Trade associations

International Superphosphate Manufacturers'  
Association, Ltd.  
28, Rue Marbeuf - 75008  
Paris  
France

Potash and Phosphate Institute  
2801 Buford Highway, N.E.  
Suite 401  
Atlanta, Georgia 30329  
U.S.A.

The Sulphur Institute  
1725 K. Street, N. W.  
Washington, D.C. 20006  
U.S.A.

International Potash Institute  
Bern  
Switzerland

Nitrex AG  
33 Bleicherweg  
Post Box 684  
CH-8027  
Zurich  
Switzerland

Phosphate Chemicals Export  
Association, Inc.  
200 Park Avenue  
Suite 4412  
New York, N.Y.  
U.S.A.

The Fertilizer Institute  
1015 18th Street, N.W.  
Washington, D.C. 20036  
U.S.A.

Campotex, Ltd.  
 P.O. Box 233  
 Commerce Court Postal Station  
 Toronto  
 Canada

Cansulex, Ltd.  
 1980-1055 W. Hastings St.  
 Vancouver, B.C.  
 Canada

Phosphate Rock Export Association  
 1311 N. West Shore Blvd.  
 Suite 301  
 Tampa, Florida 33607  
 U.S.A.

Japan Urea & Ammonium Sulphate Industry  
 Association  
 Tokyo  
 Japan

Japan Phosphatic & Compound Fertilizer  
 Manufacturers' Association  
 No. 3, 3-Chome, Muromachi,  
 Nihonbashi, Chuo-Ku  
 Tokyo  
 Japan

Arab Federation of Chemical Fertilizer Producers  
 P.O. Box 23696  
 Safat  
 Kuwait

b. International and regional lending institutions

The World Bank  
 1818 H Street, N.W.  
 Washington, D.C. 20433  
 U.S.A.

Asian Development Bank  
 2330 Roxas Blvd.  
 P.O. Box 789  
 Manila  
 Philippines

Inter-American Development Bank  
 808 17th Street, N.W.  
 Washington, D.C. 20577  
 U.S.A.

c. International engineering consulting firms and construction contractors

Pullman Kellogg  
3 Greenway Plaza East  
Houston, Texas 77046  
U.S.A.

Badger  
Gulf Design Division  
1401 North Westshore Blvd.  
P.O. Box 22317  
Tampa, Florida 33622  
U.S.A.

Mitsui Toatsu Chemicals, Inc.  
Kasumigaseki Bldg.  
Chiyoda-ku, Tokyo 100  
Japan

FEECO International, Inc.  
3913 Algoma Road, Route 1  
Green Bay, Wisconsin 54301  
U.S.A.

James Chemical Engineering  
779 North Street  
Greenwich, Connecticut 06830  
U.S.A.

Davy Powergas, Ltd.  
8 Baker Street  
London W1M 1DA  
England

Humphreys & Glasgow, Ltd.  
22 Carlisle Place  
London SW1P 1JA  
England

Inter-Uhde Engenharia Quimica, Ltda.  
Edifio Androus  
rua Pedro Americo  
32-23 Andar  
Cep 01045 - Sao Paulo  
Brazil

Snamprogetti  
20097 S. Danato  
Milanese, Milano  
Italy

Espanola de Investigacion y Desarrollo, S.A.  
Rodriguez San Pedro 2  
Madrid - 15  
Spain

d. Manufacturers of fertilizer products, intermediates,  
and raw materials

Agrico Chemical Company  
1 Williams Center  
P.O. Box 3166  
Tulsa, Oklahoma 74101  
U.S.A.

International Minerals & Chemical Corporation  
2315 Sanders Road  
Northbrook, Illinois 60062  
U.S.A.

Texasgulf, Inc.  
Agricultural Division  
P.O. Box 30321  
4509 Creedmoor Road  
Raleigh, North Carolina 27612  
U.S.A.

Terra Chemicals International, Inc.  
Plaza Building  
4th & Jackson Streets  
Sioux City, Iowa 51101  
U.S.A.

USS Agri-Chemicals  
P.O. Box 1685  
233 Peachtree Street  
Atlanta, Georgia 30301  
U.S.A.

Fisons, Ltd.  
Fertilizer Division  
Harvest House  
Felixstowe  
Suffolk IP117LP  
England

BASF AG  
Carl-Bosch-Strasse 38  
D-6700 Ludwigshafen am Rhein  
West Germany

Hoechst AG  
6230 Frankfurt-am-Main 80  
West Germany

Mitsubishi Chemical Industries, Ltd.  
5-2 Marunouchi, 2-Chome  
Chiyoda-Ku, Tokyo  
Japan

Shell Chemical Company  
1 Shell Plaza  
Houston, Texas 77002  
U.S.A.

Potash Company of America  
630 Fifth Avenue  
New York, N.Y. 10020  
U.S.A.

N-Ren Corporation  
256 McCullough Street  
Cincinnati, Ohio 45226  
U.S.A.

Potash Corporation of Saskatchewan Sales, Ltd.  
728 Spadina Crescent East,  
Saskatoon, Saskatchewan  
Canada

ESSO Eastern, Inc.  
2401 S. Gessner  
Houston, Texas 77063  
U.S.A.

e. Fertilizer traders and brokers

International Ore & Fertilizer Corporation  
1230 Avenue of the Americas  
New York, N.Y. 10020  
U.S.A.

Woodward & Dickerson, Inc.  
2 Girard Plaza  
Philadelphia, PA 19102  
U.S.A.

International Commodities Export Company  
(A division of ACLI International, Inc.)  
110 Wall Street  
New York, N.Y. 10005  
U.S.A.

H. J. Baker & Bro., Inc.  
360 Lexington Avenue  
New York, N.Y. 10017  
U.S.A.

Mitsubishi International Corporation  
Chemical Division  
277 Park Avenue  
New York, N. Y. 10017  
U.S.A.

