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# PREFACE

Fertilizer is a key input for increasing food production in developing countries A well designed fertilizer marketing program is required to get the right combination of inputs and outputs Regardless of the stage of market development in a country, new ideas are always useful This has been the principal objective in selecting the abstracts for this publication to record the new ideas—regardless of their source—so that others might study them and benefit These ideas were originally published in a large number of journals and special publications issued all over the world Specialists in TVA's National Fertilizer Development Center have been reviewing and abstracting this literature for many years Since January 1968 these abstracts have been published in *Fertilizer Abstracts,* a monthly journal available from TVA on a subscription basis All abstracts in this special collection have appeared in *Fertilizer Abstracts*

A broad definition of fertilizer marketing was used in preparing this publication for use in a large number of countries—a definition that encompassed almost everything between the preliminary survey of a potential market and the staid statistics that are published several years after an event has occurred All the components thought essential for a marketing program were listed and these components served as our guide in selecting the abstracts for this publication The list of components is printed as the Table of Contents

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# MARKET ANALYSIS

## TECHNIQUES

1

**Outline for Fertilizer Market Analysis**

Arthur M Smith

*Com Fertilizer 115* (4), 30, 32 (October 1967)

A twelve point outline of a step by step market analysis is presented in the form of questions Suggestions are given as to where and how information can be obtained to answer the questions Few suggestions, however, are given on how to interpret the information once it has been summarized

2

**Uses of Linear Programming Techniques in the Fertilizer Industry**

J R Douglas (Iowa State Univ , Ames)

*Diss Abstr 28* (11), 4340A (May 1968) *Univ Microfilms* (Ann Arbor, Mich ), Order No 68 5947

The objectives of this study were (1) to analyze the potential capacities of the fertilizer industry to produce NPK fertilizer with relation to expected future needs, (2) to analyze earlier applications of linear programming for determining least cost mixes and to investigate the practical applications which might be made thereof, (3) to prepare a linear programming model of a complex fertilizer production facility and to analyze the practical use of such a model, and (4) to simulate the entire fertilizer production and distribution facilities of an emerging nation—to develop a modified spatial equilibrium model which can be used to reduce the cost of production and distribution of the required amounts of fertilizers The raw material input factors to produce finished fertilizer products are amply available Technology for producing finished products is available A major problem remaining is to determine the most economical total system to produce and distribute this fertilizer to farmers The production operations of a highly complex fertilizer facility have been simulated mathematically in one linear programming matrix Into this matrix have been incorporated the upper and lower demand requirements for each of the end products Also, the upper and lower limits of production capacities (supply limitations) have been incor porated in all cases wherein these limitations present possible bottlenecks Analysis of the results indicates the most profit able product mix for the existing plant configuration A modified spatial equilibrium model has been completed for the entire fertilizer production and distribution facilities for one emerging nation—Turkey The input output coefficients for this model are those which were collected while a 5 yr fertilizer plan for Turkey was prepared Analysis of the results of the optimal solution to this problem is useful in deter mining the most economical production and distribution system for that nation at a future time The basic matrix, once it is completed, can be used as a starting point in analyzing additional facilities of types of fertilizers for future develop ment of the nation's industry Alternative plant locations are analyzed to determine relative economic costs The basic model with minor variations might be readily adapted to other nations

3

**Factors Inhibiting the Indigenous Growth of the Fertilizer Industry in Developing Countries**

*Report of the Ad Hoc Group of Experts from Fertilizer Deficit Countries, UNIDO Headquarters, Vienna 6 10 May 1968 New York, United Nations,* 7, 120 pp (1969)

*Trop Abs 25*, 1780

This booklet contains meeting papers of consultants and other experts from fertilizer deficit countries including Brazil, S India, Mexico, the Sudan Rep , Egypt, and from fertilizer surplus countries including Austria, W Germany, and the United Kingdom Factors affecting the growth of the fertilizer industry in developing countries are discussed The natural interdependence of the fertilizer industries and existing chemical industries as a whole, as found in developed countries, and more specifically interrelationships of plant capacity, production economy, supply of raw material, level of technology, management practices, stimulation of demand, and distribution facilities render the establishment of a highly developed fertilizer industry very difficult in developing countries at the present level of the sociological and economical infrastructure of the economy Some 25 recommendations are made for the establishment of local fertilizer industries, some of these are capital supply, raw materials, infrastructure, personnel aspects, marketing, and regional co operation

4

**A Look at the Record Snows Need for Market Analysis and Research**

Arthur M Smith

*Com Fertilizer 117* (2) 16, 18 20 (Aug 1968)

Market analysis and market research, by many of the companies who have invested since 1960 in large scale fertil izer production facilities, have been inadequate in scope and depth Statistics on a regional basis is basic information for market analysis and research, for example by states in the U S Pounds of crop nutrients per harvested crop acre multiplied by number of harvested acres gives tonnage used Ranking states for various data bits, such as total nutrient per acre, lb of N, $P_2O_5$, and $K_2O$/acre, tons of nutrients per sq mile, and percentage of total area in harvested crops provides varying ideas of where fertilizers are used and where potential sales might be Rhode Island ranks second in the U S in lb of N $P_2O_5$ $K_2O$ applied per harvested acre, but, it ranks 48th in total number of harvested acres Less than 5000 tons of plant nutrients were used in Rhode Island in 1966 67 Iowa which ranks 23rd in lb/acre and first in number of harvested acres, used over a million tons of nutrients in 1966 67

5

**Marketing of Fertilisers A Real Challenge**

B C Dalal (Gujarat State Fertilizers Co Ltd , Baroda, India)

*Fertiliser News 13* (12), 78 81 (Dec 1968)

Each fertilizer company needs to analyze the impact of the present glut in the fertilizer market and evolve a marketing organization and philosophy of its own Several of them, caught totally unaware by the present oversupply, have had to face bitter hard selling experiences The need for a marketing strategy is underscored for each company capable of creating a brand consciousness among farmers through a combination of advertising, promotion, and personal selling efforts Consumer service is another important aspect which should form part of any forward looking fertilizer sales program The present inadequacy of communication services calls for both strengthening and improving the existing media like radio, television, etc , attempting an increase in the general educational level of the farmers Considerations of marketing research, logistics, incentives for distribution at the wholesale and retail levels, development of the infrastructure like transport and storage, and provision of credit do play their part in contributing to a successful marketing strategy

6
**Market Development for Fertilisers.**
M Subramanian (Dept Agr , New Delhi, India)
*Seminar on Fertiliser Marketing, Proc.*, Fertiliser Assoc India (Held New Delhi, India, Dec 6 8, 1968), pp 127 9 (Apr 1969)
Fertilizer market development is not possible without a base of trained agronomists to provide an adequate service in the field The long term strategy further involves a continuous reappraisal of the demand situation by qualified economists Supporting data for the marketing department will need to be obtained through field investigators attached to the department

7
**The Foundations for Effective Market Development and Marketing Under Indian Conditions**
J Z Hoffman (Coromandel Fertilisers Ltd , Hyderabad, India)
*Seminar on Fertiliser Marketing, Proc* , Fert Ass India (Held New Delhi, Dec 6 8, 1968), pp 161 5 (Apr 1969)
Market development and continued marketing expansion for fertilizers in India follow conventional patterns well established in developed countries Yet some striking differences and difficulties present themselves as a result of conditions more particular to India India has diverse, but in many ways a less advanced agriculture than other nations The vast number of individual customers operating on a subsistence basis requires special consideration for any marketing organization The focus of all market development must be simultaneously on overall market expansion for fertilizers and specific brand name product promotion and sale In addition any major growth in fertilizer sales must be coordinated with other rapidly advancing crop growing techniques Particularly important is a unified approach to expanded crop production As a critical and relatively costly input, fertilizer is a key component and fertilizer marketing organizations should assume a leadership role The foundation for developing fertilizer markets in India is the understanding of the cultivator in each specific area This must be coupled with highly skilled sales efforts and the establishment of a reliable, motivated retail distribution system A number of promotional schemes should supplement these building blocks It can be said, however, that marketing fertilizer on a large scale in India is still in its early stages and many of the most potentially successful schemes have yet to be developed

8
**Hazards in Market Research and Intelligence**
R G Mueller and J R Douglas (Tennessee Valley Authority, Muscle Shoals, Ala )
*Seminar on Fertilizer Marketing Proc Fert Assoc India (Held New Delhi, India Dec 6 8, 1968)* pp 166 80 (April 1969)
The functions of market research are defined in terms of analysis and projections of supply and demand Several faults in the analysis are outlined and illustrated Major faults of demand are failure to consider changing crop fertilizer/price ratios, short run past performances, and assuming that decreased fertilizer prices would lead automatically to increased sales Major faults of analysis of supply are failure to analyze all production and distribution costs based upon 100% operating rates of the production facility, failure to consider the continued availability of all input factors, and over-estimating or under-estimating actual production of plants in relation to rated capacities

9
**Past Experience is Industry's Big Handicap in Developing Marketing**
*Com Fertilizer 118* (2) 13 14 (Feb 1969)
Present methods used by industry in marketing fertilizers are discussed It is suggested that new methods are badly needed, especially since new and improved production capacity is now available The policy of concentrating full attention on production and permitting agricultural extension services to promote use of the products should be changed More thought should be given to the needs of the buyer, and less emphasis placed on benefits through sales volume

10
**Tomorrow in Fertilizer**
R L Wehunt (Tennessee Corp , Atlanta, Ga )
*Better Crops Plant Food 53* (1), 2 7 (1969)
The old fertilizer marketing concept used production as the hub, selling and promotion as the means, and profit through sales volume as the end Marketing innovations came unsolicited, unplanned, and often as accidental by products of product development rather than as a result of systematic and careful research The fertilizer industry cannot continue as a passive response system It must be market oriented with the farmer at the hub, integrated marketing as the means, and profit still as the end but through customer satisfaction The future thus depends on end use technologists to conduct the knowledge phase of marketing

11
**The Basics of Market Research and Analysis in the Fertilizer Industry**
G C Sweeney (Arthur D Little, Inc , Cambridge, Mass )
*Fertilizer Marketing in a Changing Agriculture* (Held Oct 1 3, 1969, Memphis, Tenn ) Tennessee Valley Authority, Muscle Shoals, Alabama, pp 16 21
The essential points of information in market research are consumption statistics, marketing practices, prices, and profitability Historical consumption presents few difficulties but projected consumption does Short term estimates are subject to the uncertainties of weather For long term projections, use also is made of population trends, changes in per capita demand, acreage considerations, and other non fertilizer factors Plotting annual shifts in fertilizer response curves also appears to be a useful technique Price forecasting has few rules Examination of the future cost of manufacture can serve as an indication of what the price should be and can also give some indication of profitability Illogical management policies, apparently common in the fertilizer industry, are being studied in some simulation models to test their effect on prices

12
**Aids in Market Analysis Fertilizer Use Reports**
J Mahan (U S Dept Agr , Washington, D C )
*Fertilizer Marketing in a Changing Agriculture* (Held Oct 1 3, 1969, Memphis, Tenn ) Tennessee Valley Authority, Muscle Shoals, Alabama, pp 25 9
Federal and State governments regularly publish information about the size and growth of the fertilizer market The 31 major sources of data are classified into seven categories consumption, production of primary materials, foreign trade, prices, mineral reserves, production capacities, and miscellaneous Improvements in data are expected especially when Uniform Fertilizer Tonnage Reporting is in full operation

13
**Aids in Market Analysis Field Surveys**
R H Farrow (Kaiser Agricultural Chemicals, Savannah, Ga)
*Fertilizer Marketing in a Changing Agriculture* (Held Oct 1 3, 1969, Memphis, Tenn) Tennessee Valley Authority, Muscle Shoals, Alabama, pp 29 30
Field surveys can be conducted by company employees, outside firms, or a combination Regardless of method, market research must be continuous It should provide information about the wants and needs of the customer and what he is willing to pay, about the marketing programs and products of the competition, and about the company's own marketing programs, products, and personnel Management must then listen to the customer, rather than the production manager, when planning its marketing program

14
**Aids in Market Analysis World Fertilizer Market Facts**
L Hanover (W R Grace & Co, New York, N Y)
*Fertilizer Marketing in a Changing Agriculture* (Held Oct 1 3, 1969, Memphis, Tenn) Tennessee Valley Authority, Muscle Shoals, Alabama, pp 31 3
The two most important primary sources of world fertilizer statistics are governments and trade organizations The most effective sources, however, are secondary publications such as FAO's "Fertilizers Annual Review", the "Minerals Year Book" of the U S Department of the Interior, publications of the Organization for Economic Cooperation and Development (OECD), and quarterly summaries in *European Chemical News* Current reports of the world fertilizer market are available through the trade journals, such as those of the British Sulphur Corporation Long range projections are made by TVA, The Sulphur Institute, OECD, the United Nations, and others In discussing the problem of studying the fertilizer market of a developing country, credit is given major emphasis Selling expense, economic environment of the country, and end use of the crops are other major considerations

15
**The Role of Market Analysis in Management Decisions**
H S Ten Eyck (Ten Eyck Assoc, Inc, Everglades City, Fla)
*Fertilizer Marketing in a Changing Agriculture* (Held Oct 1 3, 1969, Memphis, Tenn) Tennessee Valley Authority, Muscle Shoals, Alabama, pp 33 7
Market analysis should receive more money and attention than in the past and management should be more aware of the importance and pitfalls in market feasibility studies A complete analysis must now consider the entire world, not just the empire building desires of an individual or small group In addition to sales, the analysis must consider possible technical advances that could lead to economic obsolescence of a product Much more attention must be given to infrastructure and the possible changes in such Small errors in estimating the cost of a plant and its financing do not seriously affect a project But, when the basic reasoning for building a plant is 50% in error, as some recent market analyses have been, the industry will suffer, as it now is

16
**Building a Healthy Industry**
E M Wheeler (National Plant Food Inst, Washington, D C)
*Fertilizer Marketing in a Changing Agriculture* (Held Oct 1 3, 1969, Memphis, Tenn) Tennessee Valley Authority, Muscle Shoals, Alabama, pp 110 12
A healthy industry is a mature industry and the fertilizer industry is maturing This is shown by several recent developments One example of maturing is the monthly NPFI Fertilizer Index which provides current statistics on production, disappearance, and inventories of the major fertilizer products For the first time, individual companies are voluntarily disclosing these data for use in management planning throughout the industry The statistics are a shock to some, a vindication to others, and an eye-opener to all It is hoped to extend these statistics to include financial and transportation data Better uniformity in state monthly reports is another objective, to make these reports suitable for computer processing Eleven states have already adopted the American Fertilizer Control Officials' approved reporting system which provides monthly information on fertilizer consumption Another example of maturity is that the industry is not assuming a head in the sand position on environmental pollution We want facts not supposition And the industry is searching for the facts A healthy industry is one which thinks not only of its own problems but those of others as well

17
**Alternative Estimates of Fertiliser Requirements Based on Econometric Models**
N C Ahuja and Sharwan Kumar (Planning Commission, New Delhi, India)
*Fert News 14* (12), 105 8 (Dec 1969)
The economic analysis of the behavior of variables considered in the present study reveals that econometric models can be used for estimating the fertilizer requirements provided the basic data is of the right type, reliable, and accurate Perfection of the tools of economic analysis is the primary task of the economic analyst and the econometrician Though endeavor to perfect tools of economic analysis is going on, further probes into the realm of statistics to improve the content and quality of data are still needed

18
**How to Use Market Planning for Greater Profits**
A R Haerr (Alvin R Haerr Co, Peoria, Ill)
*Fert Solution 14* (2), 52 61 (Mar Apr 1970)
A marketing plan should establish a goal to increase business operations to a point of predetermined net profit The following steps are recommended in establishing a marketing plan (1) establish the company objectives and goals, (2) study the total market situation, (3) develop a management planning section, (4) make a total internal audit of your present situation, (5) develop an advertising and sales promotion section, (6) use sales power to achieve your objectives, and (7) establish a system of simple controls to measure effectiveness

19
**The Demand for Fertilizer, 1949-64 An Analysis of Coefficients from Periodic Cross Sections**
G C Rausser and T F Moriak
*Agr Econ Res 22* (2), 45 56 (Apr 1970)
Changes in fertilizer demand over the time period 1949 64 were measured by both a static and a dynamic economic approach Within each discipline, random and non random models were developed and tested Cross sections of use data were made on a state/regional basis for 1949, 1954, 1959, and 1964 Demand was related to the price of fertilizer compared to the value of crops produced, price of fertilizer compared to cash wages paid to hired farm workers, and price of fertilizer compared to cash rent paid for agricultural land Changes in

demand were not affected by the method used to determine the real price of fertilizer During the period, consumption of fertilizer/acre became less responsive to price changes In 1949 a 10% increase in crop value resulted in an 8 9% increase in fertilizer use but in 1964 a 10% increase in crop value caused only a 6 4% increase in use Either fertilizer use by 1964 had become an accepted practice so that price was not very important or use had reached a rate high enough that a further increase did not materially increase production and again a decrease in the real price of fertilizer was not important

20
**Fertilizer Financial Facts 1969**
*News From the Fertilizer Institute*, (Sept 1970)
The Fertilizer Institute initiated a study of the financial operations involving a composite group of fertilizer producers These companies were divided into three groups (1) companies producing only potash, (2) companies producing one or more N, P, and K products and sold wholesale and/or retail, and (3) companies that were not basic producers The study was made by an independent auditing firm for the operation of each firm during calendar yr 1969 Group 1 was not reported because the data was inadequate Group 2 made the poorest showing with a loss, and Group 3 made a small profit before interest and taxes were taken into account

21
**Market Research on Fertilizers**
G M Desai (Indian Inst Management, Ahmedabad, India)
*Fert News 15* (12), 35 7 (Dec 1970)
There is an imperative need for problem oriented market research on demand for fertilizers At this stage, market research should answer the question "Where to sell available fertilizers"? In view of the Fourth Plan consumption targets and substantial expansion in domestic production of fertilizers, there is an urgent need for market research on growth in cultivators' demand Considering the existing pattern of fertilizer use, further growth in demand for fertilizer would depend on the spread of its use on unfertilized areas, and on the increase in rates of application on fertilized areas, the former due to the fact that diffusion process is yet incomplete, and the latter because of the present sub optimal rates of application Further, developments in crop varieties, cropping pattern, and irrigation facilities, would also increase the rates of fertilizer application A well planned questionnaire to elicit required information for assessing demand is suggested An ideal set of data could provide a sound basis for market research on growth in demand for fertilizers

22
**Survey Sampling Methodology for Fertilizer Marketing and Demand Study**
R P Chakrabarty (Fert Ass India, New Delhi, India)
*Fert News 15* (12), 64 70 (Dec 1970)
The Fertiliser Association of India has undertaken an All India Fertilizer Demand and Marketing Study in collaboration with the Indian Statistical Institute, the National Council of Applied Economic Research, the Indian Agricultural Research Institute, and the Institute of Agricultural Research Statistics A part of this comprehensive study is the All India Fertilizer Market Research Survey, which is being conducted by the F A I itself This survey will identify and to the extent possible, quantify the logistical, distributional, promotional, and other factors that facilitate or impede the free flow of fertilizers from factories or ports to the farmers and thereby provide an adequate informational base for the development of more effective and efficient distribution and marketing network The basis data for this study is being collected by field officers from State Departments of Agriculture, fertilizer manufacturers, and from a representative sample of about 2000 fertilizer dealers A list of fertilizer dealers for different States was not available and a sample of blocks from each State was selected and a consolidated up to date list of fertilizer dealers for the selected blocks was prepared This list was used to draw up a representative sample of wholesale and retail dealers of different agencies (government, cooperative, and private) The sampling plan designed for the market research survey in order to obtain statistically reliable and unbiased information is outlined

23
**Fertilizer Demand and Sales Forecast**
E M Lyons (Madras Fertilizers Ltd , Madras, India)
*Fert News 16* (5), 11 15 (May 1971)
Fertilizer demand forecasting varies widely and is quite sophisticated in technically developed countries where highly competitive marketing conditions prevail Factors influencing fertilizer dema[illegible] and various forecasting techniques such as buyers intent [illegible]les force opinion, expert opinion, trend method, area [illegible]od, statistical demand analysis, and their uses are discussed in detail

24
**Using Fertilizer Industry Facts**
W C White (The Fert Inst , Washington, D C )
*Searching the Seventies* (Held Sept 15 17 1971, Memphis, Tenn ) Tennessee Valley Authority Muscle Shoals, Alabama, pp 15 20
The Fertilizer Institute provides four major fact finding services to the U S fertilizer industry The Fertilizer Index is a monthly report on the production, import, export, ending inventory, and disappearance of 20 major materials Participation is voluntary with companies reporting information on a confidential basis and the index report being issued ten days later Comparisons with the previous yr and a 12 month moving average are features of the index Fertilizer Financial Facts (FFF) is published at the end of each fiscal year and of each calendar year Again, participation is voluntary and confidential Items included in the report are net sales of fertilizer, crop protection chemicals and other products cost of selling fertilizers crop protection chemicals, and other products gross profit, expenses for research and development, for advertising and promotion, and for other selling, general, and administrative purposes, and income from interest finance charges, and other sources FFF is categorized for potash producers, basic producers who also have wholesale and retail outlets manufacturers, and independently owned retail companies The Magruder program provides nearly 180 quality control laboratories a monthly check on their analytical methods for fertilizers It is operated in cooperation with the Association of American Fertilizer Control Officials The newest service will relate to transportation statistics fertilizer shipments by rail, water, and pipeline

25
**Market Growth Factors**
Luther Tweeten (Oklahoma State Univ Stillwater)
*Searching the Seventies* (Held Sept 15 17, 1971, Memphis, Tenn ) Tennessee Valley Authority, Muscle Shoals, Alabama, pp 24 30
The values of agricultural prices, quantities, costs, and income were projected each yr from 1970 through 1980 Estimates indicate that an immediate reversion to a free market in 1970 would cause severe havoc in the first yr—a decrease of 15

points in parity and a drastic decline in net farm income Despite the relatively more favorable long run outcome of a one shot as opposed to a gradual return to a free market by 1980, the severe short run impact of the one shot return seems to rule it out as an acceptable alternative The most likely situation is a 1 5% annual shift in demand and a 1% annual shift in supply Depending on government diversion and payment policies, the parity ratio would decrease 6 9 points from the 1969 level The quantity of marketed farm products would increase modestly Net farm income would decrease moderately to $14 7 billion under continuation of present diversion and government payment policies, decrease drastically to $8 4 billion under a 1970 free market policy, and to $9 2 billion under a policy to gradually revert to a free market by 1980 If the present program is continued, estimates indicate that prices received by farmers will increase about 1%/yr to 114% of 1969 prices by 1980 But continued input price inflation at the assumed rate of 2%/yr would deflate the nominal price gain to a loss of 6 points in the parity ratio In short, under a considerable range of circumstances for 1980, which should bracket the potential conditions that in fact will arise, the range of outcomes in terms of prices received by farmers, parity ratio, quantity marketed, gross farm income, and net farm income is not wide except perhaps for net farm income The variables most closely related to use of fertilizer, such as the parity ratio and quantity of marketed farm commodities, vary within a fairly narrow range The trend upward in fertilizer use stemming from rising demand for farm output can be predicted with some accuracy and is small—not more than a 2%/yr increase On the other hand the response of fertilizer use to favorable input price relationships and the need for farmers to catch up to an optimal use of fertilizer and improvements in fertilizer technology both on and off the farm will mean a substantial upward trend in fertilizer use Thus, we can expect a much greater use of fertilizer The gains will be motivated, not so much by extreme pressures to feed the world, but mainly by trends to substitute a more profitable input (fertilizer) for less profitable inputs (labor and land) as in the past

26

**Creating a Package for the Job Implementing the Marketing Plan**

R L Wehunt (Custom Farm Services Inc , Atlanta, Ga )
*Searching the Seventies* (Held Sept 15 17, 1971, Memphis, Tenn ) Tennessee Valley Authority, Muscle Shoals, Alabama, pp 51 5

As competition gets keener, industry will continue to shift further and further away from the "what products can we produce' attitude toward a 'what does the market really need" approach Selective selling or market segmentation will increase The breakout of customers by different categories and buying patterns will grow The terms "mass market' and "mass media" will become almost misnomers **Organizing a Sales Program** R L Balser (Willchem Co , Kansas City Mo ) and N L Case (Phillips Petroleum Co , Bartlesville, Okla ), pp 55 9 Several sources are available that provide crop statistical data The county ASCS office is probably the best When a listing of crops, their acreages, and their rates of fertilization are available the essentials are at hand to calculate the size of the total existing fertilizer market This forms the foundation for building the local retail sales program Examination of present fertilizer use and comparing this performance with agro-economic data leads to an optimistic conclusion regarding fertilizer market growth Steps to getting information in usuable form are (1) define the market geographically, (2) identify the crops and acreages of each in this market (3) develop optimum fertilization programs for each major crop in the market, and (4) use a profit story to sell the program

27

**Systems Approach to Marketing Formulating Least-Cost Products**

J L Nevins (Tennessee Valley Authority, Muscle Shoals, Ala )
*Searching the Seventies* (Held Sept 15 17, 1971 Memphis, Tenn ) Tennessee Valley Authority, Muscle Shoals, Alabama, pp 91-6

TVA has developed several reliable fertilizer formulation models based on linear programming with a computer print out In cooperation with 42 companies, 1354 least cost formulas have been calculated in the last 3-4 yr Of these, 562 were for ammoniation granulation processes, 671 for various liquid and suspension processes and 121 for bulk blending There has been little difficulty experienced in setting up the cooperative problems Most difficulty has come from people not understanding the principles of linear programming and in their inability to interpret the various reports generated in the computor A step by step derivation of a linear programming solution to the least-cost formula for a 12 12 12 blended fertilizer is presented Nine materials are evaluated for their input costs in terms of N $P_2O_5$ $K_2O$ and weight Materials rejected for the least cost formula are re examined to determine their substitution cost This type of information permits suppliers to discount materials without overdiscounting by ignoring weight values A constraint report permits selection of the least cost grade in a given ratio Price fluctuations permitted without changing the formulation are provided by a range report Price maps also can be generated by means of parametric programming **Coordinating Production and Distribution** W H Carey (Phillips Petroleum Co Bartlesville Okla ) pp 96 100 Linear programming is used in conjunction with a transportation model to plan the distribution of the company's fertilizer By using a multiperiod transportation model, seasonal demands can be programmed and the optimum distribution scheme can be computed Multiple origin transshipment, and receiving points can be handled by the program so that maximum savings in freight costs are obtained Frequently, some customers near a production source will be supplied by that source while other customers in the same apparent area will be supplied from a distant source The program considers all customers at all locations and minimizes the total cost of distribution for the entire system Disruptions in the market, such as weather production difficulties, and others require a new distribution plan Such information can be fed into the program and a new distribution plan generated on a daily basis Plans can be basically accomplished, despite disruptions if the transportation is moved to the correct supply sources rather than moving orders to where the transportation supply exists **Simulation of the Fertilizer Industry** G R Perkins D R Henderson (Michigan State Univ , East Lansing), and D M Bell (U S Dep Agr ) pp 100 6 Many studies have been made in the fertilizer industry Most of them have made a contribution to understanding some component of the industry But in an industry as complex as this maximizing components is not sufficient Each component can be organized and operated as efficiently as possible when viewed alone But total costs are likely higher, and profits lower than they would be under the optimal industry organization The systems approach combines these components into a complex combination of interrelationships With a model such as has been developed at Michigan State University it is possible to study and experiment with the interrelationships in an effort

to improve understanding of the industry The effect of numerous stimuli can be studied, whether they originate internally or externally to the industry Not only can the model lead to a better understanding of the industry, it may also be used to pre test new policies decision rules, techniques, processes, or organizational alternatives to determine if they will improve performance and efficiency in the industry **Management Games at the Retail Level** W D Downey and J F Marten (Purdue Univ , Lafayette, Indiana), pp 107 10 Although computer games are not extremely new, it has only been in recent months that a computer game has been developed that specifically simulates a retail fertilizer outlet Currently two such games are available through Purdue University—one simulating a dry bulk fertilizer firm and one simulating a liquid fertilizer outlet Additional games are available through Purdue that simulate a general farm supply firm, a dairy manufacturing plant, and a farm operation Purdue's approach to management games is unique since particular industries are simulated Management games are an exciting approach to teaching retailers a better understanding of how to use financial and marketing information to manage their business It would be difficult to prove that management games are the most effective educational tool since pencil and paper But management games are clearly an exciting approach to a vitally important area of training

28

**Role of Salesmen in Forecasting Fertilizer Demand**

D M Rao (Coromandel Fertilisers Ltd , Secunderabad, India)

*Fert Marketing News 3* (1), 2-4, 6 (Jan 1972)

A separate field staff employed to estimate fertilizer demand is desirable but usually too expensive Normally, the regular sales force conducts market surveys for the company Use of random sampling techniques for selecting areas, villages, and farmers can result in considerable lost time A suitable alternative consists of dividing each sales area into segments, dividing each segment into four parts, selecting one village in each part, and selecting four farmers in each village At least one farmer should have a large farm, one should have a small farm, and two should have medium sized farms The four basic questions asked in the survey are average rate of application of N, $P_2O_5$, and $K_2O$ for each crop, percentage of area fertilized with each nutrient, average rate of application of the firm's products, and months in which the fertilizer is applied

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**Stochastic Simulation as a Method of Economic Analysis**

J L Gaddy (Univ Tennessee, Knoxville)

*Diss Abstr Int B 33* (2), 695 96B (Aug 1972) Order No 72 21,349 260 pp

Economic comparison of two 600 ton/day ammonia plants with a single 1200 ton/day installation was made Computer models were developed Input data were obtained from an operating ammonia plant and studies appearing in the literature The results of simulation of the process model agreed closely with the data from the operating ammonia plant Simulation of the economic models of the ammonia plant installations led to the conclusion that the multiple plant facility would produce the higher earnings Simulation is recommended as a method of economic analysis only when a high degree of accuracy is required to reach a decision

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**Resource Adjustment in the Fertilizer Industry with Emphasis on Michigan**

D M Bell *et al* (Michigan State Univ , East Lansing)

*US Dept Agr , Econ Res Serv Mkt Res Rep* 974, 77 pp (Oct 1972)

This study was undertaken to investigate the economic environment in which firms operate in the Michigan fertilizer industry It was designed to complement the planning and decision making processes of individual firms by tracing out the interrelationships between the numerous firms (including manufacturing, distributing, transporting, and others) and business practices in the industry and by determining the industry wide consequences of changes in these practices Three general areas were investigated short and long run optimal organization of the industry, interrelationships between fertilizer supply and demand, and the effect of byproducts on the industry A systems model, based on linear programming techniques and representative of the Michigan fertilizer industry, was used Seven basic functions in the industry were contained in the model production, storage, handling, transportation, processing, sales, and application Thirty fertilizer products were analyzed, 12 of which are strictly intermediate products These were nitric acid, N solution, elemental P, wet process phosphoric acid, furnace phosphoric acid, ammonium polyphosphate liquids (10 34-0 and 11 37 0), superphosphoric acid, run of pile triple super phosphate, run of the mine and standard grades of KCl, and sulfuric acid Another 12 products may serve as intermediate products, or go directly to farms for application anhydrous ammonia ammonium nitrate, nonpressure and low pressure N solutions, urea, ammonium sulfate, normal superphosphate, granular triple superphosphate, monoammonium phosphate, diammonium phosphate, phosphate rock, and granular KCl Six products are used for direct application only aqua ammonia, coarse KCl, granulated mixed fertilizers, bulk blended fertilizers, mixed liquid fertilizers, and suspensions The cost of fertilizer in Michigan could be reduced about 25% in the short run and nearly 33% in the long run Savings would be distributed between fertilizer firms and farmers In the long run, anhydrous ammonia would be used for direct application and monoammonium phosphate and granular KCl would be blended to supply $P_2O_5$ and $K_2O$ in the desired ratio The ammonia could be produced at lesser cost in the consuming area than in other areas from which the product would have to be transported Monoammonium phosphate should be produced near the phosphate mines After making short run adjustments, the industry would replace facilities as they wear out with facilities needed in the long run setup Use of bulk blenders significantly lowers costs but larger blenders are needed and must also be operated more efficiently than is currently true in Michigan Liquid mixed fertilizer can not compete economically (handling costs included) However, because its handling characteristics give this type a non economic advantage, limited use may continue in the future Granulated mixes cost more than bulk blends but are less expensive than liquid mixes and suspensions Their use will probably decline because they have neither the efficiency of bulk blends nor the handling advantages of liquid mixes Current retail operations for dry, liquid, and ammonia fertilizers are high cost activities Alternative distribution channels would be preferable economically Farmers represent the primary force in reorganizing the fertilizer industry They have not always selected low cost nutrient products because of preference, insufficient information, and other factors

31

**Fertilizer Marketing Cost Facts and Fallacies**

*Mkt Bull (India) 7* (12), 8 11 (Dec 1972)

The Indian Fertilizer Market was set up to establish cost on a national basis, however, this has not proven satisfactory since

plants are not running at capacity and fluctuations have created a differential in cost Controversies have arisen over this form of marketing cost but the government is committed to the Uniform Marketing Cost and any change is meeting with resistance Many changes in the system of distribution from the manufacturer to the farmer have been considered but few have been made Studies are being conducted to draw up the profile of an average Indian farmer

## ANALYSES

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**Uruguay's Fertilizer Supply and Need—A Preliminary Study**

Fred G Heil, Jr (TVA, Muscle Shoals, Ala )

*TVA Report No S-420,* 39 pp (1967)

During the period Feb 5 to Mar 17, 1967, the author visited Uruguay at the request of the U S Agency for International Development to survey the Uruguayan fertilizer market and the potential for manufacturing development, and to advise the Ministry on proposed industry projects The resources and economy of Uruguay are dominantly agricultural At least 80% of its foreign trade income is derived from export of livestock products Income from exports has declined from about $254 million in 1950 to about $196 million in 1965 While increased livestock production is perhaps the most logical long term solution to the problem of lagging exports, such increases will come slowly Development of agricultural crops with export potential would not only be more rapid, but would also promote desirable diversification This preliminary survey should be followed by a detailed study (15 tables, 3 figures)

33

**Nitrogen Solutions Market**

*Oil, Paint Drug Reptr 192* (21), 32 (Nov 20, 1967)

The N solutions market is one of the most stable in the N fertilizer market Increased interest and use of liquid fertilizer and low initial capital investment for manufacture account for this stability List price of non pressure, 19 32% solution, continues at the long established level of $1 47 per unit Low pressure solutions, up to 41% N, are stable at $1 30 per unit of N The trend in use is toward the higher N content materials

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**Agricultural Development in Five Developing Countries—A Comparative Study**

R K Lahiri

*Ind J Agr Econ 22* (4), 6 11 (1967)

*Fertiliser News 13* (14), 30 (Apr 1968)

The five developing countries referred to in this study are Taiwan, South Korea, Mexico, Pakistan, and India Taiwan, South Korea, and Mexico have registered considerable improvement on both total and per capita basis in respect of agricultural development between 1952 53 and 1964 65 India's performance was poor although better than Pakistan Except in the case of South Korea, changes in the percentage of irrigated land in all other countries were negligible Between 1948 49–1952 53 and 1964 65 all the five countries under study increased their consumption of fertilizer Mexico, Pakistan, and India, starting from very low levels of 1 08, 0 21, and 0 59 kg/hectare of fertilizer use, respectively, registered very high percentage increase, the consumption in Pakistan and India in 1964 65 being 3 65 and 4 43 kg/hectare, respectively But the absolute level of fertilizer use was very high in Taiwan and South Korea, for example, 237 07 and 161 53 kg/hectare, respectively It could, perhaps, be concluded that the higher yield in Taiwan and South Korea in the fifties and earlier was achieved by increasing the use of fertilizer and from early sixties this process was further helped by increasing use of insecticides

35

**Selecting Fertilizer Products and Processes for Developing Countries**

Ronald D Young (Tennessee Valley Authority, Muscle Shoals, Ala )

*Chem Age (India) 18* (11) 765 72 (1967)

A discussion of the title subject points out some of the important factors that should be considered and evaluated by those responsible for planning and implementing a new or expanded fertilizer industry in the developing countries It deals primarily with the selection of appropriate fertilizer products and processes to fit the needs and to adequately utilize the potential of the particular country The first step in most cases is an evaluation of fertilizer needs and potential and an assessment of available raw materials, manpower and training, and funds or resources for the needed development Often this early stage of planning involves the use of specialists in agronomy, engineering and economics Financial requirements for construction of facilities and sustaining their operation are of utmost importance Provisions should be made to allow for regular and sensible updating of plans

36

**European Liquid Fertilizer Marketing Study**

*Chem Eng News 46* (2), 33 (Jan 8 1968)

A major study to determine the future impact of liquid fertilizers will soon be starting at Battelle Institute Geneva, Switzerland The study will concentrate on the west European area from both the point of view of consumers and producers of fertilizers (products and intermediates) However, technology and main economic trends will be considered internationally Principal aims of the tudy will include evaluating the present position of liquid fertilizers in context of the fertilizer industry in general, estimating consumption of selected liquid fertilizers in 1975, and assessing the importance of the significant variables in relation to promoting a new range of liquid fertilizers

37

**The Efforts of Governments and Private Investors in Increasing the Supply and Use of Chemical Fertilizers in Low Income Countries**

Hampton G Corneil (Esso Chemical Co , Inc , New York, N Y )

*Fertilizer Soln 12* (1), 86, 88, 90 2 (Jan Feb 1968)

A wide ranging effort is essential to bring about required increases in agricultural productivity in low income countries over the next decade Cooperation among private investors, local governments, and aid donors will be essential Effective cooperation demands that channels of communication between governments and investors be kept open and used, and that all parties respond flexibly toward the desired objective of raising agricultural productivity Worldwide interest in fertilizer production should not obscure fundamental needs for research, educational programs credit facilities, transportation and distribution systems Total resources, devoted to fertilizer production and to improving agricultural productivity in low income countries, must be increased Additional resources for overall economic develop

ment should be attracted Private investors should be encouraged to make the maximum contribution of capital, technology, and managerial skills to economic development in these countries Private enterprise has clearly been the most powerful engine for economic progress yet discovered Aid donor governments, multilateral institutions and the governments of low income countries should consistently direct their efforts toward mobilizing the forces of private enterprise by attracting additional private resources for use in economic development and for increasing productivity in agriculture

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**Recent Developments in the World Fertilizer Picture**

Raymond Ewell (State Univ of New York at Buffalo, Buffalo)

*Proc 20th Annual Midwest Fertilizer Conference,* Feb 12 13, 1968, Chicago, Ill , National Plant Food Inst Washington D C 5 15 (1968)

The author characterizes the world fertilizer picture in 1968 A very large surplus of production capacity for N, P, and K in the developed countries and increasing needs for fertilizer in the developing countries is pictured New ammonia technology in the early 1960s reduced capital cost of plants nearly 50% and over 75 companies decided to build new plants This "capitalism in chaos" has resulted in 87 new plants–producing in the order of 100 tons/day of ammonia–in non communist countries by 1970 and possibly 10 plants in the U S S R and Eastern Europe Estimated production capacity by 1971 is 58 million metric tons of N compared to 28 5 million tons in 1966 Production will be only 39 million tons with consumption lagging even more New construction, then, must be initiated in 1972 and 1973 Such construction will not be undertaken by companies still plagued with surplus capacity Fewer details are given for P and K but the author estimates their situation to be almost identical to that of N

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**World Overcapacity for Nitrogen Fertilizers Approaching**

*Oil, Paint Drug Reptr 193* (8), 7 (Feb 19, 1968)

The biggest fertilizer plant construction program in history will push world N capacity to 52 million tons by 1970, double the level of the mid 1960's In fact, the principal problem facing the N fertilizer industry in the next few yr will be finding and keeping markets in the face of large surplus capacities One thing the surplus will do will be to discourage fertilizer plant investment by developed countries in less developed nations Raymond Ewell, vice president for research at State University of New York in Buffalo, made these observations recently at the 20th Annual Midwestern Fertilizer Conference in Chicago The fertilizer trends authority estimates 1968 world N plant capacity at about 38 million metric tons, with actual production at only 29 million tons Of this, 24 million tons will be fertilizer N This will be the largest surplus capacity in history, most of which will occur in the U S , Western Europe, Japan, and Canada, in that order Eastern Europe is increasing N production rapidly, but internal consumption is keeping pace The Soviet Union will continue N capacity expansion, but at a slower rate than in 1964 and '65 when production increased 25 and 22%, respectively Currently, the U S S R is increasing N production at about 13% annually At this rate, Soviet 1970 production would be 5 5 million metric tons of N and 12 5 million tons of total plant nutrients (U S 1967 production is reckoned at 13 6 million metric tons of nutrients) Ewell estimates world capacity at 46 million metric tons in 1969, and 52 million tons by 1970 World production by 1975 76 is estimated at 49 million metric tons of fertilizer N, 80% of which will be supplied by the industrialized countries–U S , Canada Europe, U S S R , Japan, and Australia Asia, Africa, and Latin America will supply about 18% of the 1975 76 production, which will be nearly double their current share In view of the surplus capacity, new Middle East N plants or those in other natural gas rich areas will have great difficulty competing with established N exporting countries in spite of the low feedstock cost of natural gas

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**New Developments in Dry Bulk Blending of Fertilizers**

Russel Weiss (Farmland Industries, Inc , Kansas City, Mo )

*Farm Store Merchand 11* (2), 52, 54, 98 9 (Feb 1968)

An analysis of market reports in many areas shows a trend away from standard ratios and grades and increased use of straight materials in bulk blending Jumbo 100-ton hopper cars are replacing the 50 ton box car of bagged or bulk fertilizer Other developments include adequate bulk spreading equipment, inclusion of micronutrients in blends, better trained dealers and plant managers, and introductions of hybrids and varieties of new crops

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**Agricultural Chemicals Gloom Prevades the Industry**

Peter M Heylin (Chem Eng News, New York)

*Chem Eng News 46* (37), 107A 110A (Sept 2, 1968)

The fertilizer industry is preparing for two more years of overcapacity, low prices, and slowed growth in domestic demand The long term prospects remain sound, however -for the 15 major producers out of 30 that survive Prices appear to be at the lowest point already but may remain there for another yr before starting to recover Some ammonia plants already have ceased operation but capacity continues to increase as jumbo plants still under construction come onstream Potash production capacity also is on the increase Price cutting reduced corporate profits but had little effect on the amount of fertilizer sold to farmers They continued to buy what they wanted, regardless of price In 1968 they wanted less fertilizer than expected because they also were caught in a price squeeze

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**Fertilizer Solutions Boom in French Agriculture**

L A Soubies and J P Biratier (Office National Industriel de l'Azote)

*Fertilizer Soln* 12 (6), 48 58 (Nov Dec 1968)

For seven years nonpressure liquid fertilizers have been commerical in France Their development has been rapid, in some districts liquids account for 10% of the total N consumption Liquid fertilizers were first developed commercially in France by Office National Industriel de l'Azote (ONIA) under the trademark SOLONIA Other producers became interested, and liquid fertilizers are now available everywhere in France Unlike U S practice, there are practically no mixers among the distributors the liquids are produced in large decentralized factories French farmers store the product themselves on site and apply it with their own equipment, contract application is unusual ONIA has five plants for the production of liquids, four of which manufacture superphosphoric acid to make the base solutions 10 34 0 or 11 37 0 The fifth is a mixing plant only Liquids are used in France during three periods October for winter wheat, February March for winter cereals and beets, and June July for corn in growth and also for irrigation fertilizing French farmers prefer independent storage and application as compared with contracting because of rapidity and freedom of action with regard to time and rate of application Initially it

was necessary to set up contractor distribution systems, but after a few years these usually fall into disuse as the farmers obtain their own equipment

43
**Fertilizer Marketing**

*The Fertilizer Assoc India, Seminar* held New Delhi, India, Dec 6 8 1968, 342 pp (Apr 1969)

This publication characterizes changes in India's agriculture with respect to fertilizers over the past seven years The seminar on which the fertilizer trends and philosophical changes took into account were based on the philosophy of marketing, fertilizer production pattern in India (now and in the future), marketing of fertilizer in India today, the functions and costs of fertilizer marketing services, and marketing of fertilizers in India (government's viewpoint) These general captions are divided into work sessions and analyzed in more detail through small individual groups

44
**Marketing of Fertilisers in India Today**

C R. Ranganathan (Fertiliser Assoc India, New Delhi, India)

*Seminar on Fertiliser Marketing, Proc.*, Fertiliser Assoc India (Held New Delhi, India, Dec 6 8, 1968), pp 24-33 (Apr 1969)

The fertilizer marketing system in India today is more a result of historical development rather than planned policy The Government dominates the supply of straight N and complex fertilizers The Central Fertilizer Pool acts as the trading agency of the Government It started as an agency for procuring and distributing N fertilizer but now handles complex fertilizers also The Pool delivers fertilizer at a uniform price at railhead destinations anywhere in the country Most of the superphosphate manufacturers are in the private sector and the responsibility of distributing and marketing the product is their own The domestic production of potassic fertilizers being insignificant, all requirements are imported The importing agency is the State Trading Corporation and the distribution is done by the Indian Potash Supply Agency which sells it through both cooperative and private dealers The Pool's entry into the picture as an importer of potash has created some confusion because of the differential consumer prices charged for the same product by the Pool and by IPSA The management of potash imports should be left entirely in the hands of STC–IPSA Because of the lop sided distribution set up, a strong tendency towards unbalanced fertilization set in The mixture manufacturers constituted a significant force working towards balanced fertilization For an effective balanced fertilization program, effective and economic functioning of mixed manufacturers should be recognized From 1966, there has been a shift in the fertilizer policy toward a gradual liberalization of fertilizer marketing In addition to controlling imports, the Government has the right to take up for its own distribution 30% of a factory's production of straight N fertilizers at prices mutually agreed Factories are free to market their complex fertilizers Superphosphate manufacturers have marketing freedom and the responsibility for setting prices for this product lies with FAI The response of entrepreneurs to the new liberalized marketing arrangements has not been very impressive The problem of unbalanced fertilization might be aggravated with the liberalized marketing arrangements One remedy would be for the farmer to obtain his requirements of N, P, and K from the same shop and use them as per recommendations An alternative method would be for major manufacturers to take help from the Pool for complementary types of fertilizers needed and market them in balanced form This would help to organize the distribution of supplies from the Pool and would also promote balanced fertilization A third way is to develop and encourage the mixture business The proper role of the Pool should be that of a supplementary supplier of fertilizers and not that of a commercial competitor The responsibility for promotional activities should be left in the hands of a special agency and in this connection the formation of a Fertiliser Promotion Corporation is a necessity

45
**Marketing Fertilisers in India in the Future- The Cooperative's Viewpoint.**

Bhojraj Singh (Indian Farmers Fertiliser Cooperative Ltd, New Delhi, India)

*Seminar on Fertiliser Marketing Proc*, Fertiliser Assoc India (Held New Delhi, India, Dec 6 8, 1968), pp 58 68 (Apr 1969)

The present and future agricultural situation in India with improvements in practices through science and technology is described Phenomenal increases in fertilizer consumption are expected if fertilizers of right quality, at right time, at appropriate places, and at reasonable prices are supplied Emphasis has been placed on prices of fertilizers, balanced nutrients, soil tests and promotional work, and distribution of fertilizers through farmers' own organizations to safeguard the farmer from exploitation The author traces the historical background under which the cooperatives were brought into fertilizer distribution and deals with the advantages that the cooperative agency has in the matter of production, credit, storage, distribution, finances, source of inputs like pesticides, seeds, implements, and other services such as marketing and processing The example of Japan is given and it is suggested that Indian conditions being akin to Japan, cooperatives as an institutional agency should be encouraged to have the prime place in fertilizer distribution He warns the cooperatives not to be complacent and deals with the various points which need immediate attention to place the cooperative fertilizer distribution system on a strong footing to be able to handle two thirds of the total fertilizer consumption in the country

46
**Establishment and Operation of an Effective & Efficient Marketing Organization**

D L. Rucker (Fertiliser Association India, New Delhi, India)

*Seminar on Fertiliser Marketing, Proc*, Fertiliser Assoc India (Held New Delhi, Dec 6 8, 1968), pp 77 80 (Apr 1969)

An effective and efficient marketing organization is an absolute necessity for a successful marketing program, particularly in a country such as India, where farmers' use of fertilizer is only a tiny fraction of what it should be Two fairly recent developments not only have placed full responsibility on manufacturers to market their own products but also have created a supply situation which makes it incumbent on them to develop aggressive marketing programs if they are to survive These are the GOI policies of freedom of marketing and pricing and of providing for sufficient imports to meet consumption targets The combination has created a competitive situation and also an opportunity, which cannot be ignored by the indigenous industry Five functions of a marketing program are defined (1) making fertilizer of proper kinds available to farmers where and when it is needed (logistics), (2) providing or arranging at least some of the credit required by the distribution system and farmers, (3) developing the market (market research and sales promotion),

(4) promoting the efficient use by farmers of fertilizer and other inputs (package of practices approach), and (5) providing technical sales service and other special services to both dealers and farmers

47
**Market Development in an Asian Developing Country The Iranian Experience**

T W Allen (Iran Shahpur Chemical Co , Ltd , Tehran, Iran)
*Seminar on Fertiliser Marketing, Proc* Fert Ass India (Held New Delhi, Dec 6 8, 1968), pp 130 32 (Apr 1969)

Shahpur Chemical Company, a joint venture between the National Petrochemical Company of the Government of Iran and Allied Chemical Corporation of New York, was established in 1966 Its plant designed to produce urea, diammonium phosphate, and triple superphosphate is expected on stream in 1970 Between these two dates the development division of the company has made a market survey that included cultivated hectarage, logistics of fertilizer movement availability of credit for farmers, and economics of fertilizer use A publication to foster bank credit for fertilizer purchase, acquisition of warehouse space and a rice fertilization project have been initiated since the survey A "Fertilizer Facts" publication for farmers and a national fertilizer association are planned

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**A Fertiliser Seeding Programme**

J Sridharan (Indian Explosives Ltd , Kanpur, India)
*Fertiliser News 13* (12), 75 7 (Dec 1968)

With the changes in farming techniques that are taking place, the need has been felt not only to produce more fertilizers in India, but to promote their proper use Each manufacturer of fertilizer has to evolve a market strategy and also offer the farmer the necessary agronomic advice The Indian Explosives Ltd , have successfully launched a seeding program for urea which will be produced in the ICI's Kanpur factory A noteworthy feature of the distribution arrangement being developed is the decentralization of stocking at wholesaler levels and establishing retailer outlets within easy reach of the farmer In 31 districts of U P and six districts of Haryana nearly 100 wholesale points and 1000 retail selling points have been established by the company Operational research techniques may be used in determining optimum size and location of buffer levels IEL is also contemplating an ambitious program of conducting demonstrations in its market area to convince the farmers about the profitability of using urea A total of 1500 demonstrations have been already conducted during the rabi and kharif seasons preceding Technical services and a well thought out publicity are also being integrated with IEL's demonstration efforts One important area where IEL feels considerable work has to be done is provision of credit for distribution and agricultural production The share of commercial banks in this sphere has to be stepped up substantially

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**Applying Systems Approach to Fertiliser Marketing**

S Jain (Indian Inst of Management, Ahmedabad, India)
*Fertiliser News 13* (12), 66 9 (Dec 1968)

India can become self sufficient in food if the farmers will use enough fertilizers on their land, but fertilizers yield maximum results only if used as part of an overall improvement in farming methods The wave of the future in fertilizer marketing may well be a systems approach – a form of total selling that delivers a multi product, multi service operation that is wholly self sufficient Under systems approach a fertilizer company would sell solutions to farmers' problems instead of selling fertilizers The systems vendor agrees to analyze and define the prospects' problem, thus establishing the objectives of the solution He procures additional technology and material either from within the company or from outside sources for solving customers' problems He designs, engineers and builds a farming strategy for each one of his customers and trains them in operations and maintenance, on a continuous basis Fertilizer companies would be twice blessed for following the systems approach, they would earn more money and make a significant contribution to wiping out hunger among the teeming millions

50
**Peru s Fertilizer Distribution and Marketing System**

R B Diamond, J E Culp J L Nevins, and C H Davis (Tennessee Valley Authority Muscle Shoals, Ala )
*National Fertilizer Development Center* Tennessee Valley Authority, Muscle Shoals Ala , 130 pp (1968)

Objectives of the investigation reported here were to analyze Peru s fertilizer marketing system, to recommend in what ways the system needed to change and develop to meet future needs, to develop economically and technically feasible alternatives for accomplishing such changes and to determine the role that fertilizers could and should play in various commodity in depth programs The study showed a very wide gap between the amount of fertilizer needed and used High import taxes transfer taxes reliance on the government for educational and fertilizer promotional programs and purchase restrictions affected the amount of fertilizer used The authors recommended a free pricing system based on commercial competition in importing, manufacturing, and marketing fertilizers Private credit, a farm market news service, private processing and storage facilities for produce, direct application of anhydrous ammonia, and bulk blending were among the 29 specific recommendations resulting from the study

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**The Role of Fertilizer in the Agricultural Development of Afghanistan**

Harold G Walkup, Frank P Achorn, and Robert C Gray (Tennessee Valley Authority, Muscle Shoals, Ala )
*National Fertilizer Development Center,* Tennessee Valley Authority, Muscle Shoals, Ala 101 pp (1968)