Chemical Exchange International, Inc.  
Whiting Plaza  
Suite 404  
P.O. Box 414  
Tampa, Florida 33601  
U.S.A.

Transammonia, Inc.  
410 Park Avenue  
New York, N.Y. 10022  
U.S.A.

Unitrade  
Vincenz-Slatz-Str. 7  
D-5000 Ko/n 41  
West Germany

Thyssen, Inc.  
Fertilizer & Chemical Dept.  
1114 Avenue of the Americas  
New York, N.Y. 10036  
U.S.A.

f. International development assistance agencies

U.S. Agency for International Development  
U.S. Department of State  
320 21st Street, N.W.  
Washington, D.C. 20523  
U.S.A.

g. International research and professional services organizations

International Fertilizer Development Center  
P.O. Box 2040  
Muscle Shoals, Alabama 35660  
U.S.A.

h. National government agencies

National Fertilizer Development Center  
Tennessee Valley Authority  
Muscle Shoals, Alabama 35660  
U.S.A.

U.S. Department of Energy  
Forester Building  
1000 Independence Avenue  
Washington, D.C.  
U.S.A.

U.S. Department of Commerce  
Trade Information Office  
Foreign Trade Division  
Bureau of the Census  
Washington, D.C. 20233  
U.S.A.

U.S. International Trade Commission  
Washington, D.C. 20436  
U.S.A.

U.S. Department of Agriculture  
500-12th Street, S.W.  
Washington, D.C. 20250  
U.S.A.

U.S. Geological Survey  
National Center  
Reston, Virginia 22092  
U.S.A.

Examples of reports regularly or specially prepared for restricted distribution by some of the above organizations are listed as follows:

ISMA

1. The Phosphate Rock, Sulfur, Phosphoric Acid, and Phosphate Fertilizers Supply/Demand Situation, May 1980
2. Phosphate Rock Statistics (annual)
3. World Survey of Phosphate Deposits
4. Processed Phosphate Trade
5. Phosphoric Acid Plants

6. Phosphoric Acid and Nitrophosphate Plants
7. Preliminary Sulfur and Sulfuric Acid Statistics
8. The Outlook for Sulfur in the Long Term
9. Phosphate Fertilizer Statistics (annual)
10. Phosphate Fertilizers, Production, Imports, Exports, and Consumption (annual)
11. Prospects of Potash Supply and Demand, April 1979
12. Quarterly Phosphate Rock Statistics
13. Fertilizer Consumption Statistics
14. Forecasts of Phosphate Fertilizer and Phosphoric Acid Consumption
15. Ammonia Statistics (annual)

#### The World Bank

1. World Potash Survey
2. World Phosphate Survey
3. Market Forecasts for Fertilizers
4. Commodity Trade and Price Trends (annual)

#### Others

1. Graphs of Weekly International Spot Prices for Selected Fertilizer Products, Intermediates, and Raw Materials, IFDC (updated monthly)
2. Fertilizer Market Report, International Ore & Fertilizer Corporation (bimonthly)
3. Market Report, International Commodities Export Company (weekly)
4. The Fertilizer Index, (A monthly survey of fertilizer production, inventories, and disappearance), The Fertilizer Institute (TFI).
5. USDC Monthly Export/Import Data, TFI (monthly)

6. Monthly production chart, NFDC, TVA, (updated monthly on U.S. production, inventory, shipments, and disappearance of fertilizer products).

## B. Ocean Freight Rates

1. Publications--The publications currently known to the author are as follows:

- a. Fertilizer & Feed Charter Fixtures

H. J. Baker & Bro., Inc., New York, N.Y., U.S.A., weekly.

Reports: Recent fixed charter rates for fertilizer products and materials.

Lists: Ports of origin and destination, vessel name, rate, tonnage, and loading and discharging terms.

- b. Weekly Newsletter on Charter Fixtures

Maritime Research, Inc., New York, N.Y., U.S.A. Weekly, \$160/year plus \$7.80 for airmail postage in the United States and \$16.15 for postage elsewhere.

Presents graphically: Weekly general freight index and time chart index.

Lists: Weekly charter fixtures reported in New York and London, showing ports of origin and destination, vessel name, tonnage, commodity, dates, terms, rates, and reported city (primarily for non-fertilizer commodities such as agricultural products and oil).

- c. Fertilizer Report

Roymar Shipping & Trading, Inc., New York, N.Y., U.S.A. Every 2-3 weeks, \$300/year for the United States.

Lists: Fixed charter rates for fertilizer products and materials.

- d. Fertilizer International

British Sulphur Corporation, Ltd., London, England. Monthly, £42/year for the United Kingdom, \$108/year elsewhere.

Reports: Recent freight fixtures for fertilizers and fertilizer raw materials, indicating product, cargo

type, (bulk, bagged), tonnage, loading port, destination, freight rate, loading and discharging terms, and loading date.

e. Nitrogen

British Sulphur Corporation, Ltd., London, England  
Bimonthly, £90/year for the United Kingdom, \$210/year for Europe, \$240/year elsewhere.

Lists: Tramp fixtures for cargoes of nitrogen fertilizers reported in 2 previous months. Items covered are similar to those in Fertilizer International.

f. Phosphorus and Potassium

British Sulphur Corporation, Ltd., London, England  
Bimonthly, £90/year for the United Kingdom, \$210/year for Europe, \$240/year elsewhere.

Lists: Tramp fixtures for cargoes of sulfur reported in 2 previous months.

g. Sulfur

British Sulphur Corporation, Ltd., London, England  
Bimonthly, £90/year for the United Kingdom, \$210/year for Europe, \$240/year elsewhere.

Lists: Tramp fixtures for cargoes of sulfur reported in 2 previous months.

h. Green Markets

McGraw-Hill, Inc., Circulation Dept., Washington, D.C., U.S.A. Weekly, \$270/year for the United States/Canada/Mexico, \$310/year elsewhere.

Lists: Recent shipping fixtures for fertilizers and fertilizer raw materials (lists almost regularly).

i. International Trade & Mining News

International Trade & Mining News, Tokyo, Japan. Daily except for weekends, \$683/year for outside Japan.

Lists: Ocean freight fixtures for fertilizers and non-fertilizers (grains, cement, etc.), showing origin/destination, tonnage, loading/unloading terms, and loading date.

2. Computerized Data Services--Currently, only one organization is known to be providing computerized data service

on ocean freight rates. This organization is Maritime Data Network, Ltd. (MARDATA), headquartered in Stamford, Connecticut, U.S.A. It has sales offices and agents in New York, London, and Tokyo. MARDATA is a joint-venture company, formed to provide the world's most comprehensive data to the marine shipping industry. It combines the vast information resources of Lloyd's Register of Shipping (London) and Lloyd's London Press, Ltd., (London) with the data systems developed by Marine Management Systems, Inc., of Stamford, Connecticut.

Type of Service--MARDATA maintains a data bank on General Electric's time-sharing computer (MARK III®). This data bank currently consists of three files--charter fixture library, tanker casualty library, and ship library. The charter fixture library contains vessel name, dead weight (DWT), cargo, charterer, period, load area, discharge area, rates, and dates. Time charter fixtures include period, time charter rate, performance requirements, and delivery and redelivery dates. The tanker casualty library contains the casualty history on all liquid gas carriers, as well as all tankers and combination carriers over 6,000 DWT. The ship library contains ship name, owner, type of ship, DWT, gross tons, cargo cubic, dimensions, speed, ship builder, date delivered, class, and flag of registry.

The data bank can be directly accessed instantly through a local telephone number and a small keyboard terminal in over 500 cities in North America, Europe, the Far East, and Australia or through any commercial telex machine available. It is not certain how many of the charter rates contained in the charter fixture library apply to fertilizers and fertilizer raw materials. The rate data are primarily from trade and ship brokers of the United States and London.

Subscription Cost--The annual subscription fee for access to the charter fixture library is \$1,000. In addition, General Electric bills the actual computer usage cost to the user each time the data file is accessed. MARDATA also charges some computer usage cost to the user. Computer usage cost varies. For example, it may cost \$4 to search for a particular charter rate on a particular trade route as of yesterday. However, it may cost \$18 to search for the rate-route information for the last 6 months. Terminal rental may range from \$250 to \$350/month. The amount of telephone bills depends on whether special or ordinary telephone lines are used.

Address--Maritime Data Network, Ltd.  
 300 Broad Street  
 Stamford, Connecticut 06901  
 U.S.A.

Attn: Chetwood Elliott  
 Vice President of Marketing

3. Unpublished Sources--The best sources for charter rates are chartering brokers or the freight department of fertilizer traders/brokers. For conference rates, the best source is regular conference lines or steamship companies. Conference rates may also be available from a governmental maritime agency with which all steamship companies doing business with that country must register. Some examples of unpublished information sources are as follows:

a. Chartering (or ship) brokers

Charrier, McAteer & Fettig  
 1776 K Street, N.W.  
 Washington, D.C. 20006  
 U.S.A.

Simpson, Spence & Young  
 71 Broadway  
 New York, N.Y. 10006  
 U.S.A.

South, Inc.  
 1776 K Street, N.W.  
 Washington, D.C. 20006  
 U.S.A.

b. Fertilizer traders & brokers

Woodward & Dickerson, Inc.  
 2 Girard Plaza  
 Philadelphia, PA 19102  
 U.S.A.

International Ore & Fertilizer Corporation  
 1230 Avenue of the Americas  
 New York, N.Y. 10020  
 U.S.A.

Roymar Shipping & Trading, Inc.  
 355 Lexington Avenue  
 New York, N.Y. 10017  
 U.S.A.

c. Steamship companies or conference lines

Odfjell Westfal Larsen Tankers, Inc.  
375 Park Avenue  
New York, N.Y. 10022  
U.S.A.

Specific conference lines which ship bagged fertilizers (especially those to west Africa). Some examples of U.S. and non-U.S. flag lines (from U.S. Atlantic and Gulf Coast to Africa) are North American-West Africa Line, Black Star Line, Torm Line, Lignes Centrafricajnes Line, Delta Line, Liberia Line, Mid-Africa Line, CMZ Line, and West Wind Africa Line.

d. National government agencies

Federal Maritime Commission  
Office of Tariff  
Washington, D.C.  
U.S.A.

e. Trade associations

Cansulex, Ltd.  
1980-1055 W. Hastings Street  
Vancouver, B.C.  
Canada

International Superphosphate Manufacturers'  
Association, Ltd.  
28 Rue Marbeuf - 75008  
Paris  
France

Six reports prepared by the Logistics Subcommittee of the Raw Materials Committee, ISMA, for its member companies are worth mentioning. They are:

Ocean Trade and Transportation of Fertilizer Raw Materials, September, 1976;

Present Trends in Freight Rates and in Port Handling for Bulk Commodities, December 1979;

List of Tankers Suitable for Transportation of Phosphoric Acid, July 1978;

List of Maritime Terminals for Phosphoric Acid, August 1978;

List of Tankers Suitable for Anhydrous Ammonia  
Transportation, July 1978;

World Maritime Anhydrous Ammonia Terminals,  
June 1977.

C. Inflation Rates

1. Publications--The following publications contain one or more indicators for the annual rates of inflation in different countries.

World Development Indicators

The World Bank, Washington, D.C., U.S.A.  
Annual (June 1978), free.