In September 1966 and again for eight weeks in April May 1967, TVA sent a technical team to Afghanistan at the request of the Agency for International Development Objectives were to recommend needed research and extension on fertilizers, determine type of fertilizers needed and how best to fulfill these needs, advise on the development of marketing and distribution systems, estimate the rate of expansion in fertilizer use during the next 5 10 years, and indicate if an indigenous fertilizer industry could be justified and established during this period A series of 21 recommendations was prepared concerning the objectives The principal nutrients needed in Afghanistan are N and P and these are imported as urea, ammonium nitrate, diammonium phosphate, and normal and triple superphosphate For the next five years importation of most of these materials must be continued Urea will be available in 1972 from a 105,000 tons/yr plant under construction at Mazar i Sharif in the northern part of the country Ammonium nitrate could be produced at Kjakai Dam in south central Afghanistan using electrolysis of water to produce H With limited proven reserves of S, production of normal superphosphate is feasible but production of triple super and/or diammonium phosphate is not advisable until

more S is discovered Use of N and $P_2O_5$ in 1977 is estimated at 36,475 and 30,850 metric tons/yr, respectively Present fertilizer usage is about 4000 metric tons of all plant nutrients

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**World Phosphate Rock Trade Stagnates**
*Phosphorus Potassium*, No 41, 1 (May June 1969)
Most of the world's major exporters of phosphate rock reported a decline in shipments in the first quarter of 1969, and these results do not augur well for the development of world phosphate rock trade during the year Imports of phosphate rock into Western Europe were marginally below last year's level, with both North African and United States suppliers delivering less, although deliveries of West African phosphate to this market have continued to grow Eastern European countries did not increase their purchases of phosphate rock from Free World suppliers in the first quarter of 1969 Outside Europe, there have been several significant changes which have affected the pattern of phosphate rock trade Australia and New Zealand completely suspended imports of phosphate rock from West Africa The fertilizer industry's requirements were made up by increased imports from Nauru, Ocean and Christmas Islands, and by material supplied from stocks South Africa has also ceased phosphate rock imports and is now wholly dependent on domestic supplies, notably from FOSKOR's Phalaborwa mine Communist China has drastically cut back its imports of phosphate rock from North African suppliers without increasing its purchases from other Free World suppliers, it must, therefore, be assumed that this move is due to improved self sufficiency rather than the impact of high freight charges associated with North African material which cannot be shipped through the Suez Canal Japan's imports of phosphate rock were low in the first quarter of 1969 simply because large stocks of Florida phosphate were built up at the end of 1968, in anticipation of shipping difficulties arising from the United States east coast dock strike

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**They Want Fertilizer**
*Chem. Week 105* (1), 34 (July 5, 1969)
Underdeveloped nations – from Africa to the Far East – continue to build up fertilizer operations A $27 million, 170,000 tons/year N plant has been recommended for Sudan by the United Nations assisted Industrial Research Institute (Khartoum) Elsewhere in Africa, Tanzania Fertilizer has ordered a 300 tons/day NPK fertilizer plant to be built near the port of Tanga by Continental Engineering (Amsterdam) Completion target '71 Belgian engineering company Sybetra has set up a joint venture with the Gabonese government to prepare feasibility studies and arrange financing for an ammonia fertilizer plant in that West African nation It would use natural gas feedstock from Gabonese fields The study is expected to be completed by year's end The 18 member companies of the Japan Ammonium Sulphate Industry Association plan to build a $60 million fertilizer plant at Tjirebon, Java The installation will produce 600 tons/day of ammonia and 1000 tons/day of urea

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**Role of Technology in E anding Fertilizer Markets**
W E O'Brien (Mississippi Chem al Corp , Yazoo City, Miss )
*Fertilizer Marketing in a Changing Agriculture* (Held Oct 1 3, 1969, Memphis, Tenn ) Tennessee Valley Authority, Muscle Shoals, Alabama, pp 40 5
Technological advances to obtain production economies do not always consider the marketing effects Thus, replacement of small ammonia plants by the giants soon led to distress marketing To gain the maximum benefit of technology's role in marketing, the two must work together There are instances when this occurred, as in the development of granular fertilizers, fluid fertilizers, and ammonia pipelines Future areas of mutual concern are the polyphosphates, micronutrients, elemental P, conversion of ammonia to solid N–especially to urea, slow release N, and control of air and stream pollution

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**Effect of Changing Crop Acreages on Fertilizer Markets**
H G Walkup (Tennessee Valley Authority, Muscle Shoals, Ala )
*Fertilizer Marketing in a Changing Agriculture* (Held Oct 1 3, 1969, Memphis, Tenn ) Tennessee Valley Authority, Muscle Shoals, Alabama, pp 71 8
From 1950 1964 the land area used for crops decreased from 387 to 335 million acres while the fertilizer use increased from 4 to 10 3 million tons of NPK Thus, it might be concluded that when less cropland is tilled more fertilizer will be used To examine the validity of the less land more fertilizer concept, the gross relationship between total NPK used and cropland harvested in 1968 was determined for the 48 continental states by regression analysis It appears from the results that in the older fertilizer using areas the fertilizer markets with regard to specific crops are closely tied to the acreage harvested However, t appears that new fertilizer markets are being developed in these areas on crops and perhaps for other purposes for which no data were available In the newer fertilizer using areas fertilizer markets continue to increase without regard to changing crop acreage due to farmers not having arrived at optimum application rates In all areas it seems probable that fertilizer will continue to substitute for land

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**Factors Inhibiting the Indigenous Growth of the Fertilizer Industry in Developing Countries**
*United Nations Industrial Development Organization, Vienna, Austria, ID/13*, 120 pp (1969) (Sales No E 69 II B 21) Price U S $1 00
Obstacles to the growth of a fertilizer industry in developing countries, difficulties in importing the required types and quantities of fertilizers, and possible remedies to both problems were the basis of a UNIDO meeting in 1968 To provide a background for the discussion, ten working papers were presented The Fertilizer Industry in Brazil, by G V Casper, The Fertilizer Promotion Campaign in South India by M K K Nayar, The Fertilizer Industry in Mexico, by J L Garcia L , Prospects for Fertilizers in the Sudan by A A Wahab, Development of the Fertilizer Industry in the United Arab Republic, by Taha Zaky, Factors affecting and inhibiting the growth of the fertilizer industry in developing countries, by T Suzuki, Fertilizer outlook in developing countries, by Raymond Ewell, Statement of the consultant from Austria, by Hans Hohn, Remarks of the Consultant from the Federal Republic of Germany, by Greif Sander, and Statement of the Consultant from the United Kingdom, by V Varga Recommendations of the participants touched on the responsibilities of the developed countries to finance development in developing countries, to supply loans for fertilizer industries in developing countries, and to facilitate extension of credit for purchase of fertilizer equipment Nineteen additional recommendations concerned the responsibilities of developing countries to foste r faster development of an indigenous

fertilizer industry and an increase in fertilizer use

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**Phosphate Rock Production**
*Pit Quarry 62* (7), 112 (Jan 1970)
The spectacular pace maintained by the phosphate industry in recent years was appreciably slowed according to the latest Bureau of Mines statistics that cover the 1969 crop year (July 1968 June 1969) Drops from the record levels of the 1968 crop year were found in marketable production, down nearly 5%, sales or use, nearly 2% and apparent consumption,8 8% Marketable production for the year ending last June 30 was 40 million tons (12 4 million tons $P_2O_5$ content) valued at $233 million This is about 10% below the estimate made here a year ago based on reactions from industry sources The average price/ton of $5 82 was 11% below that for the preceding crop year The current picture provides a sharp contrast to that provided by the industry during the past decade, and particularly in the past five years During the latter period, and through the record 1968 crop year, there had been a 100% increase in mine production, 75% in marketable production, and 42% in apparent consumption Accordingly, there is no firm basis at this time on which to base an estimate for recapturing in the 1970 crop year much of the decreases experienced in the preceding year Agricultural requirements will probably support demand at about the same level as last year The long range picture, as painted in a recent publication of the Bureau of Mines, will apparently brighten It is estimated that the next decade will see domestic consumption almost doubled

58
**Some Implications of Free Market for Fertilizers**
R N Warriar (Fert Corp India, New Delhi, India)
*Fert News 15* (2), 73-4 (Feb 1970)
The Indian Government, in recent months, has made five major decisions that affect the fertilizer industry These are (1) registration of fertilizer dealers instead of licensing, liberalization of conditions for registration, and provision for stocking and selling N, P, and K fertilizers by all registered dealers, (?) direct supplies by the Central Fertiliser Pool to registered/licensed dealers, by passing State Governments Apex Marketing organizations and manufacturers, (3) competition of the Pool to increase its share of market for slow moving products, like $(NH_4)_2SO_4$, through price reduction, (4) establishment of a Fertiliser Promotion Council as a registered society with Government and industry participation, financed by Government grants and compulsory levy on all imports and primary fertilizer products produced in the country, and (5) liberalization of terms of credit by commercial banks to fertilizer dealers and farmers These decisions are expected to result in the development of independent dealers who will handle the products of more than one manufacturer and provide more services to farmers than mere selling

59
**Western World Sulfur Consumption 1970**
*Sulphur*, No 87, 9 10 (Mar Apr 1970)
Indications that the rate of increase in S consumption in the Western World may again return to the historical trend, after three years of slow growth, are provided by the improvements in demand in the U S A Although only preliminary results are available, it appears that the volume of phosphate fertilizer sales has risen significantly and this will be reflected in a marked up surge in $P_2O_5$ production and brimstone demand The dominant factors in the 1969 S supply pattern of the Western World continue to exert their influence in the current year During the first four months of 1970, recovered S output in Alberta was over 400,000 tonnes greater than in the corresponding period of 1969 and it is expected that in 1970 output will reach 4 6 million tonnes Output of recovered S by Societe Nationale des Petroles d'Aquitaine at Lacq, Southwest France, has increased modestly, compared with last year Output in 1970 is expected to total 1 7 1 8 million tonnes In the U S A , output of Frasch S is being kept in line with sales and deliveries In Mexico, production originates from two sources, Jaltipan and Nopalapa, and production facilities at the nearby Texistipec dome is reported to be making rapid progress Of the other sources of Western World brimstone, the output of recovered S at oil refineries is expected to increase, by about 150,000 tonnes, largely as the result of production in the U S A , Japan, and the Caribbean, while output of native ore refined S is likely to recede On balance, in 1970 brimstone supply is expected to exceed demand by not less than 1 75 million tonnes

60
**Fertilizer Situation in Europe**
*Oil, Paint Drug Rep 197* (19), 4, 51 (May 12, 1970)
The current fertilizer market in Europe is chaotic according to a British executive The last nine months of 1969 was one of the worst periods in its history Large over capacity and bad weather in Northern Europe this spring are contributing factors Consumption is cut 5% for this yr in some sections by the bad weather The firming tendency in the U S market is helping the situation in Europe, European producers think that the overall weakness of the American market is an important uncertainty in the world market

61
**Europe Long-Term U S Ammonia Outlet**
*Nitrogen*, No 65, 11 (May June 1970)
It would not be prudent of U S or any potential $NH_3$ exporters to base their future planning on the factors which have led to the almost ten fold growth of the last five yr However, the competitiveness of U S $NH_3$ in Europe, possible through low-cost feedstock, large scale production units, and improving freight rates, has made European fertilizer producers more receptive to the idea of basing fertilizer production on imported $NH_3$ The most likely European market for U S $NH_3$ at present appears to be France where the domestic $NH_3$ industry is based more than any other major European N producing country on the small to medium scale production units of the early 1960s In France several concerns are leaning towards the idea of basing any new end product facilities on imported $NH_3$ Whether the $NH_3$ would originate from the U S remains a matter of conjecture The possibility that North African countries will utilize their huge natural gas deposits to manufacture cheap $NH_3$ for export would act as a stumbling block to U S $NH_3$ sales in Europe, if large scale $NH_3$ units in North Africa could be operated efficiently, without the cooling water problems of plants in this latitude, for example the Arabian Gulf

62
**World Sulfur Consumption Accelerates**
*Sulphur*, No 88 9 (May June 1970)
For the past three yr the rate of growth of Western World S consumption was adversely affected by the net stagnation of production of the U S phosphate fertilizer industry This yr, the spring fertilizer season is reported to have been very good, with deliveries of phosphate fertilizers and intermediates at least 7% above last yr level As a result, producer stocks have

been depleted and import demand was met by increased output delivered direct to distributors and blending plants Coupled with the steady increase in S consumption by the non fertilizer industries estimated at 3 4% in 1970, it can be expected that S demand in the U S will increase by 350 000 to 400,000 ton, predominantly in the form of brimstone Western world demand may as a corollary, be expected to regain this yr the average rate of growth and register an increase of about 5% This would represent about 1 4 million tonnes S to bring Western World consumption of S in all forms in 1970 to about 29 5 million tonnes S

63

**A Fertilizer Program for Bolivia**

D A Russel, R J Ballew, J I Bucy, and D A Waitzman (Tennessee Valley Authority, Muscle Shoals, Ala )

*National Fertilizer Development Center, Muscle Shoals Ala , Bull Y 9*, 112 pp (June 1970)

During the fall of 1969 a TVA team went to Bolivia to study its fertilizer program This publication reports the team s recommendations for obtaining, marketing, and using fertilizers Presently the country uses about 2000 metric ton of N/yr, 1200 metric ton of $P_2O_5$/yr, and practically no potash By 1979 80 use (in metric ton) could amount to about 15,000 of N, 13,750 of $P_2O_5$, and 9400 of $K_2O$ Most of the increased use would be for high yielding wheat varieties now being introduced from Mexico Potatoes and sugarcane also would be major users of fertilizer Currently all fertilizer is imported Construction of a fertilizer complex near the gas fields at Santa Cruz is recommended with qualifications The N facilities would have a production capacity of 20,000 metric tons N/yr as $NH_4NO_3$ Operation at two thirds of capacity would provide N equivalent in cost to imported N Sulfur also is available in Bolivia and production of ordinary superphosphates has been proposed, cost of $P_2O_5$, using imported rock, would be 50 150% higher than that from imported triple superphosphate Importing needed P and K fertilizers in bulk, perhaps through Atlantic rather than Pacific Coast ports–lowers fertilizer costs These materials could be blended at Santa Cruz with $NH_4NO_3$ Bulk distribution is feasible on the commercial farms near Santa Cruz but blends for other areas would be bagged before leaving the complex A combination of private industry, farmer cooperatives, and the government owned petroleum company was suggested for the production and marketing phases of the fertilizer program A fertilizer promotion and education program–involving extension personnel, local dealers, and credit agents from the agricultural bank–is outlined in detail Since Bolivia has 67 radio stations and most are willing to help in agricultural programs, facilities for mass communications are readily available The TVA study was performed for the Agency for International Development

64

**A Reorganization and Marketing Program for P N Pertani (Indonesia)**

P J Stangel (Tennessee Valley Authority, Muscle Shoals Alabama) and William Johnson (Agency for International Development, Indonesia)

*National Fertilizer Development Center Tennessee Valley Authority Muscle Shoals, Ala Bull Y 17*, 121 pp (July 1970)

This is a report of the TVA team with regards to the managerial and marketing problems of P N Pertani It is a followup to a prior TVA team study (*Fertilizer Distribution in Indonesia 1969* by J R Douglas, P J Stangel, and J E Howes) This report more clearly delineates problems and offers management some conceptual approaches and management tools that can serve as possible prescriptions for solutions to these problems The team observed seven major changes since their first contact in August 1969 They made 22 recommendations for maintaining the momentum gained through the seven major changes The report is divided into the following chapters (1) The Problem – Too Much Inventory – Too Little Coordination, (2) Reorganization as a Step Toward Greater Efficiency (3) Reorganization of Headquarters and Field Units, (4) Establishment of a Better Salary and Bonus System (5) Fertilizer Needs of the New Pertani – Calendar Year 1970, (6) Market Diversification to Improve Fertilizer Distribution, (7) Better Coordination Needed of Purchases, Inventories, and Sales of Fertilizer, (8) More Efficient Management of Warehousing System (9) Support of the BIMAS and INMAS programs and (10) Development of Managerial Capabilities Included in the report are 124 tables

65

**Basic Problems for Increasing Fertilizer Production and Consumption During Seventies**

S K Mukherjee (Fert Corp India Ltd , New Delhi)

*Fert News 15* (7), 25 9, 38 (July 1970)

Scientific agriculture is the only solution to India s growing population In this aspect, fertilizers play a key role to increase the per acre yield The main problems of fertilizer production during the sixties have been non availability of foreign exchange and of raw materials If the program for the seventies is to be achieved emphasis must be placed on self reliance and allocation of foreign exchange on priority basis Naphtha available for 1973 74 has already been fully allocated Therefore future N capacities must be built on heavy stock and coal With regard to rock phosphate and S a reorientation of policy, both in respect of indigenous development of raw materials and adoption of newer technologies expeditiously, is required to attain self reliance Also production of nitrophosphate type of phosphatic fertilizers should be adopted as this requires no S In order to increase consumption of fertilizers effective steps are to be taken to organize agricultural extension service and efficient system of transport, storage, distribution, and credit facilities Promotional activities also require greater attention to create a sharp growth in demand of fertilizers

66

**Closer Watch on Ammonia Capacity Needed in West Europe**

*Chem Age (London) 101* (2673) 6 (Oct 9 1970)

Profits in the fertilizer industry have been spoiled to the extent, because of the entry of so many of the developing countries, that a number of plants have had to be shut down In addition, erection of new ammonia capacity in West Europe would have to be watched more carefully in the future This was stated by the chairman of Badische Anilin and Soda Fabrik in Frankfurt He said there was no doubt that it would be more sensible for developing countries to import fertilizers and to devote their resources to build up domestic demand than to build expensive large new plants themselves

67

**Financing Fertilizer Production and Supply in the Developing Countries**

*Agr Chem 25* (11), 16 17 (Nov 1970)

The 38th Annual Conference of the International Superphosphate and Compound Manufacturers' Association met in Athens, Greece, May 18, 1970 Special attention was focused on financing fertilizer production and supply in

developing nations Factors involved were discussed and major problems to be solved were analyzed as those of (1) markets, (2) investment climate, (3) governmental str amlining (4) distribution and credit facilities, and (5) financial structures It was concluded that all of these factors must be given consideration for successfully working out a program for any developing country

68

**Agriculture in Ceylon Until 1975**

P Richards and E Stoutjesdijk

*Organ Econ Coop Develop*, Paris, France 228 pp (1970)

In 1967 the private fertilizer industry suggested that OECD should make comprehensive studies of the agricultural prob lems in selected countries Ceylon was the second of the coun ries selected The report is divided into six sections overall economic background, general characteristics of the agricultural sector present agricultural production develop ment prospects for the economy until 1975, projection of agricultural inputs by 1975 and recommendations for future agricultural development Primary emphasis is given to Ceylon's major crops–tea, rubber, coconuts and paddy The lesser food crops are considered briefly Projections of agricultural output in 1975 show about a 2 5% annual growth for exports and 6% for domestic consumption Inputs were calculated as labor, fertilizer fertilizer subsidy, agricultural chemicals credit and organizational changes to provide research and extension services If higher rates of fertilizer are used 100,000 acres of tea and 200 000 acres of rubber will become surplus or uneconomic Changes in rice acreage would be dependent upon the opening of new irrigation schemes but self sufficiency in 1975 would be likely Assuming no change in subsidy policies government expenditures for agricultural inputs were projected to increase 33% between 1967 and 1975 Foreign exchange costs would increase at about the same rate Need for N would be high enough that a N fertilizer plant could be justified Other nutrients still would be imported

69

**Technical and Socio Economic Hindrances to the Use of Mineral Fertilizers in Senegal**

M Ollagnier and P Gillier (Stations Experimentales I R H O, Paris, France)

*Oleagineux 25* (12), 661 8 (Dec 1970) (Fr)

The results of long term fertilizer tests show that the grades and rates of fertilizer at present recommended are unquestionably effective and highly profitable There is no reason for modifying either the doses or the formulas Certain technical factors limit the effectiveness of the fertilizers, these are the low sowing density, the poor quality of the seed, the postponement of crop maintenance, bad distribution of the fertilizer, and the non observance of rational rotations The fall in the price of peanuts and the increased cost of fertilizers are vital psychological and economic factors which are the starting point of the present situation Measures are proposed at the agronomic research, extension, and governmental levels The consumption of fertilizers in Senegal is down Analyses of the causes of this regression and the means of righting the situation are presented

70

**Use of Anhydrous Ammonia as a Fertilizer**

B V Venkata Rao and S V Govinda Rajan (Univ Agr Sci, Bangalore, India)

*Bull, Indian Soc Soil Sci*, No 8, 219 21 (1970)

The supply of N fertilizers at a low price appears to be an important requisite for increasing agricultural production The development of techniques for direct use of ammonia as a source of N for crops should reduce the cost by nearly half Low cost ammonia applicators, simple in design and suitable for use under Indian conditions, were fabricated at the Mysore Agricultural College as early as 1953 Tests run on paddy and sugarcane showed their utility

71

**Modern Chemical Fertilizers Their Potential and Method of Application–Asia**

P J Stangel (Tennessee Valley Authority, Muscle Shoals, Ala)

*Ext Bull 2*, ASPAC Food & Fertilizer Technology Center, Taipei, Taiwan, 82 pp (Dec 1970)

This primarily is a review in three parts trends in the world fertilizer market, modern fertilizers and their potential in Asia, and current and new methods of supplying nutrients to crops In Asia 65% of the total nutrients used is N 22% is $P_2O_5$ and 12% is $K_2O$ Fertilizer use is only 4 8 kg/capita and 21 2 kg/ha for all Asia but much higher than this in Japan, Taiwan, South Korea, and Ceylon Urea and ammoniated phosphates will become more and more important in Asiatic countries because of their high analysis and ready availability on the export market At the next lower level of acceptance are the NPK fertilizers, a trend to chemical or physical blends has not been established Ammonium sulfate and normal superphosphate have been declining in popularity but this decline probably will level off because of pricing and increasing needs for S in Asia Ammonium chloride calcium cyanamide, ammonium nitrate, nitric phosphates, and fused phosphates are important only in special areas Fertilizers that have some near term potential are N solutions and polyphosph tes Materials that may be developed at some future time include both the N and K ultra high analysis phosphates Current methods of applying nutrients to rice are reviewed New methods of application include use of controlled release materials and protection of availability Three ways of controlling the release of nutrients are discussed These are particle size variation combination of sources of varying solubility and coatings of varying thick nesses Two methods of protecting the availability of fertilizer nutrients are discussed These are use of inhibitors to slow the rate of nitrification of ammonium type fertilizers and use of synthetic chelates to maintain the availability of micronutrients

72

**National Policy for Agricultural Inputs in the Seventies**

S M H Burney (Secretary Ministry Food, Agriculture C D & Coop, New Delhi, India)

*Proc Semn Coordinated Market Use Fert Other Inputs*, pp 52 67 (1970) New Delhi, India Fert Ass India

Since the beginning of a planning era in the early 1950's, agricultural developments have made considerable progress The use of inputs like fertilizers, quality, seeds, pesticides, and agricultural machinery have registered a substantial increase during this period However, it was during the mid 1960's that a breakthrough in agricultural production and input use was achieved through the development of high yielding hybrid varieties of cereal crops The package of practices consisting of the use of seeds of high yielding hybrid varieties of crops, adequate water supply through irrigation, use of balanced plant nutrients through fertilizers, adoption of prophylactic measures, use of agricultural machinery to increase the efficiency of farm operations and agricultural production formed the pivot on which the new strategy of agricultural development is based The success of research on various

aspects of this new strategy of agriculture has raised a number of problems, such as production and timely supply of various inputs at places nearest to consumption centers, infra structural developments for quick transport of the inputs and farm produce to market areas, availability of credit for purchase of these inputs, storage warehouses for inputs as well as farm produce and above all the need for intensifying promotional activities to increase the consumption of the inputs to achieve the agricultural production targets The present status, including the progress made so far to solve the various problems enumerated, is discussed

73

**Coordinated Marketing of Fertilizers and Other Inputs The Role of Various Agencies**

F W Parker (U S Agency for International Development, Washington, D C )

*Fert News 15* (12), 19 21 (Dec 1970)

The concept of package practices involves use of improved seeds with recommended doses of fertilizers and water at appropriate time, adoption of suitable plant protection measures, use of machinery to do the job in time and in the right manner, and the credit the farmer needs to purchase these inputs Of these inputs, seeds, fertilizers pesticides, and machinery are promoted and marketed at present by the concerned industries Water is provided from tanks, tube wells, or other sources and the credit by various financial institutions However, to promote the concept on a wider scale and extensively improve the timeliness and increase the availability of these inputs it is necessary to coordinate the efforts of individual input industries The means of coordinating marketing and promotion of industrial inputs and credit for their purchases are discussed A suggestion is made to organize an Indian Agricultural Industries Council whose function would be to encourage the coordinated promotion and marketing of agricultural inputs The scope and functions of the suggested Council are briefly outlined

74

**Phosphate Overcapacity Can Cope with Steady Market Demand**

*Eur Chem News 19* (464), 21 2 (Jan 22, 1971)

The fertilizer industry consumes about 75 80% of the total phosphate rock output It is not difficult to observe that the phosphate rock mining industry faces two major problems, namely over capacity and the dependence on exports It would appear unlikely that the existing capacities would be greatly expanded This is caused by the very low net ba ks obtained at present and the high cost of capital New investments in phosphate rock mining will compare unfavorably with most other capital uses under the actual conditions Some companies or countries may, despite the unfavorable prospects, decide to expand existing mining operations or even open new mines for a number of varied reasons such as political or economical (for example, balance of trade) Such decisions will aggravate the over supply and defer the chances for improvements of the commercial aspects of the phosphate rock trade from a producer's point of view

75

**Fertilizer Supply Study for Chile**

C H Davis, W J Free, J M Potts, and P L Russ (Tennessee Valley Authority, Muscle Shoals, Ala )

*National Fertilizer Development Center, Muscle Shoals, Alabama,* Bull Y 15, 104 pp (Jan 1971)

Alternative systems for supplying Chile's fertilizer needs and the fertilizer situation in the other Andean Common Market Countries and Venezuela are given The objectives of the study were (1) to estimate 1975 fertilizer demand, including types and quantities of fertilizers required, (2) to determine and compare costs of supplying the required fertilizers, including transport and handling, by various alternatives of importation and production, including both domestic and foreign currency costs, and (3) to analyze the fertilizer situation in the Andean market and Venezuela (32 tables, 41 figures)

76

**Is Stability Returning to the Fertilizer Industry? Part I How New Concepts Are Changing the Industry**

J R Douglas (Tennessee Valley Authority, Muscle Shoals, Ala )

*Farm Chem 134* (2), 34 40 (Feb 1971)

The effects of the 1960s on the fertilizer industry are reviewed and predictions of a more stable industry in the 1970s are made In the latter part of the 1960s overproduction in all products flooded the markets and the rapid increase in consumption suddenly slowed down, causing inventories to grow to the point they were no longer manageable As a result of following reduced production planning scheduled during the last two years inventories have been brought back in line with demand Major production capacities for the phosphate industry were complete by 1968 Since this time the phosphate industry has operated at 60 65% of rated capacity with slight improvement in the operating ratio shown in 1970 A major change in the N market is taking place in the production and use of urea Since 1965 the production of urea has doubled in the U S , production capacity more than doubled during the period Because of the higher profitability of urea compared with other N fertilizers a re evaluation of the place of urea fertilizer is occurring in the U S The potash production in Canada led to near disaster in world potash marketing In late 1969 the Saskatchewan government instituted mandatory control of production at approximately 50% reduction in production of the Canadian Mines Under these conditions the potash situation in North America will be tight The effects of changing export markets increased imports increased world competition, developing regions, reduced AID shipments and new concepts on the industry are discussed

77

**Phosphate–Emerging Trends**

A T Cole (Gulf Design Corp , Lakeland, Fla )

*Mining J 57* (2), 104 8 (Feb 1971)

The phosphate mining industry marked time in 1970 Lack of direction in the detergent industry caused concern The Florida mines operated at their usual rate Texas Gulf Sulphur continued to operate their North Carolina mines, however, other companies with leases in N C decided against further involvement toward production Improvements continued to be made on Florida ports and other shipping facilities Plans were continued on deepening the water channel in Tampa as well as other changes to increase handling facilities It is believed that the demand for phosphate rock will continue to increase New rock deposits continue to be found around the world and as these deposits are brought into production, Florida and North Carolina mines will be in a more competitive position More pressure is being put on domestic production with BPL content of rock decreasing and state regulations and taxes increasing

78

**Bulk Blending Upgrades Fertilizer Merchandizing**

Russel Weiss (Mixed Fertilizer Div , Farmland Ind )

*Farm Store Merchand 14* (2), 11 13 (Feb 1971)
Bulk blending has helped answer the marketing challenge by encouraging the use of plant food on the basis of amount of NPK needed for a particular crop This has discouraged the use of standard ratios and analyses Dry bulk blending has made rapid progress due to the following factors improved physical condition of granular fertilizers, most states have permitted the sale of fertilizer materials on a plant food basis, much bulk spreading of P K on the fields is in fall applications which lengthens the season for spreading, and it has afforded the use of trace elements along with the regular application of fertilizer The cost of applying material has been reduced and a much better job can be done in distributing fertilizer because of the equipment used and the personnel handling the equipment

79
**Dark Cloud on Sulfur's Horizon**
J M Winton
*Chem Week 108* (6), 25 36 (Feb 10, 1971)
Markets for Frasch process S are seriously threatened by the possibility of major production of $H_2SO_4$ as a byproduct of flue gas desulfurization In the U S the output of pollutant $SO_2$ last yr was equivalent to 50 million tons of $H_2SO_4$, which is about 70% more than the present level of consumption (29 million tons/yr) Several of the desulfurization processes now being developed produce byproduct $H_2SO_4$ In the opinion of one executive in $H_2SO_4$ production, the price could fall to zero in some localities by the mid to late 1970's On the other hand, there is reason to believe this threat will not materialize While recovery routes that yield $H_2SO_4$ have a head start, they are still some distance from commercialization (smelter gas excepted) But there are other, more tangible, threats to Frasch S, last yr, for the first time, Western world Frasch S production was surpassed by recoveries from sour gas and other sources These and other factors affecting S production and marketing are discussed in detail (5 charts, 1 table)

80
**Lime, Fertilizer, and Agricultural Potential in Paraguay**
D A Russel, J R Lehr, and O W Livingston (Tennessee Valley Authority), L V Blade (U S Geol Survey, Brazil), and D L Waugh (North Carolina State Univ , Raleigh)
*National Fertilizer Development Center, Muscle Shoals, Ala , Bull Y 22*, 109 pp (Mar 1971)
Use of fertilizer in Paraguay in 1969 was estimated at 1000 mt each of N, $P_2O_5$, and $K_2O$, all imported Increased use would increase agricultural production but high fertilizer prices due to low vol and long supply routes have been unfavorable for expansion This report gives the results of a study of the fertility, lime, and fertilizer problems and recommendations for dealing with them The apparent key to profitable use of fertilizer is increased production of wheat This currently is a deficit crop but production appears feasible at several locations in the eastern third of the country An important discouragement to expanded production is the extreme acidity of many of the soils – 28% of the agricultural land has a pH below 5 Some limestone is mined and calcined for mortar but none is ground for use in agriculture Several limestone deposits were located and characterized and the need for and cost of development of a limestone industry was examined At the time of the survey, all fertilizer was imported in bags via Buenos Aires, the Parana and Paraguay Rivers, and the river port at Asuncion By establishing warehouses in the various agricultural regions of eastern Paraguay, handling fertilizer in bulk and in as large a vol as possible, and importing via the least cost transportation route as determined by warehouse location, fertilizer costs for the farmer can be reduced Bulk blending would be feasible at the warehouse locations and some bulk application also would be practical, especially for wheat farmers As many as six bulk blending plants could be necessary within the next decade to handle the fertilizer that would be used Use in 1980 was estimated at 16,000 mt N, 12,800 mt $P_2O_5$, and 13,400 mt $K_2O$ The study was made for the Agency for International Development

81
**Rural Marketing**
B C Dalal (Gujarat State Fert Cc , Baroda, Gujarat, India)
*Fert News 16* (3), 17 19 (Mar 1971)
Marketing governs total business The aims are maximum profit with maximum of consumer satisfaction Most of the business organizations have concentrated their attention in urban areas ignoring the rural markets Development of intensive and scientific agriculture has changed both the economic and behavioral patterns of rural consumers to a significant extent The rising trend in disposable income of rural population and the impact of community development schemes have created a new awareness for better life in the rural areas and also created a vast market for agricultural inputs and industrial and consumer goods identification of consumer preferences in rural areas is a must for a successful marketing strategy Regional variations in buying habits and buying motives of the rural people have to be considered for long term exploitation of the market Lack of transport and distribution facilities and poorly developed trade and communication channels are the major problems The Government and the manufacturers of agricultural inputs, consumer goods, and industrial goods should join together and develop the rural markets

82
**Phosphates are Moving Again**
*Chem. Week 108* (10), 18 (Mar 10, 1971)
No one is calling the modest increase in demand for phosphate fertilizers a boom Phosphate product and rock inventories have been whittled down from their peaks during the bleak '68 selling season to where they probably will have to be boosted slightly to balance this year's increase in shipments Prices are beginning to reflect this turnaround in phosphate makers' fortunes Price quotes tell only part of the story Actual prices of the products are now closer to list than they have been for several yr, indicating a new firmness in the market Much of the growth in phosphoric demand came during the second half of the yr—it was up 17% in December And it has continued strong during the first two months of this yr More than 40% of the world's phosphate rock is produced in the U S Last yr, demand, particularly from Germany, Japan, and Italy, pushed rock exports up 3 3%, to 11 7 million tons Exports of phosphate fertilizers also were up last yr—3 6%, to 1 85 million tons ($83 2 million) Major destinations Brazil, Pakistan, and Canada At the same time, however, imports, largely in the form of DAP from Canada, rose sharply But the success of phosphate fertilizers this season rests largely with conditions in the domestic market And this yr there are more than the usual number of variables to contend with

83
**Fertilizer Adaptations Seen as Key to Future**
*Oil, Paint Drug Rep 199* (22), 7, 15 (May 31, 1971)
The fertilizer industry in the future will have to further adapt products sold to the farmer, improve logistics of getting plant nutrients to him, and perhaps change the size or relocate

plants producing intermediate and final products Direct application of N materials and bulk blends most likely will not assume the significance elsewhere in the world that they have in the corn belt of the United States There will be an increase in direct application of solid N materials as against liquids, and a large expansion in international and inter regional trade in ammonia and intermediate phosphate materials An expansion in anhydrous ammonia use in Europe is expected, following Denmark's example International shipment of ammonia and a basic P intermediate, phosphoric acid and/or ammonium phosphate, is one of the most critical areas now facing the world fertilizer industry A large expansion in international trade in ammonia is expected by 1977, 2 million tons were moved by seagoing vessels in 1970, there may be 4 5 6 million tons shipped in this manner by 1977 There will be very little expansion in the total market for complex materials in the more developed countries These are the forecasts of G R Allen, Director of Economics of W R Grace & Co , as he spoke to the ISMA Conference at Amsterdam, Netherlands

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**Fertilizer Industry Shows Improved Financial Condition**

*Agr Finance 13* (3), 7 (May June 1971)

Fertilizer Financial Facts, a report published by The Fertilizer Institute, shows the industry reported $29 3 million net income for 1970 on net sales of $2 16 billion Some groups in the Industry had shown a major loss for 1969 The report is based on data reported from 62 fertilizer companies Four of those companies were basic potash producers (Group I), 33 were basic producers with wholesale and retail operations (Group II), 13 were manufacturers of mixed fertilizers who are not basic producers (Group III), and 13 were independently owned retail operators A summary on the performance of each group is given

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**Review of Brazilian Fertilizer Market**

*Ag Chem (Newsletter)*, No 55, 4 (June 1, 1971)

Otto Lohmann, Caixa Postal 5, 165 Sao Paulo, Brazil, has just completed a survey of the Brazilian Fertilizer Market–Central Region which analyzes fertilizer use in this area of Brazil by states and zones, as well as by crops Consumption of nutrients, by crop, in each state is also given The potential for increased sale for each state and each crop is calculated, based on areas presently fertilized and as yet not fertilized

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**The Fertilizer Industry Makes the Turnaround**

*Farm Chem 134* (6), 15 19 (June 1971)

Fertilizer executives consider this spring the best in several yr for the industry The price of some fertilizers was up while others yielded to pressure and prices softened In the Midwest the preplant season was excellent and farmers had ample time for putting down fertilizer It was exceptionally good for ammonia Urea prices dropped Prices of phosphate remained steady Although prices of potash were up the tonnage used decreased Retail prices were strong and in some areas the independent dealer seemed to bolster his role in the market The consensus seems to be that the industry is on the road to recovery in spite of some problems still existing

87

**French Fertilizer Outlook**

*Chem Age (London) 103* (2712), 11 (July 9, 1971)

Azote and Produits Chimiques operate five plants making solid or liquid nitrogenous and complex fertilizers and industrial chemicals They also participate in plants producing ammonia and fertilizers at Pardies Grand Quevilly-Gonfreville and Oissel and elsewhere with 22 subsidiaries Mines Domaniales de Potasse d'Alsace have a Fr40 million capital and mine the large Alsatian potash deposits The problems of the French fertilizer industry have received a fair amount of publicity lately The president of MDPA describes the excess of investment in N fertilizers as accounting for 30 35% of total fertilizer investment in France Part of this problem was the fact that exports to Asia were considered to be within the market area while they are now in fact well covered by Japan and the Arab countries There is overcapacity in the world A number of plants will have to close down This will be difficult to achieve without more concentration of ownership Probably that is the only answer There must be some reorganization but this depends on when the French chemicals industry starts to expand Big merging actions are easier at a time of investment expansion and this may mean that the date will be after 1972 The French fertilizer industry is, however palliating its losses by commercial measures There is more contact and discussion with agriculture, and farmers have now realized that the fertilizer producers are losing money and therefore there must be price increases As far as Entreprise Minere et Chimique is concerned all the new units and expansions have been started The ammonia plants are running at 70% of capacity but plants for urea and ammonium nitrate are running at less than 50% of capacity, including exports

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**The Ammonium Sulfate Situation**

J R Douglas (Tennessee Valley Authority Muscle Shoals, Ala ) and S L Tisdale (The Sulphur Institute Washington, D C )

*The Sulphur Inst* Washington D C , Monograph No 1, 5 pp (Aug 1971)

The world export market for ammonium sulfate (AS) has changed in 3 yr It has decreased in China, India, Pakistan, South Korea, Taiwan, and Philippines It is continuing or increasing in Ceylon, Cuba Brazil and other Latin American countries World production of AS was about 2 5 million tons in 1970, down only slightly from previous years Synthetic and coke oven byproduct production have been decreasing while byproducts from other sources, mostly caprolactam plants, have been increasing Prices have decreased When priced competitively with or lower than ammonium nitrate (per unit of N basis), consumption of AS increases The long range outlook for AS prices is not particularly bright However, with new market development application of new technology, and exploitation of the agronomic need for S, prices could improve

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**South Vietnam's Fertilizer Situation and Alternatives for Production**

H G Walkup, Donald Waggoner and Conrad Kresge (Tennessee Valley Authority,)

*National Fertilizer Development Center, Muscle Shoals, Ala , Bull Y 33*, 104 pp (Aug 1971)

A Tennessee Valley Authority fertilizer team made a study of the fertilizer situation in Vietnam–how it has developed, its current condition, and its potential Annual consumption of fertilizer in Vietnam is estimated at 280,000 300,000 mt (120,000 129 000 mt plant nutrients) Market growth is estimated at 6% annually Basic or intermediate fertilizer materials are not produced, all have been imported through joint efforts of the Vietnamese and U S governments Alternatives for the establishment of fertilizer production facilities in Vietnam are discussed Recommendations are presented for a

10 yr program which will meet the needs of agriculture in Vietnam

90

**Rock Phosphate for Fertilizer Industry in India**

*Fert News 16* (9), 10, 48 (Sept 1971)

The phosphatic fertilizer industry in India has not grown as rapidly as the nitrogenous fertilizer industry for several reasons One of the important reasons is that phosphatic fertilizer production until recently depended entirely on two imports, phosphate rock and S The dependence on S for processing phosphate rock has been reduced by the development of nitrophosphates The recent discovery and commercial exploitation of good quality rock phosphate near Udaipur was hailed by phosphatic fertilizer manufacturers in the country as a welcome development for two reasons It would save foreign exchange by reducing imports of rock phosphate Also it was hoped that availability of indigenous rock at lower prices would result in a progressive reduction in production costs and lower delivered prices of phosphatic fertilizers to the farmer Requirement of phosphate rock during 1971 is about 1 2 million mt, out of which about 250,000 mt will come from Jhamar Kotra near Udaipur The balance quantity of about 950,000 mt has to be imported Udaipur rock has been tried and tested in all the sectors of the phosphatic fertilizer industry and found to be suitable with certain modifications in the plant operations The industry therefore, enthusiastically agreed to use Udaipur rock Their expectations have not been met because they have been unable to get material of consistent quality or in the quantities required by them Production has not risen beyond 20,000 mt/month and the rock supplied is not being graded on any scientific basis In view of the importance of phosphate rock as an industrial raw material, development of the mines near Udaipur on modern lines should be speeded up The efforts and resources of Rajasthan Government in this connection, even though commendable, are inadequate to cope with the task because of its magnitude It is, therefore, suggested that an autonomous corporation be formed for the purpose with Central Government, State Government, and users as shareholders each having suitable representation in the Board of Management Only such a dynamic organization will be able to bring about speedily the expansion and exploitation of the mines on scientific lines, so that a major requirement of the country is met from indigenous sources of guaranteed material at reasonably low prices

91

**Opportunities and Problems in Marketing Fertilizer Sulfur Products The West and Canada**

Karl Baur (Pacific Supply Cooperative)

*Proc Symp Marketing Fertilizer Sulfur, Memphis, Tenn, Sept 15, 1971*, pp 39-42 (1971) Tennessee Valley Authority, Muscle Shoals, Ala, and Sulphur Institute, Washington, D C

The West has long been a big user of S fertilizer Much of the 1,000,000 tons of gypsum used each yr in California comes from two large producers of wet process $H_3PO_4$ Major sources of $SO_4$–S in solid mixed fertilizers are $(NH_4)_2SO_4$, ammonium phosphate sulfate (16 20-0), $K_2SO_4$, and K–Mg sulfate Gypsum is the most important soil amendment, although S, $H_2SO_4$, and other materials are also used The industry has not vigorously promoted the use of fertilizer S compared with N–P–K fertilizers (20 ref) **Southeastern U S and Latin America** G R Hagstrom (Duval Sales Corp, Atlanta, Ga) *Ibid* 42-4 Many dealers in the Southeast add S incidentally in the form of normal superphosphate, resulting in a preference for low analysis fertilizers because of the response to the S they contain Only rarely is the S content guaranteed It would appear to be preferable to add elemental S, retaining the advantages of high analysis The S would require very fine grinding to make it available during the first growing season Although finely divided S does not blend well with granular NPK fertilizers, granulated S bentonite mixtures have recently shown promise for solving that problem Sulfur-coated urea offers tremendous potential in the Southeast The potential for fertilizer S products in Latin America is very large Although the data are scanty, there are several reasons to believe that S deficiencies are more widespread in Latin America than in the U S **West South Central Region** E A Krysl (Texas Sulphur Products, Borger, Texas) *Ibid* 45 7 In the title region, S and its compounds are used more to lower the pH of alkaline soils than to supply S as a nutrient Therefore, many people the fertilizer business in this region do not realize the importance of S as a nutrient Educational work is needed to correct this situation and promote greater use of S (3 ref) **The Central Midwest** L W Lohry (Nutra Flo Chemical Co, Sioux City, Iowa) *Ibid* 47 9 In the Midwest S is applied as $(NH_4)_2SO_4$, normal superphosphate, elemental S, and as liquid fertilizer containing ammonium thiosulfate (an extremely versatile compound because of its wide miscibility with liquid fertilizers) The growth of S fertilization in the Midwest has progressed very slowly, and vigorous promotional work will be required to bring its benefits to this region (9 ref)

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**Why Market Fertilizer Sulfur?**

S L Tisdale (The Sulphur Institute, Washington, D C)

*Proc Symp Marketing Fertilizer Sulfur, Memphis, Tenn, Sept 15 1971*, pp 6 15 (1971) Tennessee Valley Authority, Muscle Shoals, Ala and Sulphur Institute, Washington, D C

Sulfur is a plant nutrient ranking in importance with N, P, and K Certain S products are additionally beneficial to crop production on alkaline and calcareous soils because of their effect on water penetration, soil structure, and nutrient availability The benefits which accrue to the grower from the use of S products are threefold These are increases in crop yield, improvements in crop quality, and control of certain plant pests Other secondary benefits result from the use of S products including increased longevity of legume stands, increased winterhardiness of certain crops, and increased speed of the decomposition of crop residues The effect of S fertilization is discussed and the advantage to the grower of including S products in his fertilizer program is stressed (64 ref)

93

**Reading the Winds of Change**

Owen Cooper (Mississippi Chemical Corp, Yazoo City)

*Searching the Seventies* (Held Sept 15 17, 1971, Memphis, Tenn) Tennessee Valley Authority, Muscle Shoals, Alabama, pp 5 8

Spectacular technological changes in fertilizer production are not expected although some process improvements can be expected The industry will plan cautiously and carefully for the future, taking advantage of every freight and labor saving possibility available Liquid fertilizers will show a steady increase Nearly all fertilizers will be distributed in bulk Government controls will tighten in all areas including plant safety, pollution control, analysis guarantees, and tax matters Prices should increase in proportion to the increase in inflation and the fertilizer industry will cooperate–not go it alone–in

combating hunger The decades of the seventies, eighties, and nineties will require unusual amounts of fertilizers and the farmers will demand more services Industry will keep the supply/demand ratio in better balance

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**Impact of New Technology on Marketing**

A B Phillips (Tennessee Valley Authority, Muscle Shoals, Ala )

*Searching the Seventies* (Held Sept 15 17, 1971, Memphis, Tenn ) Tennessee Valley Authority, Muscle Shoals, Alabama, pp 43 8

It appears that the seventies will not be an era of great innovations in the fertilizer industry that will affect marketing such as did the technological developments of the sixties and late fifties The first half of the seventies will be a period of adjustment of oversupply to underdemand and the adoption of improvements in existing technology These improvements include reduction of organic and inorganic impurities in wet process phosphoric acid, converting wet process acid to super acid with a high polyphosphate content for fluid mixed fertilizers, upgrading ammonium phosphates to ammonium polyphosphate and to urea ammonium phosphate, and improving urea for bulk handling and use in bulk blending Some new products that may appear on the market by the last half of the seventies are S coated urea and micronutrient fertilizers

95

**Recovery of Fertilizer Market Continues**

*Chem Week 109* (14), 43 (Oct 6, 1971)

Fertilizer markets continued their recovery in the fiscal yr ended June 30, says the Fertilizer Institute in its semiannual "Fertilizer Financial Facts " All four groups of companies–potash producers, basic fertilizer products and marketers, mixed fertilizer manufacturers, independent retailers–shared in the gain The basic fertilizer producers and marketers accounting for the bulk of the industry's volume, posted an especially significant showing Total sales were $2 2 billion compared to $1 9 billion in the fiscal yr ended June 30, 1970, and margin before interest and taxes rose to $64 7 million compared to a deficit of $33 million in 1970 The latest results are even more impressive when compared with the Institute's first report issued a yr ago

96

**Developing Countries Urged to Use Fertilizer Intermediates**

*Eur Chem News 20* (502), 32 (Oct 15, 1971)

A number of speakers at the recent United Nations Industrial Development Organization Fertilizer Symposium in Kiev, USSR, stressed the need for a stage wise growth for fertilizer industries in developing countries Of all countries using fertilizers, 106, or 75%, have domestic demands for N below 180,000 ton/yr and so should import rather than operate grass roots plants of uneconomic size For a developing country with a present consumption of 20,000 ton/yr of N and $P_2O_5$ at a growth rate of 10% it would be 14 yr before an economic size $P_2O_5$ unit could be justified and 21 yr before economic N capacity could justify port and storage facilities to support a grass roots industry It seems that developing countries should follow a stage wise development for their fertilizer industry For developed countries, the battle to supply the intermediates will then intensify

97

**Integrated Use of Fertilizer Materials**

*Eur Chem News 20* (503), 10 (Oct 22, 1971)

The trend in Europe's fertilizer exports to, and contracting work for, developing countries will largely depend on the outcome of discussions between those countries and nitro phosphate and ammonium phosphate producers The nitro phosphate producers emphasized that a deciding factor would be the cost of ammonia compared with the cost of S, while ammonium phosphate producers point out that economical nitrophosphate plants are too large for the small indigenous demand of many countries, and require the country to export Industry developments would favor the use of ammonium phosphate since this could be easily shipped to the developing country for blending Fisons emphasize the advantages of using monoammonium phosphate in NPK granulation plants Its physical form make it suitable for use as an intermediate and it could be used to augment or replace single or triple phosphate in conventional NPK granulation plants It could also be transported as economically as triple superphosphate A further advantage compared with superphosphates is that it is completely compatible with urea and ammonium nitrate Full scale production of concentrated compound fertilizers based on Minifos and ammonium nitrate or urea is being carried out successfully

98

**Fertilizer Optimists are Warned**

*Oil Paint Drug Rep 200* (20), 7, 41 (Nov 15, 1971)

There's too much optimism in the fertilizer industry these days according to the manager of American Cyanamid Company's Plant Food Department He attributes the somewhat brighter marketing and financial picture primarily to the shutdown of a number of plants throughout the country and slightly more rational pricing practices on the part of the industry For example, the United States started 1970 with four fewer wet process acid companies and four fewer plants than were in existence here 5 yr earlier Without taking into account the plants that were operating it reduced rates–and most of them were–one eighth of the nation's total capacity was idle This has to help the supply/demand ratio, and thus profitability, unless of course, it was your plant that was idle Despite slim profits in 1970 and a little better prospect for 1971 high capital requirements make the industry vulnerable to the temptation of incremental pricing in which the list price soon becomes the market price From a high of $200 million a few yr ago, the Agency for International Development today is spending a negligible amount to send American fertilizers to developing nations The American market is still the largest fertilizer market in the world At its present growth rate of 3 4%/yr, a reasonable level of production in relations to capacity should be attained within 4 5 yr

99

**Canadian Fertilizer Industry Reports Heavy Losses**

*Chem Age (London) 103* (2733), 22 3 (Dec 3 1971)

A study of the Canadian fertilizer industry indicates that 33 of the largest companies had losses totaling $25 7 million before tax on total sales of $203 million in 1970 Only 13 of at least 19 basic fertilizer producing companies supplied financial figures for the study The potash industry was not involved in the study The average inventory of the report companies was $51 million or 25% of net sales while average receivables were $45 million or 22% of net sales The companies that collectively employ more than 4500 persons reported total assets of $374 million Thus, the Canadian fertilizer industry is not even covering its interest costs, which at prime bank rates would be in the order of $28 million In the US the fertilizer industry showed a loss of $70 million on sales of $1600 million in 1969 However, the US improved its performance in

1970, reporting a profit of $15 4 million on sales of $1900 million

100
**Demand for Ammonium Phosphate Increases**
*Jap Chem Week 12* (609), 8 (Dec 30, 1971)
With supply and demand for ammonium phosphate changing for the better, inquiries for ammonium phosphate export from Southeast Asia are increasing at present Ammonium phosphate business is brisk as seen in the case where 5000 tons of ammonium phosphate have already been exported to the Philippines during the July October period in 1971 fertilizer yr The cause of the favorable turn of demand for ammonium phosphate is that the U S A scrapped 13 factories to stabilize supply and demand for ammonium phosphate and the favorable turn of domestic demand in the U S A brought about a sharp decrease in export surplus

101
**Fertilizer Industry Challenges of the Future**
J P Sullivan
*Ag Chem Newsletter 26 27* (12 1), 15 17 (Dec 1971 Jan 1972)
Difficulties of the fertilizer industry over the past 5 yr and the miraculous recovery now being made by the industry are reviewed Practically the entire industry is returning to a profit basis after several yr of losses Much more must be accomplished to get others, such as bankers, involved in an integrated industry before completing the cycle and the fertilizer industry takes its place along with other related industries Factors that must be considered are technology, markets (domestic and exports), financing and credits, along with uses of fertilizer and their effect on an increasing population

102
**Demand for Fertilizer in a Developing Country The Case of Taiwan, 1950 1966**
R C Hsu (Clark Univ , Worcester, Mass )
*Econ Develop Cultural Change 20* (2), 299 309 (Jan 1972)
An estimate was made of the demand for fertilizer in a particular developing country, Taiwan, and the extent to which farmers' demand for fertilizer was affected by its price relative to the crop produced was studied In Taiwan the government monopolizes the supply and distribution of fertilizer, controls its price, and accepts payment in rice at a fertilizer rice exchange ratio that it sets The demand function for fertilizer for rice was estimated directly from a time series rather than from a rice yield function For each nutrient (N, P, and K), a traditional and an adjustment model of demand was used The traditional model was based on current usage/price data whereas the adjustment model assumed a long run equilibrium demand It was found that the price of fertilizer was important in determining the demand for N but not for P or K Demand for the latter appeared to be controlled by a learning process since the time factor was of most significance in the regression results

103
**Organization and Administration of a Fertilizer Marketing Department**
J S Nirody (Fert Div , Indian Explosives, Ltd , New Delhi, India)
*Fert News 17* (2), 15 18 (Feb 1972)
After a period of stagnation in all India food production during the early 1960s and a deficit of 9 10 million mt/yr, which had to be imported, the importance of increasing food production through improved farm technology, mainly increased use of fertilizers and other inputs, was recognized The inadequate growth of fertilizer production and consumption led to liberalization of Government policy with regard to fertilizer manufacture and distribution Fertilizer units licensed during this period were granted marketing and pricing freedom Simultaneously, due to excessive fertilizer import during 1967, the market situation underwent a substantial change from a "sellers" market to a highly competitive "buyers" market These changes led to the evolution of a marketing policy by all fertilizer manufacturers and to a full fledged marketing organization to promote usage and to conduct development and promotional work, including field demonstrations