Lists by country: Average annual percent rate of inflation for 1960-70 and 1970-76. This rate is the implicit GDP deflator which is calculated by dividing for each year of the period in question the value of GDP in current market prices by the value of GDP in constant market prices, both in national currency.

International Financial Statistics

International Monetary Fund, Washington, D.C., U.S.A.  
Quarterly, \$21/year for academic institutions, \$52/year for nonacademic institutions.

Reports by country: Consumer price index, wholesale price index, and cost of living index.

Statistical Yearbook

Department of International, Economic & Social Affairs,  
Statistical Office, United Nations.

Attn: Publishing Service, New York, N.Y., U.S.A.

Annual, \$50/copy (clothbound), \$41/copy (paperbound)

Lists by country: Consumer price index and wholesale price index for 1967 to date (1970 = 100).

2. Computerized Data Services--Currently, only two major commercial information service firms in the United States are known to have on-line data services. These are Data Resources Corporation and Business International Corporation.

a. Data Resources

Type of Service--Data Resources currently maintains one of the largest data banks in the world,

containing data history of consumer price index, wholesale price index, GNP deflator, and other economic and industry data for the United States. This firm maintains its data bank on a Burroughs 5500 time-sharing computer for instant direct access via a computer terminal. The firm provides not only historical data but also projections of U.S. price indices and GNP deflator 5-10 years into the future.

Subscription Cost--An interested user should contact Data Resources Corporation for details.

Address--Data Resources Corporation  
29 Hartwell Avenue  
Lexington, Massachusetts 02173  
U.S.A.

Attn: Ferric W. Taylor

b. Business International

Type of Service--Business International maintains a data bank (BI-DATA) on General Electric time-sharing computer (MARK III®). This data bank contains 150 data types (variable) on 131 countries year by year from 1960 to date. Consumer price index, cost of living index, and wholesale price index are included. Besides data history, the data bank also contains a set of annual forecasts, including consumer price index for 35 key market countries. The data bank can be accessed on line via a computer terminal from accessible cities in the world. For some countries, forecasts are updated quarterly. For others, forecasts are updated semiannually or annually. Most of the data maintained in the data bank are from the International Monetary Fund.

Subscription Cost--Instant direct access to the data bank is offered on an annual subscription basis at \$480/year. In addition, there is a minimum charge of \$40/month for computer usage. Actual computer usage cost varies according to both time connected to the computer and the complexity of the computer programs used to extract desired data. For additional information on costs, interested users should contact On-Line Services, Business International, or the nearest offices of General Electric Information Services Company.

Address--On-Line Services

Business International Corporation  
1 Dag Hammarskjold Plaza  
New York, N.Y. 10017  
U.S.A.

Attn: Lauren C. Lambert

3. Unpublished Sources

International Monetary Fund  
700 19th Street, N.W.  
Washington, D.C. 20431  
U.S.A.

The World Bank  
1818 H Street, N.W.  
Washington, D.C. 20433  
U.S.A.

Concluding Remarks

The information sources presented in this paper are by no means exhaustive. For some types of data, there may be better sources. Accordingly, the decisionmakers of fertilizer supply and marketing strategies need to locate as many other sources as possible and evaluate their usefulness.

If the information sources continue to proliferate, it will become even more difficult for the decisionmakers to follow and digest. The decisionmakers will undoubtedly have to eliminate those sources which are not considered essential. Furthermore, whenever and wherever possible, they should utilize some sort of computer-aided system to help document, update, and reference the sources more effectively. It would definitely be very helpful if some information service organization could serve as a central clearinghouse and develop a comprehensive computer-based system by which fertilizer market-related information sources can be documented and updated according to specific data needs and which the decisionmakers can easily and rapidly access. Development of such a system, however, requires very much time, money, and effort. For the system to be viable, it will require continuous availability of financial and human resources, skills, and dedication of persons involved, the cooperation of information sources, and frequent use of the system by the decisionmakers.

## APPENDIX A

### International Fertilizer Market-Related Publications (Publications of Relative Significance)

1. World Directory of Fertilizer Manufacturers

British Sulphur Corporation, Ltd., London, England.  
Irregular (Fourth Edition, 1977), \$38/copy.

Lists by country: Company, with general description; plant locations; manufacturing facilities; fertilizer products produced; expansions planned; and company structure.

2. World Directory of Fertilizer Products

British Sulphur Corporation, Ltd., London, England.  
Irregular (Fourth edition, 1977), \$18/copy.

Lists: Producers by country, products produced, nutrient content, commercial name, physical form, major international trading organizations; export suppliers of fertilizer intermediates and products; and national purchasing organizations by country.

Products covered: Sulfuric acid, phosphoric acid,  $\text{NH}_3$ , AS, AN, urea, nitrogen solutions, CC, SSP, TSP, MAP, DAP, basic slag, NOP, and NPK.

3. World Fertilizer Atlas

British Sulphur Corporation, Ltd., London, England.  
Irregular (Sixth edition, 1979).

Lists by country: Company, with plant locations; products produced; current plant capacities; projects/expansions; production, imports, exports, and consumption of N,  $\text{P}_2\text{O}_5$ , and  $\text{K}_2\text{O}$ ; principal crops, crop areas, and crop production; key socioeconomic data of the country, 1977/78.

4. Fertilizer International

British Sulphur Corporation, Ltd., London, England.  
Monthly (since 1969), £42/year for the United Kingdom, \$108/year elsewhere.

A topical newspaper. Highlights: Current events on industry, capacity, supply, demand, trade for fertilizers and fertilizer raw materials.

Regular features: Current market and price situations for nitrogen, phosphate, potash, sulfur; graphs of monthly international price trends for  $\text{NH}_3$ , urea, phosphoric acid, AS, TSP, DAP, MOP, and 15-15-15, for the most recent year;

tenders; plant and project news; and recent charter freight rates for fertilizers and fertilizer materials.

5. FERTECON Monthly Report

Fertilizer Economic Studies, Ltd., London, England. Monthly, £130/year.

Highlights: Current market situation on nitrogen, phosphates, potash, compounds, phosphate rock, phosphoric acid, sulfur, and  $\text{NH}_3$ .

Regular features: Current international contract and/or spot prices for dry and liquid sulfur, DAP, TSP, phosphoric acid, phosphate rock (70%-72% BPL), MOP, SOP,  $\text{NH}_3$ , urea, AS, and 15-15-15.

6. Green Markets

McGraw-Hill, Inc., Washington, D.C., U.S.A. (Circulation Department). Weekly (since 1977); \$270/year for the United States, Canada, and Mexico; \$310/year elsewhere.

Highlights: United States and international fertilizer market and industry news.

Regular features: Current U.S. domestic and international spot prices for fertilizers and fertilizer raw materials, including  $\text{NH}_3$ , AS, urea, phosphate rock (68% and 75% BPL), TSP, DAP, and phosphoric acid; granular, coarse, and standard MOP; SOP; dry bulk and liquid sulfur; U.S. import and export prices for fertilizers and fertilizer raw materials, 2 months old. Charter freight rates are reported irregularly.

7. The Fertilizer Price Handbook

McGraw Hill, Inc., Washington, D.C., U.S.A., (Circulation Department). Annual (since 1979), \$117 for the United States, \$127 elsewhere.

Lists: Weekly prices for 1979/80 and monthly prices for prior years beginning with January 1977. Regionalized listings for key U.S. and international markets.

Materials included:  $\text{NH}_3$ , urea, AN, AS, nitrogen solutions, TSP, MAP, DAP, phosphoric acid, phosphate rock, MOP, SOP; 1979/80 for sulfur only.

8. Nitrogen

British Sulphur Corporation, Ltd., London, England. Bimonthly (since 1962), £90/year for the United Kingdom, \$210/year for Europe, \$240/year elsewhere.

Highlights: World nitrogen fertilizer market trends, export prices, plant and project news, feedstock news, shipping and transportation, country situation, special topics on world supply and technology company news.

Regular feature: Charter freight rates for nitrogen fertilizers.

9. Phosphorus and Potassium

British Sulphur Corporation, Ltd., London, England. Bimonthly (since 1962), £90/year for the United Kingdom, \$210/year for Europe, \$240/year elsewhere.

Highlights: World phosphate and potash fertilizer market trends, export prices, plant and project news, shipping and transportation, country situation, special topics on technology and world supply, company news.

Regular feature: Charter freight rates for phosphates and potash.

10. Sulphur

British Sulphur Corporation, Ltd., London, England. Bimonthly (since 1962), £90/year for the United Kingdom, \$210/year for Europe, \$240/year elsewhere.

Highlights: World sulfur market trends, export prices, plant and project news, shipping and transportation, special topics on sulfur and sulfuric acid, company news.

Regular features: Charter freight rates for dry bulk sulfur.

11. Fertilizer Edition, International Trade and Mining News

International Trade and Mining News, Tokyo, Japan. Daily except for weekends, \$683/year for outside Japan.

Highlights: Domestic and international fertilizer trade, shipping and supply news. Reports charter freight fixtures regularly but mostly for agricultural commodities.

12. European Chemical News

IPC Industrial Press, Ltd., Dorset House, London, England. Weekly, £30/year for the United Kingdom, \$91/year for the United States, £35/year elsewhere.

Highlights: Chemical industry including fertilizer industry, prices, and new capacity project news.

Regularly reports: Current European contract and spot prices and U.S. prices for NH<sub>3</sub> and naphtha.

13. Directory of Fertilizer Plants in the United States

National Fertilizer Development Center, Tennessee Valley Authority, Muscle Shoals, Alabama, U.S.A. Irregular (Third edition, 1980), \$5/copy.

A cooperative project with the Association of American Plant Food Control officials; the most comprehensive listing of the retail segment of the U.S. fertilizer industry.

Lists: State fertilizer control officials, fertilizer industry associations, retail operations, and fertilizer plants (bulk blenders, fluid mixers) by state.

14. Fertilizer Reference Manual

The Fertilizer Institute, Washington, D.C., U.S.A. Irregular (Volume 2, June 1980), \$10/copy anywhere.

Reports: U.S. production capacity (1970-81), operating rates (1971-79), and production (1965-79) by fertilizer product; U.S. production of sulfur and sulfur-containing raw materials; product inventory (1970-79); U.S. fertilizer imports and exports for fertilizers and fertilizer raw materials (1970-79); duties on fertilizer and fertilizer materials (as of March 1979).

15. Current Situation and Outlook

Commission on Fertilizers, Food and Agriculture Organization, United Nations, Rome, Italy. Annual (May 1980), free.

A background document by the FAO/UNIDO/World Bank working group on fertilizers for the annual commission meeting.

Contains: Analysis of world production, consumption, and trade of nitrogen, phosphate, and potash; international prices of main fertilizer materials; short- and long-term outlook for supply/demand balance.

Regular features: Graphs of monthly export prices of urea, TSP, DAP, MOP, 1965 to date; consumption, production of N, P<sub>2</sub>O<sub>5</sub>, K<sub>2</sub>O, and growth rates for developed, developing, centrally planned economies and world total; imports and exports by country grouping and world total for selected years; production and consumption of major countries for selected years; nitrogen, phosphate, and potash capacity and supply/demand balance by world region for current and future years (nutrient tons).