104
**Phosphate Outlook Still Uncertain**
*Eng Mining J 173* (3), 157 9 (Mar 1972)
The combination of ecological considerations, continuing overcapacity, and increased operating costs tended to suppress the already battered phosphate rock industry in 1971 Additionally, some 5 5 million to 6 million tons of additional rock production capacity was brought on stream throughout the world during the yr--the majority outside North America As in the past years, the picture is still not entirely clear The yr 1971 saw a glimmer of hope for the firming of prices however profit margins still remain very low in the face of rising costs In the U S , exports were up and stocks were down--both encouraging signs as we move into 1972 Phosphate sales were moving up as the 1972 spraying season approached Producers must most certainly come to grips with the pollution standards required by regulatory agencies Conformance with these regulations will mean additional expenditures in future years--a body blow to an industry already staggered by overcapacity low product prices, and increased taxes in the recent past From the expansion plans announced in North Africa, it can be expected that potential world production capacity for phosphate will significantly increase while actual production in 1972 will also rise As production increases in such quarters as Africa the U S S R and others U S phosphate will see keen competition for export orders, however, steps will be taken to meet increased needs in the phosphate chemical areas As in the past environmentalists will push for the restoration of mined out areas For those producers who were overenthusiastic in the '60s at the signs of growth and potential, the few slightly optimistic indicators in 1971 will not induce the industry to rush into hastily planned capital expansions or other moves that are likely to jeopardize any industry recovery attained It is still a period for consolidation with emphasis on well conceived planning for the future

105
**Fertilizer Movement Reported Good**
*Ag Chem (Newsletter)*, No 65, 3 (Apr 1, 1972)
Early spring movement of fertilizer is reported good, pointing to an excellent spring season However, continued delay by the Price Commission in clarifying the price picture is causing a confused market Triple super and DAP continue in tight supply and this situation could continue until the end of the yr Manufacturers cut production over the past yr or two in a move to solve their problem of overproduction, then promptly saw both domestic and export demand increase sharply And, with the recent decision by the Price Commission to limit fertilizer manufacturers to a maximum profit of 3%, there is obviously no incentive to expand production again Since prices overseas are more attractive than those obtainable in the

domestic market, heavy pressure will continue to drain stocks from the home market All major fertilizer raw materials with the exception of ammonium sulfate are still available in sufficient quantity to meet demands of U S farmers for the balance of the 1972 season

106
**Worldwide Fertilizer Build up**
*Chem Marketing Rep 201* (25), 3, 47 (June 19, 1972)
A special adviser to Japan's Ministry of Trade and Industry addressed the Second Annual Marketing Conference of the Fertilizer Institute and reported that the fertilizer industry in Japan is in serious structural depression, accompanied by less than 80% operational rate The worldwide trend toward self sufficiency in fertilizer production is leaving the principle exporting nations–the U S and Japan in particular–holding the bag with fewer and fewer opportunities to make use of the excess production capacities As a result greater efforts must be made in developing the home markets to soften the impact of the production capacity overhang

107
**Canadian Fertilizer Industry Shows Improvement**
*Ag Chem Newsletter No 68*, 6 (June 20, 1972)
The Canadian Fertilizer Association (CFA) reports that the Canadian fertilizer industry lost $11 3 million in 1971 on sales of $232 million The record represented at least some improvement over 1970 when the loss was $25 7 million on sales of $203 million The general manager of CFA commented that the improvement in the industry's performance was encouraging because sales costs, and general and administrative expenses were reduced, but added that further improvements are necessary to maintain a viable Canadian fertilizer industry

108
**Growing Interest in New Phosphoric Acid Projects**
*Phosphorus Potassium* No 60, 5 6 (July Aug 1972)
For several yr, over capacity has been accepted as a normal feature of all sectors of the fertilizer industry, and most producers have had little incentive to consider seriously programs of investment in new capacity Projects for new phosphoric acid capacity currently at the planning stage or being implemented, taken together with new plants completed in the first half of 1972 total almost 3 5 million tons/yr $P_2O_5$ Of this amount, some 1 million tons/yr are represented by developments in the North American fertilizer industry, and a further 1 million tons/yr by the activities of the North African phosphate producers, the balance of 1 5 million tons/yr is made up of new plants and projects in both developed countries, with established fertilizer markets, and developing countries It is clear from this summary of projects that anticipated new demand for phosphoric acid in the major developed countries is being met by the construction of additional capacity

109
**Florida Phosphate Industry**
*Chem Week 111* (6), 13 (Aug 9, 1972)
Companies with a big stake in the Florida phosphate rock industry emphatically reject the recent conclusion that the industry might cease to exist within 10 years The Florida phosphate industry has problems and may be threatened somewhere along the line, but not in 5 yr, not in 10 yr according to a spokesman for International Minerals & Chemical, the largest producer and marketer of Florida phosphate rock A recent industry study discounts the potential impact of expansion in Morocco and new production in the Spanish Sahara Moreover, it points out that the world market requires an additional 6 million tons of phosphate rock every yr

110
**Bulk Blenders**
*Fert Prog 3* (5), 25 7 42 47 9 (Sept Oct 1972)
Bulk blend fertilizer mixing plants have grown rapidly since the early 1960s, both in number of plants and plant foods mixed and distributed Most of the bulk blenders are concentrated in the midwestern states with a total of over 5000 in the U S Problems have been encountered because of uneven particle size dustiness of material, uneven distribution pattern and problems with distribution equipment Most of the problems have been eliminated or minimized and the growth of the blenders continues Because of the environmentalist a concentrated effort is being made to coat fertilizer material to minimize dust As blending plants increase they become more efficient and improvements are made in conditioning handling and distribution within the plants

111
**New Ideas Needed for Fertilizer Marketing and Distribution**
B J Farmer
*Agr Chem 27* (11), 8 10 (Nov 1972)
Since 1950 the fertilizer industry has revolutionized itself in practically every fashion with the exception of basic plant food ($N P_2O_5 K_2O$) Manufacturing procedures have gone from pulverized to granular, partially liquid and pressure materials Distribution methods have been converted from fertilizers in bags to expensive dry bulk or liquid applicators that apply minor elements Insecticides and herbicides are applied with the fertilizer Time of application has changed to partial use of fertilizer in the fall Since the use of fertilizer has gone from a single function to a complex farm pattern of farmers success or failure the component parts necessary in a fertilizer program must be recognized as such and handled independently if the fertilizer dealer is to be a successful business partner with the farmer

112
**Phosphoric Acid Supply Shortage**
*Chem Week 111* (19) 29 (Nov 8 1972)
Phosphoric acid supplies are extremely tight, and producers are hard pressed to fulfill contract commitments Production of fertilizer phosphoric acid during the first 6 months of 1972 totaled 3 145 million tons up 50 000 tons from the comparable 1971 period, and production is running at an estimated 85 87% of operating capacity Export demand for phosphatic fertilizers especially triple superphosphate and diammonium phosphate is strong and overseas prices are in some instances higher than domestic tabs which are controlled by the Price Commission Several new phosphoric acid plants are on the drawing boards but the shortage is likely to remain for some time

113
**Ammonium Sulfate in The 1970 s**
*London, England* British Sulphur Corp , Ltd , 37 pp (1972)
The merits of ammonium sulfate as a N fertilizer on a wide range of crops and soils are undisputed These merits may be further enhanced when the necessity for S fertilization assumes greater importance Until this happens, economic comparability with other forms of N will determine the level of demand Throughout the early 1970's, the growth of what might be termed new outlets (for example, nitrophosphate

production) for ammonium sulfate is expected to be sufficient to maintain reasonable production increases at comparatively healthy price levels The more traditional outlets for ammonium sulfate–direct application and N carrier in low N content mixed fertilizers–are expected to diminish in importance in the late 1970's A 10 page statistical appendix gives world production, consumption, export, and import data for periods during 1963 1970

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**Supply Demand Narrows**

J R Douglas (Tennessee Valley Authority, Muscle Shoals, Ala )

*Farm Chem 135* (11), 24 26 28 29, 32 (Nov 1972)

The fertilizer market place in North America has changed from one of a buyers' market to one of a sellers' market Phosphate demand has caught up with supply and pressure is on producers to produce more–not on sellers to sell more The potash market has been brought into equilibrium by governmental action The N market is rapidly approaching equilibrium The retail dealer has been in the driver's seat the past 5 yr but this is rapidly coming to a halt

**Strategy for a Sellers Market** *Ibid* pp 24, 26, 28 A change from a buyers market to a sellers' market affects the entire strategy, planning, and action of retail dealers In the sellers market fewer discounts are available, supplier credit will decrease suppliers will not be trying to move materials and it will be more important for retail dealers to establish sound long term relationship with a supplier who can and will fill orders throughout the yr Dealers must develop flexibility in planning for and choosing products The retailer must evaluate his sales and service strategy He cannot give price discounts and service to build a market that he may not be able to supply

## DEVELOPMENT

115

**Marketing Policies of Major Suppliers**

Dan Garcia (Farm Store Merchandising, Minneapolis, Minn )

*Farm Store Merchandising 10* (11), 18 56, 58, (November 1967)

There is a potential for at least 1000 supermarket type farm stores in the United States and Canada according to Dan Danielson assistant to the president of National Farm Stores, Inc One stop shopping centers offer farm store merchandise, fertilizers, seed, and feed They also can provide professional agronomic advice, computerized management advice and tax assistance, an insurance service, and complete record keeping service Market potential for farm supplies, exclusive of fertilizer, feed, seed, and associated services, is $3 per cultivated acre or $2 $3 million annually in a radius of 20 to 30 miles of the shopping center National Farm Stores, Inc , Minneapolis, Minn , provides the technical know how for establishing one stop shopping centers It is a consulting firm, distributor of farm supplies, contractor and builder, planner and/or operator or manager Services are available to independent dealers, on a franchise basis or to national concerns The company has a Canadian affiliate and is making preliminary examinations in overseas countries

116

**New Agro Industrial Group Formed**

*European Chem News 13* (312), 28 (Jan 26, 1968)

The first steps towards the industrial development of the Dominican Republic have been taken Five international companies have joined forces in forming a consortium with the government of the Dominican Republic to undertake an agro industrial development program based on government owned land The U S Agency for International Development (AID) is cooperating with the consortium in its preliminary studies The new consortium, formed as the result of more than a year's preliminary studies and negotiations, is to be known as Agro Industrial Development Company SA (Agridco) It consists of the following member companies The ADELA Investment Company SA, of Luxembourg, the Dow Chemical Company, International Minerals & Chemical Corporation, the International Harvester Company, agricultural equipment suppliers, and Worthington Corporation, producers of refrigeration and other equipment The development program evolved by Agridco will integrate modern technology and profitable system farming, food processing, and marketing with the government's long term plan for land improvement and the broadening of land ownership among the Dominican farmers

117

**Fertiliser Industry Supports F A O Programme**

*Fertiliser Feeding Stuffs J 65* (8), 261 (Apr 17, 1968)

Fertilizer industrialists have pledged $265,000 in cash and $85,000 in fertilizers for the eighth yr of the fertilizer introduction program being carried out under the Freedom from Hunger campaign of the F A O Up to now some 130,000 demonstrations and trials have been carried out in 23 countries The new fertilizer pledges of the industry for 1968, when more than 25,000 field tests are planned are valued at $10,000 in excess of the 1967 pledge Additional specific pledges were for pilot schemes in India, Nigeria, Turkey, and possibly Latin America

118

**Bulk Blending Fertilizers – Marketing**

T J Van Camp (Custom Farm Service, Atlanta, Ga )

*Agr Nitrogen Inst, Proc 18*, 68 71 (1968) Held Nov 18 20, 1968, Kansas City, Mo

Bulk blending has advanced to include over 3000 operational blending units This method of mixing and handling fertilizers gained its reputation and began expanding in the early 1950's It provided the farmer a means of obtaining plant food to coincide with soil analysis and crop needs It also accomplished an economical and efficient means of getting the correct amount of plant food needed on his field The blend plant is providing a service to the small localized customer which the farmer does not have the labor, time, nor equipment to provide for himself

119

**Marketing of Fertilisers in India in the Future The Role of Industry**

M K K Nayar (Fertilisers and Chemicals, Travancore, Ltd Alwaye, India)

*Seminar on Fertiliser Marketing, Proc*, Fertiliser Assoc India (Held New Delhi, India, Dec 6 8, 1968), pp 50 7 (Apr 1969)

Industry's role is discussed in relation to GOI targets of production and consumption of fertilizer, barriers to increased use, demand surveys, farmer education, establishment of effective distribution systems, prices, and a code of conduct Failure of GOI to establish a National Fertiliser Promotion

Corporation has caused industry to assume a broader responsibility in marketing fertilizer The Fertiliser Association of India should perform some of the functions that a single industrial unit can not, such as assessing fertilizer demand and establishing a code of conduct in marketing

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**Establishing an Effective Dealer Organization**

K Pushparaj (Fertilisers and Chemicals, Travancore, Ltd, Alwaye, Kerala, India)

*Seminar on Fertiliser Marketing, Proc*, Fertiliser Assoc India (Held New Delhi, India, Dec 6 8, 1968), pp 100 114 (Apr 1969)

An effective dealer organization assures that fertilizer is readily available to farmers at the time they require it A combination of company owned outlets, cooperative outlets, and private dealers is more effective than any single channel Dealers should be selected on the basis of financial capacity, present business standing, local influence among customers, and interest evidenced in fertilizers Manufacturers should follow up dealer selection by offering (1) proper technical support for merchandizing, customer service, and promotion, (2) proper financial support by way of business credit, (3) adequate profit by way of attractive commissions (4) the best treatment and attention at all times and (5) by supplying products at the time needed in needed quantities to all dealers alike

121

**Marketing of Fertilisers**

B Sivaraman (Dept Agr, New Delhi, India)

*Fertiliser News 13* (12), 53-4 (Dec 1968)

Government's responsibility in the active promotion, propagation, and demonstrations of the judicious use of fertilizers is discussed with special reference to an equitable distribution of fertilizers throughout the country at fair prices and a marketing program through credit While the proposal of the Fertilizer Committee to set up a Fertilizer Promotion Corporation for carrying out systematic demonstration programs is still under consideration, an infrastructure consisting of national demonstration units with expertise of top level scientists, soil analysis laboratories, and mobile laboratories is being built up The gesture to free trade in fertilizer products should enable managers to set up a marketing distribution system over large areas of the country At the same time, to cover the gaps in free trade in newly developing areas, Government will make its stock- built up either through imports or by enforcing a 30% production takeover from factories—readily available in these areas at fair prices without interfering with the rest of the free market The establishment of fertilizer credit system in the marketing program through banking system and a credit guarantee scheme as recommended by the Venkatappiah Committee, is briefly discussed

122

**How Many Company Owned Fertilizer Outlets Now?**

Ray Bates

*Farm Supplier 43* (2), 36-41 (Feb 1969)

A survey of Farm Supplier of all major fertilizer manufacturers indicates there are now close to 3000 company owned stores in the U S Practically all of the company owned outlets specialize in fertilizer The trend toward manufacturer owned outlets is directly parallel with the entry of the large U S oil companies into the country's fertilizer business They started by acquiring the various fertilizer companies that were operating on a more or less national basis As soon as the large oil companies acquired fertilizer interests, they applied marketing and distribution philosophies similar to those they had already successfully employed in the oil and gasoline business At the same time, a 1967 FS Market Survey of the U S farm supply dealer "Universe", indicates that there are approximately 26,000 total farm retailers selling fertilizer This means that there still are about eight independent or cooperative stores selling fertilizer for each one that is company-owned The farm survey indicates company owned stores have reached a plateau around 3000 and are "peaking out"

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**Fertilizer Marketing Problems in the 1970's**

W J Turbeville (Continental Oil Co, Memphis, Tenn)

*Fertilizer Marketing in a Changing Agriculture* (Held Oct 1 3, 1969, Memphis, Tenn) Tennessee Valley Authority, Muscle Shoals, Alabama pp 10 14

Goverment policy and decisions, by both the U S and foreign governments, are the major external forces that will affect the fertilizer industry in the next decade Foreign aid programs purchase of fertilizer on the world market environmental control, and safety are typical of the government decisions that affect the industry Technological forces especially the technology of distribution, were set in action in the 1960's industry no longer can stop the effect of these forces As the fertilizer industry switches from production to marketing a new set of internal forces becomes effective These are described in five broad areas conceptual, philosophical organizational educational, and economic Independent judgement based on full analysis of the market must replace herd instinct management if the fertilizer industry is to progress as it did in the decade just past

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**Role of Industry in Market Development**

J F Reed (American Potash Inst, Atlanta, Ga)

*Fertilizer Marketing in a Changing Agriculture* (Held Oct 1 3, 1969, Memphis, Tenn) Tennessee Valley Authority Muscle Shoals, Alabama, pp 45 8

The U S fertilizer industry spends less than 2% of the retail sales price of its product on advertising and promotion Each segment of the industry (basic producer, manufacturer retail dealer, etc) has assumed some responsibility for market development as have also the trade organizations such as the Agricultural Nitrogen Institute, National Fertilizer Solutions Association, and American Potash Institute Even so much market development, and particularly product utilization originates with agricultural leaders in experiment stations, government agencies, and schools Market avenues suggested for industry attention are maintaining the demand on crops his orically fertilized developing greater demand on crops not heavily fertilized, creating new usage on crops, and developing demand in other areas of the world

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**Role of Universities in Market Development**

E T York (Univ Florida, Gainesville)

*Fertilizer Marketing in a Changing Agriculture* (Held Oct 1 3, 1969, Memphis, Tenn) Tennessee Valley Authority, Muscle Shoals, Alabama pp 48 53

Land grant universities and their agricultural programs have done more to develop markets for fertilizer than any other group, including the industry itself Soil fertility research on all crops and under a great range of soil and other environmental conditions has provided a basis for developing fertilizer recommendations Over the years the recommended

rates have increased because of improved varieties and better cultural practices Returns from fertilizer still range from 100 to over 400% of its cost to the farmer Industry, however, has tended to take orders for fertilizer rather than to capitalize on this university-conducted research Although universities seem to have been the primary fertilizer salesmen in the past, they probably will not be in the future Budgetary restrictions and legislative concern of the role of universities in agriculture may restrict university services more and more to research only

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**Market Development Experiences in Europe**

G Sander (Ruhr Stickstoff A G , Bochurn, West Germany)
*Fertilizer Marketing in a Changing Agriculture* (Held Oct 1 3, 1969, Memphis, Tenn ) Tennessee Valley Authority, Muscle Shoals, Alabama, pp 53 6

Market development in Western Europe follows two patterns nutrient-oriented approach and product-oriented approach Where the first approach is used exclusively, for example, Spain, fertilizer use presently is low but expanding rapidly Fertilizer companies follow the second approach when farmers already are using fertilizers at high rates Specialty fertilizers are developed as a result of feed back from the industry's extension service Industry, not government, is supporting the international research and market development activities of the Centre d'Etude de l'Azote, International Superphosphate Compound Manufacturers' Association, and International Potash Institute International activities will be intensified in the future and in Europe market development will explore split applications, aerial application, ammonia and N solutions for direct application, slow release products, home gardens, and forest fertilization

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**Some Experiences in Fertilizer Market Development.**

G G Williams (Tennessee Valley Authority, Muscle Shoals, Ala )
*Fertilizer Marketing in a Changing Agriculture* (Held Oct 1 3, 1969, Memphis, Tenn ) Tennessee Valley Authority, Muscle Shoals, Alabama, pp 56 61

Examples of marketing and other reaearch that have led to increased consumption of fertilizers are reviewed The research by Beal and Bohlen on the role of the fertilizer dealer in fertilizer sales and use opened a floodgate in fertilizer marketing in 1960 (a series of nine articles published in *Commercial Fertilizer,* Aug 1960 through Nov 1961 ) Other research that played a key role in market development included bulk blending and bulk handling of solid and liquid fertilizers Another example is the trellised tomato development in North Carolina (George Hyatt in "Potentials for Expanding Agricultural Business in the Tennessee Valley Region," TVA pub ) Progress in fertilizer use has been tremendous, recent recommendations call for 300-400 lb N, 600 1200 lb $P_2O_5$, and 450 lb $K_2O$/acre It is estimated that $400,000 will be spent on agricultural chemicals for the 1969 crop of tomatoes in the area Other examples include Rapid Adjustment Farms in which linear programming by computer is used to determine the best selection of enterprises to available farm resources for an individual farm

128
**Fertilizer Producers Seek to Block Restructure of Foreign Aid Program**

*Oil, Paint Drug Rep 198* (19), 3, 55 (Nov 9, 1970)

The fertilizer industry is launching a campaign to block a move by the Administration to restructure the foreign aid program of the government in a way that could prove costly to American industry The president of the Fertilizer Institute, says that the proposal to lift requirements that loan recipients purchase goods and services from the US will undermine American opportunities to develop long term trade relationships with these nations Experience shows that, as emerging nations go to a viable economy, they strongly tend to do business with commercial ties developed under Agency for International Development (AID) programs U S fertilizer shipments through AID programs had a value of $110 4 million in 1969 and $61 4 million in 1970 On bulk shipments, U S producers can usually compete, but not when the product has to be bagged and high American stevedoring costs are added The rule that 50% of shipments financed by AID be made in American ships is the single biggest point of contention in all of the fertilizer industry transactions Because of the rule, the Institute maintains, the price for the shipping charges alone in most cases exceeds the value of the fertilizer The industry spokesman points out that with no spending guidelines on U S foreign assistance loans, American dollars conceivably could be used to buy East European potash, Bulgarian nitrogen and otherwise benefit countries outside the Free World

129
**Fertilizer Marketing Through Cooperatives in Gujarat**

S M Patel (Gujarat Cooperative Executive Development Center, Ahmedabad, India)
*Fert News 15* (12), 57 61 (Dec 1970)

The activities of cooperative institutions in the marketing of fertilizers in Gujarat State during the last decade are discussed The Gujarat State Cooperative Marketing Society (GSCMS) as the sole distributor of fertilizers manufactured by the Gujarat State Fertilizers Company Ltd and of pool fertilizers has maintained a position of leadership in fertilizer marketing in the State The growth during the 1960's of cooperative retail outlets handling fertilizers distributed by GSCMS is reviewed and the functions carried out at different levels of the distribution system discussed

130
**The Green Revolution**

Montague Yudelman (OECD Develop Center, Paris, France)
*OECD Observer,* No 52, 15 18, 27 30 (June 1971)

The Green Revolution is the large scale adoption of new agricultural technology (seed, fertilizer) by countries in tropical regions Yields increased as much as 100% when new varieties of wheat, rice, and corn were used with appropriate inputs, compared to traditional varieties and lesser inputs Adoption has been very rapid Development of varieties and techniques in Mexico required 20 yr but up to 5 million farmers, mostly in South and East Asia, have adopted the new technology in the last 5 yr Farmers in Latin America, except Mexico, and Africa, except the northern and eastern areas, have not adopted the new technology The high adoption rate for varieties and fertilizer has been in areas with irrigation water available when and as needed Large farmers have adopted the new practices faster than small farmers Extension of the green revolution into other areas will be more costly because new irrigation facilities and agricultural infrastructure will be needed Extension to smaller farmers will require planning of irrigation systems, provision of credit, and distribution of fertilizers Rural marketing infrastructure, off farm storage facilities, and pricing policies are major problems created by the green revolution The green revolution also is affecting the international grain market because developing countries are importing less food grain from the

developed countries There is a fairly rapid rate of increase in farm mechanization when the new technology is adopted This reduces farm labor needs by 17 27% although seasonal demands increase as much as 30% Under and unemployment are accentuated by the new technology The green revolution will not eliminate poverty among the 20% of the population with the lowest income nor improve their diet However, their lot can be improved by developing cereals with a higher protein content that will grow with no inputs beyond those presently used

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**Effect of Canadian Business Cycles on the Adoption of Technological Innovations in Canadian Agriculture 1926 1967**

J A Butlin (Univ Manchester, Manchester, Cheshire, England)

*Can J Agr Econ 19* (2), 61 71 (Oct 1971)

The economic inter relationship between the farm and non farm sectors of an economy and the effects of economic instability in one sector on the other were examined through the hypothesis that technological innovations in agricultural inputs (fertilizers) are dopted by farmers at a faster rate during economic expansions than during contractions A mathematical model was developed where in the quantity of fertilizer sold for domestic consumption was related to the index of agricultural wages, the price index of compound fertilizers and estimates of technological change When data for 1926 1967 (excluding 1939 1945) were fitted to the model, the correlation was significant but $R^2$ was only 0 30 Coincident changes in farmer knowledge about fertilizers, availability of improved fertilizers, relative prices of labor and machinery, and complementarity of machine use and fertil izers appeared to be responsible for the low correlation

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**The Role of the World Bank in Agricultural Development**

O W T Price (Int Bank for Reconstruction and Develop ment, Washington, D C )

*Fert Soc Proc* , No 120, 36 pp (1971)

Besides their own savings, the developing countries must ely to a considerable extent on foreign sources of capital for financing their development The World Bank Group channels a small (10%), but increasing, share of these capital transfers through either the Group's main organization, the Inter national Bank for Reconstruction and Development (I B R D ), or its two affiliates, the International Development Association (I D A ), and the International Finance Corpora tion (I F C ) The Group obtains its operating funds from private and governmental sources and commits them under widely varying conditions Annual commitments have trebled during the last decade, reaching $2,300 million in 1970 Actual disbursements average about $1,000 million/yr The developing world's heavy dependence on agriculture is reflec ted by the emphasis which loans for agriculture receive, and these involve both import substituting and export expanding types of projects About one fifth of all I B R D/I D A commitments are for agricultural projects and an additional important share of I F C 's investment is in the fertilizer and food processing industries Through its capital subscription, bond purchases, and as a source for I D A funds, the U K plays a considerable financial role in the Group's activities Against this outflow of funds, however, stand the orders obtained by British industry and consulting firms for the supply of goods and services to Bank financed projects

133

**Trends in Fertilizer Marketing by Cooperatives**

M M K Wali (Natl Coop Dev Corp , New Delhi, India)

*Fert Ass India Proc No MKD/3*, 48 pp (June 1972) Price Rs 3

Until recent years cooperatives have predominantly controlled the distribution of fertilizer in India Practically all fertilizers used were handled through cooperatives who act as agents for the government Fertilizers were controlled centrally and the government handled the financing through reserve banks There was a lack of coordination in the handling and use of materials to prevent excessive inventories Efforts are being made to utilize the experience gained to improve profit margins improve financing and to promote the use of better balanced fertilizers

## NEW PROCESSES, PRODUCTS, AND MINERAL DEPOSITS

134

**Plants, Plans and Probabilities**

A P Shahbenderian

*Chem Process Eng 48* (9), 94 99 (September 1967)

Increasing size of new plants means that incorrect planning can result in costly mistakes The economics of scale are evident in many sectors of the chemical industry With a tendency to invest in plants of increasing size, the penalties of wrong decisions are becoming more severe Although market research can do a great deal to mitigate against financial loss, there is normally an element of uncertainty in the demand for a particular chemical product Techniques are available to help the intending investor to arrive at the optimum size of a chemical plant operating in an uncertain market The production economics and market demand probability patterns are examined and the profitability criterion is used to establish optimum plant size

135

**Phosphate Resources in Colombia**

H Burgl, et al

*Bol Geol , Colombia 15* (1 3), 7 174 (1967)

*Trop Abstr 23*, 2643

This issue is entirely concerned with natural phosphate resources in Colombia and contains the following articles (1) Phosphate deposits in the Cordillera Oriental, (2) New techniques for the exploration of phosphate deposits, (3) Phosphate rocks, and (4) Preliminary concepts on the development and use of fertilizers in Colombia Agricultural production has to expand enormously through increased use of fertilizer A review is presented of the fertilizers available and of those in short supply or absent Several possible substitutions are mentioned A combination of pipeline and river barge transport is suggested to overcome transport difficulties in mountainous areas

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**Mineral Raw Material Resources for the Fertilizer Industry in Asia and the Far East**

United Nations Economic Commission for Asia and the Far East

*United Nations*, New York, N Y , 75 pp (1967) Sales No 68 II F 3 , $1 50

Part I of this two part report contains 19 tables detailing actual and projected consumption of fertilizers by country and

type of material for the Economic Commission for Asia and the Far East countries Production and importation of fertilizers and materials also is tabulated by country and by year Part II is a country by country listing of deposits of raw materials used in manufacturing fertilizers phosphate rock, potash, oil and gas, and S in various forms Known characteristics of each deposit, especially those being worked, are described and production figures are given Many of the reserves or unworked deposits appear to be low grade Economical methods of using low grade ores have yet to be developed

137

**The Prospects of Nitric Phosphates 2 In Europe**

L Torvund and J Kolrud (Norsk Hydro Elektrisk Kvaelstofaktieselskab, Oslo, Norway)

*Impact of New Technology*, pp 56 61, TVA Fertilizer Production and Marketing Conference, Oct 4 6, 1967

About 15 companies on the European continent and in Scandinavia use the Odda process for an annual production of 4 5 million tons of fertilizer A new Norsk Hydro process, requiring crystallization at 5 °C, results in a product with 85% of the P in water soluble form A turnkey price for a plant to produce 600,000 metric tons annually of 17 17 17 with 85% water soluble P is estimated to be $10 mil on Operating costs are significantly lower than for plants that use sulfuric acid to produce water soluble phosphates Byproduct calcium nitrate is converted to calcium ammonium nitrate or to ammonium nitrate and calcium carbonate

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**Sulphur Sources of the Future Part 2**

John M Dale (Southwest Res Inst , San Antonio, Texas)

*Agr Chem 23* (2), 19 21 (Feb 1968)

See *FA 421* for Part 1

Sulfur sources of restricted importance at present include smelter gases, industrial stack gases from fossil fuels, and anhydrite and gypsum Smelter gases from Zn, Pb, and Cu ores may contain as little as 3 5 5 0% $SO_2$ and still be used for the production of $H_2SO_4$ Use of $O_2$ enriched air increases the concentration of $SO_2$ in smelter gases (see *FA 228*) Release of S to the atmosphere through stack gases is estimated to equal S consumed in industry Pollution control, rather than price of S, will be the controlling factor in reclaiming S from fuel oil, coal, and other fossil fuels Cost of pollution control and development of nuclear energy could reduce the amount of fossil fuels used for energy and the amount of S potentially available for reclamation Reserves of S in gypsum and anhydrite deposits in Kansas, Oklahoma, and Texas are estimated at 27 billion tons Large deposits of gypsum exist throughout the world One company already has announced plans for utilizing gypsum as a source of S (*FA 419*) Recovery of S from byproduct gypsum from rock phosphate acidulation would alleviate a waste disposal problem and nearly close the circuit on S use in the phosphate fertilizer industry Reclaimed S, S recovered from sour gas, and pyritic S are projected as the main S sources in year 2000 (15 references)

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**India Prefers $NH_3$ to Naphtha**

*European Chem News 13* (316), 4 (Feb 23, 1968)

India's Petroleum Ministry has decided to base fertilizer production on limited selective imports of ammonia rather than long term contracts for naphtha Naphtha prices increased 50% or more during the past yr and are more likely to continue upward than downward The reverse situation exists for ammonia because of growing world production Presently naphtha imported to Bombay costs $22/ton and ammonia costs $40 Indigenous ammonia is $48 50/ton The new policy already is in effect with the first license going for Dharamsi Morarji's 230,000/ton/yr phosphate fertilizer project near Bombay

140

**Sulfur The Economics of New Recovery Systems Part I**

*Eng Mining J 169* (5), 63 72 (May 1968)

A review is given including a tabulation of world S production by source and country for 1961 through 1966 (from Institute of Geological Sciences, London), and a table showing estimated known world S resources by type or source (from U S Bureau of Mines and TVA) This article attempts to substantiate the various claims made by the industry that ample S exists in the earth's crust to meet the present and future needs of all users and that technology is available to extract the ore from the ground, or S from process streams, if a company wants the product badly enough Cost estimates are given for the "Consol $CO_2$ acceptor process" now being developed by Consolidation Coal Co under contract with the Office of Coal Research Other cost estimates cover the conversion of coal to a liquid fuel

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**Fertilizer Buildup Goes On**

*Chem Week 103* (9), 53 4 (Aug 31, 1968)

At least a half billion dollars worth of fertilizer plant construction is underway or planned in underdeveloped countries Countries involved are Algeria, Ivory Coast, Kuwait, Malagasy Republic, Pakistan, Qatar, Rhodesia, Saudi Arabia, South Africa, and Turkey Urea and ammonia plants–big ones–predominate but Algeria, Rhodesia, and Turkey also will have ammonium nitrate plants and Turkey plans a diammonium phosphate plant The company or companies involved in financing, designing, constructing, and operating the plants with capacity, product, and cost is given for most of the plants

142

**Potash Mine Opened at Lanigan**

*Fertilizer Feeding Stuffs J* 65 (22), 718 (Nov 20, 1968)

Alwinsal Potash of Canada Ltd 's 'Sarcee' mine at Lanigan, Saskatchewan, has officially started production The mine will produce 1,000,000 tons of potash annually This mine is the sixth potash extraction plant to come on stream in Saskatchewan and one of three going into production this year Together they will raise Saskatchewan's potential annual output of muriate of potash from 4,800,000 tons to 8,400,000 tons Alwinsal's start up breaks the monopoly on Saskatchewan potash production that has been held by U S controlled companies since Potash Co of America pioneered commercial production in 1958 at its Saskatoon mine The Alwinsal mine is jointly controlled by Mines Domanides de Potasse d Alsace, controlled by the French Government, and a German company, Wintershall of Kassel and Hanover

143

**A New Process for Making High Analysis Polyammonium Phosphates**

*Chem. Week* 103 (22), 48 (Nov 23, 1968)

Ferguson Industries of Dallas, Texas claims a new process for making high analysis polyammonium phosphate It combines anhydrous ammonia and 54% merchant grade phosphoric acid at high temperatures and follows this with rapid quenching The process, says the company, can reduce the cost of making

high analysis liquid fertilizers by more than 20% And it can be modified to make water soluble dry fertilizer Typical grades are 10 34 0 and 12 40 0 Other claims for the method are investment is low because design is simple, plants can be built as two skid mounted modules and quickly installed, and only one operator is required

144

**New Process for Production of Mono-Ammonium Phosphate**

*Chem. Eng News* 46 (50), 11 (Nov 25, 1968)

Fisons Ltd, Great Britain is producing a powdered mono ammonium phosphate (MAP) This promises to help provide underdeveloped countries with phosphatic fertilizers at minimum cost This manufacturing process is simple and efficient It makes possible delivery of phosphate to some developing countries at 20% lower cost than any other method based on $P_2O_5$ equivalent The company now produces 24 tons of material/hour at its Immingham and Avonmouth plants MAP is compatible with all other fertilizer intermediates The Fisons process can yield MAP with up to 60% $P_2O_5$ depending on the quality of rock used The N efficiency is more than 99 5%

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**Esso Starts Up Europe's Largest Fertilizer Complex**

*European Chem. News* 14 (356), 6 (Nov 29, 1968)

Claimed to be among the largest fertilizer complexes in the world, the Esso Chemie Europoort complex is in operation The complex comprises an ammonia plant (500,000 tons/year capacity), a nitric acid plant (250,000 tons/year capacity), a calcium ammonium nitrate plant (400,000 tons/year capacity) and a urea plant (188,000 tons/year capacity) The fertilizer complex uses natural gas from the Dutch fields for the production of urea and calcium ammonium nitrate The cost of the complex was $70 m The ammonia plant is the largest single train unit to be built so far in Europe The plant is equipped with a primary and secondary reformer, one absorption and purification system, one compressor system and one synthesis convertor Apart from the advantages of smoothness of operation, Esso hopes that the single train design will give it efficient heat recovery and the advantages of centrifugal compression The urea plant was designed and built to convert all ammonia and carbon dioxide feed into urea At the site there is bulk storage for 45,000 tons of calcium ammonium nitrate, 30,000 tons of urea The storage capacity for material shipped in bags totals 10,000 tons

146

**Bulk Blended Fertilizers — Usage and Materials**

T P Hignett (Tennessee Valley Authority, Muscle Shoals, Ala)

*Proc, Agr Nitrogen Inst*, 18th Annual Meeting, Kansas City, Mo, Nov 1968, 53 8 (1969)

Bulk blending is a part of a revolution in fertilizer marketing and distribution in the United States It overcomes some of the inadequacies of the conventional system with its three segments prime producers, mixed fertilizer manufacturers, and merchants, each requiring transportation, handling, storage, overheads, and profit Bulk blending fits well into modern needs It concentrates the chemical processing in the hands of prime producers who have the technical and financial resources to do this job well at low cost It eliminates one step in the marketing chain with its attendant costs It eliminates the expense of bagging Bulk blenders have brought to the farmer services that he wants and needs They have helped and encouraged the farmer to determine his fertilizer needs by means of soil analyses and have persuaded him to apply more nearly adequate amounts They have lowered the cost of fertilizer to the farmer and relieved him of the hard manual labor of handling and applying it A sharp upturn in fertilizer use has resulted in areas where bulk blending is popular

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**Potassium Reserves in the World**

S S Adams (Anaconda Co, Salt Lake City, Utah),

*Agr, Proc Symp* 1968, pp 1 21 (Edited by V J Kilmer, Am Soc of Agron, Madison, Wisc)

An estimate of K reserves for North America, South America, Europe, Africa, Asia, and Oceania is given The total estimated amount is 48 billion metric tons of $K_2O$ Common minerals, ores, and products of deposits are tabulated with formulas and analyses in percentages of K and $K_2O$ Russia represents 49% and Canada 37% of the total reserves Recovery of K from brines, underground deposits, and by products from other processes are discussed On the basis of supply and demand figures for 1980, the gross world K reserves would be sufficient to last 1750 years

148

**TVA Plans Construction of UAP Plant**

*Chem. Week 104* (4), 26 (Jan 25, 1969)

Urea ammonium phosphate (UAP) will get intensive commercial development from the Tennessee Valley Authority Initial research has led TVA to hail UAP as "one of the most promising developments in three decades of fertilizer research" UAP, say TVA spokesmen, affords superior flexibility in formulating a wide range of plant nutrient ratios in mixed fertilizers suitable for virtually any crop An N P K ratio of 20 20 20 is commercially feasible with UAP, in contrast with maximum 16 16 16 ratios now available with conventional materials The higher nutrient content achievable with UAP would afford transportation and distribution savings, an especially important factor in developing countries, where transport systems are often primitive Domestic markets for UAP will be 3 million tons/year (nutrient basis) by '87, TVA estimates

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**World Phosphate Resources**

Richard P Sheldon (U S Geological Survey)

*Mining Congress J 55* (2), 115 18 (Feb 1969)

The world supply of phosphates is evaluated in terms of resources The supply demand and reserve resource relationships are dynamic Rapid increase in demand has generated much exploration over the last 15 years This exploration has been tremendously successful, yielding new information on deposits in five continents Australia, Asia, Africa, North America, and South America As of 1965 world phosphate reserves were estimated by the U S Bureau of Mines at 54 billion tons of $P_2O_5$ or about 1800 times the 1965 production Exploration is still going on so that current figures on reserves, even if such figures were available, would not give an accurate indication of total potential A true idea of potential resources can be obtained only by examining the current exploration and the outlook for its success First, however, one must examine the various geologic environments in which economic deposits of phosphate might occur These are outlined with diagrams and world maps

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**Phosphate Discovery in India**

J H Boulware

*Foreign Agr* 7 (14), 7 (Apr 7, 1969)

A recently identified phosphate deposit in India—with mapped

reserves of some 70 million tons—promises to supply sufficient rock phosphate to meet the country's fertilizer needs indefinitely An intensified search for phosphatic ores led to the discovery of the commercial deposits in and around Udaipur, a dry area in Rajasthan Much of this ore is exceptionally high grade The discovery promises to be one of the greater boons to Indian agriculture in recent years It is already causing prospective fertilizer manufacturers to reconsider planned plant locations

151
**Ishihara Develop Defluorinated Ca Phosphate Know How**
*Japan Chem Week 10* (474), 1 (May 29, 1969)
According to the Research Development Corporation of Japan, Ishihara Sangyo Kaisha succeeded in development of a new process based on the fluosolid burning method for defluorinated calcium phosphate, tribasic The major points of the process are (1) cheaper than the existing method by using silica instead of soda salt as raw material, (2) to improve thermal efficiency by the fluosolid burning method at a high temperature and to be capable of increase of productivity by a completely automatic system, and (3) effective in F recovery owing to high F content in waste gas and capable of effecti use of the product Current needs of the product are approximately 80,000 tons/year including export, and suppliers have been four companies comprising Onoda Chemical Industry Co , Niigata Ryusan Co , Tohoku Hiryo K K , and Toyo Denka K K

152
**World's Largest Ammonia Urea Plant Dedicated**
*Oil Gas J 67* (28), 33 (July 14, 1969)
The world's largest ammonia urea manufacturing complex has been dedicated in Kenai, Alaska The 1500 tons/day ammonia plant is operated by Collier Carbon & Chemical Corp , a subsidiary of Union Oil Co of California A joint partner in the 1000 tons/day urea portion of the operation is the Tokyo based Japan Gas Chemical Co The $50 million plant, under construction for nearly three years, shipped its first Alaska produced ammonia to Pacific markets in mid May The facility uses natural gas from Union-operated Kenai gas field

153
**Giant Step For Urea**
*Chem Week 105* (3), 59 (July 19, 1969)
The world's largest single train urea plant is on stream Mitsui Toatsu put the 1500 ton unit into operation at Osaka, Japan The rush to build ever larger single train urea plants began when Imperial Chemical Industries started its 1016 ton/day unit at Billingham, England Saudi Arabia Fertilizer has a 1200 ton/day unit at Damman scheduled on stream this year Indian Explosives slated a 1364 ton/day unit at Kanpur for start up in '69 Nippon Ammonia has a unit of 1500 tons/day or better scheduled for start up next year at Sodegaura, Japan

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**Pollution Control and Waste By Products Possible Effects on Marketing**
L B Nelson and J C Barber (Tennessee Valley Authority, Muscle Shoals, Ala )
*Fertilizer Marketing in a Changing Agriculture* (Held Oct 1 3, 1969, Memphis, Tenn ) Tennessee Valley Authority, Muscle Shoals, Alabama, pp 105 9
The current pressure for better control of environmental pollution could have specific effects on fertilizer markets Recovery of sulfur dioxide from stack gases could yield large amounts of by product S, sulfuric acid, or ammonium sulfate Recovery and utilization of municipal wastes in the form of organic fertilizers is also a possibility Other industries are searching for outlets for waste or by product materials such as spent acids and these industries are looking to the fertilizer industry as a possible user of these by products Recently fertilizers have come under attack as contributing to water pollution The fertilizer industry has reacted sanely to the pollution charge by taking the stand that sound scientific data are needed on this question, and by initiating research to obtain such data

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**Austria New Phosphate Fertilizer**
*Fertilizer Intern* , No 2, 5 (Aug 1969)
The only N fertilizer producer in Austria, Oesterreichische Stickstoffwerke (OSW) AG of Linz, has announced the introduction of "Superkorn 36", a concentrated superphosphate to be marketed throughout the country The product which is stated to be highly water soluble and economical contains magnesium and trace elements Until now, Donau Chemie GmbH has been the only Austrian company marketing high grade phosphate fertilizers in the form of triple superphosphate, PK fertilizers, and ground rock The success of these products may well have influenced OSW to broaden its product range for Austrian farmers

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**Technical Aspects of Importing Phosphoric Acid**
V R R Gupta and T R Visvanathan (Madras Fertilizers Ltd , Madras, India)
*Fert News 14* (12), 30 3 (Dec 1969)
Transport of concentrated phosphoric acid over long distances and across the ocean is feasible Its import is an attractive alternate to manufacture of phosphoric acid for locations where both S and phosphate rock are not available and the general level of S prices is high It appears that economies can be achieved for sea side locations by import of acid as against the import of all solid raw materials However, in India the position has to be reviewed after 3 5 yr when the pyrites supply position improves and when the phosphate deposits in Rajasthan and Uttar Pradesh are developed

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**$50 Million U S. Japan Venture up to Capacity**
*Nitrogen*, No 62, 28 31 (Nov Dec 1969)
Construction of probably the world's largest ammonia/urea complex was completed in three years by a 500-man force The Collier Carbon and Chemical Corp --Japan Gas-Chemical Co Ltd , complex on the Kenai Peninsula in Alaska is now being brought up to capacity production With its access to low cost feedstock, the economies of scale inherent in plants of such a size, and its suitable position for exports to Asian markets, as well as to the U S Pacific Coast region of Washington and Oregon, it seems favorably placed to sell its output The export oriented storage facilities at Kenai comprise a urea warehouse capable of storing 50,000 short tons and a refrigerated (atmospheric pressure) ammonia storage tank designed to hold 30,000 short tons of ammonia In addition to these, Collier's marketing and distribution of its share of the Kenai plant's output covers three main elements (1) an ocean going barge, with cargo space for 9500 tons of anhydrous ammonia and 6000 tons of urea, ammonia will be carried at 28°F in tanks below deck, while the urea is carried in bulk form in sealed compartments in a top-side structure, (2) a warehouse in Rivergate, Oregon, located on the Williamette River in the port of Portland, has a storage capacity of 30,000 short tons urea Unloading facilities discharge at a rate of 600 short tons/hr, into a warehouse with floor space of nearly 1½ acres Associated facilities at the

terminal permit bagging of the urea for domestic and overseas distribution, and rail and truck shipment The empty barge will then journey up the Columbia River (which, at low water, can only accommodate vessels with a maximum draught of 15 ft, and (3) Collier's Hedges terminal (300 miles upriver in the center of the $NH_3$ consuming farmland of the tri cities area of Washington) where the barge will discharge its $NH_3$ cargo into two 25,000 short ton, low temperature, atmospheric pressure storage tanks Like Collier, Japan Gas-Chemical also has its own ocean transport which will carry its half share of the urea output to Japan The impact of the Alaskan units will be felt in both the northwest of the U S , where the plant's output will fulfil a considerable demand for plant nutrient N, previously supplied from outside the region, and in Japan where the reorganization of the N industry has led to a temporary shortfall in supply until new production units are introduced during the early 1970s.

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**Reduction of Sulfur Needs in Fertilizer Manufacture**

C J Pratt

*Fertilizer Industry Series Monograph No 3* United Nations Industrial Development Organization, 61 pp New York (1969) Price $0 75

The purpose of this series of monographs is to assist the developing countries by providing them with the most recent technical and economic information on fertilizers and advice on establishing a fertilizer industry This monograph deals with patterns of world S supply and demand, fertilizer supply and demand, S consuming fertilizer processes, and S saving fertilizer processes

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**Eastern Europe in Rapid Expansion of Fertilizer Manufacturing**

*Phosphorus Potassium*, No 45 13 (Jan Feb 1970)

One of the most rapidly expanding areas in the broad field of fertilizer manufacture in recent years has been Eastern Europe Since the beginning of 1968, five new $H_3PO_4$ plants have been brought on stream, one each in Romania, Bulgaria, and Yugoslavia, and two in Poland The largest of these is the 110,000 tons/yr capacity plant commissioned at Dmitrovgrad, Bulgaria, in the latter part of 1967 and reaching full production during 1968 The product from this plant is wholly consumed in the production of single superphosphate at the same site A second new plant, under construction at Varna and due to come on stream during 1970, will add a further 200,000 tons/yr to Bulgaria's $H_3PO_4$ production capacity Yugoslavia's Prahovo plant, operated by Rudarsko Topionicarski Bazen Bor (Bor Mines) and commissioned in October 1968, is the source of most of the $H_3PO_4$ exported by this country This plant has a capacity of 110,000 tons/yr and forms a part of a major fertilizer complex officially opened in November 1968 The phosphoric acid plant installed employs the PSG/UCB process The Sabac site of Zorka Chemical Industry is being extended and a number of new plants built These include a 50,000 tons/yr $H_3PO_4$ unit which will supply an adjacent 100,000 tons/yr tripolyphosphate manufacturing plant Both are scheduled for commissioning during 1970

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**U S Largest Urea Facility Now Running**

*Oil, Paint Drug Rep 197* (2), 5 (May 18, 1970)

The largest urea plant in the U S , capable of turning out some 1200 tons of the fertilizer material daily, has been placed on stream by Triad Chemical at Donaldsonville, La Triad is jointly owned by First Mississippi Corporation and MisCoa The latter is a partnership of Mississippi Chemical Corporation and Coastal Chemical Corporation The urea plant, part of a $35 million Triad complex, got its initial shakedown in April and is already exceeding design capacity The facility can produce urea melt, urea crystal, standard and micro prill urea, as well as standard and low biuret urea Thus, the facility can provide grades for fertilizer, animal feed, and industrial outlets Ammonia for the operation is being supplied by a 1000-ton/day plant included in the Triad complex The $NH_3$ unit began production in June 1969 Other units at the Triad site include 30,000 tons of atmospheric $NH_3$ storage, 40,000 tons of bulk urea storage, and various supporting facilities First Mississippi and MisCoa will market Triad's production About 25% of the output will go to supply a 70 million lb/yr melamine plant now under construction on an adjacent site

161

**Technical and Economic Evaluation of Fertilizer Intermediates for use by Developing Countries**

G C Hicks, R. D Young, J J Stumpe, M M Norton, and M J Richards (Tennessee Valley Authority, Muscle Shoals, Ala )

*National Fertilizer Development Center, Tennessee Valley Authority, Muscle Shoals, Ala , Bull Y 3*, 54 pp (1970)

In the past, comparatively little emphasis has been placed on the position of fertilizer intermediates in supplying the rapidly growing fertilizer needs of the developing countries Instead, the development of the basic industry was promoted, using as many indigenous raw materials as possible In some cases, this approach was slow in developing and in many cases, desired levels of production were not obtained Import of finished fertilizers was necessary to start the development of a fertilizer use program in smaller countries and to meet urgent needs in larger countries, such as India Now it appears that intermediates have a good potential to supply such countries with needed fertilizers more quickly and with less impact on foreign exchange than might be expected This study was prepared for the Agency for International Development and the purpose is to evaluate economically for the developing countries the prospects for fertilizer intermediates An effort is made to rationalize the economic and practical examples by hypothetical planning exercises for the case of a few typical countries with small and large needs for fertilizers (20 figures, 25 tables, 11 ref )

162

**TVA Assesses the Impact of Its Fertilizer Program**

*Oil, Paint Drug Rep 198* (17), 31 (Oct 26, 1970)

Experimental fertilizers from the National Fertilizer Development Center in Muscle Shoals, Ala , were used by 193 commercial fertilizer manufacturers and distributors in 41 states during the 1970 fiscal yr, the Tennessee Valley Authority reports Materials from the center also were used in 1230 whole farm demonstrations under supervision of local county agricultural agents Overall shipments from Muscle Shoals were slightly better than those of the previous yr, but less than the annual totals during most of the 1960's Distribution of TVA's solid ammonium polyphosphate (15 62 0) nearly doubled, most of it as an intermediate material in making fluid mixed fertilizers Use of TVA's 12 40 0 base suspension also increased, as did use of its nitric phosphates TVA also reports that several newer experimental fertilizers were under development and were given limited field testing Among these were urea ammonium phosphate and sulfur coated urea, a N fertilizer given a coating to control the rate at which it dissolves in the soil

163
**Pennzoil Develops Process for New Fertilizer Series**
*Wall Street J 176* (47), 10 (Sept 3, 1970)
Pennzoil United Inc Houston based natural resources company said it has developed a process for producing a new series of fertilizers, called potassium polyphosphates with unusually high plant food values The process allows economic production of high grade potassium phosphate fertilizer compounds useful in solution, suspension, or granular type products The process uses phosphate rock, potash, and S as raw materials The company said the compounds, which it will license internationally have greater than 90% plant food content This is a substantial improvement over the plant food values of commercial products now available Pennzoil said the process had been confirmed by a continuous pilot plant facility and further engineering studies and field trials are under way Broad patent coverage has been applied for

164
**A and W Introduce High Concentration Prilled Products**
*Chem Age (London) 101* (2671), 20 (Sept 25, 1970)
Albright & Wilson Ltd ACC Division has introduced two new prilled compound fertilizers to be manufactured at their new Barton-on Humber plant 15 15 19 and 17 17 16 Characteristics claimed for the new prilled products include their high concentration, thus reducing the amount of farm labor needed in handling The first of the new fertilizers is a 15 15 19 compound which will be of interest to potato growers as it is said to be the first prilled fertilizer to become available in a ratio which is suitable for potatoes grown in arable systems This new fertilizer will be of interest to growers of sugar beet, fodder beet, and mangolds in heavy land areas where potash levels tend to be high and phosphate low Also introduced is a 17 17 16 which will be mainly of interest to growers of early potatoes in the east of England or growers of main crop potatoes in heavier fertile soils This fertilizer will also be useful for cereals of fen soils where N requirements are lower Both fertilizers are specially coated to ensure regular and consistent free running

165
**Byproducts from Phosphate Fertilizer Plants Creates New Interest**
*Chem Week 108* (1), 47 50 (Jan 6, 1971)
Rising prices of hydrofluoric acid and a shortage of fluorspar raw material used in making it, are sparking new interest in processes to recover the acid from the waste byproducts of phosphate fertilizer plants Producers long have recognized the enormous amount of F available in phosphate rock There have been two principal problems Phosphoric acid producers find it difficult to sell HF because much of the market is tied up in captive production The other major problem for phosphoric producers making enough byproduct waste at any individual plant to feed a HF unit of economic size Most phosphoric acid plants can make sufficient feed for 5,000 10,000 tons/yr of HF The major HF producers, however, consider 25,000 tons/yr to be the minimum size plant Chemical Construction's process for turning the fluosilicic solution into HF was developed by Buss Ltd The economics, says Chemico, depend on the value that's arbitrarily assigned to the fluosilicic raw material The company has chosen to place a cost figure on it because equipment is required for its recovery On this basis, says Chemico, the process is competitive with the conventional fluorspar route to HF This assessment takes no credit for solving a waste disposal problem for phosphate fertilizer producers And no credit is taken for the byproduct silica that's produced

166
**Fisons Completes Sahara Phosphate Study**
*Chem. Age (London) 102* (2692), 21 (Feb 19 26, 1971)
Fisons technical service department have successfully completed evaluation of Spanish Sahara phosphate rock deposits for Fosfatos de Bu-Craa SA After 6 months of analytical work and pilot plant operation Fisons were able to report that the rock is of high quality comparing very favorably with Moroccan rock It is expected that Fisons will continue to provide technical service for the Spanish company Work on the phosphate rock mine is progressing rapidly The three mile long jetty has already been completed and all the major plant and civil engineering projects are under construction The completed project is expected on stream by January 1973 Initially the plant will process 5 million mt of rock/yr, from this 3 3 million mt/yr of concentrates will be produced At present Fosfatos de Bu-Craa are producing about 1500 mt/month of rock for customer evaluation

167
**World Survey of Phosphate Deposits**
*The British Sulphur Corp Ltd* (23 Upper Brook Street, London W1Y 2BB, Engl ), Third Edition, 180 pp (1971)
As with previous editions the objective is to provide data on sources of supply of phosphate rock with special reference to location, size and quality of reserves, extent and rate of exploitation and where applicable, their potential for exploitation in the future Between 1960 and 1969 the production of phosphate rock doubled, from 39 to 77 million mt/yr Despite this substantial increase, the basic structure of the industry has changed very little The three largest producing countries continue to be the U S , the U S S R , and Morocco, accounting for 81% of world production in 1969 compared with 79% in 1960 World reserves of phosphate rock total 130,000 million mt of which 80% are located in the three largest producing countries Quantitative information on phosphate rock reserves is most unsatisfactory data are seldom given in sufficient detail and are reported on widely different bases Detailed descriptions are given for individual mines with capacities, plant details, and typical chemical analyses of the various grades of rock produced

168
**Albright & Wilson Introduces Fertilizer**
*Eur Chem News 19* (483), 4 (June 4, 1971)
Albright & Wilson Ltd , Associated Chemical Companies Division, has introduced a high K prilled compound fertilizer which has a ratio of 15 15 21 The product is thought to be the first prilled fertilizer of this analysis

169
**World's Largest Ammonia Plant in Production**
*Oil Gas J 69* (35) 30 (Aug 30 1971)
The world s largest ammonia plant is on stream in Chiba, Japan The 1700 ton/day unit can operate on a wide range of feedstocks including butane other light hydrocarbons and ethylene off gas The plant was designed by M W Kellogg Co and built by Sumitomo Chemical Engineering Co , Tokyo, for Nihon Ammonia Co Kellogg incorporated design changes necessary to effect the 70%-capacity increase over the "normal" 1000 ton/day plants common to the industry Changes involved the synthesis gas conversion, carbon monoxide shift, and secondary reformer sections Despite its size, energy requirements for the giant plant are lower than 32 MMBTU/short ton

170

**New Coarse Grained Ammonium Nitrate for Aerial Applica tion**

*Oil, Paint Drug Rep 200* (14), 5 (Oct 4, 1971)

Norsk Hydro A/S, Oslo, Norway, will boost capacity for Al and a new type of forest fertilizer At its Rjukan plant, Norsk Hydro is putting out a new granular type of ammonium nitrate fertilizer After extensively rebuilding its calcium ammonium nitrate plant at Rjukan, the firm has begun production of a new type of ammonium nitrate forest fertilizer called "SKOG AN " Until now, urea and ammonium nitrate have accounted for most of the sales of forest fertilizers, but experiments have proved that ammonium nitrate gives better results than urea on most types of forest stands in Scandinavia The company's research center has produced a coarse grained ammonium nitrate said to be suitable for aerial fertilizing This is because the grains are heavy and not easily blown away by the wind About 4000 tons of "SKOG AN" will be produced in 1971 72

171

**Converter Designs Ready for Big Ammonia Plants**

Ted Wett

*Oil Gas J 69* (41), 70 1 (Oct 11, 1971)

Ammonia synthesis converters with capacities up to 3000 ton/day have passed the preliminary design stage At the September meeting of the A I Ch E a paper was presented by G P Eschenbrenner (M W Kellogg Co , Houston, Texas) describing a radically designed horizontal converter This type of converter is installed at the 1700 ton/day $NH_3$ plant—the world's largest—of Nihon Ammonia Co Ltd at Chiba, Japan (*FA 4*, 1885) The plant went on stream last summer The converter has three catalyst beds, with gas flow directed downward through the beds The catalyst and an internal heat exchanger are housed in a low pressure cartridge inside a high pressure shell The horizontal design permits easy installation and removal of the cartridge, including the catalyst, without using heavy lifting equipment For capacities above 3000 ton/day, only the weight of the pressure shell would be a limiting factor Also presented at the meeting was a paper by Anders Nielsen (Haldor Topsoe, Denmark) describing a vertical radial flow converter The radial flow makes possible the use of very fine catalyst particles while still obtaining a pressure drop appreciably smaller than typical in older designs Another paper at the meeting was by D E Ridler (Imperial Chemical Industries Ltd , England), describing a vertical opposed flow converter This converter also consists of a low pressure cartridge in a high pressure shell Inlet gas flows through an annulus between the cartridge and the shell, keeping the shell cool After heat exchange with exit gas, it flows from opposite ends of a single bed of catalyst A gas exit grid is located in the center of the bed Each half of the bed contains a lozenge quench gas distributor All three designs have been proven in commercial service

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**Tennessee Valley Authority Fertilizer Influences Industry**

*Oil, Paint Drug Rep 200* (18), 7, 21 (Nov 1, 1971)

Tennessee Valley Authority is continuing to have a big impact on the fertilizer industry Some 200 commercial manufac turers and distributors in 44 states and Puerto Rico tried one or more experimental fertilizers produced during the past yr at TVA's National Fertilizer Development Center in Muscle Shoals, Ala This is the payoff of science-getting new technology into use, according to TVA manager of agricultural and chemical development Scientists and engineers are con tinually working to develop new fertilizer products and better ways of making them, but it is equally important that industry firms be able to buy limited quantities so they can evaluate a new product's potential under practical conditions Fertilizer materials from the center also were used in more than 1100 whole farm demonstrations in 26 states under supervision of local county agricultural agents Hundreds of pilot demonstra tions in these and other states also were used to test and introduce new fertilizers Fertilizer development begins in labs, greenhouses, and pilot plants, but the job isn't done until industry produces the improved product and makes it gener ally available to farmers Material produced in demonstration plants is a key to achieving adoption of new fertilizers by both farmers and industry Total distribution of experimental fertilizers made at the center was 247,100 tons, compared with 249,758 tons the previous yr

173

**Australia Plans Phosphate Rock Production**

*Chem Marketing Rep 201* (8), 7, 14 (Feb 12, 1972)

Australia, long an importer of phosphate rock for its P fertilizer needs, hopes to become self sufficient and a large net exporter of the material in the late 1970s Broken Hill South, Ltd , plans to start production on what are described as massive deposits of rock phosphate in the sparsely settled Northwest sector of Queensland The deposits have been awaiting development since they were discovered in 1966 Now, after a long wait for more favorable world ma kets, and after spending more than $5 6 million on drilling and evaluation, Broken Hill South says it hopes to start production in a few yr Most of Australia s phosphate imports come from Nauru and Ocean Island in the Pacific, Christmas Island in the Indian Ocean and, to a lesser extent, from the U S and Africa Nauru is expected to run out in 25 yr, and Ocean Island is even more limited Combined reserves of the deposits dis covered by Broken Hill South are assessed at 2 billion tons of 17% $P_2O_5$ quality rock Despite somewhat subdued rural activity in Australia at present, there is long term potential for greatly enlarged use of phosphatic fertilizers

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**World Phosphate Reserves—Are There Really Enough?**

G D Emigh (Monsanto Industrial Chemicals Co , St Louis, Mo )

*Eng Mining J 173* (4), 90 5 (Apr 1972)

A critical review is made of the literature on world phosphate reserves and potential reserves The quantifiable known reserves total 1,298,000 million tons This figure is about 52 times the 25,000 million tons reported by the Institute of Ecology (IOE) Workshop on Global Ecological Problems in its 1971 publication **Man in the Living Environment** There are many known phosphate deposits throughout the world for which estimates of size and grade are not currently available These deposits represent enormous additional reserves The incorrect IOE figures, and misleading statements accom panying them, have been widely published and quoted The purpose of this paper is to set the record straight

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**New High Analysis Potassium Phosphate Will be Produced**

*Chem Week 110* (15), 14 (Apr 12, 1972)

Pennzoil Chemical Inc , Houston, Tex , plans to produce a newly developed, high analysis potassium phosphate fertilizer Conversion of the Hanford, Calif , plant, which formerly produced ammonia, phosphoric acid, and granulated fertil izers, will take about 2 yr Manufacturing processes for the new materials were developed almost simultaneously by Pennzoil Research and Goulding Fertilizers, Ltd (Ireland) The two companies agreed to join forces in commercializing

the technology Pennzoil and Goulding have process and product patents in several countries and have filed additional patent applications No commercial plants are operating now The Hanford plant will be converted in stages The initial product is expected to be essentially chloride free 9 48 16 fertilizer The next stage will produce 0-48 31 and 5 45 29 materials The final stage will yield 0 25 20 solutions, 0 50-40 and other granular polymers, high purity phosphoric acid, and hydrochloric acid Initial marketing efforts will be aimed at specialty applications, especially tobacco and tomatoes, which require a low salt or chloride level

176
**ISMA Studies World Phosphate Reserves**
*Chem Age (London) 104* (2762), 6 (June 23, 1972)
Whether world reserves of phosphate rock are likely to meet the future long term demand could be answered by a survey conducted among phosphate rock producers and official institutions by the International Superphosphate and Compound Manufacturers' Association Ltd Questions which are hoped to be answered are to what extent do existing producers expect the grade of their ores to decline over the next 15 20 yr? Do they envisage the need for calcination, and what calcination capacity already exists? How have their reserves been developed over the last 15 yr and how are they classified between proven, probable, possible, and potential categories? How do they envisage the development of their production vol over the next 15 20 yr and, consequently, what is the expected life of their present reserves under present conditions? How would their reserves increase if the chemical industry could take rock grades with a lower $P_2O_5$ content or a higher Al and Fe content?

177
**Company Formed to Develop Australian Phosphates**
*Fert Int* No 41, 1 (Nov 1972)
The Australian company, Broken Hill South (BHS), has formed a new subsidiary, Queensland Phosphate, to investigate and develop the vast phosphate deposits in northwest Queensland which BHS holds The deposits will, it is hoped become an important revenue source within the period 1975 to 1980 Concentrates can be produced from the Lady Annie deposits that meet commercial grade standards, this has been proved by beneficiation tests A 100 ton/day flotation plant, to provide phosphate concentrate for full scale testing by fertilizer manufacturers, is to be erected before the end of this yr

178
**Japanese Interest High In Australian Potash Plant**
*Chem Age (London) 105* (2787) 24 (Dec 15, 1972)
The Japanese are keenly interested in the construction of a potash plant for Texada Mines Ltd at Lake MacLeod north of Carnavon in Western Australia (Cf *IA 5* 1880), which has just begun and will be completed and onstream by May 1973 The major portion of the production is to be exported to Japan with smaller quantities to elsewhere in Southeast Asia About 250 mt of potash salts have been produced and a sample of over 150 mt has already been received in Japan

## LEGISLATION

179
**Fertiliser Legislation in the United Kingdom**
*Fertiliser Feeding Stuffs J 65* (8), 248 (Apr 17, 1968)
Regulations added in 1968 to the Fertilisers and Feeding Stuffs Act include quantitative statements for any added micronutrients and for variations in N content of urea Nutrient additives are defined on an elemental basis, not as oxides or salts, and are B, Co, Cu, Fe, Mg, Mn, and Mo Limits in variation are one half the amount stated if the concentration is less than 250 ppm and three tenths if more than 250 ppm For urea, variation was set at 0 3% N on an absolute basis

180
**Effect of Regulation on Fertilizer Marketing**
H M Carter (Chevron Chemical Co , San Francisco, Calif )
*Fertilizer Marketing in a Changing Agriculture* (Held Oct 1 3, 1969, Memphis, Tenn ) Tennessee Valley Authority, Muscle Shoals, Alabama, pp 79 82
The fertilizer industry has been fortunate in that the regulations under which it operates have been generally fair and the regulatory bodies have been objective and competent Lack of uniformity of regulations among the various states has created administrative problems and increased costs For example, differences exist in designating primary and micronutrients, grade guarantees, and tonnage reporting Non uniformity of requirements among states in equipment licensing and safety standards has caused complications and increased cost at the Federal level, allowance of insufficient time to comply with certain regulations has caused confusion and higher costs

181
**Legal Aspects of Marketing of Agricultural Inputs—Fertilizers, Certified Seeds, and Pesticides**
K K Raman (E I D –Parry Ltd , Madras, India)
*Fert News 15* (12), 53 5, 63 (Dec 1970)
Laws governing the sale of fertilizers seeds, and pesticides are enumerated and the shortcomings in the enforcement of these laws are briefly discussed In respect to fertilizers, uniformity in sales tax law and levy of excise duty on the basis of nutrient content of the material instead of the ad valorum basis are suggested A plea has been made for the formation of a Seed Certification Agency which would be an independent body and not connected with either production or sale of seeds The recommendations of the Thacker Committee in regard to the use of pesticides in the country are discussed and it is suggested that sales and distribution of pesticides should be kept outside of the authority of the Drugs Act

182
**World Fertilizer Legislation and Tariffs Manual**
*Chem Ind (London)*, No 5, 135 (Jan 30, 1971)
The British Sulphur Corporation has recently published the ***1970 World Fertilizer Legislation and Tariffs Manual*** It details each country's various fertilizer tariffs and describes the implications of the various major international and regional economic organizations, such as GATT, EEC, EFTA, COMECON, LAFTA, UDEAC, and UDOA, and summarizes the continuing effects of the Kennedy Round negotiations The manual can be obtained from the British Sulphur Corporation Ltd , 23 Upper Brook Street, London W1Y 2BB

183
**Quality and Fertilizers**
R H Schwass (Massey Univ , New Zealand)
*ASPAC Food & Fertilizer Technology Center, Taipei, Taiwan, Ext Bull 12*, 29 pp (Dec 1971)
Most countries have passed legislation concerning the manufacture and sale of fertilizers but many developing countries in Southeast Asia still are contemplating quality legislation

These countries could benefit from a draft of suitable standards for the importation, manufacture, distribution, and sale of fertilizers It would be expecially desirable for all the Southeastern Asiatic countries to have the same standards (This bulletin was prepared from material presented at a seminar on Fertilizer Legislation conducted by the Food and Fertilizer Technology Center in September 1971 in Tokyo) Discussion by participants from several countries showed wide variations in the definition of fertilizer and indicated that tolerances in chemical composition would need to be larger in developing countries than in developed countries Similarly, the minimum quantity of fertilizer that could be sold without the material coming within the scope of fertilizer legislation should be much lower in developing than developed countries Labeling requirements need not be much different except that functional illiteracy in developing countries requires educational measures to supplement the labels Inspection in developing countries cannot be confined to the point of manufacture but must extend to all points in the distribution chain, including the itinerant merchant Inspection should be at irregular intervals Penalties for infringement of the regulations should be severe and enforced in order to prevent adulteration Agriculture, fertilizers and quality legislation in New Zealand is described and compared to trends in fertilizer use in Southeast Asia in order to show the need for the Southeastern Asiatic countries to adopt definite legislation

184

**European Economic Community Calls for Fertilizer Standardization**

*Chem Age (London) 104* (2738), 10 (Jan 7 1972)

The European Commission has presented the European Economic Community (EEC) Ministerial Council with a draft set of standards for approximation of the regulations employed in the fertilizers sector of Common Market member countries The Commission recommends that technical characteristics of fertilizers should be standardized within the EEC, particularly with regard to the composition, nomenclature, labeling and packaging of the products Lack of common standards is claims the Commission leading to a hindrance of the free traffic in fertilizers between EEC countries The Commission recommends EEC level action on the enforcement of nomenclature and composition standards for major single and complex fertilizers in the EEC area and the introduction of an EEC type, which would also follow marking labeling and package sealing standards Production tolerances would be permitted with regard to nutrient contents, though these would be within narrow margins While the existing draft concerns only single and complex fertilizers, further recommendations will be issued for liquid fertilizers and secondary and trace nutrients

185

**German Fertilizer Legislation**

R Schottler (Chemische Fabrik Kalk GmbH, West Germany)

*Taipei City Taiwan* Food and Fert Technol Center ASPAC Tech Bull No 3 57 pp (Mar 1972)

German fertilizer control laws are described in detail as a possible model for formulating similar control laws in developing countries

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**The Fertilizer Control Law of Japan**

*Taipei City Taiwan* Food & Fert Tech Center ASPAC Tech Bull No 4, 24 pp (Mar 1972)

The fertilizer control law of Japan is described in detail as a possible model for formulating similar control laws in developing countries

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**Fertilizer Laws for Developing Countries**

Y Ishizuka and A V Allo

*Food and Fertilizer Technology Center Asian and Pacific Council (ASPAC) Tech Bull No 5* 18 pp (ASPAC P O Box 3387, Taipei City Taiwan Apr 1972)

Guidelines are given for setting up fertilizer control laws and regulations in developing countries At a seminar on fertilizer control laws Tokyo Sept 1971 a resolution was passed calling for the preparation of model control laws suitable for adoption by developing countries However differences in degree of agricultural development social history and traditions and language made it impossible to draft regulations applicable to all developing countries If any ASPAC member country is considering the drafting of new fertilizer legislation or amending their existing fertilizer laws the Center is prepared to provide consulting services on request (See *IAS* 1304)

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**European Economic Community Drafts Fertilizer Standards**

*Nitrogen No 77* 12 (May June 1972)

Draft proposals on the elimination of technical difficulties in European fertilizer trading have been drawn up by the EEC commission The proposals lay down constituent levels and compositions for the most important types of simple and complex fertilizers in the EEC Those fertilizers conforming to the proposals will carry a designation EEC type fertilizers specially reserved for them An appendix to the EEC proposals fixes rules concerning the labeling and identification of these fertilizers

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**Fertilizer Control Law in U S A and India**

C S Rangachari (Indian Ministry Agr New Delhi India)

*Fert News 17* (7) 37 42 (July 1972)

The uniform fertilizer (model) bill of the United States and the fertilizer control law in some of the States of the United States are compared with the provisions of the Indian Fertiliser Control Order The differences between the two sets of laws and the scope for change or improvement in the Indian law are identified The object is to throw light on an area where closer attention is perhaps necessary in the interest of more effective and meaningful fertilizer control legislation in India

## SALES ORGANIZATION

190

**Australian Fertilizer Groups Consolidate**

*Fur Chem News 19* (471) 4 (Mar 12 1971)

Consolidating in the face of extremely depressed fertilizer market conditions the merging Australian Fertilizer Manufacturers, ACF and Shirleys Fertilizers Ltd and Austral Pacific Fertilizers Ltd are to form a joint marketing company ACF Austral Fertilizers Ltd The company will operate in Queensland parts of northern NSW, the Northern Territory, and the north of Western Australia ACF Austral will market and distribute the product range of Austral Pacific Fertilizers and all products sold by ACF and Shirleys,

including those of Eastern Nitrogen Ltd

191
**Australians Reform Joint Fertilizer Marketing Unit**
*Chem Age (London) 103* (2724), 20 (Oct 1, 1971)
South Australia based fertilizer producers have reformed their joint marketing scheme which broke up 3 yr ago Called Fertiliser Sales Pty Ltd , the formation of the company is seen as a further rationalization of the country's fertilizer industry

192
**Fisons to By pass Belgium Nitrogen Fertilizer Cartel**
*Chem Age (London 99* (2609), 8 (July 18, 1969)
A major marketing change in the selling of straight N fertilizers in Belgium has been initiated by Fison UCB, the jointly owned company of Fisons Ltd and Union Chimique Chemische A meeting between retailers and Fison UCB agents agreed that in future sales of N fertilizers would be directly to the trade in Belgium through Fison UCB's commercial division Previously all sales of straight N fertilizers in Belgium have been under the control of Cobelaz (Comptoir Belge de l'Azote), a centralized selling office responsible for the sales of all Belgium fertilizer manufacturers' N production The decision rationalizes the Fison UCB's marketing policy, which has been to sell directly to the trade in other Common Market countries as well as overseas

193
**Belgian Superphosphate Association Disbanded**
*Chem. Age 100* (2659), 4 (July 3, 1970)
The Association Belge du Superphosphate, Belgaphos, has been dissolved by agreement of its members Belgaphos was set up in 1961 by 10 Belgian companies for the joint sale of superphosphate The rules of the Association fixed each member's delivery quotas for sales in Belgium and for export sales, including those for the Common Market countries On the Belgium and Community sales markets, selling and invoicing were done directly by the members of the Association while in non member countries they were done by Belgaphos on behalf of its members Every yr Belgaphos evened out the prices of all sales by dividing the invoice total by the amount sold On completion of this calculation, the members had to pay each other the sums necessary for the equalization of the prices obtained, so that ultimately they all recovered equal prices for equal amounts sold

194
**New Company to Market Polyphosphates in W Europe**
*Chem. Age (London) 102* (2694 5) 24 (Mar 5 12, 1971)
UCB and Solvay have formed a joint company, called Fosal, for the production and marketing of polyphosphates in W Europe The companies announced their intention to form Fosal last yr The new company will take over UCB's existing polyphosphates plant at Zandvoorde with a 40,000 mt/yr capacity and construct a new 75,000 mt/yr polyphosphates plant at Solvay's Antwerp plant

195
**Alberta Initiative Promotes World Sulfur Cartel**
*Fur Chem News 20* (495) 5 (Sept 24 1971)
The first, but rather shaky, ndations of a world S cartel have been laid following pr tioning agreements between Alberta, France, and Mexico Although a number of producers have had grave doubts on a number of proposals a skeleton agreement has been reported whereby Canada would market 3 8 million ton of elemental S in 1972 France ' 9 million ton, Poland 1 4 million ton and Mexico 3 3 million ton, with the U S A between 6 4 million and 6 7 million ton These figures represent only about 55% of an estimated world consumption of about 30 million ton, the balance of which is met by pyrites and other nonelemental forms, and recovered S produced in the Middle East and Japan Two major factors stand in the way of Alberta's initiative on world S rationalization Polish S of exceptional purity is becoming increasingly popular on world markets as a sophisticated distribution network becomes operational and the establishment of an agreed world floor price for S U S noninvolvement in a floor price would pose severe problems for Canada and other participants in the plan, and any material sold in the U S A at lower prices than the floor level in the country of origin would obviously be open to swift anti dumping action The Federal Government's official line on S stockpiling is that any restriction program would maximize markets for nonelemental forms such as pyrites

196
**Europe Plans New Fertilizer Cartel**
*European Chem News 13* (334), 4 (June 28, 1968)
European producers of compound fertilizers are planning an export cartel in an attempt to alleviate over capacity woes UK producers have been contacted but seem unlikely to join Purpose of the cartel would be to stabilize (raise) fertilizer prices and handle negotiations with developing countries However, the 1966 prices of materials handled by Nitrex, Europe's N export cartel, were 30-40% lower than 1965 prices Since compound fertilizers are in less demand in developing countries than straight materials the new cartel will be of doubtful help to producers

197
**CFA to Give Up Fertilizer Sales in France**
*European Chem. News 15* (378), 4 (May 2, 1969)
A reorganization in he marketing of nitrogenous fertilizers has taken place in France Comptoir Francais de l'Azote (CFA) has been divested of its marketing function as far as metropolitan France is concerned, although the company will continue to handle exports of fertilizers The new arrangement as far as CFA is concerned was effective on June 1 this year A number of French ammonia and nitrogenous fertilizer producers have decided that they prefer to handle the marketing of their own products themselves as far as the domestic market is concerned As far as exports are concerned, CFA will continue to operate as it did previously, acting for all the companies which participate in it It is quite possible that CFA will cease to function even in this way, since there is another organization, Complexport, which handles exports of complex fertilizers and could easily take over the present activities of CFA

198
**EEC Commission Seeks Change in French Potash Monopoly**
*Chemical Age (London) 100* (2638) 7 (Feb 6, 1970)
France has been requested by the EEC authorities to change its potash arrangements Last year France carried out some liberalization measures that led to a slight rise in imports from other EEC countries, but the EEC still wants further steps. The end of import quotas left France with price-fixing arrangements and export restrictions. Specifically, the EEC calls on France to allow foreign firms to set up stocks in France, to set up sales companies, to decide their own prices, and carry out publicity Exports must be freed completely

199
**Charbonnages Will Manage Finalen's Fertilizer Plants**
*Oil, Paint Drug Rep 197* (21), 7 (May 25, 1970)
Societe Chimique des Charbonnages will take over the management of the fertilizer plants of Finalens in Northern

France Finalens is half owned by SCC Finalens is heavily engaged in N fertilizer production and has apparently felt keenly the current difficulties in that market The contract under which SCC takes over the direct management goes to December 31, 1981 In another move involving SCC, the fertilizer links with Pierefitte Auby are being separated These arose because of the complicated set of mergers which created the two groups In the future each will market its own materials SCC now has a production capacity of about one million ton/yr in compound N fertilizers and claims to hold 20% of the French fertilizer market

200
**French Fertilizer Cartel Approved by Euromart**
*Oil, Paint Drug Rep 199* (4), 5, 26 (Jan 25, 1971)
The European Community Executive Commission in Brussels has approved the continued operation of a French fertilizer export cartel, Supexie, provided all its operations are outside the Common Market area Before the restriction of its activities, Supexie handled all phosphate fertilizer sales for its members outside France The participating companies are Pechiney Saint Gobain, part of the Rhone Poulenc SA Group, Ugine Kuhlmann, Fertilisants de l'Ouest, and Estab Linet Under the European Economic Community rules, the participants have now agreed to drop the cartel arrangements for Common Market sales, so that they now compete individually in these markets

201
**French Fertilizer Industry to Coordinate Policy Through New Federation**
*Chem Age (London) 102* (2694 5), 8 (Mar 5 12, 1971)
Following proposals by leaders of the French fertilizer industry to adopt a national plan the country's trade associations for N, P, and compound fertilizer have set up the Federation Nationale de L'Industrie des Engrais In 1969 the fertilizer industry formed an association called SDAC to regulate sales It is believed that the body, although initially formed as a temporary measure, will now exist for at least several yr In spite of over capacity large amounts of material have been imported from east Europe Miscalculation by the producers on market needs meant that large increases in N fertilizer capacity were being constructed, but little attention was given to installing plant for the production of other fertilizers such as urea, triple superphosphate, and potash fertilizers The result is a lopsided fertilizer industry with a great excess of N fertilizers and still having to import many other types of material

202
**European Economic Community Accepts Italy's Fertilizer Cartel**
*European Chem News 16* (389) 6 (July 18, 1969)
A fertilizer cartel in Italy has been accepted by the EEC Commission in Brussels SEIFA of Milan will handle the selling of straight N fertilizers, simple and complex phosphate, and K fertilizers for the fertilizer companies in Italy as far as Italy and non EEC export markets are concerned The decision is in line with that handed down by the Commission in the case of Cobelaz in Belgium and Comptoir Francais de l'Azote in France

203
**Dutch Fertilizer Company Changes Marketing Strategy**
*Chem Mkt Rep 222* (23) 7 29 (Dec 5 1972)
A new marketing strategy is to be adopted by Unie van Kunstmestfabrieken BV (UKF) the Dutch fertilizer specialist to meet the situation in which today's big markets (Asia Africa, North and South America) are producing more of their own fertilizer requirements UKF will thus concentrate on exporting to countries closer to Holland In the 12 months prior to September 30 the company sold more than 2 5 million mt of fertilizer or some 2 5% of world consumption of N (in terms of N) The UKF share in world trade outside West Europe is an impressive 10% Set up in March this yr, UKF has plants at Geleen in South Holland at Pernis Amsterdam, and Ijmuiden Joint ammonia capacity stands at 1 million mt of N Bringing onstream of big new facilities at Geleen and Ijmuiden has enabled older plants at the two sites to be taken out of service The Pernis facilities have capacity for 145 000 mt of phosphoric acid ($P_2O_5$) UKF capacity for all types of fertilizer stands at over 3 million mt/yr

204
**Norsk Hydro to Market Qatar Fertilizer**
*Oil, Paint Drug Rep 197* (14), 7 (Apr 6, 1970)
Norsk Hydro of Oslo, Norway, will manage Qatar Fertilizer Company, the four way ammonia urea venture in the Arabian Gulf, and will market the firm's output Qatar Fertilizer-which is owned by the government of Qatar (63%), Norsk Hydro, Hambros Bank of London, and Power Gas Corporation of Stockton on Tees, England–will have a plant capable of producing 900 tons of $NH_3$ and 1000 tons of urea/d The facility, reportedly the biggest of its kind in the Middle East, will be located at Umm Said on the Eastern Coast of the Qatar Peninsula in the Arabian Gulf The unit is due to be in operation in mid 1972 Production will be based on the conversion of waste natural gas from Qatar s Western Dukham oilfield

205
**Thailand to Regulate Compound Fertilizer Imports**
*Fert Int* No 30, 2 (Dec 1971)
The appointment of a Compound Fertilizer Import Association for Thailand was expected in November, according to the information received by exporting sources The formation of such an association has been under consideration by Thai importers and sales organizations of European compound fertilizer manufacturers The association was to be a composition of three parties 35 such companies in Thailand, major foreign companies (including Japanese), and agricultural organizations The objectives of the association are quoted as being (a) to prevent excessive competition in local sales, (b) to ensure a 10% profit by the introduction of floor prices, and (c) to set up quality check organizations and to dispose of troubles concerning compound fertilizer imports

206
**United Kingdom Fertilizer Producers in Marketing Agreement**
*Chem Age (London) 103* (2728), 16 (Oct 29, 1971)
Two of the UK 's small fertilizer producers Lasco & Lindsey and Kesteven Fertilisers have joined together in a marketing agreement which will mean the take over of Lasco's Sangral horticultural fertilizers distribution by Lindsey and Kesteven

207
**Fertilizer Association for Independents**
*Agr Chem 24* (5), 54 (May 1969)
Independent Fertilizer Manufacturers of North America, Inc , a new organization, now has members from 14 states and Canada Membership is limited to independent fertilizer firms that are not suppliers or manufacturers of basic raw materials The group has taken two years to become formally organized, and is now incorporated in the state of Delaware The group is established as distributors, and is purchasing insurance, equipment, supplies, bags, chemicals, and other materials for

its members

208
**It Takes a Specialist in the World Fertilizer Market**
*Farm Chem. 133* (5), 30, 34 (May 1970)
There is enviable respect among fertilizer marketers for International Commodities Export Corp In the tough world fertilizer market, ICEC has built an enviable record, boosting sales from $5 6 million in 1960 to $43 million last yr With a small but aggressive organization, ICEC has been able to accomplish what larger companies have often found difficult, and sometimes, impossible–make a profit on fertilizer exports Founded in 1942 as a general chemical exporter ICEC began in 1947 to concentrate on overseas marketing of fertilizers and fertilizer raw materials The company handles combined tonnages of about 1,250,000 tons annually, and this sizable volume results in lower transportation costs By sometimes operating its own vessels, ICEC is able to drive down freight rates by combining several shipments in one bottom, or by making economical, long term shipping arrangements Mr Finley, ICEC's president states that in the 1950s, there was a tendency of large fertilizer suppliers to establish their own international sales organizations Some had a measure of success, others have since disbanded their int national units and are relying on specialists such as ICEC When the oil companies arrived on the scene in the 1960s, they immediately went out on their own in the world market They soon found out that buying and selling oil is not akin to selling fertilizers It was a bad, sad experience for most of them He sees encouraging signs of growing price stability, particularly in potash He also sees a better balance in supply and demand, primarily as a result of cutbacks in production by some U S N and phosphate producers The oversupply situation is also being somewhat eased by the delays of plants now under construction around the world to come on stream

209
**New Phosphate Rock Export Association Signs Its First Sales Contract**
*Fur Chem News 20* (506), 6 (Nov 12, 1971)
The Phosphate Rock Export Association (Phosrock), formed recently in Tampa, Florida by a consortium of major U S producers, has successfully negotiated its first sales contract which calls for the export of considerably tonnages to Latin America Member companies of Phosrock are American Cyanamid Conoco, W R Grace International Minerals and Chemical Corp , and Occidental Chemical Co

210
**Phosphate Rock Exporters Sales Office in Paris France**
*Chem Mkt Rep 202* (26) 20 (Dec 25 1972)
Phosphate Rock Export Association (Phosrock) has established a new European sales office in Paris in a move to expand service to customers in that region The association formed about a yr ago to promote the export of Florida phosphate rock on a worldwide basis has as its members Agrico Chemical Company American Cyanamid Company W R Grace & Co International Minerals & Chemical Corporation and Occidental Chemical Company

211
**Venezuelan Urea Marketing**
*Ag Chem Newsletter* 70 4 (Sept 1, 1972)
Woodward & Dickerson, Philadelphia, Penn is reported to be negotiating with Nitroven, who produces anhydrous ammonia and urea in a plant on Lake Maracaibo, Venezuela Woodward & Dickerson is hoping to receive an exclusive sales contract to market this plant's entire output, which consists of approximately 800 thousand tons of urea, plus some ammonia At present Nitroven is the only ammonia producer in Venezuela

212
**West Germany Further Integrates Potash Industry**
*Ind Minerals*, No 40, 33 (Jan 1971)
The latest development in the rationalization of the industry is that the sales organization of the entire West German potash industry–Verkaufsgemeinschaft Deutscher Kaliwerke GmbH (VDK)–has been integrated beginning January 1, 1971 It now forms the marketing division of Kali and Salz and is located as before in Hannover It will continue to be responsible for all West German potash exports Kali und Salz produces potash fertilizers, rock salt, K, and Mg chemicals The total 1971 turnover is expected to be in the region of 800 million DM, which will make the company one of the largest mining enterprises in West Germany, as well as one of the largest potash producers in the world The restructuring carried out over the past six months has enabled the potash industry in W Germany, in spite of costs and greatly increased competition, to maintain its position in the world market With exports of over 1 million tons of $K_2O$, it is the third largest exporter in the world

## MERGERS

213
**Australian Fertilizer Merger**
*European Chem News 16* (401), 60 (Oct 10, 1969)
Financial arrangements of the planned merger between Austral Pacific Fertilizers of Queensland and Cresco Fertilizers of Adelaide, are nearing completion The combined interests of both companies are to be channelled into a newly formed company, Argro Holdings, in which a portion of the equity will be offered to the Australian public Control of the company will, however, be in US hands Dow Chemical and Swift, will eventually hold 52% share in the new company The third US company involved in the deal W R Grace, has agreed to sell off it 79% controlling interest in Cresco

214
**Anglo Lautaro Plans Sale of Nitrate Assets to Chilean Governement**
*Chem Age (London) 102* (2707), 6 (June 4, 1971)
Reports from Chile suggest that Anglo Lautaro Nitrate Co is on the point of selling its holdings in the Chilean nitrate industry to the government Following the recent nationalization of Chile's major industries, Anglo Lautaro stated that it has agreed in principle with the Chilean development agency, Corporacion de Fomento de la Produccion, for the sale of the Angle Lautaro interest in Sociedad Quimica & Minera de Chile SA, the company which owns and operates substantially all the nitrate and iodine business in Chile

215
**New Fertilizer Company to be Established in France**
*Chem Age (London) 103* (2736), 4 (Dec 24 31, 1971)
La Generale des Engrais is the name of a new fertilizer company that is to be set up by Rhone Poulenc and Pechiney Ugine Kuhlmann to provide France's largest fertilizer group With an annual turnover of around Fr 1200 million, the

new company will produce about 3 5 million mt/yr of product, equal to 30% of France's overall production of fertilizers The new company will have nine plants in France as well as eight other plants producing sulfuric acid and phosphoric acid, one of which is in Belgium In addition it will have a holding in Zuid Chemie of the Netherlands Reorganization and closure of three plants at Tours, Petit Quevilly, and Nantes will help turn the fertilizer operations of the two companies into a profitable organization

216

**Japanese Companies Join to Stabilize Fertilizer Business**

*Jap Chem Week 12* (598), 3 (Oct 14, 1971)

Toagosei Chemical Industry Co recently reached an agreement with Mitsui & Co regarding establishment of a joint venture which will separate its compound fertilizers department and rationalize its compound fertilizers business Operation is to start July 1972 Name and executives of the new company are to be announced later Mitsui & Co will be in charge of sales and financial affairs of the joint enture, and Toagosei Chemical Industry will be in charge of facilities and production

217

**Mexican Government Company to Buy Esso Chemical's Fertilizer Operation in Central America**

*Chem Week 107* (8), 31 (Aug 19, 1970)

Guanos y Fertilizantes will pay more than $5 million for Esso's 96 8% interest in Fertica, which has plants in Costa Rica and El Salvador The combined capacity is more than 800 ton/day of fertilizer The company is building a $2 5 million fertilizer plant in Guatemala in partnership with the Guatemalan government and is said to be considering a similar venture in the Dominican Republic

218

**CRC Will Make and Distribute Fertilizers in Europe**

*Eur Chem. News 17* (431), 12 (May 8, 1970)

Central Resources Corporation (CRC) of New York, has been successful in acquiring the total business of Erste Nederlandse Cooperative Kunstmestfabriek (ENCK), of the Netherlands CRC, with headquarters in New York, is well established in the field of international shipping, distribution and marketing of fertilizers and fertilizer raw materials and has offices in Europe and Asia The acquisition of ENCK with its various subsidiaries brings CRC for the first time into the production sector of the fertilizer industry Within ENCK, Windmill Fertilizers operates a large phosphoric acid plant at Vlaardingen, on the Rotterdam waterway, and Deltachemie produces complex fertilizers on an adjacent site The total annual production of these plants exceeds 500,000 ton of product Although CRC does not operate any shipping between the U S and Europe, it has a wholly owned subsidiary in Holland–Transterminal NV – which operates a 50,000 ton bulk carrier on long term time charter between North Africa and Rotterdam, shipping regular cargoes of phosphatic rock At its Rotterdam site, Transterminal has storage facilities for 75,000 ton of phosphatic rock and warehouse facilities for the storage of 20,000 ton of granular product Chemie Gas is a marketing pool with refrigerated storage facilities for 12,000 $m^3$ of $NH_3$ There is land available at the terminal site for any expansion that CRC's entry into fertilizer production might cause Eurofert has extensive transport facilities It operates a seagoing $H_3PO_4$ tanker and a fleet of barges for the movement of phosphate rock On land it operates both rail tank cars for $NH_3$ and road tankers for $H_3PO_4$ Duringlast yr Windmill's sales exceeded $35 million and Transterminal and Eurofert together handled 480,000 ton of product

219

**Dutch State Mine-Shell Fertilizer Merger May Have Effects on Export Market**

*Chem Age (London) 103* (2728), 7 (Oct 29, 1971)

The merger between the N compounds division of DSM and the Shell Akzo Hoogovens fertilizer subsidiary Vereinigde Kunstmestfabrieken Mekog/Albatros NV will result in the creation of a fertilizer concern 'of world format' which could have a significant effect on a difficult export market The aim of the merger was to reduce cost price by coordination of production, research and transport, and by efficient management to promote sales by the consolidation and further extension of marketing channels

220

**Spain Merges Fertilizer Operations**

*Chem Week 111* (22) 22 (Nov 29 1972)

Instituto Nacional de Industria (INI) a Spanish government holding company has merged the fertilizer operations of three companies under its control The newly formed venture Empresa Nacional de Fertilizantes is owned 66% by Refineria de Petroleos de Escombreras which is owned 52% by INI Remainder of Fertilizantes is held equally by Empresa Nacional Calvo Sotelo and Empresa Nacional Siderurgica Steel The U S s Chevron and Texaco have an indirect interest since together they hold a 40% share of Escombreras Production capacities (mt/yr) ammonia 500 000 urea 175 000 ammonium nitrate 320 000 ammonium sulfate 200 000 ammonium calcium nitrate 198 000 Spain s Chemical Industry Minister Jose Llado says expansion plans call for additional investment of $67 million (probably in the next 5 yr) The Spanish government hopes the merger will spur the country s private fertilizer makers to rationalize their operations into a similar competitive unit

221

**Swedish Fertilizer Producers to Merge**

*Eur Chem News 17* (431), 38 (May 8, 1970)

The three major Swedish fertilizer manufacturers are to merge Forenade Superfosfat Fabriker and Svenska Salpeterverken will combine with Kvaveverket in a transaction which will involve S Kr 190 million To the new group the State Investment Bank is making a loan of S Kr 85 million Together the three companies will control about 90% of the country's production and meet about 70% of its demand A major proportion of the remaining fertilizer used in Sweden is imported from Norsk Hydro's works at Herøya and Glomfjord in Norway The Swedish government is not worried about the danger of a monopoly situation and is more interested in improving the efficiency of the three companies, none of which are large by international standards

222

**Shellstar Soon Will Be Wholly Owned by Shell**

*Oil, Paint, Drug Reptr 195* (22), 3 (June 2, 1969)

Royal Dutch/Shell Group, through its Shell Chemical UK, Ltd , subsidiary, is buying from Armour & Co , Chicago, that firm's 50% stake in Shellstar, Ltd , their jointly-owned fertilizer and agricultural chemical concern Shellstar is expected to start up soon a $50 million plant with a capacity for 750,000 tons/year of straight and compound fertilizers Heart of the Shellstar plant at Ince Marches, near Liverpool, is a 330,000 ton/year ammonia plant which will use British natural gas from the North Sea as feedstock The company's aim is to raise its share of the current UK fertilizer market

**Shellstar now has about 12% of Britain's fertilizer business, and it wants to increase this to around 20%**

223
**Tenneco May Buy Control of A & W**
*Chem Week 108* (14), 10 (Apr 7, 1971)
Tenneco, Inc may acquire control of British chemical producer Albright & Wilson if it exercises its stock conversion rights under a proposal to subscribe to a $42 million, 15 yr convertible loan stock to be issued at par by A&W The proposal needs a British government okay

224
**American Potash and Kerr McGee Merge**
*Com Fertilizer 116* (2), 13 (Feb 1968)
Stockholders of Kerr McGee Corp and American Potash and Chemical Corp approved the merger of American Potash into Kerr McGee Kerr McGee is engaged in the exploration for and development of oil and gas, U, and other natural resources American Potash is engaged in the production, manufacture, and distribution of a variety of chemicals for industry and agriculture

225
**U S Steel Steps Up Chemicals Push with Purchase of New Plants**
*Chem. Eng News 46* (7), 10 (Feb 12, 1968)
U S Steel is purchasing Armour & Co 's agricultural chemicals division to greatly enlarge its present capability in ammonium sulfate, anhydrous ammonia, and ammonium nitrate Among facilities to be acquired are three phosphate mines, two phosphate plants that produce ammonium phosphate and triple superphosphate, two N plants that produce ammonia and ammonium nitrate, and 26 mixed fertilizer plants Included in the sale will be Armour's selling operations in agricultural insecticides, herbicides, and fungicides U S Steel also is expanding its operations in other phases of chemical production

226
**Occidental Hooker Merger**
*Farm Chem 131* (4), 98 (Apr 1968)
Occidental Petroleum Corp and Hooker Chemical Corp plan to join forces An agreement in principle for the acquisition of Hooker by Occidental was announced by both companies March 21 Occidental's sales in 1967 totaled $825 7 million, Hooker's $364 5 million If approved by stockholders, Hooker will become a wholly owned and independently operated subsidiary, with Hooker management and personnel continuing in their present positions

227
**Swift Buys Mobil Oil's Farm Fertilizer Retail Facilities**
*Wall Street J 174* (88), 5 (Nov 4, 1969)
Swift & Co announced it has acquired the assets of the farm fertilizer business of Mobil Chemical Co , a division of Mobil Oil Corp Officials disclosed that Swift's own fertilizer operations have experienced a substantial turnaround in the past year and have been operating profitably, contrary to general industry conditions The transaction involves most of Mobil's retail fertilizer assets, which include its liquid and chemically mixed fertilizer operations and its marketing force However, Mobil Chemical said it will continue to wholesale fertilizer materials and to operate its N complex in Beaumont, Texas Swift will assume control of about 65 blending operations, 15 mixed goods plants and six redistribution warehouses, employing a total of some 1,400 persons Swift officials said they anticipate shrinking the assets obtained from Mobil Chemical to make them profitable Joseph P Sullivan, president of Swift's agricultural chemicals division, said the company expects to follow moves that it has been making in its own operations by eliminating areas considered obsolete and unprofitable He said Swift probably would be able to hire only about half of the Mobil operation work force

228
**Williams Brothers Co to Buy Fertilizer Units**
*Wall Street J 177* (56), 17 (Mar. 23, 1971)
Williams Brothers Co of Tulsa, Okla , a diversified oil and gas pipeline concern, said it signed a letter of intent with Gulf Oil Corp providing for its Williams Chemical Co subsidiary to acquire certain chemical fertilizer operations from Gulf The acquisition would be through a lease of plants and purchase of inventories and other assets The transaction, subject to definitive agreement and approval by directors of each company, will involve Gulf's plants at Donaldsville, La, terminal and storage facilities at Henderson, Ky and Blair, Neb , more than 20 service centers located throughout the Midwest, and related machinery equipment and rolling stock

229
**Florida Phosphate Firm Sold**
*Pit Quarry 63* (9), 34 (Mar 1971)
CF Industries Inc , Chicago, has acquired Central Phosphates Inc , Plant City, Fla CF Industries also owns and operates Bartow Phosphate Works, near Bartow, Fla

230
**CF Industries Acquires Central Nitrogen Interest in Nitrogen Complex**
*Oil, Paint Drug Rep 200* (2), 7 (July 12, 1971)
CF Industries, Inc , Chicago, has acquired all the outstanding stock of Central Nitrogen, Inc , Terre Haute, Ind , and has liquidated the corporation into CF Industries The facility will be known as CF's Terre Haute N complex Central Nitrogen operates a N fertilizer manufacturing plant in Terre Haute CF Industries has been responsible for the operation of the Terre Haute plant since 1967 and owned the manufacturing facility jointly with FS Services of Bloomington, Ill , Landmark, Inc of Columbus, Ohio, and Indiana Farm Bureau Cooperative Association of Indianapolis, Ind

## TRADE ORGANIZATIONS

231
**Fertilizer Industry Getting Gift of a Monthly Statistical Service from Nat'l Plant Food Institute**
*Oil, Paint, Drug Reptr* 194 (21), 3 (Nov 18, 1968)
The National Plant Food Institute will publish a monthly statistical service on fertilizer production, inventory, and disappearance The monthly report will include index values for sixteen products, and will also be concerned with imports and exports Tonnages and index values will be for five U S and two Canadian regions, as well as for the U S total Use of index values provides two distinct benefits, they provide a common basis for time trend comparison, as well as a means for a company to compare its position with that of industry Furthermore, it provides the capability of a company to enter or to leave the reporting system without disturbing the basis of comparison Participating companies are to file reports by the

fifteenth of each month, covering pertinent activity of the preceding month The service is available to any fertilizer company doing business in the U S, and Canada Total cost is borne by NPFI The sixteen fertilizer products include For N anhydrous ammonia, solutions containing over 32% N, solutions with 32% or less N, ammonium nitrate, ammonium sulfate, and urea, for phosphate liquid phosphoric acid, phosphate rock, normal superphosphate, and concentrated phosphate, for potash muriate standard, and muriate coarse, and for multi nutrient products base solutions, other liquid mixed fertilizers, diammonium phosphate, and dry mixed fertilizers

232

**NPFI and ANI Become Unified Fertilizer Group**

*Oil, Paint Drug Rep. 196* (24), 15 (Dec 15, 1969)

A new, unified fertilizer trade association has been created by the merger of Agricultural Nitrogen Institute with National Plant Food Institute to become the Fertilizer Institute on Jan 1, 1970 The action sets up an organization representative of all segments of industry from producer and manufacturer to dealer Current association programs will be broadened to serve the combined membership ANI, based in Memphis, Tenn has been in existence since 1950 NPFI was formed in 1955 by consolidation of American Plant Food Council and National Fertilizer Association

233

**UK Fertilizer Makers Study Production and Distribution**

*Eur Chem. News 17* (426), 6 (Apr 3, 1970)

A series of preliminary discussions about common problems in the fertilizer industry by Fisons, Shellstar, and ICI have been reported The UK Government is aware of these talks The discussions are said to cover (1) the need of the UK industry to have a stronger international competitive position, (2) assistance to farmers to help overcome difficulties with their working capital, (3) the avoidance of duplication of large plants, and (4) the improvement needed in marketing and distribution to reduce costs There is an implication that the companies are considering the effects of a merging of production capabilities and regionalization of distribution

234

**Fertilizer Companies Sign Agreement on Exchange of Information**

*Chem Age (London) 103* (2730), 8 (Nov 12, 1971)

After 18 months of denial the U K 's three major fertilizer producers, Shellstar, ICI, and Fisons, have at last formally announced their open secret that an agreement to exchange information about the U K fertilizer industry and its future had been signed Initially the agreement will be effective until 1981 The agreement will, said the three companies, confine itself to information about the size of the U K market, its likely growth and how this equates with existing production capacity and any plans for increasing capacity, taking into account estimates of imports and possible exports Marketing policies and practices, customers, and prices are not included in the agreement An exchange of information will allow existing capital to be efficiently used and also reduce the risk of overcapacity or premature investment This should help productivity and make more efficient use of the industry's cash flow and contribute towards the containment of cost escalation The Department of Trade and Industry, the Ministry of Agriculture, Fisheries and Food, and the NUF have all been informed of the agreement

235

**International Exchange of Information Among Phosphate Producers Sought**

*Chem Age 104* (2744), 6 (Feb 18, 1972).