16. Current World Fertilizer Situation and Outlook, 1977/78-1983/84, (as of October 1979)  
FAO/UNIDO/World Bank Working Group on Fertilizers, Food and Agriculture Organization of the United Nations, Rome, Italy. Special (1980), free.  
Consumption, production, capacity, supply/demand balance by country and country grouping (tons of N, P<sub>2</sub>O<sub>5</sub>, K<sub>2</sub>O).
17. FAO Fertilizer Yearbook  
Food and Agriculture Organization, Rome, Italy. Annual (1978), \$15.25/copy.  
Reports: Annual production, consumption, exports, imports of nitrogen, phosphate, and potash fertilizers by country and by economic class of the countries; fertilizer consumption per hectare of agricultural area and per capita by country by year; contributions of economic classes and regions to world production, consumption, and trade; estimated production of technical-grade potash; potash re-exports in the form of complex fertilizers; fertilizer consumption ratio, production, imports, and exports of phosphate rock by country; new production capacity and trade for ammonia and wet-process phosphoric acid by country and region; farmers by country; fertilizer prices paid by farmers and fertilizer subsidies received by farmers (nutrient tons) by country by year; exchange rate by country by year.
18. FAO Monthly Bulletin of Statistics  
Food and Agriculture Organization of the United Nations, Rome, Italy, Via delle Terme di Caracalla. Monthly, \$8/year anywhere.  
Special features: Monthly prices paid by farmers, by crop, by country.  
Fertilizers: Annual production, trade, and consumption of nitrogen, phosphate, and potash by country (nutrient tons).
19. World Fertilizer Situation and Outlook  
International Fertilizer Development Center, Muscle Shoals, Alabama, U.S.A. Irregular (March 1979), free.  
A cooperative project between IFDC and TVA.  
Analysis: World NH<sub>3</sub> capacity, world nitrogen fertilizer production and consumption, world and regional nitrogen supply/demand balances; world phosphate production and consumption, world and regional phosphate supply/demand balances;

world potash capacity, production, and consumption, and world and regional potash supply/demand balances.

Contains: Historical data on capacity, production, and consumption of N, P<sub>2</sub>O<sub>5</sub>, and K<sub>2</sub>O by world region, 1967-77; export prices of DAP, MOP, and urea, 1968-78; U.S. indices of farm-level fertilizer and crop prices, 1965-78 (graphs).

20. The World Fertilizer Sector--At A Crossroads

International Fertilizer Development Center, Muscle Shoals, Alabama, U.S.A. Special (April 1980), free.

A paper presented by P. J. Stangel at the Symposium on Food Situation in Asia and the Pacific Region, April 24-29, 1980, at the Asian and Pacific Council, Food and Fertilizer Technology Center, Taipei, Taiwan. An analysis of some basic issues facing the world fertilizer sector in the 1980s, ownership, plant investment costs, raw material costs, supply, demand, nitrogen outlook (NH<sub>3</sub> capacity and feedstock, supply/demand balance, trade price), phosphate outlook (phosphate rock, phosphoric acid capacity, production and consumption, trade, price), and potash outlook.

21. World Fertilizer Review, 1979/80

The World Bank, Washington, D.C., U.S.A. Special (December 1979).

A paper presented by W. F. Sheldrick and H. Stier at a meeting of FAI in New Delhi.

Analysis: World nitrogen capacity, supply, consumption/demand (agricultural and industrial uses), and supply/demand balances (1979-86), energy cost impact on nitrogen supply/demand, and changing trade pattern for nitrogen fertilizers; world phosphate rock supply/demand, phosphate capacity, supply, consumption/demand, technical phosphate and phosphate fertilizer consumption/demand, phosphate fertilizer supply/demand balances (1974-85), and changing phosphate fertilizer trade patterns; world potash capacity, supply, consumption, and supply/demand balances (1977-86); fertilizer export prices (historical and forecasts).

22. 1980 Fertilizer Situation

U.S. Department of Agriculture, Economics, Statistics, and Cooperatives Service, National Economics Division, Washington, D. C., U.S.A. Annual (December 1979), free.

U.S. fertilizer outlook for 1979/80; U.S. fertilizer inventories, production, prices, and use, 1978/79; fertilizer use on crops,

1978/79; U.S. import-export review and outlook; the U.S. Agency for International Development (USAID) fertilizer program; world fertilizer review and prospects; world fertilizer supply/demand forecasts to 1983/84; international spot prices for principal fertilizers and raw materials, 1978/79.

23. Process Economics International

Chemecon Publishing, Ltd., London, England. Quarterly, £48/year for the United Kingdom, £56/year elsewhere.

International price of naphtha,  $\text{NH}_3$ , natural gas, nitric acid, crude oil, phosphate rock, phosphoric acid, sulfur, and sulfuric acid.

24. Chemical Marketing Reporter

Schnell Publishing Co., New York, New York U.S.A. Weekly (since 1871), \$28/year.

Highlights: Domestic and international chemicals and fertilizer market and industry news.

Regular features: Prices of chemicals including fertilizers and fertilizer materials.

25. Chemical Economics Handbook

Stanford Research Institute, Menlo Park, California, U.S.A. Periodically updated. \$2,500/year, loose leaf. Available only to subscribers.

Anhydrous Ammonia--(last update, April 1977). Production and capacity by country; international prices; U.S. production by feedstock and process; U.S. export-import.

Urea--(last update, March 1976) Production, capacity, and consumption by country and region; U.S. exports-imports by country.

Ammonium nitrate--(last update, January 1976). Capacity, production, and consumption by country.

Ammonium sulfate--(last update, December 1976). Production and capacity by country and region.

Triple superphosphate--(last update, October 1977). Capacity and production by country and region; U.S. exports-imports by country.

MAP-DAP--(last update, January 1978). Capacity and production by country; U.S. exports-imports by country.

Calcium Phosphate--(last update, October 1977). Capacity and production by country.

Potassium Chloride--(last update, August 1976). Capacity and production by country; U.S. exports-imports; exports by country.