An improvement of the international exchange of information on market prospects and capacity plans in the phosphates sector was called for by a 16-country conference which took place under the patronage of the United Nations in Geneva This would, according to a statement issued by the UN Conference for Trade and Development (UNCTAD), help to avoid a further deterioration of the current situation of surplus production in this field The UNCTAD statement drew attention to the serious effects on the economic and social development of developing countries who had relied on obtaining a considerable part of their foreign exchange earnings from phosphate exports The share of developing countries in world exports of crude phosphates had sunk since 1955, while those from developed countries had risen considerably The conference calls for measures to expand exports by developing countries by means of phosphate processing on the spot into such products as phosphoric acid Steps should further be taken to promote phosphate consumption in the developing countries themselves

## DISTRIBUTION SYSTEMS

236

**Fertiliser Distribution The Emerging Pattern**

M Subramanian (Ministry of Food and Agr , New Delhi, India)

*Fertiliser News 13* (3), [illegible] 1 (Mar 1968)

India's new policy is to allow fertilizer manufacturers to set up their own distribution systems The change is based on the belief that farmers will obtain the best service in a competitive market rather than one closely controlled by the government Companies establishing marketing organizations will be concerned with selecting and training local dealers and salesmen, providing soil testing services, ensuring quality products, and maintaining competitive prices The Fertiliser Association of India, a voluntary trade organization, is providing leadership in establishing and conducting various training courses that will help in the new marketing policy

237

**Changed Distribution Patterns Require New Marketing Concept Studies**

J P Rogers (Mobil Chemical Co )

*Com. Fertilizer 118* (6), 21 (June 1969)

There is a great need to improve agricultural chemicals marketing in its broadest sense – salesmanship, service, credit – logistics – advertising and promotion – the whole spectrum of activity In the past, growers used lesser amounts of fertilizer than they do today They didn't mind so much handling a few of those heavy bags This was the general picture of fertilizer marketing for many years The concern was, and is, to develop a market for these growing fertilizer tonnages We see a wide array of marketing techniques, distribution methods, and retail facilities It has been called by some an "era of scrambled marketing" Many fertilizer companies have built retail fertilizer stores Most of these are blend plants, some are liquid, and most carry the "farm service center" name This trend will continue with both company-owned and franchised dealer outlets However, there must be a definition of these levels of activity It is

mandatorily basic for successful marketing The lack of this basic of marketing is one of the major problems of the fertilizer industry today, equally important to excess capacity The truly franchised dealer will have an increasingly important position in this segment of our industry, provided producers make their franchise truly valuable to the businessman-dealer We are in a good basic industry and will find ways to work and service our way out of the problems we face

238
**Fertilizer Distribution—A New Approach**
R G Tagat and K K Bhandari
*Planned Selling* 7 (6), 34 6 (Dec 1970)
*F A I Abstr 10*, 1727
Management aspects of setting up retail units by fertilizer manufacturers on chain stores model are discussed to investigate how far the distribution of fertilizers can be linked up with other facilities The reasons for decline in fertilizer offtake are lack of promotional efforts, Government policy, and reluctance on the part of consumers to switch over to fertilizer use Establishment of retail units will mean decision on product mix, such as types of fertilizers and other inputs to be stored Cost considerations comprising capital and recurrent costs are important A different set of marketing organization will be required and territorial allocations have to be made wisely The system will open avenues for employment and quality of promotion will improve and become more effective since the manufacturer will be in direct contact with the consumer

239
**Fertilizer Distribution in the Philippines**
E O deGuia
*Development Center, Organization Economic Cooperation Development, Technical Papers, 139 pp* Paris (1970)
The fertilizer distribution system in the Philippines is examined against the background of the agricultural sector, government programs affecting food production, and the present status and future prospects of domestic fertilizer supply and demand Logistic factors, market limiting factors, and economy of scale factors are examined and recommendations made for improving the distribution system

240
**Real Time Computer Delivers Instant Information**
T C Parry
*Farm Chem 133* (3), 62 (Mar 1970)
A computer based on line real time system that delivers instant information at any point on a four state communications network has improved service and eased growth problems at Mississippi Chemical Corp—a fertilizer company built, literally, on growth The computer checks status records, determines whether any order can be delivered, updates all affected records, schedules shipments, and stores pertinent data in accounts It plucks shipping rates and applicable tax rates from its own memory, prepares shipping authorization, bills of lading and related shipping papers, and prints these on a terminal in the shipping department and/or at the warehouse from which the shipment is to be made When an order is actually shipped, the computer updates inventory as it may be affected at any of 500 shipping points At the end of the month, the UNIVAC—working automatically from its own records—prepares statements, and assembles monthly sales reports It updates all General Ledger accounts, prepares budget reports comparing actual performance against budgeted targets in each of 285 cost centers, and produces monthly financial reports within a few days after the close of the accounting period At the end of the season, the computer figures each stockholder's usage by product, applied margins by product, figures the amount of patronage due him, and writes patronage checks and statements

## DIRECTORIES

241
**BSC Publishes Fertilizer Atlas.**
*European Chem. News 16* (410), 6 (Dec 12, 1969)
The British Sulphur Corporation has published a completely revised third edition of the World Fertilizer Atlas which lists as of June 30, 1969, 640 ammonia plants, 280 phosphoric acid plants, 400 nitric acid plants, and 1500 fertilizer product plants The Atlas is arranged by continents and countries, and for each country maps have been prepared showing the location of each plant in relation to raw material mining facilities, principal railways, petroleum refineries, oil and natural gas fields, and pipelines There is a detailed list of companies with their established plants and all new projects, supplemented by data on production, consumption, and trade in the three major nutrients In addition, information is provided on major crops, total and cultivated land area, population, and GNP per capita

242
**World Nitrogen Plants 1968 1973**
Chemical Information Services
*Stanford Res Inst*, Menlo Parl, Calif, 164 pp (1969)
This volume is the first in a proposed Agrochem Economics series It lists the status of existing and planned synthetic ammonia, urea, nitric acid, and ammonium nitrate plants throughout the world Most of the information was obtained by survey in 1968 In 1969 the total world synthetic ammonia capacity was 48 7 million metric tons or 14 kg/person Capacity added by 1973 will be 21 million metric tons and per capita capacity will be 18 kg In the forepart of the book production capacity is summarized by region and country Most of the book is used for listing each known plant (actual and proposed) that produces ammonia, urea, nitric acid, ammonium nitrate, or calcium ammonium nitrate These individual listings show company name and plant location, yr on stream, annual capacity for each product, designer and/or constructor, basic process, other processing capacity (such as prilling and granulation rates), end uses, and miscellaneous remarks (such as probability of closedown)

243
**Soil Fertility—Fertilizer Research Summary**
*Natl. Plant Food Inst*, Washington, D C, 365 pp (Oct 1969)
The NPFI has reproduced the computer print out of USDA's CRIS (Current Research Information System) entries on soil fertility and fertilizers The land grant colleges and universities and various USDA stations have listed 985 projects in these two categories For each project is given the leader, objectives, progress report, and publications Three two way tables show the number of projects conducted in each state by crop, by type of fertilizer and lime project, and by type of soil plant relationship project Forages are involved in 90 of the 486 projects involving a crop and vegetables in 64 of the projects Of the 226 fertilizer and lime projects, only three deal with

liquid fertilizers and only four with fertilizer marketing. There are, however, 61 micronutrient projects and 67 related to some aspect of N fertilization Soil testing and fertilizer response studies together account for almost 50% of the soil plant relationship projects Pollution, with 14 projects, accounts for another 5% of these projects

244
**Directory of Fertilizer Production Facilities Part I Africa**
*United Nations Industrial Development Organization* Vienna Austria ID-44 1, 271 pp (1970) (Sales No E 70 II B 28 ) price $3 00
Concise, factual information about the countries of Africa and their fertilizer production facilities is provided by this directory The information for each country includes area population, average annual growth rate, gross domestic product (including its distribution among agriculture, mining, and industry), per capita income, cultivated land area by crop, annual consumption and production of plant nutrients, availability of feedstocks for fertilizer (natural gas, coal, lignite crude oil, phosphate rock, potash, elemental S, and pyrites), other mineral deposits, manufacturers of fertilizers (including size, location, and products of each plant), projected plants, and projected consumption of plant nutrients

245
**Directory of U S Ports Exporting Fertilizers**
C L Ahrens, W J Free, and W G Smith (Tennessee Valley Authority, Muscle Shoals, Ala )
*National Fertilizer Development Center Tennessee Valley Authority Muscle Shoals Ala Bull Y 14* 84 pp (Nov 1970)
A study on port facilities in the United States was conducted for the Agency for International Development This directory was compiled as a result of the study There are 61 ports listed in the directory equipped to export fertilizers Of these 13 are located on the East Coast, 33 on the Gulf and 15 on the West Coast The following subject areas are reported dock (or port) facilities, bulk fertilizer handling facilities and loading capacities bag fertilizer handling facilities and loading capacities, bagging equipment and rate of bagging, storage facilities for bulk and bagged fertilizers and plans for expansion A detailed description of each of the 61 ports is presented

246
**World Directory of Fertilizer Products**
*British Sulphur Corp Ltd* London, England, 78 pp (1971)
There are 304 fertilizer producers and 60 traders listed in this directory The directory is tabulated first on a regional basis (Western Europe, Africa, Asia, Oceania, South and Central America, and North America) and then by country For each producer, the directory provides mail address, telephone number, cable address, fertilizer products manufactured, and the trade names of the products Trader affiliation also is given There is a cross index for trade names and an alphabetical index for companies Nearly 50 different products are manufactured according to the directory but the only way to determine all the producers of any specific material is to inspect the product list for each company

247
**World Potash Producers**
*Ind Minerals*, No 42, 15, 26 (Mar 1971)
A summary of world potash production and location of principal mines are given West Germany has one of the oldest known potash deposits still being mined After World War 1, Alsace came under French control, this territory gave France large deposits of potash Other countries producing potash are Israel, Spain, Italy, E Germany, U S S R , and the United Kingdom Each of these export to the United Kingdom and estimates are that the United Kingdom will continue to receive imported potash

248
**World Potash Producers United States–Canada**
*Ind Minerals, No 41*, 15 27 (Feb 1971)
The United States and Canadian potash producers are listed by company, location, initial production, and annual capacity Potash production and trade for the U S (1965 70) and Canada (1965 69) are given for each yr Details of mining operations at most of the deposits in the U S and Canada are given

249
**Dictionary of Plant Foods '71**
*Meister Publ Co* , 37841 Euclid Ave Willoughby, Ohio 74 pp (1971)
This publication is revised annually in order to provide current information about fertilizers and their U S producers In the present edition, five pages are required to list the companies and locations of plants that produce various fertilizer materials such as anhydrous ammonia, ammonium phosphate, wet process phosphoric acid, potash etc Company trade names, product description, and market area are listed on a company by company basis There also is a cross index by fertilizer trade names The most extensive part of the book is the dictionary (60 pages) Most of the terms that relate to fertilizers are explained or defined The official definition of the Association of American Plant Food Control Officials is given when such exists Dictionary terms start with Acid Forming Fertilizer and end with Zinkox in between are alkyla ion acid, blast furnace slag, calcium nitrate urea den foliar diagnosis, and a host of others, Many terms are amplified by tables, such as the one for manure that provides the average composition of fresh manure from various sources or the one on potash that gives the composite analysis of 50% and 60% grades One of the most useful tables–and new for this year–is the four page listing of Who s Selling Micronutrients–and What They Are Offering For each micronutrient there is a list of the companies that produce or manufacture the nutrient trade name and description of products, and marketing system Thus, there are five sellers of B and 21 of Cu there is one basic producer of Mo and three additional companies that manufacture Mo fertilizers

## HANDLING AND STORAGE

250
**Bulk Delivery of Fertilizers (in Denmark)**
S Hojer Pedersen (Dansk Superphosphat Fabrik, Denmark)
*Phosphorus in Agr* , No 48, 29 34 (Oct 1967)
The bulk distribution and application of fertilizers in Denmark are described The area of Danish agricultural land is 3 million hectares and the consumption of commercial fertilizers in 1965 66 was 64 kg N, 18 kg P, and 51 kg K/hectare of agricultural land Distances from manufacturing plants to the farms are relatively small and most of the bulk shipment is by truck Some farmers, especially the larger operators, have appreciable fertilizer storage capacity to ensure its availability

at the proper time Under Danish conditions bulk delivery has many advantages

251
**Dual Use Ammonia Tank Developed**
*Oil Gas J 66* (8), 42 3 (Feb 19, 1968)
A new combination transport and storage container for anhydrous ammonia is expected to help ease a growing problem in moving anhydrous ammonia The unit is basically a 7760 gal (18 ton) container which meets specifications for ammonia service It can be transferred from the truck chassis to a rack or vice versa Harold C Hermann of General American Transport Corp described the versatile unit for the Chemical Marketing Research Association's Midwinter Con ference in Dallas

252
**Storage and Transportation — Today and Tomorrow — Ammonia Storage**
J A Lawrence (Central Farmers Fertilizer Co , Terre Haute, Inc )
*Agr Nitrogen Inst , Proc 18*, 145 7 (1968) Held Nov 18 20, 1968, Kansas City Mo
A large percent of ammonia produced is for use in fertilizer which is seasonal This creates a transportation and storage problem Much has been accomplished in modern transportation, large rail cars especially equipped for handling ammonia refrigerated barges, and now pipelines are being introduced Large storage facilities have been constructed at production points and in the market areas A continuing study is being made of modern facilities for transporting and storing of production from large efficient plants It is important to have fertilizer available for seasonal use

253
**Cost of Selling Nitrogen — Dry Nitrogen Material**
J E Wise (Gulf Oil Corp , Kansas City, Mo )
*Agr Nitrogen Inst , Proc 18*, 15 22 (1968) Held Nov 18 20, 1968, Kansas City, Mo
The cost of selling is divided into several functions (storage, transportation, terminal, and application) and by different forms of N (anhydrous, liquid, and dry) The cost illustration in table form indicates a much higher cost for anhydrous ammonia than for liquid and equally higher cost for liquid N over dry N fertilizers Most of the differences in cost of distribution were in storage and application

254
**Warehousing of Fertilisers**
P V Shenoi (Ministry of Food, Agriculture, C D & Cooperation, Government of India, New Delhi, India)
*Seminar on Fertiliser Marketing, Proc* , Fert Ass India (Held New Delhi, Dec 6 8, 1968), pp 239 41 (Apr 1969)
The sale of fertilizer is very much dependent upon timely availability of fertilizers and nothing can insure timely availability more definitely than a well distributed network of selling points, supported by storage areas Agricultural production cannot expand by an annual rate of 5% unless fertilizer consumption targets are achieved and fertilizer targets cannot be achieved unless there is an efficient distribution system The role of efficient warehousing in this connection can hardly be exaggerated

255
**Fertilizer Storage and Transport Technology**
*Japan Chem. Quart 5* (1), 68 (Jan 1969)
Japan's fertilizer makers are now tackling this problem of transportation in all earnest As a step in this direction, one or two manufacturers have begun studying bulk storage in large silos and bulk transportation, taking advantage of a urea anti-caking agent developed recently Methods of transportation and storage techniques are introduced with primary reference to urea Large silos and bulk carriers are regarded as capable of the most economical storage and transportation of fertilizers Bulk carriers are reportedly already in commercial service on the West Coast of the United States In the near future, urea storage in silos will be widely practiced to make effective use of plant area and reduce the storage cost at pier warehouses Following the development of silos a bulk carrier was put into service in Japan

256
**Fertilizer Packaging in all Plastics Bags**
S K Mukherjee, Duleep Singh, and S K Patankar
*Pap Seminar, Plastics in Packaging*, Calcutta Nov 29 30, 1969
*F A I Abstr Serv 9*, 1044
The technical and economic merits of plastic bags over the jute bags were studied by tests at Trombay It was found that plastic bags were cheaper and better than jute bags in many respects The problems of conversion from conventional jute bags to all plastic bags have been examined The extra expenditure involved in conversion will be more than off set by the low cost of the plastic bags The plastic bag definitely appears to be the fertilizer package of tomorrow

257
**New Techniques to Cut Cost of Bulk Handling**
*Chem Week 105* (19), 34-5 (Nov 12, 1969)
What can be done to make a materials handling system contribute to—rather than detract from—the cost-cutting potential of a large scale chemical plant? The world's two largest S companies have both come up with answers to this problem Freeport Sulphur last week described two innovations that it says are helping its Freeport Chemical Division's phosphoric acid plant near Convent, La One of the innovations claimed by Freeport is the use of dual arm, rotary action plow feeders in the barge unloading systems For the first time, according to Freeport, automatic reclaiming of stocked phosphate rock is handled entirely above ground Texas Gulf Sulphur's Phosphate Division is benefiting from two large, specially designed materials handling facilities twin bargeloading units at its Lee Creek, N C , phosphate mine and processing plant, and the $11 4 million ship loading terminal at Morehead City, N C

258
**Fertilizer Handling Advice**
*Fert Feed Pesticide 67* (1), 21 (Jan 1970)
Fisons have set up a fertilizer handling consultancy service covering the whole of Great Britain This was announced by the marketing director of Fisons Fertilizers at the company's Spreaders in Action demonstration held near Darlington recently The customer service has been introduced into Fisons' technical services because a great number of leading farmers had asked for help with fertilizer handling problems The Company has recently introduced a range of highly concentrated fertilizers offering specific analyses for individual vegetable crops. Under Topgro, the new range includes six fertilizers as follows 23 7 14 for processed sprouts, 23 15 8 for dwarf beans, 0 14-28 for peas, 12 12 30 for sprouts and carrots, 18 12-18 for beetroot, runner beans, cauliflower and winter cabbage, and 8 16 30 for broccoli and spring cabbage

259
**Fertilizer Filling Station for Fluid Fertilizers**
*Farm Store Merchand 13* (5), 35 (May 1970)
Fertilizer filling stations may be in store for farmers in the future Each user's needs would be supplied by metering various quantities from storage tanks The materials would be mixed as they are pumped into the farmer's tank. This prediction is based on the belief that use of fluid fertilizers, both clear and suspension, will continue to increase because they are easier to handle, cause less air pollution during production, are easier to place accurately as starter fertilizers, and can be applied more uniformly than solid or granular fertilizers Herbicides can be applied more uniformly in fluid fertilizers, mixing plant and storage costs are less for nonpressure liquids than for solid fertilizers or anhydrous ammonia, and small quantities of micronutrients can be more uniformly mixed and applied with fluids The future for pipeline transportation of non pressure N solutions seems to be bright In many ways, transportation by pipeline is less hazardous than the transportation of anhydrous ammonia by this means Terminal storage cost/ton of N is cut by half, and cost of installing pipelines is less than transportation costs of anhydrous ammonia

260
**Big Bags for Intermediate Bulk Containerization**
*Brit Chem. Eng 15* (7), 851 (July 1970)
A simple solution to intermediate bulk containerization problems is offered by a 70 $ft^3$ capacity PVC coated nylon bag (also available in synthetic rubber coated polyester fabric) with a tear strength of more than 200 lb single cut The top of the bag is fitted with a filter or air relief valve for dust free operation The base of the bag is conical and it folds in a steel pallet until unloading Pallets are supplied to users of the bags The bag is fitted with supple inlet and outlet sleeves which can be easily tied to provide an air tight and water tight closure The bag is lifted off its pallet by the fixed steel lifting collar and positioned for discharge The material is discharged by gravity The collapsed empty bag is folded and stacked with pallets for convenient transport or storage

261
**Containers for Delivery of Fertilizer**
H C Hermann, (General American Transportation Corp )
*Fert Progr 1* (3), 6, 8 (July Aug 1970)
Transportation methods and distribution systems are closely related Much progress has been made to lower the distribution cost of fertilizer transportation by the use of general and specialized barges, jumbo size hopper and tank car, pipelines, and unit train concept A secondary link of the distribution, getting material from the dealer to the farm, has received little attention Much can be done in this phase of the distribution, such as placing containers with fertilizer on the farm or nearby This will enable the fertilizer dealer to give each farmer better service and enlarge his area of distribution The '70s will be a period during which emphasis will be placed on a well developed dealer distribution program built around containerization and tied into a well designed intermodal transfer system

262
**U S S R Improves Fertilizer Distribution**
*Eur Chem News 18* (444), 12 (Aug 7, 1970)
Improvements are being made in the facilities for the storage and distribution of anhydrous $NH_3$ produced at the Severodonetsk chemical combine in the U S S R This yr will see the completion of an $NH_3$ store near the rail sidings which serve the Selskhoztechnika, the distribution center of the U S S R's agriculture industry Production of 82 3% N content anhydrous $NH_3$ has been carried out for a number of yr at the Severodonetsk chemical combine and a substantial part of the combine's output is distributed in rail tank cars to Selskhoztechnika, in the Lugansk region In order to improve the system of supplying settlements in the Lugansk region with anhydrous $NH_3$ from the chemical combine, it was decided to build an $NH_3$ store Another N fertilizer prepared at the Severodonetsk combine in large quantities is urea To decrease the distribution costs for this type of fertilizer, an experiment was carried out in which the fertilizer was delivered unpackaged in road tankers to nearby settlements All loading and unloading work was fully mechanized, the plant being especially equipped for this exercise with two loading lines to load the urea direct into the waiting road tankers After four yr of experiment the Severodonetsk combine's research laboratory have come to the following conclusions (1) that more attention should be directed towards the construction of transport and application machinery for anhydrous $NH_3$ and other liquid, synthetic N fertilizers, (2) that storage facilities for these fertilizers should be constructed near railway tracks by the Ministry of the Chemical Industry, (3) that the Selskhoztechnika should be equipped with machinery for the application of anhydrous $NH_3$, and (4) that urea should be delivered in non packaged form by road tankers or in special rail tank cars designed like those which carry cement

263
**Storage and Handling Costs for Anhydrous Ammonia in Relation to Variable Offtake and Storage**
A M M Brown (British Sulfur Corp , London)
*In International Symposium on the Economics of Ammonia Production and Distribution London, Eng* The Fertiliser Society, Proc No 117, pp 116 27 (1971)
Data are presented which show that, for large $NH_3$ terminals, fully refrigerated tanks are the most economical method of storage The size of the terminal is indicated almost solely by the size of the vessel used for transporting the $NH_3$ The choice of individual tank sizes and combinations do not affect the overall economics if the capacity of individual units is not less than 10 15,000 mt

264
**Some Recent Developments in Fertilizer Packaging**
W Miller (Scottish Agricultural Industries Ltd , Edinburgh, Scotland)
*Symp on Packaging and Handling of Fertilizers, Proc No 116,* Fertiliser Soc , pp 4 23 (1970)
The fertilizer packaging and handling units at the Leith plant of Scottish Agricultural Industries Ltd , modernized in 1968, are described Four different grades are handled, all $NH_4NO_3$ based The bulk material is stored in circulating dry air It is removed from the storage piles by a bulldozer and loaded onto belt conveyors which carry it to a scalping screen The screened material is discharged to a series of eight, 40 ton, hopper bins in a heated bagging house The bags are open mouth, 700 gage polyethylene holding 100 lb, held on the bagging conveyor by vertical side boards until the bags are sealed By using a bag vibrator during filling, a polyethylene saving of about 5% is obtained The filled, sealed, bags are palletized semi automatically and are usually delivered to the farmer on the original returnable wood pallets Equipment is described in detail (16 fig ) **The Plastic Sack in the Fertilizer Industry** B W Overton (British Visqueen Ltd ) *Ibid* 29-46 Development of the use of unsupported plastic bags for

fertilizer packaging in various parts of the world is described, with discussion of costs and bag design **Some Aspects of Mechanical Handling in the Fertilizer Industry** R E Worthington (Goulding Fertilizers Ltd) *Ibid* 47 74 Commercial methods for storage, handling, and transport of fertilizer raw materials and finished fertilizers are reviewed For bagged solid fertilizers it appears that shrink wrapped pallets may be the cheapest and most convenient method of storage and shipping from plant to farm A farm tractor equipped with a fork lift would remove the pallets from the truck The palletized fertilizer could be stored outdoors without risk and could therefore be delivered at any time

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**Improvement in Efficiency of Handling Bagged Fertilizer**

Julius Silverberg and C P Harrison (Tennessee Valley Authority Muscle Shoals Ala )

*National Fertilizer Development Center Muscle Shoals Ala Bull Y 31* 10 pp (July 1971)

A study was made for the purpose of improving the efficiency of handling bagged fertilizers shipped to the developing countries Emphasis was placed on the handling of hygroscopic fertilizers in 50 kg, 10 oz jute bags with loose polyethylene (PE) liners Limited tests of 50 kg woven polypropylene (PP) bags with PE liners also were made Best results were obtained with a novel TVA design comprising two concentric polyethylene liners The improvement is ascribed to the fact that when the bag of fertilizer is moved after being punctured with a hook the liners are no longer aligned but in effect are closed It was recommended that (1) test shipments be made of urea in 10 oz jute bags with double PE liners (2) consideration be given to test shipments in woven PP with single and double liners because PP is more resistant to tearing and does not lose strength when exposed to fertilizer salts or salt water and (3) a study be made of the feasibility of using smaller packages which might not be handled with the aid of hooks The costs of the 10 oz jute bags with double liners are estimated to be from 3 5 to 8 0¢ more than the cost of the currently approved jute bag with single liner Woven PP bags cost a few cents less than the jute bags Other changes that might help reduce fertilizer losses are (1) establishment of penalties and incentives, according to losses incurred, for crews handling fertilizers, (2) development of bags having specific hooking areas together with incentives for their use, and (3) the ultimate of eliminating, completely, the use of hooks

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**English Store Liquids in Free-Standing Lagoons**

D A Palgrave and J B Parkin (J W Chafer Ltd , Doncaster, England)

*Fert Solutions 15* (5), 44, 46 (Sept Oct 1971)

Over three fourths of the consumption of N solutions in parts of England occurs March through May but production occurs at a constant rate and storage is a problem Mild steel tanks for this storage require a sizeable capital outlay A suitable and much cheaper alternative is lagoon storage A lagoon can be constructed of precast concrete of the type normally used for the storage of bulk solids These 8 ft high modules are strapped together by a metal band and lined with butyl rubber sheeting, if necessary sheets are welded together on site Care must be exercised to avoid stress in the membrane until solution is placed in lagoon Excavating is desirable for increasing volume but excavation must not go below the water table because of extra stress on the membrane Open lagoon storage is most appropriate for storing intermediates which require dilution before sale At Chedburgh, where the annual rainfall is 25 in , a 32 0 0 N solution has never been diluted below 26-0 0 The estimated cost of this storage (excluding land) is $2 80 $5 60/ton of product stored

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**Fertilizers Consume Large Portion of European Economic Community Plastic Bags**

*Chem Eng News 49* (49), 21 (Nov 29, 1971)

About 4 4 billion sacks and bags were used last yr throughout the European Economic Community (EEC) Of these, 75% were made from paper stock, 20% from plastic, and the remaining 5% from jute, according to a survey just published by Business Intelligence Services, Ltd , in London Cost is an obvious factor in plastic's favor Kraft paper sacks have increased in price by as much as 30% over the past 5 yr, whereas polyethylenes (accounting for about 75% of the sack costs) have been getting cheaper by an average of 6 to 7% each yr Coupled with the declining price of plastics has been the intense level of their promotion by polymer makers Many of these same chemical companies also make fertilizers shipment of which accounts for more than 48% of plastic sacks currently used in the EEC About 77% of the sacks and bags sold in the EEC today are used for shipping cement, fertilizers, animal feed, and chemicals A weak spot in the future growth potential of the sack business is that bulk shipments are increasing

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**The Feasibility of Shipping Bulk Fertilizer Materials into Developing Countries**

T M Kelso, D R Waggoner, and P A Corrigan (Tennessee Valley Authority, Muscle Shoals, Ala )

*National Fertilizer Development Center, Muscle Shoals, Ala Bull Y 29*, 83 pp (July 1971)

The first phase of studies by TVA of the feasibility of shipping bulk fertilizer materials into developing countries (DC's) has been completed Shipment of urea was emphasized in the work because urea is becoming the most widely used N fertilizer and because urea is one of the more difficult fertilizer materials to ship, handle, and store in humid areas Also, for economic reasons, urea must be produced in conjunction with $NH_3$ production Thus, there will likely always be substantial long distance movement of urea Three bulk urea ocean shipments, including one into a DC, were evaluated The unloading operations were studied and documented Costs were estimated and compared with costs of bag shipment Problem areas were identified Bulk shipment of fertilizers, including urea, into DC's is feasible if suitable equipment is provided and is properly utilized Cost studies showed that shipment of bulk fertilizer from the United States to India or Pakistan should cost about $20/ton less than bagged shipment If the bulk fertilizer is bagged at the receiving port, total costs should be about $10 12/ton less than for materials bagged prior to shipping With the usual clamshell type of unloading equipment, loss of material due to spillage and degradation was substantial Some new concepts in shipping, such as self unloading vessels and vessels that can be loaded with bulk material and bagged en route, were investigated The Lykes and LASH (Lighter Aboard-Ship) handling concepts of transporting barges inside a mother ship were studied An investigation of the possible use of containerization for fertilizers was initiated All of these concepts have special advantages that may be attractive for movement of bulk fertilizer materials to and within DC's

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**Transportation and Storage of Fertilizers**

Coromandel Fertilisers, Ltd (Visakhapatnam, India)

*Fert News 17* (4), 23 7 (Apr 1972)
Moving fertilizers in bulk or bagged form from factory to the farm is a gigantic and complicated task in India The transportation and warehousing pattern is governed by two significant aspects of the fertilizer industry (a) while production of fertilizers is continuous, consumption is seasonal, about half of the product being sold in a 3 month period and (b) manufacturing units usually are near ports where primary raw materials can be imported, whereas the consumption centers are widely spread During 1973 74 over 16 million mt of fertilizer material must be transported Assuming the railways' share is 75%, the rail movement for 1973 74 amounts to 12 million mt Indian railways must equip themselves for this heavy traffic Until there are regional balances in the consumption of fertilizers, the economies of scale will require the manufacturers to seek markets throughout the country This results in a certain amount of long lead and cross movement that is unavoidable To meet the total transportation requirements, facilities for bulk transportation must be provided, both manufacturers and railways must become involved Warehousing is another important part of the physical distribution network because of bulk demand and seasonal consumption The manufacturers generally have a bulk storage capacity of about 10% of their annual production It is estimated that by the end of 1973 74, storage for only 1 6 million mt will be available for fertilizers as against the required capacity for 6 5 million mt The Government of India has appointed an Expert Committee on Storage to examine the needs of the country

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**Fertilizer Distribution in U S S R**
*Eur Chem News 22* (549 50), 13 (Sept 8 15, 1972)
There is considerable controversy in the U S S R over the distribution of fertilizers, according to a report of the inspectorate of Soyuzselkhoztechnika Several complaints about the quality and transportation of fertilizers are outlined As chemical plants manufacture more complex and concentrated fertilizers the quality and handling of the fertilizers becomes of prime importance There have been many problems due to the inconsistent standards, products have often arrived in the fields in lumps instead of powdered or granulated, in torn bags, without full markings, under weighing has occurred, and generally at a lower quality due to handling delays At present complaints are reduced now that the combine has a cooling installation so that the hot fertilizer no longer burns the bags, and has the weighing machine adjusted

## RAIL TRANSPORT

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**IMC Cuts Railway Car Loading Costs**
*World of NPKS* No 15, 17 18 (September 1967)
A unique loading system, consisting of electronic load cells, off tract storage of material, and an integrated system of automatic control and billing is now in use by International Minerals & Chemical Corp at Kingsford, Fla , for handling and weighing continuously, without uncoupling, rail cars of various capacities loaded with dry phosphate rock A train of more than 20 cars can be loaded, certified and billed by a single operator in a remote, automated control booth The system is the first one of its kind to be approved by any regional weighing and inspection bureau It was developed by IMC's engineers in collaboration with Revere Corp of America

272
**Union Tank Car Company Shows Dramatic New Tank Car Designs**
*Fert Soln 11* (6), 20 21 (Nov Dec 1967)
Changes in freight rates and distribution patterns cause technical obsolescence of tank cars Consequently, most cars are leased on a relatively expensive short term basis Union Tank's *changeable car* is designed to expand in length by insertion of ring sections at pre selected points to match new capacity objectives Long term lease benefits can result The cars also are designed to accept heavier trucks when needed and to funnel liquids to the center of the car for easier and faster cleanout Universal saddles and nozzles and a more efficient heating system are other characteristics of the new design

273
**Unit Trains Proposed for Shipping Ammonia**
*Chem Eng News 46* (3), 20 (Jan 15, 1968)
Unit trains, the railroad concept that has brought transportation economies to coal, have now been proposed by Missouri Pacific Railroad for shipping $NH_3$ With the lower shipping rates possible under the unit train arrangement the company hopes to stave off impending loss of business to large capacity barges and to the recently announced pipelines Since pipelining $NH_3$ will involve long term contracts, Mopac looks on any $NH_3$ committed to pipelines as lost to the railroads forever Rates proposed by Mopac would provide savings over present tank-car rates of \$3 50 \$5 00/ton of $NH_3$ The rates have encountered an objection, however in the first review, so other, protracted review procedures now go into effect

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**First Unit Train of Potash Has Been Delivered**
*Chem. Eng News* 46 (51) 19 (Dec 2, 1968)
The marketing battle on potash may be just starting International Minerals & Chemical Corp 's agreement to ship potash via the Great Northern and Burlington Railroads at lower unit train rates is now in effect (*C&EN* Sept 23, page 20) IMC expects to ship a unit train about every four days and move about 70,000 tons of Canadian potash/month from Northgate, N D , to the Midwest

275
**Economies in Transportation of Rail Barge Potash Shipping**
*Chem. Week* 103 (24), 52 (Dec 14, 1968)
Potash shipping costs could be slashed drastically if integrated rail barge service were put into effect Louis Fiore, Ohio River Co president, proposed at an AIChE meeting in Los Angeles a plan that would cut shipment costs from Saskatoon, Sask , to St Louis, Mo , from \$14 60/ton to \$10 15/ton The same concept would shave Saskatoon Guntersville, Ala , costs from \$17 77/ton to \$11 61/ton, a 34 6% saving The plan entails unit train shipping from mine site to a Minneapolis terminal that would be large enough to permit hopper cars and barges to operate at maximized utilization rates Barges would connect the terminal with those at St Louis and Guntersville, Ala Recently, International Minerals & Chemical began unit train potash shipments from Northgate, N D , to Minneapolis and to Beardstown and Mendota, Ill The unit train rate on the 519 mile Northgate Minneapolis haul is \$3 60/ton, a 56% cut

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**Unit Trains Trim Acid Costs**

*Chem Week 104* (11), 101 (Mar 15, 1969)

Canadian Industries Ltd has cut its sulfuric acid freight costs 30% by using a unit train between Copper Cliff and Courtright, Ont , a distance of 490 miles The 20 month experiment has proved so successful the company hopes to add 20 cars to the present 36 car train later this year to achieve even greater savings To qualify for the low unit train rates, railroad regulations require precise schedules for loading and unloading Unit train rates from CIL's 1200 tons/day metallurgical based sulfuric acid plant in Copper Cliff to the company's phosphoric acid plant at Courtright are $3 84/ton The rate for single train loads is $5 50/ton The unit train averages eight round trips each month, sometimes unloading at Hamilton, Ont , where CIL has a superphosphates plant Rate $2 68/ton, 40% below single-car rail rates

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**Unit Trains Carry Canadian Sulfur**

*Eur Chem. News 17* (415), 19 (Jan 16, 1970)

A unit train operation for the transport of S between Alberta and the Pacific coast of Canada has been started by Canadian Pacific Three 65 car trains have been scheduled to carry 5500 tons of S on each journey The cargo originates at Shell Canada's Waterson gas processing plant near Pincher Creek and it has been estimated that the use of such unit trains will reduce the freight rates by some 37%

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**New Sulphur Shipping System for Canada**

*Chem Age (London) 100* (2643), 22 (Mar 13, 1970)

Faced with falling prices as a result of over supply, Alberta producers of S have joined forces to devise a more efficient system of shipping S to export markets Known as the "Sulphur solid train operating and exchange plan", the system is expected to move more than 1 5 million tons of S from Alberta to west coast terminals during its first yr of operation The system was developed by Trimac Transportation System They will manage and operate the plan under contract with 24 S producers These producers previously shipped from 24 widely scattered points in Alberta, but with the new concept, only four of the largest plants will be unit train connected to the west coast where common stockpiles will be maintained from which all 24 S producers may draw for export sales

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**Rail Increase of 6% Proposed**

*Oil, Paint Drug Rep 197* (20), 4, 19 (May 18, 1970)

The Fertilizer Institute has labeled the proposed increase, now pending before the Interstate Commerce Commission, as unjustified and unfair Rail freight rates on fertilizer primary shipments (from production sites) have increased nearly 15% since 1967 while fertilizer prices have dropped an average of nearly 8% The Institute charges that rate increases in the past have not improved services, the fertilizer industry is forced to spend additional funds to purchase or lease rail equipment because of railway inability to service the industry during critical seasons Fertilizer remains one of the most profitable products handled by railroads, rail costs are estimated at $420 million/yr One rail revenue dollar in every 25 now comes from fertilizers Verified statements have been filed with the Interstate Commerce Commission on behalf of the fertilizer industry by institute transportation committee members and by transportation consultants

280

**Rail Freight too Costly for Fertilizers**

*Chem Week 107* (16), 17 18 (Oct 14, 1970)

Rail freight rates have shot up more than 25% in the past 32 months, and another increase is expected to be okayed by the Interstate Commerce Commission The railway companies say the additional 6 15% boosts they've asked for are desperately needed Producers of chemicals and fertilizers say they'd be particularly hurt by any additional rate increase because of present market conditions in their industries The Fertilizer Institute says its members paid $400 million in rail freight charges last yr and that the increases now requested by the railroads would inflate those charges by more than $60 million/yr This, the institute adds, would severely set back the fertilizer industry's prospects for profitability The traffic manager of one company, which now ships 55% of its chemical products by rail, talks about transferring some 20% of this volume to other modes The bulk of the chemical traffic diverted from the rails is going to private barging and to private and contract trucking operations The railroads are not giving up all this traffic without a fight They've launched a number of programs designed to give shippers all the benefits of rail transportation at relatively low ton mile costs Sulfur, potash, and phosphate rock are being shipped in unit trains (a unit train carries only one commodity, owned by a single shipper, and the entire shipment must originate at one point and generally must be unloaded at a single destination) Traffic specialists emphasize that a company shouldn't switch to alternate shipping modes without first examining its total distribution system The study should cover costs of warehousing, inventory control and local trucking, as well as the long distance freight rates

281

**Lower Multiple Car Rates on Superphosphates**

*Daily Traffic World*, No 19880, 3 (Oct 6, 1971)

Reduced multiple car rates on superphosphates and diammonium phosphates published by the Norfolk & Western and the Norfolk Southern railroads were effective Oct 2, 1971 The schedules establish new all rail annual volume multiple car commodity rates on superphosphates in carrier owned covered hopper cars, minimum 190,000 lb/car subject to 4000 net tons/shipment, from Aurora and Lee Creek, N C , to specified points in Illinois, Indiana, Iowa, Missouri, and Ohio The railroads said they published the new rates because the North Carolina shipper, Texas Gulf Sulphur Co , has lost 79% of its market for superphosphates in the last 2 yr Also, the railroads acknowledged, the low rate will assure additional traffic for them The commodity will move in 42 car trains from the Texas Gulf Sulphur facilities to a point in Ohio, where the trains will be broken up and distributed to points in the destination states The schedules were published by the Southern Freight Association

282

**Fertilizer Shipped in Unit Trains**

*Railway Age 171* (8), 13 (Oct 25, 1971)

Norfolk & Western began to move solid trainloads of fertilizer from the South to the Midwest Oct 14 The first 42 car train, carrying more than 4000 tons of superphosphate and diammonium phosphate, left Norfolk for Maumee, Ohio, a distribution point A minimum of 28,000 additional tons–seven more trainloads–will move under the plan from the Texas Gulf Sulphur plant at Lee Creek, N C , to distribution points in Ohio, Illinois, Indiana, and Missouri The plan calls for a minimum annual movement of 32,000 tons, or some 335 cars The shipments are made in 100 ton covered hopper cars The cars will be fanned out beyond the distribution points in lots of one or more to destinations in the surrounding areas

Because of the trainload volume, the fertilizer also can be economically unloaded and stored at the distribution points for final delivery as required

283

**Canadian Potash Producers Protest Freight Increase**

*Eur Chem News 22* (537), 11 (June 16, 1972)

Saskatchewan mining companies and the provincial government are protesting at a 70 cents/ton increase in the freight rates on potash shipped to Vancouver, on the Canadian Pacific coast The Saskatchewan Government points out that freight rates already amount to about 49% of the total f o b price of potash But the Government itself is about to take an extra $4 million/yr from the producers, in the form of a proposed 60 cents/acre production tax and an increase in the Mineral Acreage Tax from 10 to 20 cents

284

**U S S R Suffers from Lack of Fertilizer Transport**

*Eur Chem News 22* (556) 14 (Oct 27 1972)

The second Uralkali potash combine at Berezniki in the Ural region U S S R has been working at only 50% of capacity for the last 6 weeks because of a lack of rail wagons to ship out the product fertilizers According to a recent report in Pravda If an adequate supply of rail wagons is not forthcoming in the next few days production will have to be stopped completely or products will have to be stored in the open air A new third potash combine which is under construction nearby and expected to be completed in 1973 will add to the already critical situation At a smaller potash combine at Solikamsk which is also in the Ural region a similar situation also apparently exists In total the Uralkali combine has accumulated over 180 000 tons of potash fertilizers because of the shortage of rail transport At Berezniki the storage facilities for ammonium nitrate are also full and stocks of lime are also growing for the same reason It has been suggested that the River Kama be used for fertilizer transport but the ports are even more poorly equipped for the handling of fertilizers than the railways

## PIPELINE TRANSPORT

285

**2000-Mile Pipeline Planned**

*Agr Nitrogen News 17* (6), 58 (Nov Dec 1967)

The Gulf Central Pipeline Co has been formed with offices in Houston, which will build and operate an ammonia pipeline from the Gulf Coast to the Middle West Hy Byrd, president of Gulf Interstate Co of Houston, is serving as president of Gulf Central Pipeline The pipeline will operate as a common carrier and will offer its services to all ammonia producers and marketers Ownership of the line excludes ammonia manufacturers and marketers "This will insure that the pipeline will operate as an independent common carrier and thereby provide the most equitable and efficient service for all shippers," said Mr Byrd The investment in the pipeline and related facilities will total approximately $65 million and the initial capacity will exceed 1,500,000 tons per year according to Mr Byrd The line is scheduled to go into operation in the spring of 1969 The 2000 mile system will consist of a trunk line from Central Louisiana to Northern Missouri with laterals to the Gulf Coast ammonia plants and distribution laterals into the ammonia fertilizer consuming areas in Nebraska, Iowa, Illinois, and Indiana

286

**The World's Longest Ammonia Pipeline Goes Onstream in Southern Mexico**

*Chem Process 31* (1), 28 31 (Jan 1968)

Mexico's 150 mile $NH_3$ pipeline is now in operation The line has an initial capacity of 500 tons/day, later to be increased to 1000 tons/day $NH_3$ is fed into the line through a pumping station which has a total of six pumps three booster pumps operating in parallel (each with a capacity of 175 5 gpm) used to feed, and three horizontal centrifugal pumps which have a similar capacity and a discharge pressure of 960 psig The line has one intermediate pumping station located 75 miles from the primary station The intermediate pumping station is equipped with three horizontal centrifugal pumps in parallel These pumps have a combined output of 472 5 gpm at 947 psig discharge pressure The pumps are driven by internal combustion engines fueled by diesel oil The 6 5/8 in line connects Minatitlan (the site of 1200 tons/day $NH_3$ plant) with the Pacific Seaport of Salina Cruz

287

**Anhydrous Ammonia Pipeline to North Central States Seen Starting Distribution Revolution**

*Oil Paint Drug Reptr 193* (7) 3 (Feb 12 1968)

Anhydrous $NH_3$ distribution to the largest single consuming area in the U S the North Central States is about to undergo a vast revolution which will (1) put the lion s share of new $NH_3$ capacity into the Louisiana Texas area (2) possibly eliminate the need for construction of new $NH_3$ plants in the Upper Midwest and (3) cut back on the need for costly refrigerated storage during the off season How will this revolution come about? By pipeline This is the view of John J Lee vice president of sales of Gulf Central Pipeline Company Houston Tex He voiced this opinion before the Chemical Marketing Research Association in Dallas Tex recently The proposed pipeline will gather product from major $NH_3$ producing centers in the Texas and Louisiana Gulf Coast areas with a trunkline running North from a point near Alexandria, La through Central Arkansas and Missouri, terminating near the Missouri Iowa border Distribution will originate at the Northern end of the line, running in one section East to Illinois and Indiana and in another, Northwest into Iowa and bending West and Southwest across the Missouri River into Eastern Nebraska The pipeline operations will be subject to Interstate Commerce Commission regulations as a common carrier It costs from $24 to $28/ton to make $NH_3$ in the Gulf by the time it winds up with the farmer it costs an average of $96/ton after shipment dealer storage distribution to farm and other costs An $NH_3$ plant of 1200 tons/day on the Gulf Coast might put out materials at a theoretical $23 71/ton, whereas a unit of 600 tons daily in the Midwest might require a cost of $35 45/ton The smaller size of the Midwest plant is dictated by problems of storage plus the higher cost of natural gas and the lower operating rate factor In most cases, these added costs would exceed the freight differential for $NH_3$ transported from the Gulf Coast to the plant site in the market The component of outbound freight is the most expensive part of the distribution network, and it represents short haul and tanktruck movement Another major problem is that in the corn belt, most consuming areas are away from the river barge terminals Hence, a pipeline is the most feasible means of cutting distribution costs Construction of new $NH_3$ plants in the Upper Midwest is unlikely Future growth in consumption of N will be supplied by $NH_3$ plants

on the Gulf Coast, if complemented by a pipeline distribution system One current problem is storage of $NH_3$ in refrigeration Peak $NH_3$ use typically occurs in late May and early June $NH_3$, produced 365 days a yr, is used only about 5% of the yr, showing the magnitude of the industry's storage problem During peak seasons jumbo tankcars are used for storage, thus reducing the amount of rolling stock needed to move material The pipeline plan by Gulf Central will have built in surge storage tanks, thus enabling customers to take off what they need at given locations and eliminating costly storage practices The importance of the new distribution program for the corn belt states can be shown in 1966 consumption data Almost 50% of the total N consumption in the U S was in the twelve state area to be served by the line During the next 5 yr growth has been estimated at 10 20% a yr Predictions of growth range from 8 12% annually in the area Product upgrading facilities will be built increasingly in the market area Nitric acid N solutions ammonium nitrate, and diammonium phosphate will be manufactured from pipeline $NH_3$ Urea because of its need for $CO_2$ will remain an $NH_3$ satellite operation Its distribution however in solution with $NH_3$ in the pipeline holds a great deal of promise Similarly, other fertilizers can be expected to move in an $NH_3$ pipeline in the future as progress in materials handling is achieved specifically through encapsulation slurry and other techniques

288

**Ammonia Pipers Gain**

*Chem Week 101* (7) 53 (Feb 17 1968)

Monsanto Co (St Louis, Mo ) and Central Farmers Fertilizer (Chicago Ill ) have signed with Gulf Central Pipeline (Houston Tex ) for transportation of substantial quantities of ammonia in Gulf Central's pipeline (*IA 1* 113 114 115) Gulf Central formed by Gulf Interstate (Houston) Cabot Corp (Boston Mass ) and Loeb Rhoades & Co (New York) also expects Santa Fe Railway to become a substantial stockholder Three basic types of contract services will be offered to ammonia shippers The first is a base load service designed for those who can ship and receive ammonia all yr The second, which uses the shipper's own storage is designed to provide a shipper with a high rate of pipeline delivery during peak demand periods The third is a peak service plan that would also provide a shipper with a high rate of delivery during peak demand periods Unlike plan No 2 however, it would employ storage owned by the pipeline Other groups and companies also are considering pipelines for ammonia A group of ammonia producers called Coast Midwest Pipeline has been formed to make feasibility studies Hill Chemicals (Borger Tex ) and Mid America Pipeline (Tulsa Okla ) are considering an 850 mile line Arkla Chemical (Shreveport La ) also has discussed a line from its plant at Helena Ark , to distribution stations in Oklahoma Kansas and Nebraska

289

**Fertilizer by Pipeline Allied Shares New Approach**

*Oil, Paint Drug Reptr 192* (26) 5 28 (Dec 25 1967)

Allied Chemical Corp and Williams Brothers Co have developed a method for moving liquid fertilizers by pipeline The technique batches the fertilizer solutions with other products in the line in such a way that specification purity is maintained Pipeline transportation is substantially cheaper than other methods Allied plans to transport some of its liquids by this method in the 1968 planting season in the upper Midwestern states

290

**New Firm Eyeing Potash Slurry Pipeline**

*Oil Gas J 66* (8), 42 (Feb 19, 1968)

Western Products Pipe Line Co has been organized to build–if feasible– a $175 million pipeline to move potash from deposits in Saskatchewan to a Great Lakes port in the U S An oil or water slurry would be used for the movement Duluth, Minn , is perhaps the U S port and would be 750 miles from the point of origin The line would be at least 20 in diameter and could cut transportation cost 25 30%

291

**Shell Canada's 750 Mile Sulfur Line Advances**

*Oil Gas J 66* (11), 53 (Mar 11 1968)

The Canadian Parliament has approved Shell's 750 mile pipeline for moving S from Calgary to the Pacific Coast The 12 in line would cost $60 000 000 and would move 1600 tons/day of S in a crude or condensate stream The company will be incorporated as Commercial Solids Pipe Line Co and is committed to spend $1 000 000 for testing a 10 mile pilot line

292

**Feasibility Studies for a Third Ammonia Pipeline Are Nearing Completion**

*Chem Eng News 46* (20) 21 (May 6 1968)

The plan projected by Coast Midwest Pipeline Corp which was formed 1st October is for an $80 million common carrier pipeline the main line of which would run from Lake Charles Louisiana to distribution points in the Midwest Coast Midwest Pipeline based in Chicago was formed by a number of companies among them Cities Service Allied Chemical Olin Mathieson Chemical and American Oil Initial throughput of the line in 1970 71 would be about 1 million tons of ammonia per yr with an ultimate capacity of 2 5 3 0 million tons a yr

293

**Transportation of Potash by Pipeline**

Donald G Anderson and Raymond H Pfeihm (Esso Research & Engineering Co )

*U S* 3 384 419 May 21 1968 Appl Mar 31 1966 3 pp

A method of transporting granular potash consists of a suspension containing 38 42 5 wt % granular potash (KCl) in a saturated solution of $MgCl_2$ with 2 5 3 0 wt % attapulgite as a stabilizing agent Suspensions formed with granular potash in a saturated $MgCl_2$ solution are unstable but with the use of attapulgite, a suspension is formed which avoids previous difficulties with other stabilizing clays (cation exchange between $K^+$ which flocculates the clay is absent)

294

**Innovation Into Shipping of Ammonia**

*Farm Chem* 131 (11), 76 (Nov 11 1968)

October 21 is certain to become a milestone in fertilizer annals That's the day the first anhydrous ammonia moved through a pipeline to market The ammonia was delivered to MAPCO, Inc 's pipeline from Hill Chemicals Inc 's new 1000 tons/day plant at Borger Texas for transport to distribution terminals in Kansas Nebraska and Iowa Hill is now completing an 80,000 ton ammonia storage and distribution terminal at Early, Iowa

295

**Ammonia Transport Via Pipeline**

W A Inkofer (Gulf Central Pipeline Co , Houston, Tex )

*Chem Eng Progress 65* (3), 64 8 (Mar 1969)

A description is given of a long distance pipeline to transport anhydrous $NH_3$ from producers along the Texas and Louisiana Gulf Coast to the corn belt areas in Iowa, Illinois Nebraska, Indiana, and Missouri Engineering details are given with emphasis on safety features A study of the metallurgy required led to the selection of Grade X42 steel pipe (having a minimum yield strength of 42,000 psi) with a maximum Cu content of 0 15% This residual Cu is in solution in the steel and is not attacked by $NH_3$ The pipe size ranges from 6 and 8 in diameter for the laterals, to 10 in for the trunkline section the latter extending a distance of 548 miles The minimum cover is 36 in , increasing to 48 in where deep plowing is practiced

296

**Pipeline Transportation of Phosphate Rock**

L W Koch and D F Keller (to Continental Oil Co )

*U S* 3 471 204 Oct 7, 1969, Appl May 19 1967 4 pp

To prepare phosphate rock for pipeline transportation the ore is deslimed and separated into a 6 +14 and 14 +150 mesh fraction by usual wet methods The two fractions are then mixed with 30 70% of unsized deslimed ore and sufficient slimes to prepare a stable suspension containing 45 55% total solids and 2 6% slimes This mixture is pumped into a pipeline The mixture is deslimed at the discharge end of the pipeline by usual hydraulic methods

297

**Transporting of Fluid Fertilizer via Pipeline**

*Fertilizer Soln 13* (6) 7 (Nov Dec 1969)

In the early part of 1968 when Francis Henry, manager of product quality control for Williams Brothers Pipe Line Company, developed a successful technique for transporting liquid fertilizer solutions in the Williams Brothers system, fertilizer solutions entered a new and promising era Development of the transportation procedure came too late to transport the fertilizers to meet the demands for the 1968 planting season, however Williams Brothers was quick to make plans for the 1969 season Utilizing the new "on stream loading, and the recently completed barge facilities, Williams Brothers is ready to embark on a new record setting year in transporting liquid fertilizer solutions

298

**The Pipeline Arrives**

*Farm Chem. 133* (6), 20 2 (June 1970)

As late as 1967, even the most avid supporters of pipelining were predicting that it would be a least 10 yr before a system could become operational Ammonia pipelines now stretch from the Gulf Coast to the corn belt, crisscrossing the richest N market in the U S More than 225,000 ton flowed through the Mid America Pipeline system last yr Add to this 50 000 ton of 32% urea ammonium nitrate solution carried in the Williams Brothers' refined oil products pipeline system Gulf Central Pipeline is posturing itself to have its $NH_3$ pipeline in full operation this fall Williams Brothers anticipates pushing the first batch of 10-34-0 base solution through its pipeline in July There aren't enough trucks or tankcars to serve the market during those peak rush periods With a pipeline product is stored in the market place on a yr round basis and is therefore available in sufficient supply during the estimated 120 day period each yr when it is applied by the farmer More dependable delivery, reduction in cost of distribution on vol movements, and less paperwork in handling shipments are some of the reasons cited for using a pipeline The dedicated $NH_3$ lines may be joined in the future by potash pipelines and phosphate rock pipelines One company is now actively investigating pipelining of potash from the rich Saskatchewan fields Another pipe dream? Remember what happened with $NH_3$

299

**Gulf Ammonia Pipeline System Progress**

*Oil Gas J 68* (28), 56 (July 13, 1970)

Construction began last week on the final 300 mile portion of Gulf Central Pipeline Co 's 2000 mile anhydrous $NH_3$ pipeline system through the Corn Belt from western Iowa and terminating near Aurora, Neb The line, including the eight in main line, will be constructed in four sections and will be completed in September Contractors are Ohio Pipeline Construction, Natco Inc and Joyce Western Corp

300

**Pipeline Transportation of Liquid Fertilizers**

F N Larson and F B Henry (to Williams Brothers Co )

*US* 3 556 761 Jan 19 1971 Appl Nov 30, 1967, 3 pp

In transporting petroleum and liquid fertilizers by pipeline, the two fluids are separated by a two zone liquid buffer, the zones of which are soluble in the respective fluids and also in each other for example acetone or alcohol and water

301

**Study of Potash Transport by Pipeline**

*World Fert Review* No 4 44 (Sept 1971)

A great deal of interest is likely to be shown in a project being undertaken by the Saskatchewan Research Council (SRC) on new ways of moving solids through pipes It costs more to transport potash by train from the mines in Saskatchewan to Vancouver than for example by ship from Vancouver to Rotterdam The costs associated with the pipeline system are potentially very low perhaps one fourth one half cent/ton mile At present it is estimated that about $1 in every $5 of the Gross National Product is absorbed by transport costs

302

**Pipeline Planned for Australian Phosphate Rock**

*Mining Congr J 58* (4) 18 (Apr 1972)

A 200 mile pipeline is planned for carrying phosphate rock slurry from deposits in northwestern Queensland Australia to a deep water port on the Gulf of Carpentaria Broken Hill South Ltd plans to start mining and production in the late 1970 s (See *FA 5* 956)

303

**Sulfuric Acid Pipeline Will Link Complex with Port**

*Fur Chem News 22* (535), 14 (June 2 1972)

Construction is to begin soon on a pipeline linking the sulfuric acid plant at the Police petrochemical complex in Poland to the port of Szczecin Quantities of up to 1800 tons of sulfuric acid have in the past been loaded into tankers at the Superfosfat berth at Szczecin Larger quantities have had to be delivered by rail to ports such as Gdansk for loading into larger vessels In order to cut down the high costs incurred by these piecemeal transport operations the directors of the Police plant decided on the construction of the pipeline Plans for the laying of the line have already been completed by the Biuro Projektow Budownictwa Morskiego Projmors in Szczecin and construction of the line due to be started this month, is to be supervised by the Biprokwas organization of Police Commissioning is scheduled for the first half of 1973 Production of sulfuric acid at Police is expected to reach 1 million ton/yr during 1972 with the coming on stream of the second sulfuric acid unit at the complex Until recently,

Poland's total capacity was little more than this figure With completion of the various plants at Police, the complex will be producing more than 330,000 tons of mineral fertilizers/yr including Poland's only NP fertilizers This will follow the expansion of the present facilities in 1975, when two units producing ammonium phosphate (18N-48 $P_2O_5$) and a unit for nutrient fertilizers (8N 24 $P_2O_5$ 24 $K_2O$) are scheduled to be brought on stream

304

**Ammonia Pipeline to be Extended to Include New Plant**

*Chem Marketing Rep 201* (25), 4 (June 19, 1972)

Mapco Inc said it will build a six in common carrier anhydrous ammonia pipeline from the 1250 ton anhydrous ammonia plant that Farmland Industries Inc will build near Enid, Okla , to an existing pipeline southwest of Hutchinson, Kan Mapco said the pipeline will be 115 miles long and will have an initial transportation capacity of slightly more than 11,500 barrels/day The company said it is entering into a long term contract with Farmland to transport ammonia Contract terms and cost of the pipeline weren't released

## WATER TRANSPORT

305

**West Coast Storage Facilities**

*Chem Week 101* (27), 20 (Dec 30, 1967)

Collier Carbon & Chemical (Los Angeles) plans to build a $2 million bulk terminal, warehouse, and bagging units in the Rivergate Industrial District of the Port of Portland, Ore It will receive urea and $NH_3$ from Collier's $50 million chemical complex under construction in Alaska Material will be shipped in a 480 ft oceangoing barge now under construction, said to be the world's largest

306

**Ammonia Shipping Fosters New Competition**

*Chem Eng News 46* (6), 28 30 (Feb 5, 1968)

Barge shipment currently is the most economical way of transporting anhydrous $NH_3$, at least where barges can be used $NH_3$ pipelines may replace barges as the backbone of the distribution system Unit train–proposed by the Missouri Pacific Railroad–offers another avenue of competition and reduced shipping costs $NH_3$ transportation costs involve more than actual shipping costs Storage must be considered $NH_3$ plants operate yr round but most $NH_3$ is sold in only a few months in the spring Storage requirements and costs at transport terminals vary with method of transportation and significantly influence final delivered costs Most involved in current efforts to determine least cost transportation methods are the production area centered near New Orleans, Baton Rouge, Louisiana and the Corn Belt delivery area More than a third of U S $NH_3$ capacity is installed in the Gulf Coast and almost two thirds of direct application $NH_3$ is used in the Corn Belt

307

**IMC's New Potash/Phosphate Ship Spotlights Need for 40 ft Port**

*Florida J Com 10* (3), 12 14 (Mar 1968)

A new ship to be used by IMC for transporting fertilizer materials has a capacity of 46,500 long tons and requires 40 ft port facilities The port of Tampa, Florida, which serves many fertilizer plants, has a 34 ft channel, ships that need a larger one must enter and leave Tampa with less than full loads

308

**World's First Phosphorus Ship is Launched**

*European Chem News 13* (325), 42 (Apr 26, 1968)

The *Albright Pioneer*, first of two ships designed for transporting elemental yellow or white liquid P, has been launched by Swan, Hunter, and Tyne The ship will be used to transport P in 5000 ton loads from Albright & Wilson's new plant under construction at Long Harbour, Newfoundland, to A & W plants and other buyers in the world Each of the four cargo tanks for P will hold 1210 tons at a temperature of 60° C

309

**New Company for Transportation of Urea from Alaska**

*Japan Chem Week 9* (418), 3 (May 2, 1968)

Japan Gas–Chemical Co , and Mitsubishi Petrochemical Co have jointly established Sakai Fertilizer Co Ltd The new joint venture capitalized at 9 million yen, is for transportation of urea from Alaska to Japan The ammonia and urea plants being constructed in Alaska jointly by Japan Gas–Chemical and Collier Carbon and Chemical Corp of the U S are approaching completion and operation is expected to start in 1968 fertilizer year Sakai Fertilizer will build a relay base for export of urea brought from Alaska The base will be equipped with a pier, loading and unloading facilities, packing plant, warehouses, etc The company will bring back 12,500 tons urea monthly, for which a specialized carrier of 14,500 tons has been ordered from Nippon Kikan Kabushiki Kaisha

310

**$11 4 Million Transhp Installation Set to Transfer Phosphate Cargoes**

*Pit Quarry 60* (12), 26 (June 1968)

Construction of a phosphate terminal at Morehead City, North Carolina, state port, is nearing completion Texas Gulf Sulphur will barge phosphate mined in Beaufort County, N C , south on an inland waterway, to this special dock Interstate Barge Corp will operate specifically designed barges The phosphate will be lifted from the barges 1000 tons/hour The cargo can be diverted into a 600 ft long storage warehouse or directly to the ship loading dock

311

**Contract for 12 Million Ton Capacity Phosphate Terminal Let by Seaboard Coast Line at Tampa**

*Florida J Com. 10* (7), 6 8 (July 1968)

Seaboard Coast Line Railroad announced the award of a contract to McDowell Wellman Engineering Co of Cleveland, Ohio, to build a 12,000,000 ton/yr capacity phosphate terminal at East Bay Work will begin this summer with completion expected about September 1969 The terminal will operate at a loading rate of 3000 tons/hour Seaboard Coast Line will charge shippers using the new terminal a put through rate of $1 25/ton, which includes loading and trim of the vessel, blending, storage, and other service The terminal will be located adjacent to Port Sutton, site of International Minerals & Chemical's own phosphate terminal, which handles approximately 3,500,000 tons of outbound material each yr Seaboard Coast Line's new terminal reportedly will cost about $18 million and will incorporate the most modern concepts in car handling, car dumping, and ship loading to be found at any port in existence

312

**A & W Launches Second Phosphorus Ship**

*European Chem News 14* (339), 16 (Aug 2, 1968)
Swan Hunter & Tyne Shipbuilders has launched the *Albright Explorer,* second of two P ships for Albright and Wilson The *Albright Explorer* contains only two holds for elemental P, dry cargo can be carried in the other holds Like its sister ship, the *Albright Pioneer* (*Fa 1,* 878), *Albright Explorer* will be used from Long Harbour, Newfoundland

313
**Phosphoric Acid Shipping Enters New Phase**
*European Chem News* 14 (354), 22 (Nov 15, 1968)
The world's largest phosphoric acid tanker is scheduled to enter service this month Some 90,000 tons of phosphoric acid will be shipped in the tanker from Fertilizantes Fosfatados Mexicanos' fertilizer complex located near Coatzacoalcos in the Mexican Gulf to the Madras Fertilizer Company, of India The plant, due on stream towards the end of the year, will initially produce 400,000 tons/year of $P_2O_5$ compounds About 300,000 tons/year S material will be supplied by Pan American Sulphur from its Mexican concessions at Jaltipan Dome, in the Yucatan isthmus Producing phosphoric acid on site and then shipping it to the customer is a more economical method of producing phosphatic fertilizers For example, it is cheaper to transport two tons of phosphoric acid rather than to transport around three tons of phosphate rock and one ton of S to make the same product With these economies in phosphatic fertilizer production, more widespread shipments of phosphoric acid are likely to follow

314
**Storage and Transportation – Today and Tomorrow Barges**
F T Stegbauer (Southern Towing Co , Caruthersville, Mo )
*Agr Nitrogen Inst , Proc 18,* 162-4 (1968) Held Nov 18 20, 1968, Kansas City, Mo
Transportation costs represent a sizable percentage of the costs of fertilizers and offer one of the few remaining areas for cost cutting The technical advances in design and construction of barges offer barges tailored for many requirements They offer self unloading for liquids, temperature control as low as 50°F , tanks of all size and shape, various types of construction to control corrosion, complex electronic systems for environmental control, and other devices to provide custom made shipping space One of the modern towboats has the horsepower to move a tow of barges holding as much product as a thousand railroad freight cars More areas are opening up for barge shipment The proposed 253 mile Tennessee Tombigbee River project and others will be served by the barge industry as they are opened

315
**Florida's New Phosphate Terminal**
*Farm Chem 132* (2), 84 (Feb 1969)
A novel raw material transport system for Florida phosphates has been developed by the barge operations of Eastern Gas and Fuel Associates for the Freeport Sulphur Co The system provides dependable economical large volume movement of phosphate rock from Tampa across the Gulf of Mexico to Freeport s new agricultural chemical plant in Uncle Sam La For the next 15 years the barges and tugs are committed to transport up to 2 1/4 million tons of phosphate rock yearly Each tug and barge unit will make the 540 mile trip from Tampa to Uncle Sam and back to Tampa in approximately seven days Capacity of the terminal is 170,000 tons of wet phosphate in open storage and an equivalent amount of dry phosphate in covered storage Annual through put capacity is in excess of 10 million tons

316
**Urea Carrier Delivered for Alaska to-Japan Run**
*Oil Paint, Drug Reptr 195* (9), 31 (Mar 3, 1969)
What is reportedly the world's first carrier for transporting urea only, the 14,249 ton "Urea Maru," has been delivered to Showa Shipping Company of Japan The vessel will be used exclusively on the Alaska Japan route for transporting urea to Japan on a one round trip/month basis Main features of the vessel include both belt conveyer and pneumatic systems for loading and discharging cargo Enclosed systems, handling 540 tons/hour, permit loading and unloading operations to be continued during rain storms Specially designed holds are equipped with devices for the prevention of cargo solidification due to excess moisture The hull is reinforced against possible damage from ice

317
**Anhydrous Ammonia First Ship in Service**
*Oil, Paint, Drug Reptr 195* (12), 4 (Mar 24, 1969)
The first American flag vessel for coastal transport of refrigerated anhydrous ammonia has just been christened in Newport News, Virginia The 615 ft chemical tanker will operate between Gulf ports, principally Beaumont, Texas, and Delaware River and New York ports The ship will have a capacity to transport one million cu ft of chemicals–enough to make up a train of 10 000 gal tankcars more than five miles long

318
**Fertilizer Cargoes**
*Oil, Paint, Drug Reptr 195* (19), 9 (May 12, 1969)
The Agency for International Development has made a special study of fertilizers and has discovered that more than half of the f o b value of the fertilizers (53%) that it financed last year went to meet the costs of ocean transportation In some cases, it was more than equal to the product value The reason for this is that under the provisions of the cargo preference act of 1954, at least 50% of all commodity exports sponsored by the government must be carried in U S flag vessels The aim of the cargo preference law, of course, is to make sure that the U S merchant marine gets some of the business The problem comes in the fact that the estimated freight costs on U S vessels were two and half times more than the freight cost incurred on foreign vessels–$41 44/ton against $16 45/ton

319
**MAP Rocks the Phosphate Boat**
*Chem Week 104* (20), 90 (May 17, 1969)
What s the cheapest way to ship phosphates abroad? Swift & Co is saying there is a saving of 20% in transporting monoammonium phosphate (MAP) A study shows total cost of transporting MAP (10 5 53 0) plant to plant should amount to $11 19/ton, compared with $14 49/ton for 54% wet phosphoric acid The freight cost (sea trip of 5000 miles) is $7 50/ton for MAP (15,000 20,000 ton load) vs $11 27/ton for wet acid Costs of unloading MAP are $1 50/ton, acid is unloaded by pumps aboard ship and costs are included in the freight bill But cheap transportation costs are not MAP's only merits It can be used as a raw material for granular mixed fertilizers, as an intermediate that can be splived into existing diammonium phosphate and offers phosphoric acid producers an outlet for the extra dirty phos acid left after cleaning the wet acid stream Southeast Asia, Latin America, India, and parts of Europe are the major markets for proposed MAP exports, and the stakes are high

320
**Collapsible Pallet Mats and Disposable Slings for Cargo**

**Handling**

*World NPKS*, No 35, 19 (May 1969)

As world markets become more competitive and production increases, the need for fast, economical methods of dispatching and transporting fertilizers becomes more urgent To help meet these needs Miller Weblift Ltd , of London, has developed two new methods of handling bag cargo Both increase efficiency and reduce costs First is a collapsible pallet mat made of terylene webbing It incorporates tubular lifting gear which overcomes the problem of trailing ends, the chief disadvantage of conventional mats Miller Weblift has also designed a disposable sling for storing, transporting, and lifting By preslinging cargo with disposable slings, consignments remain in the sling from the time fertilizer is bagged until it reaches its final destination, which may be in another continent The reduction in handling time, speed of loading and unloading by the formation of these units reduces cost to both the supplier and the customer, as well as improving the service With the benefits that can be gained from both these systems prices can be made more competitive, delivery improved, and damage reduced Disposable slings and pallet mats that are already in use have proved very successful and have achieved the required standard of durability and economy

321

**Present Shipping Supply/Demand Balance May be Disrupted Next Year**

*Sulphur*, No 83, 9 (Aug 1969)

Under the stimulus of a revival in the chartering of tramp vessels for fertilizer materials, the May aggregate for the voyage sector was some 300,000 tons above that for the previous month, although still more than 1 million tons below the March total Rates of freight, where changed, tended to weaken, notably in the Transatlantic eastbound trades Over the past few years two very notable changes in cargo movement patterns have emerged—a significant diminution in the formerly all important routes from the East Coast of North America to United Kingdom Mainland European destinations, coupled with a massive increase in the volume of Japanese import traffics According to *World Freights 1968*, the proportion of world annual tramp ship liftings since 1963 represented by Transatlantic Eastward shipments fell from over one third to only 23% of the overall figure In this period the slice of global tramp fixtures represented by cargoes going into Japanese ports rose from 18% to 38% in terms of deadweight tons, and is still moving upwards An explanation of the latter phenomenon is simple It stems from the gigantic expansion in Japanese heavy industry, the commodities principally involved being iron ore and coal and at the same time, the higher living standards of an increasing population ensure a continuing and rising high level of imports of foreign agricultural produce The decline in shipments across the Atlantic is a little more complicated to explain In the first place coal chartering from Hampton Roads to this side, the lifeblood of the entire tramp structure in the decade which followed World War II, has virtually disappeared and months pass without a single booking being reported At present there is a rough equilibrium between the amount of cargo seeking shipping space and the availability of ships to carry it Although, on the face of things this indicates a satisfactory enough situation, fears are being raised on the London freight market that by 1970 the amount of new tonnage coming into commission, will be sufficient to produce another huge surplus of ships over cargo

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**FFM Ship First Major Quantity of $H_3PO_4$ from Mexico to Rotterdam**

*Chem Age (London) 99* (2619), 10 (Sept 26, 1969)

The first large volume shipment of merchant grade phosphoric acid recently docked at Rotterdam in the tanker FFM *Vassiyaure*, from the Fertilizantes Fosfatados Mexicanos (FFM) $55 million phosphate fertilizer complex at Coatzocoalcos, Mexico The 23,000 tons dwt tanker is owned by Grangesberg Oxelosund of Sweden and is on long term charter to FFM This ship has stainless steel tanks and equipment to enable the transport of phosphoric acid to be carried out in a state of suspension FFM have already asked for the conversion of two more Grangesberg ships into chemical tankers with conversions starting this month at Gotaverken, Gothenburg The cargo was discharged into one of three recently completed neoprene rubber lined rake agitated tanks each capable of storing 9000 tons of phosphoric acid at the Pakhoed Botlek terminal in Rotterdam FFM state that at present only short term contracts for phosphoric acid have been achieved in Europe, but long term contracts have been signed with Madras Fertilizers Ltd of India, Chemical Industries of the Philippines, and Austral Pacific Fertilizers Ltd, who are constructing a petrochemical complex financed by Dow Chemical Co , Swift and Co, and Australian investors

323

**Port Congestion in Indonesia Holds Up Fertilizer Distribution**

*Fertilizer Intern* , No 5, 2 (Nov 1969)

Chaotic conditions in Indonesia's internal transport and distribution system affecting fertilizer use are confirmed by reports reaching London from the Far East, most recently from Tokyo, according to which there is 200,000 tons of urea waiting to be distributed in ports and other key points Unless urgent measures are taken to move a good part of this quantity, little of this year's rice crop will receive N, which may prevent the desired increase in food production Indonesia badly needs The fertilizer should have been used by now, not only because the monsoon starts in October, but also because urea may not store well due to storage and climatic conditions Urea is the major source of N in the country's fertilizer consumption pattern and usage reached some 220,000 tons in 1967/68 About one half of this was supplied by the Pusri plant at Palembang In view of the large volume of material still in ports, the contracted deliveries still outstanding will probably need rescheduling by Nitrex and Japan and this may well have adverse effect on the 1970 purchasing program of Indonesia Without casting doubt on the large future potential, the consequences of the present situation are quite serious for Indonesia As of now the country has to rely on an inflow of foreign capital and goods, neither of which is forthcoming due to the precarious economic status of the country A number of effective measures will have to be taken before confidence is restored

324

**Florida Phosphate Industry Urging Go-Ahead on Tampa Bay Channel Project**

*Phosphorus Potassium, No 44*, 49 (Nov Dec 1969)

Spokesmen for Government, industry, and the Tampa Ports Authority have submitted facts and testimony supporting the proposed deepening of the Tampa Harbor Project At a public hearing in Tampa on June 27, 1969, the U S Army Corps of Engineers was summoned to determine the viability of the proposal and to provide an estimate of its cost Support for the project was also given by the director of the Manatee County Ports Authority, and by the executive director of the

Florida Phosphate Council To maintain the competitiveness of the phosphates from Polk and Hillsborough Co nties it was suggested that the harbor and entrance be modified sufficiently to allow the capacity loading of bulk carriers Otherwise, dead freight charges will result in increased transportation costs being levied against Tampa cargoes The phospnate industry in Florida has long been urging the implementation of this project as it has become increasingly aware that freight costs would, in the future, be a critical factor in determining the competitive status of Florida rock

325

**Reduced Fertilizer Activity on Freight Market**

*Nitrogen,* No 62, 9 (Nov Dec 1969)

Tramp freight markets, having remained steady during the summer months, despite a severe cutback in the volume of chartering, appear poised for an upward trend until at least the spring of 1970 So far fertilizer freights have not reflected the general upward trend, simply because markets have not been tested A useful pointer to the general state of things is provided by the key heavy grain traffic from the U S Gulf to Holland At midsummer this was worth no more than $3 40/ton on f i o charter terms Latest (mid October) chartering over this route was made at $5 50/ton Even more impressive is the rise in values for the conventional tramps, ships from 10,000 to 15,000 tons, on which the international nitrogenous fertilizer traffic leans heavily

326

**New Phosphate Rock Carriers for Japan**

*Fert Int , No 7,* 5 (Jan 1970)

Two new phosphate rock carriers, one of about 46,000 tons dry weight and one of 56,000 tons dry weight are due to enter service in June July and August September respectively The first mentioned will deliver to Nihon Rinsan and the second to San Chemical (Niigata Fertilizer Kombinat), in Japan Cargoes are guaranteed by Nihon Rinsan and by Zenkoren for San Chemical For the bulk carrier for San Chemical, Zenkoren plans to load Canadian potash on its way from Japan for delivery to the Gulf area but there may be some reappraisal of this scheme in view of the Saskatchewan (Canada) State Government's regulation of potash production Phosphate rock shipments under the aegis of Zenkoren are planned to begin in October or November The planned assignment of the carriers for Nihon Rinsan and San Chemical is considered as a logical step in the rationalization of the marine transportation of phosphate rock Yet to be solved is the question of the handling of bulk cargo arrivals from the carriers, while the future production pattern of Nihon Rinsan is the concern of all local fertilizer interests

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**Super Barge for Ultramar Chemical**

*Galveston News 128* (351), 1 (Apr 2, 1970)

Kelso Marines Super Barge *Hawaii* built for Ultramar Chemical Company, Honolulu, Hawaii was launched April 1, 1970 This 430 ft long barge will make eight or nine round trips/yr between Hawaii and the mainland of the United States The vice president and manager of Ultramar, who's primary business is the blending and distribution of fertilizers in the Hawaiian Islands, said the five plants on four major islands with blending and distribution points would be supplied by the barge It will pick up its cargo from mainland ports where it will be brought from sources in California, Idaho, and Canada This will institute the company's own transportation system in order to better serve their customers The barge will provide the Islands with the first dependable service from the mainland and keep their product inventories at levels that will assure growers of its availability Hilo Transportation and Terminal Co will operate the barge A newly constructed tug will tow the barge to Hawaii and will be used with the barge on its trips between Hawaii and the mainland This barge is equipped with newly designed methods never before proven in the construction of barges The barge is designed with a modified spoon bow with a punching notch on the stern and full depth skegs Her hull dimensions are 430 by 80 by 29½ ft A cargo house is located above the main deck and its dimensions are 330 by 80 by 25 ft, allowing for 550,000 $ft^3$ of cargo space There are seven cargo compartments in the deck house, fitted with rolling hatch covers The barge weighs 5000 tons and has a deadweight capacity of 18,000 tons with ballast and liquid cargo tanks in the hull A power plant makes it completely self sufficient for discharging liquid and dry cargo

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**Phosphoric Acid Cargo for Australia**

*Oil, Paint Drug Rep 197* (14), 5 12 (Apr 6, 1970)

The tanker *Vassiyaure* made it from Mexico to Brisbane, Australia The cargo was $H_3PO_4$ which could quite easily eat away a ship, except that the *Vassiyaure* is constructed with special stainless steel tanks to carry the product She lays claim to being the world's first vessel specially built to haul this demanding chemical commodity around the world Her owners also say she is the largest ship in the world carrying $H_3PO_4$ The *Vassiyaure*, which berthed at the Gibson Island wharf of Austral Pacific Fertilizers, Ltd , brought into Brisbane the first shipment of $H_3PO_4$ for Australia Traditionally, fertilizer manufacturers have produced their own $H_3PO_4$ That has meant a special plant and has called for the shipping of two components, S and phosphate rock, over long ocean distances Fertilizantes Fosfatados Mexicanos SA, the Mexican shipper, has pioneered a new world concept that promises to cut fertilizer production costs dramatically FFM is shipping to world fertilizer manufacturers the actual, finished high quality $H_3PO_4$, sludge free FFM established a $60 million $H_3PO_4$ plant at Coatzacoalcos, on the Gulf of Mexico, in the State of Veracruz, close to existing S and rock phosphate deposits Its capacity is 550,000 metric tons of $H_3PO_4$ and 204,000 metric tons of triple superphosphate/yr and is reportedly the world's largest fertilizer export complex FFM is shipping $H_3PO_4$ to Rotterdam where it has established its own storage terminal Sales have been made through the Rotterdam terminal to France, Sweden, the United Kingdom, Germany, Holland, and Ireland FFM recently signed a $10 million/yr contract to supply $H_3PO_4$ for fertilizer manufacture in Madras a major step toward helping solve India's hunger problem The firm also has just agreed to supply 24,000 tons of $H_3PO_4$/yr to Ecuador Tank terminals are now being constructed at Santos, Brazil and Rijeka, Yugoslavia Three specially fabricated, neoprene rubber lined tanks have been installed at Gibson Island, Austral Pacific's complex They take the $H_3PO_4$ which FFM will ship in a shuttle service from Mexico The three tanks have a total capacity of 30,000 tons

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**Phosphate Rock Delivered by Nuclear Ship**

*Phosphorus Potassium* No 47 48 (May June 1970)

The *Otto Hahn* West Germany s first nuclear powered cargo vessel has been employed for transporting phosphate rock Chartered for two voyages by Montan Transport GmbH, the *Otto Hahn* loaded 8500 ton Moroccan phosphate at Safi on March 4, discharging it three days later at Hamburg, and

returning to Morocco for a second cargo The phosphate rock is understood to be destined for consumers in East Germany

330
**Norsh Hydro Runs New Fertilizer Ships**
*Eur Chem News 17* (437), 14 (June 19, 1970)
Norsk Hydro has begun operation of a new system for the transport of fertilizers within Scandinavia Contracts have been placed for three specially designed pallet carrying ships, each capable of carrying 1000 ton of fertilizer Norsk Hydro at present transports some 80% of its fertilizer production by sea With the introduction of modern loading and discharging methods, side ports vessels and the truck to truck system, it is expected that these new pallet-carriers will be able to make more voyages/yr than were possible with the conventional vessels

331
**Florida Phosphate Market Handling in Balance**
*Florida J Commerce 12* (9), 12 13, (Sept 1970)
The United States is rapidly losing its grip on world phosphate markets and may find itself shut out from $350 million/yr additional export business unless the Tampa, Fla harbor is deepened to 44 ft The picture was presented to Congress July 29 by a delegation of Tampa businessmen seeking authorization of a $102 800 000 channel deepening project in their port The present 34 ft Tampa harbor is the shallowest port in the entire world for both exporting and importing phosphate rock Port Authority Chairman told the Senate Public Works Committee While the United States is a favored source of supply for many of the world s largest phosphate buyers due to stability of government in this country, the large firms of Western Europe and Japan are filling a lower percentage of their requirements from the U S due largely to the higher cost of transportation from Tampa harbor

332
**Australian Shipping Company Will Use $H_2SO_4$ Carrier**
*Eur Chem News 18* (454), 12 (Oct 16, 1970)
A sulfuric acid carrier, the 6000 ton *Silverharrier,* has been handed over to the Ship Mortgage Finance Co Ltd , of London Sulfuric acid will be carried in two 3000 ton capacity tanks Elaborate safety systems have been built into the tankage and all pipelines with the result that cargo can be safely loaded at a rate of 1000 tons/hr and unloaded at 500 tons/hr

333
**Anhydrous Ammonia Sea Shipment to Triple by '77**
*Oil, Paint Drug Rep 198* (25), 3, 46 (Dec 21, 1970)
Anhydrous ammonia is taking to water The director of economics for the Agricultural Chemicals Group of W R Grace & Co , New York, predicts that long distance water born merchant ammonia shipments in 1977 will range from 4 5 million to 6 million short tons He predicts that, through 1972, volume will fall to around 1 5 million tons, but that with the next phase of world expansion, in 1974 to 1977, export oriented plants will be more important During the past yr, some 2 million tons were moved by seagoing vessels There is a strong potential, as yet untapped, for anhydrous ammonia as a low cost fertilizer in Western Europe He cites the rapid rise in the U S of direct application chemicals, as contrasted to use of mixed fertilizers, which has plateaued He uses two main arguments to show that interocean ammonia trade will increase First is that there will be increasing use of direct application N throughout the world–and in some areas where production facilities are not available or feasible Second reason for an increase in water shipments of ammonia is that in large oil producing areas where natural gas is now flared, since it is not consumed nearby, the gas will be converted to ammonia for offshore movement

334
**New Technique Used to Reduce Transportation Cost of Fertilizer**
*Agr Chem 25* (12), 12 (Dec 1970)
The Andersons Co , Maumee, Ohio, has been trying to reduce fertilizer costs by using the Port of Toledo, the cost of transportation being about half of the total cost of fertilizer To reduce shipping costs, the firm began bringing phosphate pellets through the St Lawrence Seaway from processing plants in Mexico, shipping by water being less A new method was put into use this yr Phosphate pellets from processing plants in Louisiana are sent by barge up the Mississippi River to Chicago, then transferred to lake freighters and sent through the Great Lakes to Toledo

335
**Water Rights Granted for Hauling Liquid Fertilizer**
*Daily Traffic World,* No 19696, 2 (Jan 13, 1971)
The Motor Carrier Board of the Commission has granted Bulk Food Carriers, Inc , San Francisco, Calif , temporary authority to operate as a contract carrier by water, by non self propelled vessels with the use of separate towing vessels, in the transportation of liquid fertilizer, in bulk, from Geismar, La , to San Diego, Los Angeles, Long Beach, and San Francisco Bay ports, Calif , and Portland, Ore Temporary authority was granted January 13 to be effective from February 1 through June 30 (See *FA 4* 663)

336
**A Case Study of the Feasibility of Shipping Bulk Urea Fertilizer Under Tropical Conditions**
J T Shields
*National Fertilizer Development Center,* Tennessee Valley Authority, Muscle Shoals, Ala , Bull Y 19, 16 pp (Feb 1971)
This report documents the technical and economic aspects of a bulk shipment of urea fertilizer from Kenai, Alaska to Jurong Wharves, Singapore Upon discharge the urea was hand bagged and transshipped to coastal ports in Indonesia Data indicate it is technically and economically feasible to transport urea in bulk under tropical conditions Cost estimates indicate that bulk urea can be delivered from U S to Asian ports $19 22/mt cheaper than bagged material Good handling practices and precautions are discussed

337
**Japanese Firm to Build Ship for Exporting Sulfuric**
*Jap Chem Week 12* (593), 1 (Sept 9, 1971)
Nippon Mining Co recently decided to build a sulfuric acid carrying tanker to extend exports and rationalize transportation system for the product, and is to make detailed plans shortly Its own tanker building plan is now of urgent necessity to the company The previous export inquiry from the Philippines amounting to 8000 tons has not been realized due to transportation problems With the advancing swift change of demand structure for sulfuric acid, ever increasing needs call for rationalization of the transportation system to secure a large export tanker capable of loading more than 1000 tons as well as a coastal navigation tanker of the 500 1000 tons class for Tomakomai's project

338

**Ocean Shipping of Ammonia—Costs and Forms of Contracts**
C Marner (Mundo Gas S A , Bermuda)
*In International Symposium on the Economics of Ammonia Production and Distribution London Eng* The Fertiliser Society, Proc No 117, pp 147 55 (1971)
A list of 45 existing or being built oceangoing $NH_3$ vessels is given, including name, capacity, and yr launched Capacities range from 10,000 to 66,000 $m^3$

339
**First Phosphoric Acid Terminal for United Kingdom is Being Constructed**
*Eur Chem. News 20* (509), 14 (Dec 3, 1971)
Construction work has started at the Immingham, Lincolnshire, facilities of the Immingham Storage Company on what will be the UK's first bulk storage terminal for phosphoric acid Capacity for the product will be 12,000 $m^3$ in a single tank to be constructed by the Darlington based company Whessoe Constructed in mild steel, the tank is to be rubber lined and fitted with an agitator to avoid the build up of deposits which occur during the storage of this product On completion, the tank will be linked by a 12 in diameter, stainless steel pipeline to the eastern jetty at Immingham, where the company has full reception/delivery systems to and from ships, road tankers, and rail tank cars The company is not at present prepared to divulge the source of the phosphoric acid to be stored at its terminal, but the arrangement is said to be similar to the Paktank/Fertilizantes Fosfatados Mexicanos venture in Rotterdam Completion of the facility is scheduled for June 1, 1972 Immingham Storage estimates that the terminal will handle an initial annual throughput of some 50,000 ton of acid, with the first cargo unloading soon after completion of the tank

340
**Packaging and Port Operations of Imported Fertilizers in India**
B P Sikdar (Port Operations and Projects, Ministry Agriculture, New Delhi, India)
*Fert Marketing New 3* (2), 1 4, 9 (Feb 1972)
Fertilizers are imported both in bulk and in bags Bulk materials are diammonium phosphate, ammonium sulfate, NPK, and muriate of potash Bagged fertilizers are calcium ammonium nitrate, urea, and ammonium nitrophosphate but the latter two probably will be imported in bulk in the near future Importing in bulk saves about $15/ton in foreign exchange All bulk imports are bagged at the port but methods vary from highly automated to almost completely hand labor depending upon port facilities Bag specifications for imports of bagged fertilizers from U S A , Japan, Poland Canada Romania and U S S R are given Such bags are hooked eight times in the port fertilizer is lost and quality deteriorates Fertilizers bagged in the port also are hooked and bags may not be properly sewn Loss experience at three ports is detailed Port improvements, especially at Kandla will eliminate many of these problems

341
**New Type Ships Bring Norwegian Fertilizers to United States**
*Eur Chem News 21* (531), 12 (May 5 1972)
Norsk Hydro has started regular shipments of NPK fertilizers, urea, and calcium nitrate by self discharging bulk carriers from Norway to the U S West Coast The bulk carriers, of between 20,000 and 30,000 ton, are loaded at the plant's port with 15 20,000 ton of three or four types of dry fertilizer at a speed of 6000 ton/day The discharge will take place at several locations especially equipped to unload material

342
**New Phosphate Terminal to be Built at Port Tampa**
*Agr Chem 27* (6), 7 (June 1972)
CF Industries announced plans to construct a multi million dollar phosphate terminal as the new port facility in Tampa Fla The Tampa Port Authority will contribute up to $150,000 toward installation of the terminal, water, road, and rail facilities Projected for completion by early 1973, the terminal will be supplied with diammonium phosphate from CF's Bartow, Fla , phosphate complex and granular triple superphosphate from the company's Plant City, Fla complex The facility is expected to handle approximately 500,000 tons of product annually

343
**Phosphorus Shipped to Pacific**
*Chem Marketing Rep 202* (3), 4 (July 17 1972)
A specially designed, 7000 ton bulk P freighter, has made its first trans Pacific voyage, taking cargo on a 10,000 mile trip from the Long Harbour, Newfoundland plant of Albright & Wilson, Ltd , under a long term contract with Nippon Chemical Industries Company (NCI), to Kinuura where NCI has built a special terminal to receive and store bulk P *Albright Pioneer* and *Albright Explorer* the only ships of their kind in the world were designed to carry up to 5000 tons of P each The P is transported in a molten state at 60° under water and inert gas in mild steel, beehive shaped tanks which hold 1250 tons each (See *FA 3*, 512)

## TRUCKS AND CONVEYORS

344
**Storage and Transportation — Today and Tomorrow Truck Transports**
W L Giles (Ruan Transport Corp , Des Moines, Iowa)
*Agr Nitrogen Inst , Proc 18*, 165 7 (1968) Held Nov 18 20, 1968, Kansas City, Mo
The direct application of anhydrous ammonia fertilizer in the corn belt states is extremely seasonable Many factors have improved the availability of ammonia to the farmer at the time it is needed The truck transport industry is affected by these factors The truckers' hauls will be shorter with more loading points Increasing consumption will require more trucks Truckers and shippers will look for alternative uses for their equipment to spread ownership costs Trucking costs are rising Driver wages are increasing Equipment costs are increasing In the years ahead there are going to be new and different developments in handling of ammonia by truck

345
**Change in Modes of Fertilizer Transportation**
*Farm Chem* 131 (11), 76 (Nov 11, 1968)
Since World War II, trucks have become the major means for terminal delivery and a factor in shipment from primary plants to mixers and from mixers to dealers Railroads continue to be the major carrier for long hauls In a survey of transportation made in 1963, the Bureau of the Census found that 29 138,000 tons of fertilizers had been shipped by superphosphate and associated mixing plants Presumably these tonnages represent outshipments Mode of transportation for this tonnage was Rail 56%, motor carrier 16%, private trucks 23%, and water 5% Eighty one percent of the ton miles was by rail, 4% by motor carrier, 7% by private

truck, and 7% by water These data indicate that the longer hauls were by rail and by water Thirty seven percent of the fertilizers was shipped less than 100 miles and 59% of them was in lots of 45 tons or more

345
**Cross Country Conveyor for Spanish Phosphate Rock**
*Chem. Week* 103 (18), 42 (1968)
A contract has been signed for the construction of a rubber belt conveyor system 60 miles long to transport phosphate rock from the Spanish Sahara deposits to a projected $22 million ore port south of El Aaiun Spain's Institute Nacional de Industria has entered into an agreement with a consortium headed by West Germany's Krupp for the construction The rubber belt system will be supplied by Japan's Mitsubishi, a part of the consortium Completion of the conveyor and the port is scheduled for mid 1969 Studies indicate reserves of 1 715 billion tons of B P L in the Spanish deposits

## GENERAL

347
**Getting Fertilizer from Plants to Farms in Developing Areas**
J C Engibous (International Minerals & Chemical Corp , Skokie, Ill )
*Phosphorus in Agr* , No 46 17 22 (Feb 1968)
This paper (presented to the Fertilizer Association of India at New Delhi in Dec 1967) explores means of distributing fertilizers in developing countries Problems of production, storage, and dock facilities to consumers unfamiliar with fertilizers, barriers to farm acceptance due to superstition lack of knowledge, inadequacies in equipment and distribution systems are also considered

348
**Transport of Fertilizers**
Krishan Mohan (Cement Corp India, New Delhi, India)
*Seminar on Fertiliser Marketing, Proc* , Fert Ass India (Held New Delhi, Dec 6 8, 1968), pp 230 8 (Apr 1969)
Indications are that the estimated fertilizer movement in 1973 74 may be about 16 million tonnes, according to the plans of the Ministry of Food and Agriculture During the second quarter of this year, there was a severe strain on the railway transport network because of the heavy movement of foodgrains Supply of some vital commodities to the agriculturists, such as fertilizers, cement, agricultural inputs, and coal was severely affected, more so in the Northern states Several bottlenecks that recur during certain periods of the year could be avoided For example, warehouses should be located in the states deficient in fertilizer, supplies could thus be disbursed more conveniently in transport emergencies Authorities should be consulted on the use of containers for movement of fertilizers from local or foreign factories directly to the consumer center This container system is making headway in Europe and America The rural credit system should permit the farmer to obtain supplies in advance of the busy season Necessary transshipment of fertilizer at the break of gauge points should be avoided by first supplying the areas located on that gauge

349
**The Rush to 'Integrated' Distribution**
Ivan M Moser
*Farm Store Merchand 11* (7), 38 40 (July 1968)
Estimates of the share of the U S fertilizer market accounted for by integrated distribution systems vary widely Differences in definition are responsible for some of the variation The author estimates 40-45% integrated distribution in the private sector with cooperatives accounting for another 33% This estimate includes owner integrated distribution contractually integrated distribution, and direct sales to farmers by manufacturers Integration is increasing

350
**Logistics of Fertilizer Distribution**
S Bhoothalingam (Natl Coun of Applied Economic Res , New Delhi, India)
*Seminar on Fertiliser Marketing, Proc* , Fertiliser Ass India (Held New Delhi, Dec 6 8, 1968), pp 227 9 (Apr 1969)
Chemical fertilizers have to be produced in large modern factories employing continuous production processes They have to be used by millions of farmers in thousands of villages The farmers need fertilizers before each cultivating season, but are usually unwilling or unable to buy and store in advance Storing by the farmers will perhaps present more technical problems than storage elsewhere Logistic problems in conditions of scarcity will be different from conditions of relative plenty It is necessary to plan for plenty A widespread distribution organization is the prime need All agencies which are competent to participate should be pressed into service There can be no room for monopolies or near monopolies Distribution agencies, particularly in conditions of adequate supply, will have to take on advice and servicing functions Competition in the offer of these services should be encouraged and not frowned upon on the plea of duplication of cross movement of traffic Over time, multiple cropping will tend to even out seasonal demand This will be desirable from all points of view Suitable packaging may help to strengthen this tendency Storage has to be distributed widespread, to ensure efficient and continuous production, storage in factories should be minimized Based on a scientific and continued study of the pattern of distribution and demand and the needs of movement arising from it, what is produced in the factories should be quickly transferred to storage in a large number of points convenient for further distribution In these studies too much centralization should be avoided The inter play of parallel judgments by several organizations will, in the long run, produce more fruitful results These will be worthwhile even at the risk of what might appear as duplication After all, different oil companies have their distribution points facing each other

351
**Logistic Considerations for a Larger Fertilizer Company**
Jatin Desai and Madhukar Maharaja (Gujarat State Fertilisers Co , Ltd , Baroda, India)
*Seminar on Fertiliser Marketing, Proc* Fert Ass India (Held New Delhi, Dec 6 8, 1968), pp 242 50 (Apr 1969)
With fertilizer manufacturers expecting to develop their production capacity at faster rate in the near future, there is a need for an integrated effort to increase consumption An efficient distribution system has a direct bearing on sales Transportation is often a major bottleneck in the desired increase in the supply of fertilizers Therefore, logistic considerations are of prime importance for any large fertilizer company Logistic operations include packaging, branding, inventory control at factory sites, transportation of materials,

arrangement of warehouses, and others An efficient logistic management can reduce overall marketing cost to a considerable extent A dynamic logistic unit contributes towards enlarging the markets for products and also reduces the physical distribution cost per ton of fertilizers Some of the activities and studies carried out by the logistic department of GSFC are discussed

352
**Transportation Systems for Moving Fertilizers**
*Agr Chem. 24* (1), 21, 22, 24 (Jan 1969)
A sound transportation system is vital to the fertilizer industry from point of production to the time of use by the farmer Transportation usually consumes 25 35% of prices paid by the farmer for his fertilizer Every possibility should be studied to determine the most efficient means of transportation–rail, truck, water, or pipeline and to obtain the best freight rates New methods of shipment are appearing on the horizon, such as air transportation None of these should be bypassed without looking closely into their possibilities as a means to move fertilizer

353
**Determination of the Optimum Capacity of Fertiliser Plants as a Function of Production and Transport Costs**
A Schmidt
*Chem Ing Tech 41* (22), 1208 12 (1969) (Ger)
*J Sci Food Agr 21* (3), 116 (Mar 1970)
To estimate the transport costs from the production site to the user, the integration of a function for costs resulting from delivery in a differential circular consumer area is worked out The practicability is exemplified by $NH_4NO_3$ production

354
**Improving Services**
A H Stephenson (Farmland Industries, Kansas City, Mo )
*Commer Fert 120* (2), 25 (Feb 1970)
Farmer cooperatives are the leaders in fertilizer distribution and they have been for many years They have saved farmers hundreds of millions of dollars This enviable position can be maintained The farmer of the future will be attracted to local cooperatives and will continue to patronize them only if he is provided with a dependable supply of quality fertilizer, competively priced, and accompany it with a complete program of services Two major fertilizer problems over the years have been (1) providing storage sufficient to handle product in the off season so that plants can operate at capacity the year round, and (2) supplying loading and delivery facilities in order that member associations can be provided an adequate supply of fertilizer during the peak periods For several years, the product causing the biggest problem in the peak season was anhydrous ammonia Finally, an experienced transportation consulting firm was used Definite action was taken on each of their recommendations On a full year's basis, they will improve savings by over $1½ million dollars as well as provide improved services to locals

355
**Logistics Play Dominant Role in Choice of Fertilizer Routes**
*Fur Chem News 17* (419 420), 31 (Feb 13 20, 1970)
Nitrophosphate and phosphates from phosphoric acid are discussed by J R Potter of Humphreys and Glasgow He stressed the need for a collection of all available agronomic data and illustrated the effect of logistics on the choice of fertilizer routes If a company were faced with having to import all its fertilizer raw materials and had a choice between building a plant on the coast and building a plant at the center of distribution, then transport costs would play an all important part In some instances the advantage of lower transport costs is sufficient to outweigh the advantages of concentrating production in one location If ammonia is to be made from naphtha, it is cheaper to transport the naphtha than the ammonia In considering circumstances under which the thermal process for phosphoric acid is more economic than the wet process route, Potter looks at the situation where the phosphate rock deposit is remote from both the fertilizer market area and sources of S If power can be obtained at about 0 5d/kwh, the thermal process would enable fertilizers to be made at lower cost in the market area, the savings due to lower transportation costs of P or 68% acid being sufficient to offset the higher processing costs When choosing fertilizer routes, greatest attention must be paid to the $P_2O_5$ nutrient

356
**The Transportation Bramble**
*Fert Progr 1* (2), 24 5, 32 (May June 1970)
With the beginning of each fertilizer season the transportation of materials becomes tangled The transportation companies complained of the seasonal effect of fertilizer on use of equipment and for the short season the expense of purchasing equipment can not be justified Some leasing companies can justify tank equipment on the basis of its use in handling other commodities Fertilizer companies are more versatile in their use of equipment because trucks can be converted to a number of uses There is some thought of interchanging shipment with pipeline and rail Irrespective of what improvements are made large warehouses and liquid storage are necessary for effective transportation and distribution of fertilizers

357
**Application of a Transportation Model to the Fertilizer Industry in India**
D K Desai and S B Tambad
*World Agr Econ Rural Sociology Abstr 12* (2), 309 (June 1970)
The minimum cost of fertilizer transportation from the ports or production centers to the consuming centers is determined by means of a transportation model The minimum is compared with the actual cost of 1963 64 and the estimated minimum cost of projected production and consumption of fertilizers for 1974 75 The savings that could be achieved by following a transport cost minimization program is determined Policy implications of the analysis on pricing of fertilizers and location of fertilizer factories are discussed Linear programming is used to determine an optimum program for fertilizer distribution in India, based on rail transportation costs Data regarding the quantities of fertilizers produced, imported, and distributed to the states during 1963 64 were fitted into the simplex model and used to estimate transport requirements for 1974 75 The analysis of data for 1963 64 indicated that the optimum distribution could make a net saving in transportation cost of 3 64% for urea and 9 51% for other fertilizers Total savings in transport costs for both urea and other fertilizers would be 7 92% of the present costs The model also provides information on shadow prices which can act as guides for policy makers and it can be applied to problems of location of production centers, warehouses, processing plants, determining most profitable markets, bidding of raw materials, and the impact of various policies

358
**ertilizer Group Asks Nitrate Transport Ruling.**
*Oil, Paint Drug Rep 199* (21), 19 (May 24, 1971)
Fertilizer Institute has petitioned the Hazardous Materials Regulations Board to redefine ammonium nitrate so as to distinguish more clearly between fertilizer grades and explosive

grades in regulations covering transport The amendment proposed to the board would remove such fertilizer material from classification as a hazardous product by ensuring that ammonium nitrate labeled as fertilizer could not contain potentially explosive percentages of organic or other sensitizing substances The Institute's definition establishes a 0 2% carbon maximum limit for fertilizer grade and incorporates a practical detonation test procedure as a positive method of excluding fertilizer grades from those nitrates that exhibit hazardous properties The definition has the approval of the National Fire Protection Association, the Bureau of Explosives, and Manufacturing Chemists Association

359
**Overcoming Transportation Problems Impact of New Modes of Transport**

H C Herrmann (General American Transportation Corp , Chicago, Ill )

*Searching the Seventies* (Held Sept 15 17, 1971, Memphis, Tenn ) Tennessee Valley Authority, Muscle Shoals, Alabama, pp 79 82

Distribution in the fertilizer industry is viewed as two systems The primary system is the transport and storage of large quantities of product on a continuous basis between the producing point and the market place The secondary system is concerned with the intermittent movement of product from the terminal facility to the dealer and ultimately to the farmer Studies of the primary system have led to system innovations and development of hardware that lowered fertilizer costs and better balanced supply and demand Only recently has management begun to look at the secondary system Farm trends dictate changes in this system With the trend to larger farms the containerization system shows promise as a retail distribution system that can meet the challenge of the next decade Because a container system acts as a transport and storage vessel it eliminates the necessity for investment, not only in permanent storage, but also in expensive truck transports necessary to supply that storage Past experience with containerization systems are discussed **Problems of the Carriers** L H Durham (Seaboard Coast Line Railroad Co , Jacksonville, Fla ), pp 82 6 The most significant problem areas to both the agricultural chemical industry and the railroads are an adequate car supply, maximum car utilization, adequate train service, and a reasonable pricing structure Car supply has been augmented by development of cars designed specifically for fertilizers and raw materials or intermediates many of these have a much higher load capacity than conventional cars Further development of a computer car location and national automatic car identification system will result in empty cars returning more quickly to the owner line and to areas where needed Train service involves both consistent schedules and adequate terminal services Computerized cost information is being used to evaluate both parts of train service Carriers also are beginning to exchange information on traffic potential so as to improve service Future pricing will give more consideration to the direct costs of service rather than to the value of service rendered Again, use of computers makes possible the detailed breakdown of service costs **Problems of the Shippers** J H Thompson (Duval Sales Corp , Houston,Texas) pp 86 9 An inadequate supply of transportation equipment (rail cars, trucks, barges, and other) can nullify the very best of product quality controls, sales efforts, and favorable freight rates The shipper suffers the loss if materials are not delivered on time The present carrier furnished equipment does not permit adequate distribution, self help becomes a necessity This self help will require shippers to invest in or to lease rail, truck, and/or water transport equipment Alternative solutions to the shippers' problems may be offsite storage in warehouses or track storage with private covered hoppers on a full time or split lease Shippers have one of two choices either make the necessary plans to obtain the equipment needed to move their product in the quantities and at the time desired or else suffer the fate of loss of sales

360
**British Fertilizer Plants Move Closer to Markets**

*Chemscope (Eur Chem News)*, pp 68 74 (Sept 24 1971)

Fertilizer plants in the U K are moving closer to the market This move has been stimulated by a number of factors Railroad, waterway, and other transportation facilities are becoming more efficient through technology In many instances it has proven more efficient to haul raw materials Some plant foods are not essential in parts of the country so that facilities are built for plant foods needed locally Studies indicate where plants producing different materials should be built Factors that must be taken into account are the need for a single plant food by area, feedstock for the fertilizer product, sources of energy to operate plant the area of distribution around the plant, and the adequacy of transportation for the products

361
**Comparative Costs of Ammonia Transport**

G C Sweeney (Arthur D Little, Inc , Cambridge, Mass )

*In International Symposium on the Economics of Ammonia Production and Distribution London, Eng* The Fertiliser Society, Proc No 117, pp 132 45 (1971)

Cost data on various methods of transporting $NH_3$ show that truck transport is economical only for distances of less than 100 miles although it has the greatest flexibility Rail shipment in standard 11 000 gal cars is substantially less expensive than trucks but more expensive than barge or pipeline Efficient use of jumbo rail cars, especially in multi car units, can make rail shipment more competitive with pipelines Barge shipment for distances beyond 500 miles is probably the lowest cost method but is the least flexible because it is restricted to navigable waterways Transportation of $NH_3$ is inevitably tied to storage and distribution and in many cases the costs cannot be arbitrarily separated

362
**Distribution Problems—Present and Future**

*Agr Chem 27*(11), 12 13, 15 17 (Nov 1972)

Predictions are that the fertilizer industry is headed for a transportation crisis this yr Because of the price freeze and increased exports fertilizer inventories are lower than last yr Rail equipment for transporting fertilizer has increased very little, however shipments by water have increased Storage facilities along waterways have been constructed but were not filled last fall partially because of exports Difficulties have also been encountered in export shipments because equipment for transportion is being used for more valuable commodities Area warehousing and trucking locally is the best solution to the transportation of domestic fertilizers

## PRICING POLICY

363
**Pricing Policy for Nitrogenous Fertilisers**

S N Kashyap (Fertiliser Corporation of India Ltd, Gorakhpur, India)

*Seminar on Fertiliser Marketing, Proc.* Fertiliser Assoc. India (Held New Delhi, India, Dec 6-8, 1968), pp 115 23 (Apr 1969)

Under the new pattern of marketing N fertilizers, manufacturers assume complete responsibility for product distribution and development Manufacturers must determine fair margins for serv ces to be rendered at various levels in the distribution channel and work backward through these from the retail consumer price to the selling price The main considerations for fixing margins are interest free supply period, distribution margin, transportation, storage, distribution credit, margin differential for government agencies, cooperations, and private dealers, direct sales to bulk consumers, and sales to other manufacturers for their seeding programs

364

**Fertilizer Distribution Geared to Increasing Size of Fertilizer Plants**

*Japan Chem Quart 5* (3), 43 7 (July 1969)

One of the notable developments in the Japanese fertilizer industry is a move to increase its international competitiveness by increasing the size of fertilizer plants This is particularly true of the ammonia industry, often referred to as a process industry, in which positive streamlining efforts are being made to expand ammonia plants and increase its exports As of April 1968, Japan's daily ammonia capacity totaled about 9100 tons, which is programmed to be increased to about 13,000 tons by the fertilizer year (July 1971 June 1972) a figure corresponding to the year's estimated demand As for phosphatic fertilizers, the current streamlining move is passive, rather than positive, in the sense that this industry is being compelled to strengthen its competitive position to meet the foreign demand for capital liberalization by April 1970 In Japan, the fact that this industry relies on the import of phosphate rock, combined with the constitutional weakness of the domestic S industry which supplies sulfuric acid for phosphatic fertilizers, puts the Japanese phosphatic fertilizer producers at a disadvantage Japan's fertilizer distribution system rests on two main pillars, agricultural cooperatives and ordinary dealers The price system sets July as the starting month because shipments are at the lowest ebb in that month The peak months are April, May, and June Monthly prices are determined within the framework of basic annual prices agreed upon between National Purchasing Federation of Agricultural Cooperative Assoc (Zenkoren) and manufacturers The price system for fertilizers is based on the prices on delivery at the railway station of destination, and the cost of physical distribution is borne by manufacturer The standard wt of a package of fertilizer was changed from 82 5 lb to 88 lb in January 1959, when the metric system was put into force The unit is being changed to 66 lb, however, in view of the growing need for light wt packages that reflect the current shortage of farmers in the physically strong age brackets Distribution, therefore, is the second most important question after that of fertilizer production In this respect, cor ration between maker and cooperative is needed to work c ac a be'ter system of distribution

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**Fertilizer Pricing**

R N Warriar (Indian Potash Supply Agency Ltd, Madras, India)

*Fert News 15* (9), 37-41 (Sept 1970)

A major factor influencing price decision is the company s basic objectives An effective approach to pricing should allow for periodical adjustments and be based on a proper analysis of current market conditions and historical data on production cost price sales relationship Factors affecting price decisions include the nature and extent of demand, competitive practices and likely responses to price changes, manufacturing and marketing costs, company's share of the market company's profit objectives environment–social, economic, political, and legal, and company s long term corporate objectives

366

**German Fertilizer Industry to Maintain Price Structure**

Peter Wiebe (Ruhr Stickstoff AG)

*Eur Chem News Spec Issue Germany*, pp 38-40 (Apr 30, 1971)

The price index for the most important type of fertilizer on the German market, lime ammonium nitrate, which accounted for more than 50% of total consumption was 76 in 1969 70 compared with 100 in the 1959 60 fertilizer yr, and the index for NP 20 20 0 as a representative compound fertilizer was 66 This price policy benefiting the agricultural user has been made possible by successful rationalization and the passing on of the savings to buyers and users At the beginning of the 1970 71 fertilizer yr, the list prices for individual N fertilizers were again reduced by 3% and, in addition, the 6% increase in transport charges for N fertilizers made at the same time was absorbed For no other agricultural material of comparable importance have the price trends in the past 10 yr been so favorable to German agriculture as for N fertilizers Fundamentally, it is true that the German N industry, like the other secto - of the chemical industry is under considerable and steadily increasing pressure from costs As a result of these rapid increases in the cost structure, prices for compound fertilizers had to be raised by about 5% at the beginning of 1971 An increase in the Federal Railways freight charges notified for the near future will also have to be passed on in full However, the German N industry will continue to make every effort to keep prices as low as possible