Potassium sulfate--(last update, November 1976). Capacity and production by country.

Phosphoric acid--(last update, August 1978). World production by source; capacity by country (lists companies and locations); imports by major country; U.S. exports by country of destination.

Natural gas--(last update, December 1978). World reserves by region and by country in billion cubic feet and percent of world trade; world production in billion cubic feet.

Phosphate rock--(last update, March 1980). Phosphate fertilizer demand by region; capacity and production by country; export-import by region and by country with country of destination.

Sulfur--(last update, December 1979). Production by country: capacity by producer, location, date on stream, and process. Canadian producers of sulfur from sources other than natural gas or petroleum; Canadian production, sales, imports, exports, year-end stocks, apparent consumption and unit sales value; list of Mexican producers and capacities; list of Japanese producers of recovered sulfur and capacities; production from ores; imports, exports, and domestic demand; and consumption by major use.

26. Potash Sales by North American Producers

Potash and Phosphate Institute, Atlanta, Georgia, U.S.A. Updated monthly, free.

Annual and quarterly domestic and export sales of standard, coarse, and granular MOP and SOP for all purposes by U.S. and Canadian producers.

27. U.S. Potash Imports by State for Muriate, Sulfate, and Total Potash

Potash and Phosphate Institute, Atlanta, Georgia, U.S.A. Updated monthly, free.

Annual and quarterly potash import by country of origin in product and nutrient tons.

28. Export Sales of Standard, Coarse, Granular, and Soluble Muriate and Sulfates of North American Producers  
Potash and Phosphate Institute, Atlanta, Georgia, U.S.A.  
Updated monthly, free.  
Annual export sale for agricultural purposes by buying country.
29. Potash Production, Inventory, Disappearance of Sales by North American Producers  
Potash and Phosphate Institute, Atlanta, Georgia, U.S.A.  
Updated monthly, free.  
Annual and quarterly data by U.S. and Canadian producers by grade.
30. Monthly Newsletter  
The British Sulphur Corporation, Ltd., London, England.  
Monthly, £290/year.  
A monthly summary of developments in the fertilizer marketplace with price news and informed comments for all the main fertilizer products, intermediates, and raw materials.  
Products covered: Nitrogen, phosphate, potash, compounds,  $\text{NH}_3$ , phosphoric acid, sulfur, phosphate rock.
31. Quarterly Reports  
The British Sulphur Corporation, Ltd., London, England.  
Quarterly, £275/year for any one of the products (phosphate rock, sulfur, potash,  $\text{NH}_3$ , phosphoric acid, sulfuric acid, urea, phosphate fertilizers).  
Reviews: Global supply and demand; salient developments in the context of world production, consumption, and trade; forecasts of future supply/demand and prices, updated once or twice a year.  
Presents: Regional forecasts of supply and demand and the effects of recent events (new capacity closures, improved utilization rates, factors influencing consumption).
32. The Sulfur Industry to 1990--A Global Study of Supply, Demand, and Price Trends  
Fertilizer Economic Studies, Ltd., London, England. Irregular, £2,900/copy.

**Examines:** The factors and interrelationships affecting global supply, demand, and prices over the next 10 years.

**Includes:** Forecasts and analysis of all forms of sulfur supply by type, demand by end-use sector, global and regional sulfur supply; supply/demand balances; the effects of supply/demand balance on prices; projected price trends in the major market areas; the impact of price changes on supply and demand.

33. The Sulphur Industry in East Europe and the U.S.S.R.

Fertilizer Economic Studies, Ltd., London, England. Irregular, £1,300/copy.

**Appraises:** Current, future, and historical production; consumption and trade of sulfur and sulfuric acid.

## APPENDIX B

### International Fertilizer Market-Related Publications (Other Pertinent Publications)

1. World Survey of Potash Resources  
The British Sulphur Corporation, Ltd., 1979, \$230/copy.
2. World Survey of Phosphate Deposits  
The British Sulphur Corporation, Ltd., 1980, \$230/copy.
3. World Sulphur and Sulphuric Acid Atlas  
The British Sulphur Corporation, Ltd., 1976, \$38/copy.
4. Ammonium Phosphates--Outline of the Industry  
The British Sulphur Corporation, Ltd., 1978, \$180/copy.
5. World Survey of Sulphur Resources  
The British Sulphur Corporation, Ltd., 1974, \$192/copy.
6. Urea--World Analysis and Prospects, 1970-80  
The British Sulphur Corporation, Ltd., 1975, \$175/copy.
7. Ammonium Nitrate--Supply/Demand, 1957-77  
The British Sulphur Corporation, Ltd., 1970.
8. Fertilizer Manual  
International Fertilizer Development Center, 1979, \$15/copy.
9. Seaborne Trade in Phosphate Rock and Phosphoric Acid Up to 1980  
Westinform Shipping Report No. 306, Westinform Service (London), January 1975.
10. Phosphate Rock: Trends in Supply and Demand in Relation to World Fertilizer Requirements  
International Superphosphate Manufacturers' Association, Ltd., (a paper by K. C. Windridge), 1971.
11. Long-Term Forecast for World Nitrogenous Fertilizer Demand and Supply  
UNICO International Corporation (Tokyo), September 1977, \$185/copy.