367

**Is Incremental Pricing Dead?**

*Farm Chem 134* (6), 44 (June 1971)

Incremental pricing of fertilizers was adopted in the late 1960's as a result of excess production capacity brought on by the new large, and more efficient plants The fertilizer industry has traditionally been production oriented with much emphasis on keeping production at near capacity The fertilizer market is not responsive to lowering of prices, about the same volume is moved even at lower prices Companies do not consciously follow a system of incremental pricing Established producers resort to this practice to protect their positions, new entrants in the industry attempt to buy a position in the market Much of the disappearance of profits reported by fertilizer companies can be traced to the incremental pricing adopted in the late 1960's Management must be convinced that only total systems costing and pricing will lead to improvement of the overall financial condition of the fertilizer industry

368

**Grace to Encourage Off Season Buying**

*Ag-Chem (Newsletter)*, No 55, 1 (June 1, 1971)

W R Grace & Co has announced a new schedule of discounts for the 1971 72 fertilizer yr designed to encourage off season buying Discounts as high as 5% will be offered to stimulate

advance buying, for payment within 30 days, as compared with the present maximum discount of 2% for 30 day payment Discounts will vary, depending on month of purchase, ranging from 5% down to 2%, with early purchases rewarded with maximum discount Experience during the 1970-1971 season demonstrated once more how important it is to have buying spread through the yr Again this season, many buyers delayed purchasing as long as possible, then came into the market with record demand during the closing weeks of the season, and in many cases found producers unable to meet their needs

369
**Pricing Policy for Fertilizers**

Girdhari Lal (Industrial & Allied Sales Private Ltd , New Delhi, India)

*Fert Marketing News 2* (11), 2 5 (Nov 1971)

Fertilizers in India are recognized as essential commodities and thus have been subject to statutory control of pricing, distribution and other aspects Pricing of N prior to 1966 was based on a policy of uniform prices for all farmers regardless of location or distance from a railhead For P and mixed fertilizers, prices varied from place to place except for distribution by centralized agencies such as cooperatives With the 'freedom of marketing" policy announced in 1965 pricing of indigenous fertilizers has been the responsibility of the producers Many tried to maintain uniform prices but most are now changing to other systems A uniform delivered price for a region served by a factory, particularly a region well served by connecting roads, appears to be gaining in popularity An ex works price is used for areas beyond this region

## PRODUCTION COSTS

370
**Nitric Phosphates An Economic and Agronomic Evaluation**

D W Bixby and G R Burns (Sulphur Institute, Washington, D C )

*Sulphur Inst J 3* (4), 2 9 (Winter 1967 68)

The costs of nitric phosphates made by the Odda, carbonitric, sulphonitric, and phosphonitric processes are compared with those for superphosphates plus N and diammonium phosphate The cost of S and degree of water solubility of the P are considered as other variables Granule size, water solubility, soil properties, and crop characteristics are discussed as factors affecting agronomic effectiveness

371
**Low Production Cost is Key Feature of New Process for Making Urea**

Peter Ellwood

*Chem Eng 75* (2), 132 4 (Jan 15, 1968)

A flowsheet is shown for a urea synthesis process developed by Stamicarbon N V (cf *FA 1*, 328) By stripping the products of the $NH_3$ $CO_2$ reaction with $CO_2$, and by operating at moderate temperatures and pressures, this technique requires lower investment and operating costs Stainless steel instead of more expensive metals can be used in key pieces of equipment Initially, Stamicarbon had limited the capacity of plants using this process to 250 tons/day The two plants in operation, one in Geleen, The Netherlands, and the other in Langelsheim, West Germany, are of that capacity However, the company has recently taken orders for plants up to 900 tons capacity Process of requirements per ton of urea are $NH_3$ 1254 lb, $CO_2$ 1660 lb, steam (350 psig) 2200 lb, steam (45 psig) 330 lb, and cooling $H_2O$ 14,528 gal

372
**The Production of Ammonium Nitrate Fertilizer by Using Low Cost Energy from a Nuclear Desalination Reactor**

J M Holmes, *et al*

*Oak Ridge Natl Lab Rept* ORNL-TM 2202, 20 pp (Apr 20, 1968)

The cost of producing ammonium nitrate using low cost power from a nuclear desalination reactor was estimated and compared with that for the conventional steam methane process Hydrogen was produced by the electrolysis of water using advanced type cells now under development and ac power costs varying from 1 0 3 0 mills/kwhr Nitric acid, ammonia, and ammonium nitrate were produced with the H by conventional methods The capital cost of the nitric acid plant was reduced by about 8% by using $O_2$ from the electrolysis plant instead of air Nitrogen for the ammonia plant was recovered from the nitric acid tail gas The results showed that ammonium nitrate produced in a 698 ton/day plant using low-cost nuclear power at 1 6 mills/kwhr could compete with the product from a conventional reforming plant using 31¢/$10^6$ Btu natural gas If $O_2$ credit is allowed ($4/ton $O_2$ for 10 and 15% return on investment and $2/ton $O_2$ for 4% return on investment), electrolysis would compete with plants using 20¢/$10^6$ Btu natural gas At larger plant sizes, the comparison is less favorable to the electrolytic process, because of its poorer scaling factor At 2330 tons/day of ammonium nitrate, 1 6 mills/kwhr electricity competes with 34 5¢ natural gas, assuming no $O_2$ credit The average U S industrial natural gas price in 1963 was about 34¢/$10^6$ Btu (32 references)

373
**Canadian Venture Will Cut A & W Phosphorus Costs**

*European Chem News 14* (335), 30 31 (July 5 1968)

Albright & Wilson's thermal P venture at Long Harbour, Newfoundland, should be in operation in early 1969 Two 60,000 kw electric furnaces–with possibilities for a third furnace–will use Florida rock and hydroelectric power to produce 68,000 tons/yr of P Florida rock can be shipped to Newfoundland cheaper than Morocco rock can be shipped to the U K and hydroelectric power is about half the 8 mill/kwh in the U K Savings in production costs thus are estimated to be about $80/ton of P but shipping across the Atlantic, including dock facilities, requires $20 30/ton and conversion to $P_2O_5$ requires another $18/ton Thermal production of P in Newfoundland still appears very competitive with wet process phosphoric acid in the U K

374
**Economical Fertilizer Process Developed by Georgia Institute**

*Pit Quarry 62* (5), 148 (Nov 1969)

Georgia Institute of Technology, working in conjunction with the Perlite Institute, Inc , has developed an economic process for manufacturing lightweight fertilizer containing perlite by the wet granulation process The process permits the fertilizer manufacturer to use low cost N solutions in the production of the perlite based fertilizer, thereby making possible a highly economic end product Georgia Tech's work to date on this process involves two successful production runs in its pilot plant One run was made to demonstrate the manufacture of a 22 4-6 granular fertilizer according to a major manufacturer's specifications The other run demonstrated manufacture of a 20-10-5 formulation

375
**Improved Economics in Synthesis Gas Plants**
T P Cook and R N Tennyson (Fluor Corp , Ltd , Los Angeles, Calif )
*Chem Eng Progress 65* (11), 61-4 (Nov 1969)
A comparison is made between manufacturing costs for $CO_2$ removal by the Fluor Solvent Process and by activated potassium carbonate for a 1000 ton/day $NH_3$ plant and a 700 ton/day urea plant using naphtha or natural gas feed The capital investment costs required for the Fluor Process are slightly higher but the operating costs are lower In each case considered, the net economic advantage of the Fluor Process is sufficient to merit the attention of designers and operators of $NH_3$ and urea plants (3 tables, 1 figure)

376
**Loop System Slashes Costs for Making Phosphoric Acid**
L E Bostwick (M W Kellogg Co )
*Chem Eng 77* (8), 100 2 (Apr 20, 1970)
A wet process flowscheme is presented that claims lower capital and maintenance costs for the manufacture of wet process phosphoric acid A slurry of feed and product is cycled through two interconnected vessels at different levels Phosphate rock is added to the slurry in the lower vessel maintained at atmospheric pressure, $H_2SO_4$ is added in the upper vessel maintained under vacuum The heat of the reaction is largely removed by the evaporation of water from the slurry in the upper vessel As a result of close control, coarser rock yields larger more easily filtered gypsum crystals even under reduced retention time

377
**Economic Analysis of Fluid Mixed Fertilizer Plants in the Midwest Area of the United States**
J A Wells (Tennessee Valley Authority, Muscle Shoals, Ala )
*Thesis Univ Illinois*, 180 pp (June 1970)
Twelve fluid mix fertilizer plants in the Midwest were studied for the purpose of (1) describing the fluid mixed fertilizer industry in the area, (2) determining production costs, including marketing costs, as related to size and type plant, and (3) cost reduction suggestions Plants studied were classified as cold mix, hot mix retail, hot mix wholesale, and suspensions Costs were classified in areas of building, manufacturing equipment, storage tanks, raw materials, labor, and sales related to delivery and application Production and sales were directly related to investments Ranges of annual production and sales were 452 16,914 ton and $11,686 $273,706, respectively The most economical production units were in the order of (ton/yr) cold mix, under 2500, low investment hot mix, 2500 to 6000 8000, and high investment hot mix, above 6000 8000 The most important variable cost is that of raw materials Raw material prices varied more due to differences in management abilities than to freight rates Sales are seasonal, 67% of annual sales occurred in April and May Distribution systems are in a period of innovations and technology Firms must balance production rate, storage, and marketing efforts

378
**Synthesis Gas Ammonia**
A V Hahn
*The Petrochemical Industry Market and Economics*, pp 19 72 (1970), Pub McGraw Hill Book Co , New York, N Y
The economics of ammonia production and utilization for other fertilizer products are discussed The U S demand and distribution, manufacturers, capacities, location, raw material positions, and captive outlets are given with relative merits and economics of various processes The data given should serve as a basis of quantitative forecasts and provide the background for predicting how prices can be expected to evolve as plants get larger and producers consolidate their raw materials positions

379
**Economics of Sulfuric Acid Production**
G G Patterson and I W McCamy (Tennessee Valley Authority, Muscle Shoals, Ala )
*National Fertilizer Development Center Muscle Shoals, Ala , Bull Y 28*, 37 pp (July 1971)
A study was made to compare the economics of manufacturing sulfuric acid from three basic raw materials–brimstone, pyrites, and gypsum Three developing nations with widely divergent needs for this fertilizer intermediate were selected as model countries for the study they were India Morocco and Uruguay Plants of the following nominal capacities were considered for each type of raw material in the selected locations India -1000, 600 and 400 mt/day of acid, Morocco–400 200 and 100 mt/day, and Uruguay–100 mt/day It was assumed in base cases that brimstone would be imported at a price of $35/long ton ($34 45/mt) f o b U S Gulf ports Each $5 change in the cost of S results in a change of about $1 75/ton in acid production costs Native pyrites and gypsum were assumed for India native pyrrhotite and byproduct phosphogypsum for Morocco, and imported pyrites (from the Mediterranean area) and byproduct phosphogypsum (supplemented by about one third of S value as brimstone) for Uruguay Results of the basic estimates indicated that brimstone based acid would be more economical to produce than acid from the other sources however, the margin was narrow in several instances as compared with acid produced from a pyrite ore base at high tonnage levels For India, estimated costs for brimstone based acid ranged from $21 22/mt (1000 mt/day) to $24 89/mt (400 mt/day) Comparable costs for pyrite based acid were $23 56 to $31 22/mt and for gypsum based acid, $31 76 to $48 32/mt Estimates for the Moroccan situations indicated that costs for acid produced from brimstone would range from $24 05 to $35 37/mt (400 and 100 mt/day, respectively) while that from pyrrhotite would cost $29 69 to $51 17/mt and phosphogypsum based acid $56 64 to $105 29/mt at the same production levels For the situations assumed for Uruguay, manufacturing costs for acid produced from brimstone, pyrites, and phosphogypsum supplemented with brimstone were estimated to be $35 92, $56 99, and $120 01/mt, respectively The price of S has declined substantially since the basic estimates were made and these lower prices would of course give the brimstone based plants an even stronger position Supplemental estimates were made to show the effects of varying rate of return on investment, raw materials costs, and credit for byproducts Others were made to show the effects on production costs of below capacity operation An evaluation was made of the effects of varying the shadow rate of foreign exchange on the economics of producing sulfuric acid from the different raw materials If foreign exchange were valued at a 1 1 ratio with respect to local currency, the most economical approach to the production of sulfuric acid in each of the countries studied and at each level of production would be to employ brimstone as the raw material However, the evaluation indicated that in India pyrite based acid would be more economical to produce when the shadow rate of exchange was greater than 1 2 1 at the higher level of production (1000 mt/day) or 1 5 1 at the

lower production level (400 mt/day) Pyrite based acid also was estimated to be more economical than brimstone-based acid to produce in Morocco when foreign exchange was valued in the range of 1 6 to 1 9 1 as compared with local currency For Uruguay, brimstone appeared to be the favored raw material at any reasonable shadow rate of exchange

380
**Environmental Rules Costly to Fertilizer Manufacturers**
*Chem Week 109* (15), 20 (Oct 13, 1971)
Fertilizer manufacturers face a big challenge in keeping up with proliferating and ever changing state environmental codes John Layton, Agrico Chemical, underscored the problems confronting the industry at the annual fall conference of the Fertilizer Institute in Atlanta Because of the new standards, Layton said, some fertilizer plants that have to undergo costly changes to meet pollution control codes, might better be closed, as were several Agrico plants in the last few yr The new federal safety law, according to Layton, will add up to 2¢/ton to product cost to bring some plants into compliance, and complying with Walsh Healey Act provision on noise pollution could add ½¢/ton to product cost

381
**Recent Trends in Published Ammonia Prices and the Prospects for 1971 1975**
N P Smith and M E Barjon (Battelle Memorial Inst, Geneva, Switz )
*In International Symposium on the Economics of Ammonia Production and Distribution London Eng* The Fertiliser Society, Proc No 117, pp 161 90 (1971)
An analysis of the $NH_3$ world market and consideration of feedstocks, operating costs, and shipping costs was the basis for estimating long term equilibrium prices for $NH_3$ (in 1970 U S dollars/mt) as follows U S A 34 6, Europe 43 5 Persian Gulf 37, N Africa 41, Japan 44 6, and India 56 (5 fig, 10 tables)

382
**Manufacturing Economics Suspensions Update—1972**
F P Achorn and N L Hargett (Tennessee Valley Authority, Muscle Shoals, Ala )
*Proc 1972 Natl Fert Solutions Ass Roundup* pp 40 6 (1972)
A survey was made of the U S fluid fertilizer industry to determine the status of suspension fertilizers compared with the results obtained from a similar survey made in 1967 (*FA 1* 1173) Of the tonnage reported by 642 plants, 66 5% of fluid mixed fertilizers was produced as clear liquids and 33 5% as suspensions the 1967 figure was only 7% as suspensions Of the 267 plants reporting the manufacture of suspensions, 72% used base solutions such as 10 34 0 or 11 37 0 and 21% used $H_3PO_4$ and $NH_3$ There is a significant trend toward the use of $H_3PO_4$, $NH_3$, and KCl to produce suspensions without using polyphosphate solutions, cost analyses indicated that this was the more economical method in 1971 The leading grades of suspensions were 4 12 24, 3 10 30, 5 15 30, and 14 14 14, it is noteworthy that all these grades are high in KCl (10 tables, 2 fig)

## MARKETING COSTS

383
**The Cost of Distributing Fertilizer**
John R Douglas and J Harold Parker (Tennessee Valley Authority, Muscle Shoals, Ala )
*Farm Store Merchand 11* (2), 60 61, 64 65 (Feb 1968)
A breakdown of distribution costs in various assumed situations is given No firm answers on distribution costs are apparent, but these may be higher than production costs Service is increasingly a part of distribution costs The continued successful operation of a farm service center depends on sufficient margins to cover costs plus a return on investment

384
**The Functions and Costs of Fertiliser Marketing Services.**
F W Parker (Agency for International Development, Washington, D C )
*Seminar on Fertiliser Marketing, Proc*, Fertiliser Assoc. India (Held New Delhi, India, Dec 6 8, 1968), pp 34-41 (Apr 1969)
Five fertilizer marketing services are discussed (1) making the fertilizer available to farmers, (2) providing some of the credit to dealers and farmers, (3) developing or expanding the market, (4) promoting the efficient use of fertilizers and complementary inputs, and (5) providing technical and special services Their relative importance varies somewhat with the degree of modernization of agriculture and the national economy Data are presented on the cost of fertilizer marketing services in the United States, Europe and several developing countries In all cases, the capital investment in marketing services is of the same order of magnitude as that for mining fertilizer raw materials and converting them into fertilizers The total cost of fertilizer marketing services is about one third of the selling price in the United States, Europe, and some developing countries Two thirds of the total marketing costs are direct sales costs including storage, transportation, technical and special services, and general administration The other one third covers depreciation, income tax, and return on the investment, including profit In India, the marketing services should be directed primarily to (1) making fertilizer more readily available to farmers, (2) assisting in providing credit to dealers and farmers, and (3) promoting the efficient use of fertilizers, complementary inputs, and improved practices for crop production

385
**Economics of Fertiliser Marketing.**
R N Warriar (Fertiliser Corporation of India Ltd New Delhi, India)
*Seminar on Fertiliser Marketing, Proc*, Fertiliser Assoc India (Held New Delhi, India, Dec 6 8, 1968), pp 81 9 (Apr 1969)
The present share of marketing expenditure is estimated at about 22% of the consumer price of fertilizer For a product like fertilizer, which is required in large quantities to achieve agricultural self sufficiency, a 22% share for marketing expenditure is too high to be sustained or justified Every effort should be made to reduce marketing cost, the reduction in cost is to be achieved not by cost cutting but by maximum possible utilization of resources and by achieving higher levels of consumption These can be achieved only through effective management of the marketing function The applications of major management techniques to the marketing function are discussed The techniques considered include marketing research, sales forecast, sales budget, industrial engineering including work study, methods study, operations research and inventory control, distribution cost analysis, budgetary control, and management audit

386
**Who Pays for Marketing Services.**
*Fertilizer Soln. 13* (1), 28 (Jan Feb 1969)
Cost of marketing should be divided in proportion to the manufacturer's development cost, marketing evaluation, pricing, advertising, and services rendered Pricing should be based on definitely established cost to the dealer, including the cost of selling and service to the farmer This also involves seasonal use of expensive equipment that requires accurate cost, use longevity, and size of area served Cost of service must be based on benefits received by the farmer and his potential return from plant food needed

387
**An Analysis of Fertilizer Distribution Cost**
*Farm Store Merchand 12* (3), 82 (Mar 1969)
In an effort to ensure maximum distribution of fertilizers and thus maintain near capacity operation of the large new production facilities, many major fertilizer firms have gone the vertical integration route They have established large numbers of new wholly owned or controlled retail outlets In the Midwest, most of these outlets have followed a basic pattern of a modified farm service center with blending facilities The costs of retail distribution have proved high in terms of capital investment, annual operating costs, and dollar/ton of throughput The minimum basic investment is to be around $75,000 Fixed costs total about $28,500 annually Variable costs are assumed at about $5 50/ton These new outlets have in most cases increased the tonnage of fertilizers sold Often, however the added costs of the retail outlets have not been covered by their operating margins on sales

388
**The Cost of Doing Business in Mixed Fluid Fertilizer and Nonpressure Solutions for Direct Application**
H G Walkup (Tennessee Valley Authority, Muscle Shoals, Ala )
*Fertilizer Soln 13* (2), 10 18 (Mar Apr 1969)
Cost data were obtained from 28 fluid fertilizer mixers located in the Southeast Northeast, Midwest Mississippi Delta, Southwest, and Far West to determine dealers' costs of handling, mixing, distributing, and applying liquid mixed fertilizers and nonpressure or low pressure N solutions The data showed that for mixed fluid fertilizers about 74% of all costs are for materials Administrative costs are about 14% of the total and the remaining 12% consists of depreciation, repairs, interest on working capital and on average investment in the site, equipment and facilities, and shrinkage Total cost/ton was $54 07, or $90 81/$100 of sales Net income was $5 47/ton of product, or $9 19/$100 of sales I the case of non pressure N solutions for direct application, materials represent 70% and administrative costs about 18% of the total Total costs are $70 67/ton, or $102 79/$100 of product sold This unfavorable cost return situation may have resulted from the relatively low volume of the N solutions as compared to mixed fluid fertilizers sold by the dealers studied Also, the dealers may have overestimated allocations to N solutions in equipment shared with the higher volume mixed fluids However, the results show that mixed fluid fertilizers are more favorable than non pressure N solutions from the standpoint of net returns

389
**Cost of Distributing Fertilizers**
J R Douglas and J H Parker (Tennessee Valley Authority, Muscle Shoals, Ala )
*Agr Chem 24* (7), 13 15, 48 (July 1969)
Under typical cost conditions in today's new farm service centers, experience has proved that these fertilizer outlets must maintain their gross margins if they expect to break even financially The fertilizer industry's situation is traced to a serious overcapacity of all three major plant nutrients N overcapacity will probably continue into 1970 and the situation could get worse before it gets better The oversupply situation of phosphatic fertilizers could well be corrected very shortly, although basically, overcapacity for production could be expected to continue into the early 1970's In potash the current supply demand imbalance will worsen in the years ahead with new production in the Canadian fields the major cause The analysis does not necessarily represent standard or average costs because of wide variations in size and type of opeations, but it represents the costs of many typical installations

390
**Fertilizer Outlet Operating Cost Comparisons**
R G Hanson (Univ Missouri, Columbia)
*Fert Solutions 14* (3), 16 19 (May June 1970)
Competitive bulk blend and liquid fertilizer plants of comparable size were selected for comparison of capital investment, distribution, and operating costs Data on cost for independent dealers, company operated outlets, and cooperative member dealers are given Company owned outlets are diversifying into other farm products such as seed, pesticides, farm equipment, and others to spread the cost of overhead in the fertilizer operations

391
**Documenting the Great Fertilizer Give Away**
*Chem Week 107* (10), 92 101 (Sept 2 1970)
There's new data to show management the magnitude of typical profits losses, and returns on investment for seven of the most important U S fertilizer materials And the data for four of the seven clearly document what marketing men have been saying for the past few years—that recent fertilizer pricing policies have been unrealistic and have not reflected the true costs of making and distributing the products The reason why prices of fertilizers have not been kept in line with costs, says Grace s director of economic planning for agricultural chemicals is that many companies do not know the true costs of making and selling these materials Fertilizer makers have been analyzing their expenses but most companies usually study only individual portions of the total fertilizer operation A Tennessee Valley Authority economic expert agrees with the Grace economists that companies do not have accurate cost information And he claims that because fertilizer manufacturers have not looked at the total systems cost for fertilizers prices have often been set on the basis of Gulf Coast delivered, costs Thus the expense of transporting the materials to consuming areas and the costs of local distribution, which account for the bulk of operating costs for the total fertilizer system, have not entered the pricing picture

392
**Large Plants—Pipelines Shave Cost of Ammonia**
*Oil Gas J 69* (34), 117 (Aug 23, 1971)
Savings in transportation costs and a more optimistic outlook on the practicality of plants with capacities greater than 1000 tons/day have meant better prices to consumers of ammonia in the past 3 yr Transportation, storage, and retail operations add materially to the price of ammonia However, these costs have been decreasing In 1963, distribution costs were reported to be $25 15/ton Transportation and terminal

storage currently add about $18 60/ton This reduction in cost reflects the use of more economical means of transportation, such as pipelines, and a reduction of terminal storage cost due to the installation of large refrigerated terminal storage facilities Retailing cost has also decreased from the 1968 reported value of $49 85/ton to about $30/ton One reason for this significant reduction is that company owned outlets are diversifying into other farm products such as seed, pesticides, and farm equipment to spread the overhead cost associated with fertilizer operations Although over one half of the ammonia production facilities are located on the Gulf Coast, approximately two thirds of the anhydrous ammonia used as direct application fertilizer is consumed in the farm belt–Iowa, Nebraska, Illinois, and Indiana

393
**Economies in Fertilizer Operation Show Results**
*Chem Week 109* (14), 43 (Oct 6, 1971)
Fertilizer companies tightened their operations in the past fiscal yr Cost of sales for example, fell to 70% of net sales compared with 74% in fiscal 1970 Tighter credit management cut the number of days' sales outstanding to 103 compared to 117 in fiscal 1970, and the basic producers' cutbacks in employment helped raise assets per employee to $80,400, compared with $78 300 in fiscal 1970 Price increases helped, too, although some of the increase in value per ton may reflect higher analysis of the average product The average retail price of fertilizer sold by the basic producers was about $63/ton compared to about $54/ton in fiscal 1970 Prices of both N and P products are still low While the shutdown of several phosphoric acid plants may bring a fairly close supply demand balance in the current fiscal yr and help producers hold their prices at satisfactory levels, it may take longer for N products to come into balance

394
**Fertilizer's Last 30 Miles**
B J Farmer
*Ag Chem Newsletter 26 27* (12 1), 24 6 (Dec 1971 Jan 1972)
The cost and problems involved in overall distribution of fertilizer from producing point of raw materials to use by the farmer are reviewed Details are given for distribution from retail dealer to farmer application Changes in application brought about by changes in the fertilizer materials from dry to liquids, change in size of farm, and the farmers methods of applying fertilizers are discussed Because of the changes the local dealer has necessarily had to change his methods of marketing and sales approach to the farmer The local dealer must identify and rationalize his changing situation and prepare his operation to meet the inevitable changes in the future

395
**Philippine Fertilizer Complex Shows a Profit Under New Management**
*Chem Week 111* (2), 20 (July 12, 1972)
Planters Products Inc (PPI), the first wholly integrated fertilizer complex in the Philippines, earned only $800,000 on sales of $25 million last yr, but its owners, the Philippines Sugar Producers Cooperative Marketing Association are pleased with the 3 2% return Reason it's the first profit the operation has shown since it was launched Moreover, sales are growing–up a healthy 40% last yr PPI credits the turnaround to cost cutting measures, upgraded equipment, and improved marketing PPI is the successor to Esso Standard Fertilizer & Agricultural Chemical ESFAC was formed at Limay, Bataan, in 1962 as part of Esso's worldwide push into the fertilizer market Commercial operations began in 1968 PPI officials say the plant's 1972 output will be up to about 65% of rated capacity, which they hope will help them to improve on last year's sales and earnings

396
**Bulk Blender Costs**
H G Walkup (Tennessee Valley Authority, Muscle Shoals, Ala )
*Fert Progress 3* (4), 9 12 (July Aug 1972)
A cooperative survey by the Tennessee Valley Authority and The Fertilizer Institute was made to determine the cost structure for bulk blended fertilizers from the supplier of raw materials through mixing, distribution, and application Cost data were obtained from commercial bulk blending and ammoniation granulation plants which had been in operation for several yr, using a 1 yr period which, in most cases, reflected costs for calendar yr 1970 The averaged costs show that practically all profits came from custom application (about $6/ton) and rental of towed bulk spreaders (about $3/ton) Profit from sale of bulk blended fertilizer was only about one third of 1% of total raw materials, operating, and investment costs The average total plant nutrient concentration was 55 2%, the average N $P_2O_5$ $K_2O$ ratio was 1 3 3, and the average total cost/ton applied fertilizer was $74 44 (5 tables, 1 fig)

397
**The Break Even Point Bulk Blenders**
Harold Walkup (Tennessee Valley Authority, Muscle Shoals, Ala )
*Fert Progress 3* (5), 12 13 (Oct 1972)
The fixed and variable cost are shown (see *FA 5*, 1893) The break even vol is approximately 2500 tons with an average price of $75 41 per ton of product Above 2500 tons of sales, profits increase and are shown to be just over 6% at the 3457 ton average throughput For less than 2500 tons losses occur and become progressively larger per ton and in total as vol decreases

## REBATES, SUBSIDIES, AND TARIFFS

398
**Rebates On the Way Out**
*Chem Week 102* (7), 31 (Feb 17, 1968)
Major N fertilizer producers made cuts in posted prices in California in early February and simultaneously ended or curtailed the practice of giving buyers an annual or semiannual rebate Changes in actual cost of N were negligible Shell Chemical Co (San Francisco) initiated the move, Collier Carbon and Chemical Corp (Los Angeles) and Chevron Chemical (San Francisco) followed These companies, together with Valley Nitrogen Producers Inc (Fresno, Calif ), account for 75% of the N fertilizer sold in California Valley Nitrogen, a cooperative, has rebated to its members for several years and private industry began a similar practice in the early 1960's The system has degenerated to one of giving buyers a discount at time of purchase rather than a rebate at year's end The new system formalizes this practice The move to net pricing appears to be timed to take advantage of Valley Nitrogen's present poor cash position caused by setbacks in startup of its 550 tons/day anhydrous ammonia plant at El Centro,

California

399
**New Subsidy Scheme**
*Fertilizer, Feed, Pesticide J 66* (7), 12 (July 1969)
With a view to helping the Ceylon cinnamon industry, a fertilizer subsidy scheme to assist the industry is to be launched by the Ministry of Agriculture The main purposes of the scheme are to achieve an increased production, and to strengthen the industry to meet a threat that has gradually emerged from other producers of cinnamon in the world, particularly the Seychelles Island It is proposed that a fertilizer subsidy of 50% of the cost of fertilizer required per acre should be offered by the Government of Ceylon In introducing the scheme, the Ministry of Agriculture has taken the view that if cultivators could be induced to fertilize the 30,000 acres under cinnamon, Ceylon could easily produce 25,000 to 50,000 cwt/year within the nex 3 5 years World trade in cinnamon is shared between Ceylon, the Seychelles Islands, and South Vietnam The annual world exports of cinnamon are estimated at about 100,000 cwt, of which Ceylon's share constitutes 50,000 cwt, and that of Seychelles Islands' 35,000 cwt

400
**Phosphate Fertilizers in Australia**
*Phosphorus Potassium*, No 43, 13 18 (Oct 1969)
During the past decade the Australian fertilizer industry has undergone a period of both substantial change and extensive expansion Australian soils generally are deficient mainly in phosphates and to a lesser extent in S, and this has resulted in a preference among farmers for single superphosphate fertilizers which contain both the deficient nutrients The expansion of Australian fertilizer usage has been due both to an increase in the total fertilized area as well as the more intensive use of fertilizers on existing fertilized areas In an effort to reduce the dependence of Australian farmers on wool production the Government moved to encourage the use of the fertilizers necessary for crops and improved pastures, and in August 1963 introduced a subsidy on phosphate fertilizers which is paid to the producers, provided that the full effect is passed on to the consumers Introduction of the subsidy led not only to an expansion in the demand for phosphate fertilizers, but also to an increase in the number and complexity of the products available The Australian phosphate fertilizer industry is based on a relatively small number of companies of which the Imperial Chemical Industries of Australia and New Zealand Ltd group has emerged as the leading producer of superphosphates and also of nitrogenous fertilizers In 1968 there were 12 highly inter linked companies operating 23 plants for the production of single superphosphates, phosphoric acid, and the phosphate fertilizers The estimated installed capacity of these plants at the end of 1968 was 6 26 million tons/year expressed in terms of single superphosphate Nevertheless, as the crop acreage throughout Australia is expanded and as fertilization becomes ever increasingly more widespread, there will be a call for further expansions in the years to come

401
**Australia to Halt Fertilizer Subsidies**
*Chem Week 107* (20), 38 (Nov 11, 1970)
Australia's fertilizer industry was shocked by a government decision to eliminate virtually all subsidies to producers of N fertilizers, effective November 18 Since '66, Australian producers have received a subsidy payment of $17 90/ton for urea (up to a limit of $560,000) and $6 70/ton for ammonium sulfate (up to a limit of $1 12 million) The subsidies were paid to help producers compete with lower priced imports Even with the subsidies producers have not been able to operate at a profit, according to Barraclough Industry observers say the government's action may force the closing of at least one major plant in the country The action was recommended by the Australian Tariff Board, which pointed out that the industry had overexpanded In '65, before the subsidies were instituted, domestic capacity of N fertilizer was able to supply two thirds of the market, according to the board Total capacity today is 474,000 tons/yr, about two and one half times the present market requirements

402
**Australian Fertilizer Rationalization Nears Completion**
*Chem Age (London) 103* (2712) 6 (July 9 1971)
Rationalization of over £ 60 million of investment in the Australian fertilizer industry is nearing completion Depression of the rural economy and removal of government protection from the N fertilizer industry are claimed to have proved disastrous for segments of the Australian fertilizer industry Operation of the Ammonia Co of Queensland ammonia plant has been suspended and the future of Eastern Nitrogen s Newcastle ammonia plant will depend largely on success with exports of liquid forms of ammonia Austral Pacific s Brisbane ammonia plant should be safe from the axe indefinitely because its long term natural gas contract suits the production of urea in conjunction with ammonia Statistical projections show the new company would become profitable about 1975

403
**Australian Nitrogen Fertilizer Industry Seeks Tariff Protection**
*Chem Age 104* (2749), 8 (Mar 24, 1972)
The Australian Tariff Board has been asked by the government to make a study of the country's ailing fertilizer industry to see whether assistance should be given to domestic N fertilizer producers The industry, largely dominated by Dow Chemical and ICI subsidiaries has for the past few months been undergoing severe rationalization Four major companies formed themselves into Consolidated Fertiliser Ltd last yr as a move towards rationalization, but since then it is reported that the company lost A$16 million on production has written off A$6 million in plant and equipment, and laid off 20% of the staff

404
**Subsidy Increases Nigerian Fertilizer Use**
*World Fert Rev No 11*, 17 (May 1972)
The Western State of Nigeria is well aware that the quickest way to achieve increased production in agriculture is through the use of fertilizers In order to stimulate their wider use the Government has been subsidizing the cost of fertilizers to farmers Consumption has steadily increased from 140 tons in 1965 (when the scheme was first launched) to 600 tons in 1968, when the subsidy was increased from 12% to 50% In 1970, total fertilizer sales amounted to almost 900 tons, but consumption is still very low in the area It is proposed that the subsidy shall continue for an additional period, until such time as an appreciable increase in consumption is noticeable

## GENERAL

405

**Economic and Technical Evaluation of Overseas Shipment and Utilization of Elemental Phosphorus for Fertilizer Production**

W C Scott, G G Patterson, J R Gahan, and T P Hignett (Tennessee Valley Authority, Muscle Shoals, Ala )

*National Fertilizer Development Center, Tennessee Valley Authority, Muscle Shoals, Ala*, 32 pp, (Jan 1968)

This evaluation shows a significantly lower cost for diammonium phosphate (DAP) produced from elemental P shipped to India than that imported to or made from wet process acid produced in India The cost per metric ton of plant nutrient in DAP would be $108 130 using elemental P, $135 using wet process acid, and over $150 when imported Price and source of imported rock cause some variation in cost estimates Foreign exchange requirements also were evaluated for the three methods of obtaining DAP Production in India from imported rock and S requires the least foreign exchange with production from imported elemental P costing 0 20% more in foreign exchange outlay Production of elemental P from indigenous phosphate rock would eliminate foreign exchange outlay Importation of elemental P could be an interim measure until startup of P production from domestic sources since shipment of elemental P is technically feasible

406

**Suspension Fertilizer Prices on the Way Down**

*Prairie Farmer, 140* (7), 83 (Apr 6, 1968)

High analysis, more than twice the analysis of clear liquids, is a strong selling point for suspension fertilizers High analysis permits price savings of 40% in transportation, handling, and storage Suspension fertilizers are comparable to bulk blends in analysis and competitive in price with them

407

**Phosphate Rock Price Decline Seen from Moroccan Expansions and Entry of New Producers**

*Oil, Paint, Drug Reptr 193* (21), 7, 36 (May 20, 1968)

Rapid expansion in Moroccan phosphate rock output and the entry of new producers into the market will force world phosphate rock prices down, according to several European fertilizer traders Morocco has opened a new mine at Ben Guerir, near Marrakesh, that will produce 2 million tons by 1970 and ultimately 10 million tons annually Production at Youssoufia and Khouribga also will be stepped up Karim Lamrani, head of the Office Cherifien des Phosphates (OCP), the state company which owns the mines and sells the phosphates, is seeking to recover some of the markets lost to marginal phosphate producers and to the U S Current price of Moroccan phosphate in Europe is $10 11/ton, production costs are not known but are estimated at $6 7/ton Morocco also is upgrading from rock to processed phosphate A plant at Safi now treats 500,000 tons of rock annually to triple super, plans are to double capacity for producing phosphoric acid OCP also has negotiated with Shahpur Chemical Co of Iran to provide that company with most or all its phosphate needs in return for S and ammonia

408

**Canada Plans New Rates for Potash**

*European Chem News 14* (347), 16 (Aug 23, 1968)

Freight rate incentives for Saskatchewan's potash industry are announced by the Canadian National and Pacific Railways These incentives are claimed by Canadian National and Pacific to give an annual saving of $10 million for the industry as a whole No comment has yet been made by potash producers The new freight rate plan provides for lower rates for producers who schedule shipments on a regular annual basis A further rate reduction is provided for shippers who load freight wagons to maximum capacity

409

**Fertilizer Production and Distribution Costs**

John R Douglas, Jr, J H Parker, and E A Harre (Tennessee Valley Authority, Muscle Shoals, Ala )

*Com Fertilizer 117* (3), 18 23, 26 (Sept 1968)

The North American fertilizer industry is in a position of relatively large overcapacity of N and K The overcapacity situation could well get worse before it gets better The situation with respect to phosphate, could well deteriorate, although some actions have already been taken to ease it Profits of the fertilizer industry are said to have deteriorated badly, or vanished, as a result of decreasing margins and increasing price and non price competition In such times, it is essential that economic analyses be thorough and complete if management decisions are to be based on proper facts Partial analysis is not sufficient In fact, partial analysis may be so very misleading as to be worse than no analysis Total economic analysis must be instigated on potential sales–both domestic and foreign Studies in depth of potential sales for industrial uses also are necessary Economic analysis of proposed courses of action must consider the total costs of production and distribution and must include provision for all real costs–not just bare production costs In addition the total system must be made to operate with some rate of return on investment

410

**Fertilizer Industry Needs Marketing Efficiency to Survive**

F E Hartzler (Kansas State Univ , Manhattan)

*Com. Fertilizer 117* (4), 22 (Oct 1968)

Industry that continues to produce when there is no demand for more product is in trouble The market is determined by how much people are willing to buy at a price that returns a reasonable profit to the seller Producers should concentrate on areas they understand–production–and get out of the retail business Efficiency in production has little or no relationship to efficiency in marketing

411

**Cutting the Cost of Canadian $K_2O$**

*Ind Minerals* No 17, 7, 35 (Feb 1969)

As impressive as Canada's potash industry is in reserves of high grade ore, in the scale of mining and processing, and in efficiency–the present marketing situation demands increasing sophistication in all sections of the industry, from mining and beneficiation to transportation and distribution, if it is to hold its own against fierce competition in world markets Once an operation is highly automated, as are all the Saskatchewan mine refineries, and costs of production reduced as far as possible, the only possible way to reduce the delivered cost further is to cut the cost of transportation A significant saving could be achieved by the use of "unit" trains The provision of large capacity storage in the main consuming areas, or at loading and discharging terminals, is costly but the wider use of unit trains would be one way of reducing the industry's freight burden There is growing interest in the possibility of moving fertilizer minerals in pipelines, either as slurries or in capsules in a fluid carrier The successful development of such a pipeline would pave the way for lines to serve the potash industry Whether a pipeline is viable or not, the Canadian potash industry will continue to concentrate its efforts on developing lower cost, more efficient methods of transportation and distribution with the object of achieving economies vital to the competitive marketing of potash In the

longer term "freight efficiency" will undoubtedly contribute to the continued expansion of an industry temporarily frustrated by low prices for its product and the problems of over-capacity

412
**Oil Finds Profits Slippery in Fierce Fertilizer Game**
L R Aalund (Editor, Petrochemical J )
*Oil Gas J 67* (11), 43 5 (Mar 17, 1969)
A review is given of the present outlook on fertilizers and the oil companies' interest Profits were low for the $3 billion U S fertilizer business in 1968 The biggest effect was due to $NH_3$ A list of 28 plants that produce 600 1500 tons $NH_3$/day is given it totals 9 million tons/year Though 1 4 million tons capacity was shut down in 1968, the present capacity is reported to be 17 million tons/year of which oil companies hold about 40% Industry uses about 32% and agriculture about 01 5% Several oil companies have interests in phosphates, but none have developed potash reserves The outlook for 1969 is for improvement, phosphate rock is expected to be profitable, but not $H_3PO_4$

413
**Economic Comparison of Overseas Manufacture and Importation of Anhydrous Ammonia**
G G Patterson J K Metcalfe, and J R Douglas (Tennessee Valley Authority Muscle Shoals, Ala )
*TVA Rept S 437* 31 pp (Prepared for the Agency for International Development) (Mar 1969)
A study was made of the economics of manufacturing compared with importing anhydrous $NH_3$ in India, South Vietnam, and Uruguay The assumed levels of operation were 150, 600, and 1000 metric tons/day The results indicated that in all three locations and at all three levels of operation $NH_3$ could be imported at lower cost than it could be manufactured At the higher tonnage levels the margin between import and manufacture is relatively narrow In such cases the foreign exchange requirement which is significantly higher for import than for manufacture, would be an important consideration in choosing between the two alternatives On the other hand, capital requirements would be roughly 5 7 times as much for manufacture as for import With foreign exchange valued at a 1 1 ratio with local currency, import would be more economical in all cases considered But with foreign exchange ratios much higher than 1 1 (which would be the case in most developing countries), manufacture in efficient 600 or 1000 tons/day plants would be more economical in the long run than import

414
**Cost Identification as a Basis for Marketing Decisions**
Richard Phillips (Logistics Research Inc , Kansas City, Mo )
*Fertilizer Marketing in a Changing Agriculture* (Held Oct 1 3, 1969, Memphis, Tenn ) Tennessee Valley Authority Muscle Shoals, Alabama, pp 92 5
Next to knowledge of the market being served, knowledge of marketing costs is probably the most important prerequisite for planning and carrying out a successful marketing program Management is not dependent upon outside sources for this information and accurate figures are relatively easy to obtain, at least in theory Yet most businesses do not have the cost information they need Too often accounting systems are not designed to summarize the direct costs of the various operations within the business or to establish the relationships between marketing costs and volume, market density, types of service, etc needed to support marketing decisions Accounting practices designed to obtain the proper information on these subjects are described

415
**Cost of Marketing Solid Fertilizer**
R A Garn (Central Farmers Fertilizer Co , Chicago, Ill )
*Fertilizer Marketing in a Changing Agriculture* (Held Oct 1 3, 1969, Memphis, Tenn ) Tennessee Valley Authority, Muscle Shoals, Alabama, pp 100 2
An example is presented showing the marketing costs for a ton of 10 20 30 blended solid fertilizer from the time the materials are loaded in cars at the point of production until they are applied on the land as a blend at a midwestern location The materials consisted of $NH_4NO_3$ originating at Terre Haute, Ind , diammonium phosphate (18-46-0) originating in Florida, and potash originating in Canada Not included were general and administrative expenses at the producer level, return on facility investment, or shrinkage Transportation costs from producing point to local destination were $14 04/ton, receiving, storage, and blending costs were $7 22/ton, and delivery and application costs were $8 20/ton

416
**Cost of Marketing Liquid Fertilizers**
N D Abell (Ouachita Fertilizer & Grain Co , Monroe, La )
*Fertilizer Marketing in a Changing Agriculture* (Held Oct 1 3, 1969, Memphis, Tenn ) Tennessee Valley Authority, Muscle Shoals, Alabama, pp 95 9
This paper discusses and interprets cost data collected in a recent NFSA–TVA Survey (H G Walkup, *Fertilizer Soln 13* (2), 10 18, 1969, *FA 2*, 683) The investment required for liquid mixed fertilizer is $25 57/ton and the operating cost is $13 97/ton For N solutions the investment is $38 22/ton and the operating cost is $21 08/ton There is no economy-of scale both the investment cost and operating cost are straight line functions Based on available data it seems reasonable to price liquid fertilizers (with application equipment furnished) as follows For liquid mixtures the breakeven price = raw material cost + $14 00/ton For any particular job the gross profit margin between raw material cost and selling price should return $2 50 $3 25/acre N solutions should be priced with equipment furnished at cost plus $21 00 to break even The gross profit should be no less than $2 25/acre In recent years the fertilizer business has generally underestimated the cost of doing business,–a factor in the present unsatisfactory situation

417
**Potash Prices in the US and Canada Seen Boosted by Conservation Rules**
*Oil, Paint Drug Rep 196* (21), 20 (Nov 24, 1969)
Potash conservation regulations to be imposed by the Canadian province of Saskatchewan will virtually assure higher potash prices in the months ahead for US output as well as Canadian This is the opinion of most industry spokesmen contacted in the wake of the announcement that Saskatchewan po producers will be required to limit production and abide by a floor price In addition, a tightening of stocks in the US held by producers in Carlsbad, N M., is likely to support upward price movement in this country The Canadian regulations to control the potash industry in that country are to take effect immediately for the duration of the current potash marketing emergency, and will be reviewed in one year A three member Potash Conservation Board is to be appointed, representing the government, the industry, and the academic scientific community to help implement the new regulations The members will be chosen from the province's Department of Mineral Resources, the Saskatchewan Mining

Association, and the faculty of the University of Saskatchewan or the Saskatchewan Research Council The board will hold hearings periodically at which the potash producing parties will be required to state their potash producing requirements--including sales and storage The board will then recommend to the Minister of Mineral Resources the amount of potash each plant will be allowed to produce during a certain specified period The prorationing is likely to vary from 40% to 65% of a plant's design capacity, according to the Mineral Resources Department The amount will depend on how much a plant is currently producing, the amount of new orders on the books and the plant's inventory

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**Why Do We Give Fertilizer Away?**

R K Hoddinott

*Farm Store Merchand 13* (3), 58 (Mar 1970)

The true objective of any corporation or company in the fertilizer industry is to make a satisfactory return on capital invested For three yrs now the earnings have dropped sharply for most of the companies engaged in the plant food industry There are two reasons for this (1) the current supply and demand situation, and (2) poor sales and marketing For some reason merchandising, marketing techniques, or salesmanship are not used prices are cut, discounts are increased, service charges are waivered, and interest on the account is carried The second factor affecting profits is cost Here again, too many are not fully aware of full cost, including depreciation, for the products and services that are supplied More important is the fact that most companies do not accurately determine the actual cost of marketing and distribution of the product once it leaves the plant gate What about collections? As a supplier your primary purpose is to market for a profit, and there can be no profit until the account is collected in full Slow pay means increased cost It is important to set a definite payment procedure, then contact the customer immediately when an account becomes overdue Let's start today then, right now, and become progressive, positive marketers, not tonnage oriented as has been the custom

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**New Forms of Fertilizer Use--Economic Evaluation**

H G Walkup (Tennessee Valley Authority, Muscle Shoals, Ala )

*Phosphorus Agr 24* (55), 55 65 (June 1970)

New analytical techniques, grouped under the broad term systems analysis, promise to provide improved interdisciplinary approaches to the evaluation of new products generally Herein lies the possibility for tracing the new P fertilizer in every stage of its progress through production marketing use channels, and, finally, of developing estimates of the quantities that will be utilized for various purposes--nonfertilizer and fertilizer Costing procedures utilize the discounted cash flow concept, which includes institutional considerations such as the income tax advantages available on investment in plant and equipment through additional first yr depreciation, accelerated depreciation, investment credit, and loss carryover--all of which are so important nowadays in planning succesful industrial operations Since the approach is interdisciplinary and presumably would be guided by an interdisciplinary team comprising at the very least a chemical engineer, an agronomist, and an economist, the present tendency for naive assumptions and analytical methods to creep into analyses by single disciplines would be minimized Systems analysis incorporates electronic computer use and provides the basic information required for simulation analysis of a dynamic nature through time It allows the analyst to insert alternative conditions and circumstances and thus to determine their overall effect on the new product and the production marketing use system involved

420

**Who Profits Most from Fertilizer**

M H McVicar (Chevron Chem Co )

*Agr Chem 25* (7 8), 15 48 (July Aug 1970)

The farmer is the one man who must benefit from any fertilizer purchase Unless he benefits, he cannot continue to be a repeat customer Why do farmers purchase fertilizer? They are interested in increasing their profits through the use of fertilizers Increased profit in use of fertilizer may come from an increase in yield, an improvement in quality, a hastening of maturity, a more uniform maturity, or from a combination of these or other favorable responses Fertilizer by itself not a magic ingredient that insures increases in yields and profits Fertilizer, when properly programed, can return handsome dividends Maximum profits come only when all things are "go" for top crop production Scientific know how must be put into practice to achieve precision The quality of services that accompanies the fertilizer has the major impact on its true value

421

**Pressure on Ammonic Prices to Stay**

*Chem Age (London) 101* (2671), 18 (Sept 25, 1970)

Ammonia prices in Western Europe are likely to continue under pressure up to the end of 1973, while in the US the long term equilibrium price for 1975 will be $34 3o/ton A short term analysis of the oversupply position in North America, which has existed since the advent of the 1000 ton/day plants, will have ended by 1972--73 The major importance of exports of N fertilizers from Japan, in particular to China, inevitably leave the industry open to drastic and sudden oversupply problems in event of a major drop in export sales volume The reduction of tariff barriers within the major parts of Western Europe and the movement towards the adoption of ammonia plants with similar production costs will make this area become a price coherent zone with the higher prices in the regions most isolated from natural gas supply and/or with the highest naphtha prices If exports are achieved on a marginal costing, it is probably that European producers will endeavour to improve overall profitability by improving domestic prices

422

**U K Fertilizer Price Rise Suggest FMA**

*Fert Int No 17*, 1 (Nov 1970)

The U K Fertilizer Manufacturers Association (FMA) has advised the U K Government that fertilizer price rises in the near future are inevitable, inflationary pressures on manufacturing and distribution being the primary causes The FMA's president has said that the undertaking given last spring, to hold list selling prices, was given against an acceptance of the fact that prices would be varied only in exceptional circumstances In the view of the Association such circumstances had now arisen in the shape of cost increases in power, shipping, wages, and raw materials While farmers do not usually pay list prices for fertilizers it is claimed that they have been paying considerably more to merchant suppliers this year, although still not above list prices which still bear a favorable comparison with those of 10 years ago Prospects for the current fertilizer yr are appreciably better, in spite of the pressure on margins June and July buying was heavy enough

to lead to a short term shortage and was particularly brisk in straight N types

423
**Canadian Sulfur Prices Affecting U S Production**
*Oil, Paint Drug Rep 198* (20), 3, 49 (Nov 16, 1970)
Canadian S suppliers were accused last week by two major U S producers of selling their product below production costs and of posing a life and-death threat to the continued existence of the domestic industry Charges of the S producers that Canadian S is being offered at less than cost of production were based on the argument that the Canadian producers failed to make a fair allocation of production costs between the S and the co products, natural gas and gas liquids As a result, it was argued, natural gas sales at ever rising prices are being used to subsidize S production The prices at which Canadian S is being offered indicate a determination on the part of the Canadian producers to drive other S producers out of the business Present estimates indicate that Alberta S production will grow from the present rate of 4 million to 5 million tons annually to 7 million or 8 million tons by 1976 78

424
**Nitrogen Export Prices**
*Nitrogen*, No 68, 9 10 (Nov Dec 1970)
It is apparent from the comparatively sparse activities of the last two months that there has been an attempt on the part of major producer exporters to bring about a hardening of prices For most of the world N exporters prospects are little improved The reduced activity on the market in general is, to a large extent, the result of a withdrawal from the market by some producers and the spiralling course taken by world ocean freight rates since the beginning of the yr Following the mid yr revelations of the two AID financed tenders for Ceylon's purchase of bulk ammonium sulfate, there has been no resumption of any large scale business in this product by any of the major N purchasers Ammonium sulfate has been available for export at the lowest price levels yet witnessed on the market, the rise in ocean freight rates has meant that landed prices in markets in the Indian sub continent and the Far East are now little improved on their traditional levels West European urea is reported to be available for export, although in comparatively restricted quantities at prices slightly higher than those reported for the Mainland China business Latest reports indicate that $45 $47 per mt fob Northwest Europe is a representative level The lack of major business with ammonium nitrate during recent weeks comes as no surprise, since these products have lost much of the importance on the export market attached to them in the past Apart from an impending tender for ammonium phosphates in Chile and comparatively small negotiations between Japan and respectively Malaysia and Indonesia, the complex fertilizer market has been devoid of any major dealings in recent weeks

425
**Cooperative Involvement in Financing and Marketing of Agricultural Inputs**
M M K Wali (National Cooperative Development Corp New Delhi, India)
*Fert News 15* (12), 29 32 (Dec 1970)
In the marketing and distribution of farm production essentials, the cooperatives have been playing a vital role The turnover of distribution of agricultural inputs has increased eight fold, from Rs 357 million in 1959 61 to Rs 2530 million in 1968 69, of which nearly 80% is for distribution of fertilizers Cooperatives are now also engaged in the distribution of seeds, pesticides, and agricultural equipment The Fourth Five Year Plan sets a target of distribution of agricultural inputs worth Rs 5650 millions through cooperatives However, there are a number of essentials to achieve the necessary growth of cooperatives The contribution of cooperatives in the distribution of production essentials are described The role of the National Cooperative Development Corporation in building up cooperatives is discussed

426
**Fertilizer Industry Improves its Financial Position**
*Oil Paint Drug Rep 198* (25), 7, 46 (Dec 21, 1970)
The president of the Fertilizer Institute has reported a sharp reduction in losses by most basic fertilizer producers for the 1969 70 fiscal yr Losses were cut more than half by basic producers in Group II (which includes producers of one or more primary fertilizer materials) This group still recorded a $33 3 million loss on $1 9 billion total net sales This compares with a $70 million loss on $1 6 billion in sales for calendar yr 1969 for reporting companies Basic potash producers, included for the first time as Group I, recorded $2 4 million profit, before interest and taxes on $54 million total sales A sharp drop in profit margin before interest and taxes signals a significant change in retail operations from 1969 During fiscal yr '70 companies reporting primarily for retail operations (Group III) recorded $1 5 million net income on $171 million sales for 0 9% profit, a 50% decrease in margin of profit from calendar yr 1969