12. The Future Ammonia Business, A Global Analysis to 1990  
Chem Systems International, Ltd. (London), July 1978.
13. Chemical Age  
The International News Weekly, Morgan Grampian House  
(London), £34 for Europe, \$76 for the United States.
14. International Petroleum Encyclopedia  
PennWell Publishing Company (Tulsa, Oklahoma), 1980, \$45/  
copy.
15. Minerals Yearbook  
Vol. II and Vol. III, U.S. Bureau of Mines, 1975.
16. Mineral Industry Surveys  
U.S. Bureau of Mines (monthly).
17. Industrial Minerals  
Metal Bulletin, Ltd. (London), \$90/year (monthly).
18. Industrial Minerals and Rocks  
American Institute of Mining, Metallurgical, and Petroleum  
Engineers (New York), 1975, \$22.50/copy.
19. Oil and Gas Journal  
Petroleum Publishing Company (Tulsa, Oklahoma), \$21/year  
(weekly).
20. World Energy Outlook  
The Exxon Corporation, 1979.
21. Oil--The Present Situation and Future Prospects  
Organization for Economic Cooperation and Development  
(OECD) Publication Center (Washington, D.C.), 1973.
22. Reserves of Crude Oil, Gas, Natural Gas Liquids, and  
Sulphur  
Province of Alberta as of December 31, 1975, Energy  
Resources Conservation Board (Alberta, Canada), 1976,  
\$35/copy.
23. Crude Petroleum and Natural Gas Production  
Department of Statistics, Canada (Ottawa, Ontario), \$3.30/  
copy (monthly).

24. Reserves of Crude Oil, Natural Gas Liquids and Natural Gas in the United States and Canada and U.S. Productive Capacity as of December 31, 1974  
American Gas Association, (Arlington, Virginia) \$5/copy.
25. Platt's Oilgram Price Report  
Platt's Oilgram Price Service, McGraw-Hill, Inc., \$607/year for the United States, and \$707/year elsewhere (daily).
26. Milling Feed and Fertilizer: Fertilizers and Agro-Chemicals  
Turret Press, Ltd. (London), \$60 for the United States, £25.40 for the United Kingdom/Irish, £27.60 for others.
27. Chemical and Engineering News  
American Chemical Society (Washington), \$19/year (weekly).
28. Fertilizer Statistics  
The Fertiliser Association of India (New Delhi), Rs 35/copy (annual).
29. Fertilizer News  
The Fertiliser Association of India, Rs 4/copy for India, Rs 45/year elsewhere (monthly).
30. Situation 79  
National Fertilizer Development Center, Tennessee Valley Authority, TVA/TFI Annual Fertilizer Conference. Proceedings, St. Louis, Missouri, August 23-24, 1979.
31. Agro-Chemicals, (Fertilizers and Agro-Pesticides)  
News in Brief, Agricultural Requisites Scheme for Asia and the Pacific/Fertilizer Advisory, Development, and Information Network for Asia and the Pacific (ARSAP/FADINAP), Agriculture Division, Economic and Social Commission for Asia and the Pacific (monthly).
32. Phosphate Rock Capacities and Reserves  
Commission on Fertilizers, Food and Agriculture Organization, September 1979.
33. "The World Raw Materials Outlook for Nitrogen" by B. Mostafi, Fertilizer News, the Fertiliser Association of India, July 1977.
34. Ammonia Production Cost Trends, 1977-1984  
Stanford Research Institute (Menlo Park, California, U.S.A.), July 1978, \$5,500/copy.

35. World Nitrogen  
Stanford Research Institute, 1977, \$3,000/copy. For 1980 update, due out in December 1980, \$6,750 for new clients and \$5,000 for old clients.
36. Fertilizer Trends, 1979  
National Fertilizer Development Center, Tennessee Valley Authority, free (annual).
37. 1978 Fertilizer Summary Data  
National Fertilizer Development Center, Tennessee Valley Authority (every 2 years, free).
38. Fertilizer Progress  
The Fertilizer Institute (bimonthly, \$15/year for the United States, Canada, and Mexico, \$35/year elsewhere).
39. U.S. Exports, Commodity by Country  
U.S. Department of Commerce, Bureau of the Census (monthly, \$80/year for the United States, plus \$20 for foreign mailing).
40. U.S. General Imports, Schedule A - Commodity by Country  
U.S. Department of Commerce, Bureau of the Census (monthly, \$63/year for the United States, plus \$15.75 for foreign mailing).
41. Current Industrial Reports - Inorganic Chemicals  
U.S. Department of Commerce, Bureau of the Census (monthly, \$4/year).
42. Current Industrial Reports - Inorganic Fertilizer Materials and Related Products  
U.S. Department of Commerce, Bureau of the Census (monthly, \$3.25/year).
43. Fertilizer Marketing News  
Fertiliser Association of India (monthly, Rs 1.50/copy or Rs 15/year).
44. Energy Data Reports  
U.S. Department of Energy, Energy Information Administration.  
Report A - Liquefied Petroleum (annual).

Report B - Natural and Synthetic Gas (monthly).  
Report C - U.S. Imports and Exports of Natural Gas (annual).  
Report D - World Natural Gas (annual).  
Report E - Crude Petroleum, Petroleum Products, Natural Gas Liquids (annual).  
Report F - Petroleum Refineries in the United States and U.S. territories (annual).  
Report G - Sales of Fuel Oil and Kerosene (annual)  
Contact publisher for subscription costs.

45. Fertilizer Abstracts

Tennessee Valley Authority, (monthly, \$30 for the United States and Canada and \$45 elsewhere). Abstracts of articles on fertilizer analysis, technology, marketing, and use.

46. Commercial Fertilizer

U.S. Department of Agriculture, (annual, free). Details of fertilizer consumption in the United States by products and states.

47. Fertilizer Supply

U.S. Department of Agriculture, (annual, free). Estimated annual production, export, and import of major basic fertilizer materials.

48. Other National Fertilizer Consumption/Production Reports. Most countries with substantial fertilizer use issue annual consumption and/or production reports either by the government or by industry associations. Examples:

Fertiliser Statistics (annual)

The Fertiliser Manufacturers Association, consumption report for the United Kingdom.

Fertiliser Statistics (annual)

The Fertiliser Association of India, details of production and consumption in India.