427
**Market and Real Prices of Fertilizers and Impact of Price Changes on Fertilizer Consumption and Production of Crops**
W B Donde
*Agr Situation India 25* (5), 493 9 (1970)
The crucial element in fertilizer demand in India is the output response to fertilizer use and the real price of fertilizer, as distinguished from its market price The elasticity of fertilizer (N) consumption with respect to fertilizer cost is established Real cost of fertilizers use is higher than market price because of lower rates than recommended and equal associated cost The price/cost elasticity of fertilizer demand is found to be higher at lower level of use than at higher level

428
**Cost Implications of Multiple Product Farm Supply Retailing**
D L Helgeson and D G Anderson
*Nebraska Univ Coll Agr Home Econ Dep Agr Econ Staff Paper 1971 12*, 22 pp (June 1971)
*Amer Bibl Agr Econ* 2, 135
Grain marketing, feed, fertilizer and liquid petroleum retailing operations have potential cost complementarities when combined under a single management Economies from diversification are much less significant, however, than economies from improved plant utilization or from horizontal expansion in plant capacity Economies from diversification are in large measure dependent on size of the respective plants being combined Products experiencing no marked seasonal demand fluctuations benefit little from integration into other product lines Conversely, highly seasonal demand patterns make grain operations prime merger candidates Depending on the nature of seasonal demand, advantages from diversification may be greater for the smaller plants under some circumstances, for the larger ones under others Sharing of labor and capital resources is the basis for cost savings from diversification generated by the model There may be additional reasons for diversifying Sharing of certain fixed facilities or of advertising

or promotional budgets might yield further economies Demand complementarities may also be important

429
**Canadians Move to Stabilize Sulfu Prices**
*Lur Chem News 20* (494), 6 (Aug 20, 1971)
A move by the Alberta Government to raise S prices by controlling sales and stockpiling byproduct S produced by the huge Alberta gas fields has met with a favorable response from France and Mexico The Mexican Government has stated that it will request producers to rationalize production in efforts to raise prices, also suggesting that companies publish their prices to assist in the new moves to stabilize the chaotic world markets Societe Nationale des Petroles d'Aquitaine (SNPA), the major producer of S from Lacq gas, also backs the Canadian moves, stating that the ruling, which one would hope to see followed by other great producers, should see an adjustment of supply and demand in 1972 and a consequent amendment of the currently abnormally depressed prices SNPA produces some 1 6 million tons/yr of S at Lacq and is the largest European producer

430
**U S Freeze Hits Potash**
*Lur Chem News 20* (499) 4 (Sept 24, 1971)
The U S price freeze has prevented potash producers from raising prices per unit of $K_2O$ from 33 75¢ to 35¢ this month While potash prices normally swing seasonally, last yr prices never rose above 33¢/unit Under the 90 day price freeze, seasonal prices may not be increased over last yr levels

431
**Fertilizer Net Income Up**
*Oil, Paint Drug Rep 200* (14), 15 (Oct 4, 1971)
The fertilizer industry is putting on a happier face than it has been able to do for several yr The industry s gradual movement towards an improved net income continued during the yr ended June 30 The industry's basic producer group showed net income before interest and taxes of $64 7 million, equivalent to 2 9% of $2 1 billion total net sales of fertilizer and related products This compares to a 1969 70 loss of $33 million on $1 9 billion of net sales The improved net income sets a definite upward trend since the first semi annual financial facts report was issued for the calendar yr 1969 That report noted a loss for the basic producer group of $70 million

432
**Higher Sulfur Prices Predicted**
*Chem Week 109* (16), 55 (Oct 20, 1971)
Higher S prices seem certain to follow this month's meeting of producing and consuming nations A final version of a global S sales prorationing plan may emerge from the sessions in Vancouver, B C , if the conferees can reach agreement European S buyers are cool to suggestions by provincial officials that tabs be upped $9/ton, to $15 17/ton, f o b Alberta producing points Such a hike would push the Rotterdam price of Canadian S to about $30/ton And that's a lot more than Europeans want to pay Indications are that European custon ers may be willing to pay $2/ton or so more for S–mainly to keep traditional Gulf Coast sources in business A $9/ton hike, however, would send them scurrying for new sources of supply, including the Mideast Depressed ocean freight rates make the Mideast option at least a possibility–if not a probability European fertilizer makers also have an eye on sulfuric acid recovered from Canadian smelting operations Despite cancellation of the big Inco sulfuric venture, European S users claim large quantities of "future" byproduct acid are being offered at very attractive prices, with deliveries promised to begin in 18 24 months

433
**Credit to be Increased by Japanese to Help Fertilizer Exports**
*Chem Age (London) 103* (2731), 8 (Nov 19, 1971)
In a bid to help Japanese fertilizer exporters the Ministry of International Trade and Industry (MITI) has begun talks with the Ministry of Finance and the Foreign Ministry on substantially increasing yen credits to South East Asian countries The extra yen credits would be tied to purchases of Japanese produced fertilizers MITI feels that better yen credits would strengthen Japan s economic cooperation in the area as well as boosting fertilizer sales The move has come in anticipation of a slackening of export growth to China MITI is looking to South East Asia as a substitute selling area The Japanese fertilizer industry has offered its full support to the idea Yen credits to be extended in the 1972/73 fiscal yr will include MITI, increased amounts for fertilizer purchases by India and Ceylon A figure of two or three times the present amount has been mentioned by MITI Both the Finance and Foreign Ministries have stated that while it is vital to increase yen credits to developing nations it will be very difficult to grant special treatment to fertilizers alone when the present international trend is away from so called tied loans

434
**Fertilizer Problems in France**
*Chemscope (LCN) France*, pp 28, 31-4 (Nov 26 1971)
France's fertilizer industry like the rest of the world has its problems Their ammonia is produced in 20 plants varying in capacity Nitrogen products are manufactured and distributed from 25 plants while phosphates are produced in numerous plants The major problems are pricing and distribution Prices have dropped throughout the common market area, whereas manufacturing cost have increased The distribution is by cooperative and private traders with about 10% going through a direct sales network This form of distribution has encouraged price cutting Of the three basic materials potash does not present a problem Both nitrogen and phosphate will be imported unless new discoveries of gas are made for ammonia production and a source of phosphate rock is found In the future France may find itself dependent on imports of complete fertilizers or fertilizer materials

435
**Japanese Fertilizer Situation in 1971**
*Jap Chem Week 12* (606), 3 (Dec 9, 1971)
The Agricultural Administration Bureau of the Ministry of Agriculture and Forestry recently surveyed the chemical fertilizer situation (production, domestic demand, import and export, price and distribution) for the 1970 and 1971 fertilizer yr Particularly, in contrast to a price reduction for ammonia, producers' prices of all chemical fertilizers in 1971 fertilizer yr were raised by 2 3% over the previous yr with price hike of raw materials such as potassium and phosphate rock and an increase in wage However, marginal profit caused by the dollar devaluation can be estimated at some $8 3 million in the case of the chemical fertilizer industry Therefore, when the present flotation of yen exchange rate is converted into the fixed yen exchange rate, the Bureau estimates end users will call for price reduction of straight fertilizers with potassium and phosphate rock as materials, and of compound fertilizers

436
**Environmental Problems Facing the Fertilizer Industry in the**

**1970s**

Bernard Raistrick (Albright & Wilson Ltd, Oldbury, England)

*Fert News 16* (12), 49 52 (Dec 1971)

Pollution and environmental problems of every kind are facing industry generally and these will intensify in the next decade In common with all manufacturing operations, fertilizer production will have to face more stringent regulations and attitudes The choice of sites and processes for new plants will become increasingly important A mounting proportion of plant cost will be devoted to pollution control equipment Liquid and solid discharges must be treated in the factory if increasingly heavier charges for disposal to sewers, rivers, and dumps are to be avoided Attacks on fertilizer use for polluting natural waters are often based on half truths and a refusal to consider any evidence contradicting preconceived notions Nevertheless, more must be done to minimize the general contribution of agriculture to pollution, this will be more difficult technically than the control of pollution arising from manufacturing activities or from sewage disposal These latter sources of pollution are being steadily reduced and improvements in the agricultural contribution will be needed to avoid an increase in the proportion in this direction

437

**Fertilizer Industry Improves Profits**

*Chem Week 110* (14), 31 (Apr 5, 1972)

Fertilizer makers boosted their profits in 1971 The Fertilizer Institute says the big producers and marketers in its Group II raised their 1971 profits 29%, to $84 million, compared with $65 million in fiscal 1971 (ended last June 30) and $15 4 million in 1970 Their profit margin in 1971 was 3 9%, compared with 2 9% in fiscal 1971 Cost savings accounted for most of the profit improvement, since 1971 sales declined 1 5%, to $2 158 billion compared with $2 191 billion in fiscal 1971 For example, selling and general administrative expenses fell to $339 million in 1971, compared with $372 million in fiscal 1971 Interest income helped, too It was $6 63 million in 1971, compared with $3 104 million in fiscal 1971

438

**An Econometric Simulation Model of United States Agriculture with Commodity Submodels**

D E Ray (Iowa State Univ, Ames)

*Diss Abstr A 32* (10), 5439A (Apr 1972)

An econometric simulation model is developed which casually links resource use, production, price, utilization, and income for major agricultural commodities Based on this quantitative model, the implications of changes in selected variables on resource use, output, and income are investigated for individual commodities and U S agriculture as a whole Finally, a modified version of the model is used to project resource requirements to 1980 under alternative 1980 production needs The simulation model has submodels for livestock, feed grains, wheat, soybeans, cotton, and tobacco Annual time series data from 1930 to 1967 are used to estimate the econometric relations The results of 17 historical simulations are reported Conditions simulated include (1) the removal of government price and income support programs, (2) increases in input prices, (3) restrictions on production elasticities, (4) variations in commodity support prices, and (5) limitations on acreages Farm prices and income decline substantially in the absence of government farm programs Total net income in agriculture declines by nearly one third over the period simulated, 1932 67 Lower prices and incomes dampen the level of capital inputs used in agricultural production Total fertilizer demand under the free market assumption is down 6% Estimated man hours of labor required is slightly higher The implication is that without government price and income support programs farmers would have had less incentive and financial resources to purchase labor saving capital inputs during the 1932 67 period Simulation results suggest that agricultural policies which increase input prices and(or) slow technological advance would be effective in increasing farm prices and incomes The trend toward a very capital intensive agriculture will continue in the years ahead Total 1980 labor requirements in agriculture are projected to decline by over 34% from the 1967 requirements, while capital input demands will continue to increase as will capital's share of the total input mix

439

**Favorable Outlook for Nitrogen Fertilizer**

*Jap Chem Week 13* (626), 2 (Apr 27, 1972)

Supply and demand for N fertilizers are making favorable gains internationally In particular, the increase in price seen at an international tender for supply of ammonium sulfate was welcomed by fertilizer manufacturers Many informed sources say that bottom price seems to have been seen during the past yr At the Board of Directors meeting of Japan Urea & Ammonium Sulphate Industry Association the situation in ammonium sulfate and urea exports and the increase in contracted price were reported

440

**Supply Pricing Worries Ammonia Producers**

*Oil Gas J 70* (36), 50 (Sept 4, 1972)

Natural gas shortages are already affecting the ammonia industry The Manager of the Chemical Division of Felmont Oil Corp reported the results of a survey conducted by this company to determine the extent of the problem The respondents represented 50% of the annual ammonia production in the U S Of those responding, 41 6% had interruptible gas contracts, 58 4% firm In 1969, respondents suffered a total of 326 days interruption In 1970, they suffered 412 days, an increase of 26 4% In 1971, interruptions increased to 527 days, up another 28 5% On this basis, he predicts, a 600 ton/day Gulf Coast plant built in 1965 will need to sell its ammonia at $39/ton in 1975 to realize a 9% return on investment after taxes A 1000 ton/day plant built in 1975, returning 9% would have to sell it at $46 50/ton If agricultural ammonia imports are left uncontrolled, older plants will be unable to compete

441

**Fertilizer Producers Watching Prices of Exports**

*Chem Mkt Rep 202* (15), 4, 24 (Oct 9, 1972)

Fertilizer supplies will present no problem for the current season, except in the area of phosphates World market demands have drawn heavily on domestic supplies and production, and differentials between U S and world price quotations are making the export market look attractive These and other topics–including an impending shortage of phosphatic fertilizers–were discussed at Fertilizer Institute's Fall Conference The manager of domestic fertilizer marketing for W R Grace & Co, Memphis, Tenn, sees a substantial shortage of phosphate products through this Fall and into Spring of 1973 The shortage is the result of two factors–increased world market demand and domestic price controls

442

**Fertilizer Margins Increase**

*Chem Mkt Rep 202* (18), 7 (Oct 30, 1972)

Fertilizer producers registered an improvement in net income during the fiscal yr 1971 72, according to figures released by Fertilizer Institute Net income before interest and taxes, as a

percentage of sales, for the producer group, amounts to 5 1% as compared with 2 9% the previous fiscal yr, the institute reports Export tonnages during the twelve month period, according to Department of Agriculture, rose 7% for phosphate rock, 24% for urea, 36% for ammonium phosphate and 15% for concentrated superphosphate

443

**Potash Prices Improving**

*Chem Week 111* (19), 29 (Nov 8, 1972)

Potash Co of America (PCA) upped granular potash 1 25¢/unit, to 35¢, Canadian funds f o b Saskatoon, Sask Granular potash is a preferred form and spot shortages have occurred in the past despite huge overcapacity in the potash industry PCA will hold the line on quotes for other forms of potash until the end of yr, when it will reestablish the schedule attempted earlier this yr If the boost holds standard, soluble coarse and granular potash will sell for 33 75¢ 35¢ 37¢, and 38¢/unit respectively Improvement in demand by January 1973 is expected to be sufficient to support higher prices

444

**Effects of Wage and Price Control on Fertilizer Markets**

*Chem Mkt Rep 202* (2?) 3 18 (Nov 27, 1972)

Lifting of price controls from industry in any program of the Administration for the return of the economy to the normal forces of supply and demand should be on an across the board industry basis Starting first with those industries which have not contributed to inflation, and the one industry that would fit into such a program perfectly would be the fertilizer industry according to the president of Fertilizer Institute He indicated that current price restraints are forcing small independent fertilizer businesses to hold down retail prices in face of rising material costs while larger producer competitors are able to cover such increased costs through improved export sales or sales of nonfertilizer items The current restraints are beginning to cause serious artificial distortions Small companies are being threatened with disappearance because of the lack of any relief from rising costs while their big competitors are turning to the export market where prices are uncontrolled He estimated that 35% of the total U S production of triple superphosphate and diammonium phosphate will enter the export market this yr The Institute request included government price data showing that while consumer prices have zoomed by nearly 35% since 1961, fertilizer prices have increased by only 2% in the same period

## TRAINING

445

**Sales Training—Its Role in Fertilizer Marketing**

Louis E Haley (Coromandel Fertilisers Ltd , Secunderabad India)

*Fertilizer News 12* (9), 11 3 (Sept 1967)

Well planned, continuous company training programs are a necessity to avoid excessive personnel obsolescence Primary subjects to be covered are (1) company knowledge (2) market knowledge, (3) product and service knowledge, (4) marketing program analysis, (5) effective selling presentations, and (6) follow through Major responsibility for personal development belongs to the individual, however, and he should devote 5 hrs/wk of his own time to professional improvement In the company training program, primarily of the group type, audio visuals should supplement lectures In long meetings some group activity should be planned such as round table discussions or problem solving assignments

446

**Midwest Fertilizer Men Attend Short Course**

*Com Fertilizer 115* (4), 42 (October 1967)

Fertilizer dealers, salesmen, and bulk blend plant operators from Wisconsin, Illinois, and Iowa have completed a new three week short course in crop production and soil management The course was sponsored by the University of Wisconsin College of Agriculture, University Extension, and Wisconsin Fertilizer Association Objective was to provide technological training to men without a college degree but working with agricultural chemicals Similar schools will be organized in the future as the need arises

447

**Fertilizer and Hunger Problem It is More a Matter of Education and Distribution than Capacity**

*Oil, Paint Drug Reptr 193* (19), 3, 29 (May 6, 1968)

C J Pratt, manager of agricultural development for Mobil Chemical Co , told Chemical Marketing Research Association that minimum world primary nutrient needs will increase to 86 6 million metric tons in 1975 and 143 3 million by 1985, compared to 1965's 42 6 million metric tons Problems such as farmer education, distribution, and payment are more serious than production capacity or technology in getting these quantities of fertilizer actually used

448

**Fertiliser Education – Whose Function?**

A Ganguly (F A I , New Delhi, India)

*Fertiliser News 13* (12), 104-6 (Dec 1968)

Farmers must receive proper technological guidance on fertilizer use that will provide the optimum yield of crops from their soils It is the responsibility of the Government Extension Agencies, Central Fertilizer Pool, Fertilizer Industry, and others involved in the task of boosting agricultural production to frame and integrate fertilizer education programs The fertilizer industry, by virtue of its being a producer, has to recognize that its growth and continuing prosperity depends to a great measure on well informed farmer-customers Well trained fertilizer retail dealers can disseminate fertilizer know-how more effectively than anybody else because they have direct contact with farmer customers and have the motivation to increase fertilizer consumption in their own area, but this objective can only be achieved if there is organic relationship between the manufacturers and retail dealers

449

**Fertilizer Marketing—Staff and Dealer Development**

R N Warriar (Fert Corp India, New Delhi)

*Fert News 15* (3), 27 32 (Mar 1970)

Building an efficient marketing organization implies the development of managers and men The immediate task of the fertilizer industry in India is to develop a cadre of adequately trained and motivated managers, field staff, and dealers at wholesale and retail levels Four company training programs are outlined in detail two week induction/orientation program for sales personnel, two week induction/orientation program for fertilizer promotion personnel, three day induction/orientation program for dealers, and two day induction/orientation program for extension personnel

450

**Training for Efficient Fertilizer Marketing**

R S Giroti (Fertiliser Ass India, New Delhi, India)
*Fert News 15* (10), 23-8 (Oct 1970)

Marketing of over 20 million mt of fertilizer materials in 1973 74 will require a force of knowledgeable, skilled, and efficient manpower trained in all phases of marketing But such a large number of trained personnel are not available The Fertilizer Association of India, in its endeavor to ever erve the fertilizer industry has undertaken the task of training line and staff marketing executives in order to prepare them for challenges ahead The tl ee training courses so far conducted by the I AI are reviewed and some aspects of training in general are discussed

451

**Techniques of Evaluating Training Results**

B G Varshney (Fert Corp India, Naya Nangal, 'ndia)
*Fert News 16* (7), 49 52 (July 1971)

Training is an important tool of personnel development Management is always concerned with the effectiveness of the training programs The steps involved in the evaluation of training results are reaction, learning behavior, and results Commonsense evaluation systematic evaluation, experimental evaluation and formal approach are the current practices in the field of evaluation of training results Evaluation pro cedures must be built into the training program from its conception A scientific evaluation of training program leads to higher training productivity

452

**Farmer Meetings—An Effective Farmer Education Technique**

N G Nayar
*FACT Market Bull* 7 (1), 7 8 (Jan 1972)
*FAI Abstr Serv 11* 2404

Farmers' meetings enable direct contact of marketing personnel with their customer farmers In a particular meeting only 100 150 farmers or more from 1 or 2 villages should be covered A suitable place for such meetings are premises of village office or a school In case there is a demonstration plot, a meeting in the plot owner s house would be preferred Personal invitations or invitation by mail should be sent to farmers Cooperation of dealer of the area is helpful A well planned program for the meeting, to be attended by the company's agronomist and sales staff, is a must The presence of an agricultural extension officer as a guest speaker will add weight to the meeting The subject matter should be brief and supported with aids like product literature, handouts describing services photographs of successful demonstration plots, harvests, fertilizer samples, projector, soil testing facility, and others Adequate time has to be provided for questions and answers A film show at the end serves as recreation Detailed information about farmers present at the meeting will be advantageous for establishing future contacts with the farmers The farmers' meeting has to be a continuous process

## PROMOTION

453

**Persuading Millions of Peasant Farmers to Use Fertilizer**

H L Richardson
*International Develop 1966*, 138 47 (1967)
*Trop Abstr 23*, 631

An increase in the use of fertilizers by small farmers can be achieved in developing countries as is illustrated by the experience of Mexico, Greece, and India The programs in these countries are characterized by experimental work follo ved by thousands of demonstrations on farmers' fields A review is presented of the FAO fertilizer program under the Freedom from Hunger Campaign, which started in 1961 and is now operative in 18 developing countries in the Near East and N frica, in W Africa, and in northern Latin America Total consumption of N, $P_2O_5$, and $K_2C$ in 15 of these countries increased from 190 000 tons in 1961 to 334 000 tons in 1964, a rate of increase about twice that in comparable countries without such a program

454

**Needed An Idea Not Just a Product**

G Philmer Teel (Rumrill Hoyt, Inc , Rochester, N Y )
*Agri Marketing 5* (12), 52 3 (Dec 1967)

Thoughtful market oriented creativity can capitalize on ideas to improve the level of promotion activities and the advertising that backs them up Yield opportunities through proper fertilization and promotion based on basic agronomic prin ciples are used by a number of fertilizer companies Few ads, however promote application services crop programs based on much more than a particular brand, or other non exclusive features of fertilizers

455

**How Olin Sets Its Dealers Apart from the Flock**

*Agri Marketing 6* (6) 32 3, 36 38 9 (June 1968)

Olin's 'Rare Bird" advertising program is described as a break away from conventional fertilizer ads Dealers or "agent" identification with the falcon emblem was sought and attained Farmer ads were based on unusual visuals terse headlines and frank, conversational copy in the body

456

**Fertilizer Distribution and Promotion Part III**

R N Warriar (Fertilizers & Chemicals, Travancore Ltd , Alwaye, India)
*Fertiliser News (India)* 13 (7), 27 30 (July 1968)

Fertilizer promotion should consist of promotion of the concept of scientific agriculture on a broad and properly integrated base In order to inspire confidence, the program should be organized by agencies in whom the farmers have confidence In the absence of such agencies, a dynamic program of public relations should be the starting point of any promotional effort A sound public relations prog m has two essentials doing good and making people aware you are doing good Regardless of the agency responsible for fertilizer promotion, key activities should be performed at the farmers' level such as agronomy assistance, soil testi ig, demonstrations, and fertilizer trials Thus, the promotional agency should be field activity orientated It is desirable that the promotional agency should not be required to shoulder other responsibilities The work should include exhibitions, public meetings, study and discussion classes, study tours, distribution of literature, audio visual programs, and advisory and consulting services Evaluation of the quality of these activities is not easy, overall increase in agricultural production and consumption over a period of time would give some indication of the impact of the promotion effort

457

**Fertiliser Sales Promotion**

B C Dalal (Gujaret State Fertilisers Co , Ltd , Baroda)
*Fertiliser News 13* (11), 11 14 (Nov 1968)

India's fertilizer industry is in a transition stage from a seller's to a buyer's market Imaginative and aggressive sales promotion coordinated with distribution logistics will be required Most Indian companies in the next five years need to develop an extensive network of distributors on a national scale supported by a national advertising program, strong regional markets with active dealers, and better services to farmers Brand name promotion and improved packaging also are suggested

458
**Sales Promotion in Fertiliser Marketing**
V R Rajagopalan (Rallis India Ltd , Bombay, India)
*Fertiliser News 13* (12), 82 6 (Dec 1968)

Sales promotion in fertilizers in India today involves considerable drive, imagination, and innovation The Indian farmer is highly selective and choosy both in regard to the type and source from which he obtains his fertilizers This emphasizes the need for organizations dealing in fertilizers to streamline their distribution policies and promote aggressive salesmanship The sales of fertilizers in India will, for a long time, continue to hinge on the availability of credit on the one hand and the existence of associate inputs in the way of irrigation, seeds, etc , on the other hand It is, therefore, squarely the responsibility of the firms engaged in the fertilizer business to contribute their lot in any program that is designed to set up the creation of this infrastructure for fertilizer use as well as assist credit availability necessary that would encourage the farmer to use this input at the requisite level In order that fertilizer use becomes a widespread reality on the Indian farm scene, the Government must consider the removal of controls, such as movement, allocations, State trading, and imports They must take steps to increase the availability of credit to the farmer in order to provide the necessary conditions which would maximize fertilizer sales and fertilizer use

459
**The Functions and Costs of Fertiliser Marketing Service**
F W Parker (Agency for Intern Develop , Washington, D C)
*Fertiliser News 14* (1), 29 34 (Jan 1969)

Five fertilizer marketing services are discussed, namely making the fertilizer available to farmers, providing credit to dealers and farmers, developing or expanding the market, promoting the efficient use of fertilizers and complementary inputs, and providing technical and special services Their relative importance varies somewhat with the degree of modernization of agriculture and the national economy The total cost of fertilizer marketing services is about one third of the selling price in U S A , Europe, and some developed countries Two thirds of the costs are direct sales costs including storage, transportation, technical and special services, and general administration The other one third covers depreciation, income tax, and return on the investment including profit In India, the marketing services should be directed primarily to making fertilizer more readily available to farmers, assisting in providing credit to dealers and farmers, and promoting the efficient use of fertilizers, complementary inputs, and improved practices for crop production

460
**Winning Big Farms' Big Market.**
*Chem. Week. 104* (4), 41 (Jan 25, 1969)

Teams in Allied Chemical's agricultural division are working with flipcards and slides to find new markets for fertilizer This is an attempt to reach the large scale corporate farm through its Board of Directors By presenting a complete fertilization package including a scientific liquid formulator or a blending plant, efforts are made to show how purchases can be made directly from producer at the lowest price and blends fertilizers in proper ratios

461
**Marketing Fertilisers in India in the Future — Farmer's View Point**
S B Pandya (Natl Tonnage Club of Farmers, New Delhi, India)
*Fertiliser News 14* (2), 18 20 (Feb 1969)

With increased fertilizer consumption targets, there should have been adequate promotional efforts Successful practical demonstrations in the fields of farmers accompanied with publicity and fertilizer festivals under the combined auspices of the government, industry, and farmers' organizations would inspire better confidence Credit is the main bottleneck for purchasing fertilizers and it should be easily available It is necessary to bring down the cost of fertilizers It will be in the interest of the industry to support farmers in their claim for economical prices for their products Farmers should be protected against droughts and other natural calamities by crop insurance

462
**Marketing of Fertilisers in India in the Future — The Role of Industry**
M K K Nayar (Fertilisers & Chemicals, Travancore, Ltd , Alwaye, Kerale, India)
*Fertiliser News 14* (1), 35 9 (Jan 1969)

The role of industry in the marketing of fertilizers in coming years is discussed The responsibilities the industry should assume in the future with measures like farmers' education and sales promotion are stressed Effective distribution system comprising adequate number of dealers, training of distributors, salesmen, etc , among other things, is necessary to the growth of fertilizer marketing The author calls for a code of conduct in fertilizer marketing, and for close cooperation between the industry and the government

463
**Fertiliser Promotion**
K Sengupta (Additional Dir Agr , West Bengal, India)
*Fertiliser News 14* (3), 13 15 (Mar 1969)

Production of fertilizers is only the first step towards increasing their use Short supply of fertilizers and channelization of all N fertilizers through the Central Fertilizer Pool inhibited initiative in the development of efficient fertilizer distribution system However, recent changes in distribution policy made fertilizer selling a primary responsibility of manufacturers A description is given of various factors, such as, economics of fertilizer use, availability of fertilizers, storage, and credit facilities These are intimately connected with distribution of fertilizers particularly highlighting the fertilizer promotional aspect

464
**The Customer How to Encourage Farmers to Adopt New Practices**
Girdhari Lal (Shree Ram Fertilisers & Chemicals, New Delhi, India)
*Seminar on Fertiliser Marketing, Proc* , Fert Ass India (Held New Delhi, Dec 6 8, 1968), pp 133 40 (Apr 1969)

The customer, in case of fertilizers and other agricultural inputs, is the farmer The farmer in India varies widely as far as

his reactions to adoption of new practices is concerned The variation arises from the level of education, practical knowledge, resources, size of holding, level of income, and attitude towards taking a risk The objective is to accelerate the adoption of new practices by farmers The capacity of the farmer to receive new ideas should first be assessed Then, more and better communication is needed concerning the profitability of proper fertilizer usage, the cost involved, the possible risks, the fringe benefits, and the need for him to record his yield and to inform other farmers

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**Farmer and Fertilizer**

A. V Gokhale (Dharamsi Morarji Chemical Co , Ltd , Bombay, India)

*Seminar on Fertiliser Marketing, Proc ,* Fert Ass. India (Held New Delhi, Dec 6 8, 1968), pp 156 60 (Apr 1969)

The basic input in an agricultural improvement program is the farmer He is to be motivated and converted for use of inputs For this, socio-economic survey of farming communities is a pre requisite for planning marketing strategy A farmer, motivated through mass media and other communication channels, is a serious and sensitive customer, especially in case of chemical fertilizers In the present shift to buyers' market, quality of fertilizer product is the key to successful marketing Temptation to adulterate the product for high profit or over paint the merits for quick selling would not only spoil the market but would lead to negative thinking by buyers regarding fertilizer use Farmers are getting a range of fertilizers for different crops and soils New products many times supplement or compliment the old ones Acceptance of new product is a complicated process Balanced fertilization of crops is the only policy that increases consumption In India, there is marked imbalance of P and K to N Every fertilizer dealer should advocate use of N, P, and K in proper proportion For this the dealer should be allowed to sell N, P, and K fertilizers, straight and mixed, under one roof Both straight fertilizers and fertilizer mixtures have their own advantages and their need would be felt by different levels of farmers Dealers should sell quality material of what farmers want Besides these, compound and liquid fertilizers could dominate the Indian scene in the near future and these should not be accepted as necessary evils but with understanding and advantageous use Starved soils and stunted crops can be converted into rich granaries, through fertilizers, only by placing marketing organizations on rational footing, recommending few fertilizer grades bas d on soil analysis and crop calendar and instructing and inspiring farmers to use fertilizers profitably

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**Publicity, Advertising and Public Relations**

D L Rucker (The Fertiliser Assoc India, New Delhi)

*Seminar on Fertiliser Marketing, Proc ,* Fert Ass India (Held New Delhi, Dec 6 8, 1968), pp 187 92 (Apr 1969)

Public relations is defined as "planned activities or actions designed to create a favorable impression or image of an organization or individual with people with whom that organization or individual wishes to have favorable relations " Advertising is defined as "buying (or hiring) the right to place a message in a medium of communication which is supplied by another entity " Publicity is defined as "making use of any and all means of communication, other than paid advertising, to convey to a public a message which is in the interest of the organization or individual initiating the communication" Two other terms are considered – education and promotion It is pointed out that whereas there is a degree of separation in their meanings and application, there is considerable overlap Presumably, educational communications serve the purpose of conveying knowledge to people which if acted upon, will be beneficial both to them personally and to society, whereas promotional messages serve only a vested interest of the initiators and, therefore, are not necessarily beneficial either to the individual or to society It is concluded that publicity and advertising may serve the purposes both of education and promotion and that even with their self–serving purpose, they have a greater potential for imparting basic beneficial knowledge to the post school age population in developing countries, such as India, than any other channels The applications of publicity, advertising and public relations in fertilizer sales promotion in India are discussed in some detail These form the foundation for a sound and effective sales promotion program, but are like a cafeteria in that the initiative to act on the messages conveyed is strictly with the persons to whom the messages are beamed Thus such activities can only be expected to create a favorable atmosphere for the actual direct selling process This further points to the necessity for a well trained, aggressive sales organization including retails dealers The ingredients of communication also are discussed and it is emphasized that communication is not complete until the intended recipient not only is exposed to the message, but assimilates and understands its meaning.

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**Publicity and Advertising Meetings and Fertilizer Festivals**

V T Thomas (Fertilisers and Chemicals, Travancore, Ltd , Alwaye, Kerala, India)

*Seminar on Fertiliser Marketing, Proc.,* Fert Ass India (Held New Delhi, Dec 6 8, 1968), pp 193 201 (Apr 1969)

Publicity, advertising, and other promotional techniques play a vital role in inducing the farmers to cast loose from the ancient moorings of the traditional farming It is a problem of winning the farmers against their own convictions The resistance among farmers to fertilizer use is a built in one Even in a country like Great Britain this resistance is strong In a country like India the resistance in this regard is bound to be of larger proportion The situation can be saved if the necessary efforts are made FACT embarked on a planned program of fertilizer promotion in 1960, to secure the maximum possible consumer acceptance of chemical fertilizer use This promotional program liberally made use of the conventional media such as the press, leaflets, posters, hoardings, exhibitions, demonstrations, and film shows FACT also evolved new promotional methods, such as fertilizer festivals, evening study classes, FACT farmers' clubs, and organized a good number of them during the past few years Analysis of the effectiveness of various means and media employed and a projection of the importance of various fertilizer promotion activities in promoting fertilizer use are given

468

**The Package of Practices' Approach to Sales Promotion**

D A W Hall (Shaw Wallace & Co , Ltd, Madras, India)

*Seminar on Fertiliser Marketing, Proc.,* Fert Ass India (Held New Delhi, Dec 6 8, 1968), pp 219 24 (Apr 1969)

In the past the emphasis in sales promotion has been on fertilizers, this itself has been one leg of a twin approach, the other leg is the provision of water, at the right time and in the right place, and in the right amount This has tended to be left unstated, or at least under emphasised possibly because of its obviously transcending importance This is easily overlooked

when considering the "Package of Practices" approach to sales promotion It is pointless expecting dealers and farmers to invest in improved seeds, pesticides, mechanical aids, and even fertilizer itself unless the essential pre requisite of irrigation can be assured, if not guaranteed The foregoing demands a selective approach to dealers, and it is one where education should proceed downwards from the main dealers in the larger towns who have the finance, staff and educational accomplishments to handle a diversified product line Hand in hand with this should go education, extension, and propaganda work at the grass roots to bring home to the bigger farmer and cultivator the benefits to be derived from making use of improved seeds pesticides and equipment in order to get the best out of the fertilizers which they are now beginning to apply

469

**Use More Fertilizers—A Case Study in Audio Visual Presentation**

John Falloon (Univ Missouri and Orissa Univ Agr & Technology, Bhuraneshwar, Orissa, India)

*Seminar on Fertilizer Marketing, Proc* , Fert Ass India (Held New Delhi, Dec 6 8, 1968), pp 253 85 (Apr 1969)

Two of the important reasons for low usage of fertilizer are (1) the distribution system is weak and (2) the attitude of many farmers is indifferent to the use of fertilizer or even wrong The two are entwined but the points relating to them can be discussed more clearly when the two are separated The significance of the first point is recognized and the second point is discussed It makes little or no difference whether a person is right or wrong—his actions are based on what he thinks to be the situation—and he may be thinking wrongly instead of rightly The job is to get many farmers to thinking about fertilizer and thinking correctly The burden is on two groups of people—(1) those who deal in education only, influencing attitude only, and (2) those who sell the produce—merchandise fertilizer in this case A meaningful solution lies in cooperation to mutual advantage This presentation focuses on some of those points

470

**Role of Communication in Fertiliser Marketing**

T M Alexander (Fertiliser Asso India, New Delhi)

*Fertiliser News 14* (5), 35 7 (May 1969)

Communication has a vital role to play in fertilizer marketing Fertilizer has to be produced and to reach the field of every farmer in the country if agricultural production is to increase Farmers at different educational and economic levels have to be motivated and assisted in using fertilizers Government and the industry have to take up promotion of fertilizer through publicity and advertisement using all mass communication media available

471

**The Futures Market and The Agri Marketing Man**

*Agri Marketing* 7 (9), 24 30 (Sept 1969)

A farmer who buys or sells on the futures market is aiming for what amounts to price insurance The optimum application of fertilizer obviously hinges on the cost of fertilizer versus the anticipated price of corn The higher the price of corn, the more fertilizer it will pay to apply It follows that a farmer who knows he'll pocket, say, $1 10 for his corn (because he's already used the futures to sell it at that price) is at the very least a better prospect for fertilizer than a farmer whose corn crop may bring only $1 00, or even the farmer whose corn might bring $1 20

472

**Modern Methods for Promoting the Sale of Fertilizers.**

A E Cascino (International Minerals & Chemical Corp , Skokie, Ill )

*Proc Fert Soc*, No 107, (1969)

While marketing is more of an art than a science, application of the scientific method in marketing is not precluded The difficulty of such application is that marketing problems are often difficult to define in exact and precise terms, and often no controls exist for testing of hypotheses The fertilizer industry has experienced marked changes during the past 30 years, and marketing methods have required changes to keep up to-date What was adequate 10 years ago may not be adequate today Since the products of the International Minerals & Chemical Corp (IMC) are basic chemicals or minerals there is little opportunity for differentiation In order to gain distinction in such a market it was therefore necessary to offer services These services have included a large fleet of ships and railroad cars and a computerized system for keeping tabs on the location of shipments in transit This enables IMC to expedite shipments and avoid delays, often without awareness on the part of the customer that delays are impending Since large scale shipment of low cost commodities is basic in the fertilizer industry, a well organized transportation system often provides a competitive advantage over other suppliers Other services consist of helping the customer to sell his product to the farmer, and in helping the farmer to get maximum return from his fertilizer expenditure by buying only what he specifically needs and using it under optimum conditions Since this latter service involves the use of computers and special formulations, it costs the farmer about 20% more per ton of fertilizer But the cost advantages to the farmer in increased yields have shown the farmer that it is a sound investment

473

**Advertising, an Important Link Between Producer and Consumer**

T M Alexander (Fert Ass India, New Delhi)

*Fert News 15* (3), 33 5 (Mar 1970)

Fertilizer advertisers must recognize that consumption is seasonal (and requires promotion tied to the season of use) but production is continuous (and requires advertising at intervals throughout the year) Since companies advertise to locate consumers and increase sales vol, care must be used to translate advertising messages into effective audio visual presentations Newspapers, journals, radio, cinema, and billboards are available media but must be selected in accordance with advertising goals Fertilizer advertising in metropolitan newspapers is of doubtful value to Indian farmers living in villages

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**Integrated Promotion and Marketing of Agricultural Inputs**

K Pushparaj (Travancore Ltd , Alwaye, India)

*Fert News 16* (5), 23 7 (May 1971)

Integrated promotion and marketing of agricultural inputs is essential for the proper development of agriculture Fertilizer is the most important agricultural input industry in India and the initiative for a coordinated effort towards integrated marketing has to come from the fertilizer industry The problems in implementing a program of integrated marketing of agricultural inputs through a horizontal and vertical integration of efforts on the part of various agencies involved are discussed

475

**Music—New Medium for Fertilizer Publicity**

V S Ramaswamy (FACT, Tamilnadu, India)

*FACT Marketing Bull 6* (4), 12 (Sept 1971)

Increased intensity in promotional efforts are needed as the fertilizer industry expands in India Fertilisers and Chemicals Travancore is distributing 45 rpm records containing specially composed lyrics about FACT fertilizers and the green revolu tion The lyrics are set to popular music and recorded by well known, popular screen artists Each song lasts slightly over 3 min Distribution of records in rural areas is a joint effort of FACT and its fertilizer distributors

## GENERAL

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**Farm Service Centers Multiply**

*Chem Eng News 47* (8), 22-4 (Feb 24, 1969)

Only 10 years ago, bag fertilizer was sold as a sideline of the feed and grain business in most cases Today, in a rush to become basic large companies are integrating all the way from the mine to multiservice, highly capitalized retail outlets Fertilizer producers set up farm centers in the hope of gaining customers by offering more and better service than their competitors To date most of these farm service centers have been set up by a few large companies throughout the Midwest In 1967, 50% of all fertilizer used in the United States was used in 12 Midwest states

477

**Dealer Services Editorial**

*Agr Chem. 24* (2), 9 (Feb 1969)

Service must be supplied by the local agricultural chemicals dealers and blenders Similarity of product lines, saturation of the market, and a rock bottom price structure have left the local outlet with very little other than service with which to attract customers Their number is growing but they are attracting fewer customers Consumers like service because it means they no longer have to do many of the time-consuming chores that they used to do Such services as soil testing, bulk delivery, and spreading often are provided by fertilizer dealers at cost -or less than cost

478

**How to Sell Fertilizer Programs to Farmers**

R E Berk

*Farm Supplier 43* (4), 34 (Apr 1969)

Simply selling fertilizer isn't enough The program must consist of a package of services A number of these services recommended are (1) soil testing, (2) a map showing location and size of fields, (3) what the farmer expects to plant, (4) crops formerly grown in these areas, (5) trace elements necessary, (6) recorded historical data relating to the use of fertilizer, and other data may be obtained as needed These and other services actually amount to a consultation program, designed to accurately pinpoint a farmer's fertilizer needs

479

**What the Farmer Wants and Needs.**

John Malcolm (USAID, Government of India, New Delhi)

*Seminar on Fertiliser Marketing, Proc.*, Fert Ass. India (Held New Delhi, Dec 6 8, 1968), pp 141 5 (Apr 1969)

Whatever products farmers buy, they want security against loss and a possibility of profit In fertilizers this means an analysis which they can trust and physical quality which meets their needs Fertilizers must be available in adequate quantities at the right time and at a price which allows a generous return on investment The importance of product quality cannot be over emphasized Fertilizer is to supply a need which cannot be met from the supply of nutrients in the soil This may be N, P, K, or a micronutrient Not only chemical but physical quality is important There still is and there will always be a need to use straight materials in Indian agriculture With some soils and crops only a single nutrient supplement is required More often a soil is deficient in more than one element and it is for this reason that mixed fertilizers have their own peculiar place Mixtures represent built in service They provide factory controlled uniformity To have a sufficient large number of mixtures to meet all other contingencies would still mean a costly and unnecessary proliferation The intermediate road between straight fertilizers and mixtures is the bulk blend The professional agronomist with industry or with government must be willing to make positive recommendations but the farmer must be allowed to make the final choice from an adequate variety of fertilizers

480

**What Kinds of Fertilizer Service do Farmers Want from Dealers**

D G Newcomb

*Farm Supplier 44* (1), 20-2 (Jan 1970)

Fertilizer sales are a significant portion of most suppliers' income Dealers often feel they should be doing more volume The secret in many cases is how the farmer views the dealer and his services In many cases the supplier is not giving the customer the services he wants A survey of farmers' wants and needs by *Farm Supplier* revealed (1) farmers rely on fertilizer dealers for advice regarding their fertilization program, (2) they feel the dealer should supply application equipment, (3) he should assist in a soil testing program, and (4) the dealer should show an interest in working with them

481

**Just How Important Are Customer Services.**

W L. Nelson (American Potash Institute)

*Agr Nitrogen News 20* (1), 33 6 (Jan Feb 1970)

Customers services are a big thing with fertilizer companies Everybody knows they are an expensive item and highly important in building or protecting market share in local areas But nobody seems to be quite sure just how expensive or important customer services actually are The wide offering of customer services as a merchandising tool in the plant food industry was emphasized in a recent Indiana Study The role of customer services in the buying decision was a primary issue in the study Interviews were made in the summer of 1969 and were based on spring and summer fertilizer purchases When asked why they chose their primary fertilizer dealer, farmers gave a wide variety of reasons The largest portion of farmers (25%) gave "service" as the most important reason And another 21% gave reasons such as honesty, reliability, and personality which are closely related to service This means that nearly half emphasized the importance of service oriented factors Only 14% gave price as their major reason and only 11% said their selection was due to quality In the confusion of a glutted fertilizer market, many decisions regarding customer services have been made without full regard to the consequences Too, customer services are added quickly to keep up with the competitor or protect market share Often little or no analysis is made of the actual cost of providing the service Consequently, there is little basis for pricing the services Many companies have no real idea of what it costs for

delivery, application, and farm planning. The extremely wide variation in pricing services reflects the confusion. Careful study of the costs of providing particular services and their impact on the business is badly needed

482
**Independent Operators—A Major Factor in Fertilizer Sales**
*Agr Chem 25* (9), AB4 AB12 (Sept 1970)
Over the past 10 yr independent operators have declined in number and seemed to be moving into eclipse Strong independents are major factors in the fertilizer market and some evidence indicated they are staging a strong comeback Operators of three completely different type operations were interviewed to determine how they operate and to what factor they attribute their success in selling fertilizers The successful independent operations are tailor made for the particular locality, the crop pattern, and the capabilities and preferences of the owner Fertilizer is treated as an important product to be added to another operation, operators use a diversified operation in which they can keep a staff busy yr round on a series of activities The success of each of the three operators is discussed in detail

483
**Service Is Called Major Factor in Cooperatives Fertilizer Success**
*Farmland 38* (14), 9 (July 31, 1971)
Service rather than return on investment is the main difference between cooperatives and other fertilizer companies according to R R Baxter, CF Industries, Chicago Other factors helping cooperatives to grow at a rate faster than the industry average are investments in manufacturing facilities, development of a large scale distribution system, and emphasis on marketing rather than production The effective tax rate for cooperatives is comparable to that of other fertilizer companies so that tax differences have not been a factor

484
**Successful Selling Experiences Programs That Worked for Us**
Keith Erny (Erny's Fertilizer Service, Watton, Ind )
*Searching the Seventies* (Held Sept 15 17, 1971, Memphis, Tenn ) Tennessee Valley Authority, Muscle Shoals, Alabama, pp 111 12
Retail firms must decide what plan they will use to market their product and proceed in the proper direction Erny's Fertilizer Service decided that it should be service oriented and should operate in a small area with a high percentage of repeat customers The marketing plan consists of fall sales and preseasonal discounts for early delivery, a firm credit policy that includes discounts for cash and service charges on past due accounts, soil tests and crop recommendations, high quality products at fair prices, a good maintenance program for equipment, and a complete line of chemicals, application equipment, and fertilizers Despite extremes in weather during the 1970 and the 1971 seasons total sales were about the same but actual products and services supplied differed substantially **Programs That Worked for Us** Q S Lee (Gold Kist, Inc , Atlanta, Ga ), pp 112 14 A program for the retail distribution of fertilizers should include such policies as treat all customers alike, aim for a profit, provide a complete program- offer a package program, and provide agency managers with incentive

## MANAGEMENT

485
**Services by the Independent**
Elwyn Kroger (Logan Valley Fertilizer Co , Lyons, Neb )
*Fertilizer Soln 12* (1), 24-6 (Jan Feb 1968)
Independent fertilizer dealers usually have several yr experience in retailing to farmers They are able to anticipate the special products and equipment needed by the farmer Farmers need advice in management decisions, and the dealer's ability to assist in this service is very important The community needs the intangible service of reinvestment of profits This service can be supplied from centralized management through the dealer on a part time basis as it is required

486
**Computer Based Programs Boost Farm Profits**
*Chem Eng News 46* (26), 48 51 (June 17, 1968)
Computers are being used increasingly for solving such farm problems as economic choice of crops, rate and kind of fertilizer and pesticide application, and cultivation practices Two companies (International Minerals & Chemical Corp and Monsanto) and many universities are active in this field These programs offer the farmer expert advice on his specific problems, the key objective being to make farming more profitable, not merely to produce higher crop yields For companies marketing farm chemicals, the program is a marketing tool providing direct contracts with the farmer These are fee programs, not a something for nothing plan, although the fee usually covers only a small part of the program's expense Some programs are primarily diagnostic while other programs are aimed at improving the technology of farming

487
**Technical Sales Service**
G C Patel (Gujarat State Fertilizers Co Ltd , Baroda, India)
*Seminar on Fertiliser Marketing, Proc* , Fert Ass. India (Held New Delhi, Dec 6 8, 1968), pp 202 11 (Apr 1969)
In an era of ever changing technology and techno-economic integration, rapid economic growth is attainable only by quickly assimilating new technological development This is true both for industry and agriculture However, when traditions conflict with technology, systematic planning and efforts need to be made to sell technological hardwares to the tradition bound consumers This is essentially the situation in which the fertilizer industry and other agro based industries are placed today in India so far as the sale of their factory produced inputs are concerned Technical Sales Service is therefore of vital importance to the fertilizer manufacturers This would primarily help the farmers in making correct decisions to ensure maximum profits through the use of fertilizers and other capital intensive inputs It is in the interest of the fertilizer manufacturers to see that the farmer makes a fair profit If he does not, he won't survive and neither will the manufacturer The Technical Sales Service must provide, broadly speaking, the following services reorientation services, basic services, diagnostic services, other chemical services, money maker services, and top most harvest services The Technical Sales Service team must not only possess the necessary know how and experience but also the missionary zeal, energy, and faith Its motto should be 'Sell while serving'

488

**Fertilizer Insurance Now Written**

*Oil, Paint, Drug Reptr 195* (14), 4 (Apr 7, 1969)

Modern farmers can insure their critical spring fertilizer application, no matter how wet their fields might be, at planting time One fertilizer company–International Minerals & Chemical Corporation, Skokie, Illinois–is promising it can deliver and apply fertilizer on or before April 25, regardless of field conditions The company is making the promise through its Rainbow Division, and it's backing it up with a $1/ton/day payment for each day's delay if the fertilizer is not on the ground on time

## APPLICATION

489

**Drip Irrigation Method Produces Sharp Increases**

*Ghana Farmer* 11 (3), 118 9 (1967)

*Trop Abstr* 23, 1997

A concise description is presented on the Blass system of drip irrigation, developed in Israel Permanent plastic pipes laid in shallow furrows carry water mixed with fertilizer continuously to the root zone of the plants A control head unit consisting of a water tap with filter, water meter, and fertilizer tank is required, for every two hectares Capital outlay per hectare amounts to U S $1000 for orchards and vineyards, to $2500 for vegetable gardens Considerably higher yields than with furrow or sprinkler irrigation have been obtained with a 20 50% lower water consumption Weed growth is reduced as the water is not distributed over the whole area The system is particularly suitable for arid regions

490

**The I I S R Bullock Drawn Chemical Applicator**

R G Menon and N S L. Srivastava

*Indian Farm. 18* (1), 27, 29 (1968)

Details are presented of the construction and operation of a mechanical applicator, developed in India in particular for bullock traction Among other things, fertilizers, fungicides, insecticides and nematicides in granular, dust or liquid form can be placed at a predetermined depth 5 15 cm The rate of application may be adjusted from 0 2 2 kg/100 m furrow A single pair of moderately good bullocks and one operator can complete 0 24 hectare/hour at a row spacing of 90 cm

491

**Slurry Fertilizer Equipment and Application Costs**

W E Funk and I H Lehman (Edw J Funk & Sons Inc , Kentland, Ind )

*Trans ASAE 11* (3), 419 21 (May June 1968)

The ratio of N and P to that of K can be varied in slurry fertilizers to a greater degree than in clear liquid fertilizers but special applicators are necessary for the viscous slurries Equipment developed by the authors is described A truck mounted slinger consists of a 1000 gal tank equipped with its own internal agitator, inside suction (Schvleyer) pump, hoses, booms, and dispensers (spinners) It is driven by a power take off from the truck motor A governor on the truck and a combination of factors such as volume of the pump, speed of travel, and speed and pitch of spinners controls the pattern of application Another applicator is the tractor pull type slinger It has a 500 gal capacity tank It is mounted on dual wheels, pulled by a farm tractor, and the slinging apparatus (which is the same as that of the truck model) is driven by the power take off from the tractor motor These machines do not spray but actually "sling" the slurries in an even pattern The advantages of slurry fertilizers to producers, plant food suppliers, and the farmer are reviewed

492

**Agricultural Aircraft in Philippine Rice Production**

W G Golden

*Agr Aviation 11* (4), 117 21 (1969)

*Trop Abstr 25*, 1032

The development and prospects of the use of aircraft in agriculture in the Philippines, in particular in rice production, are discussed Results of a number of trials on aerial sowing of pre soaked rice seed and on aerial application of fertilizers and pesticides, conducted by or with the support of the International Rice Research Institute since 1964, are reviewed These tests were started after it had been demonstrated that yields of broadcast rice may be as high as the maximum yields which can be obtained from transplanted rice

493

**How Much Equipment do Fertilizer–Chemical Dealers Use?**

R Bates (Editor)

*Farm Supplier 43* (10), 20 2 (Oct 1969)

Information obtained from 482 fertilizer and/or pesticide dealers responding to a Watts Publishing Co survey showed that each owned an average of 19 pieces of rolling application equipment These included an average of 9 5 nurse tanks 3 6 dry fertilizer spreaders 3 0 ammonia applicators, 2 3 liquid fertilizer applicators, and 0 6 farm chemical sprayers Equipment rental and/or loan and custom application are expanding rapidly Fertilizer sold/dealer averaged 1350 tons/year with 24% sold in the fall months 60% of the dealers expected their fertilizer sales to expand from 1968 to 1969

494

**Cost of Services and Who Provides Them**

J R Porter (Agway, Inc , Syracuse, N Y )

*Fertilizer Marketing in a Changing Agriculture* (Held Oct 1 3, 1969, Memphis, Tenn ) Tennessee Valley Authority, Muscle Shoals, Alabama, pp 102-4

Service to farmer should include product service (delivery of goods, spreading, and blending), credit service (an open line of credit and pre arranged financing and lease arrangements), soil service (soil testing and usage recommendations), and management service (crop management recommendations and financial management) Some companies attempt to perform all these services for their farmer customer A big problem in the fertilizer industry is that we have been trying to sell a half baked service program The spreader service is one that needs attention including more well trained operators and more frequent inspection of equipment The spreader service can be singled out as a direct charge and this might be preferable to including this service in the price of the product Other aspects of the service program are discussed

495

**Take a Look at Liquid Fertilizers**

*Wallaces Farmer 95* (3), 28 (Feb 14, 1970)

Time and labor savings with liquids may reduce cost per pound of applied nutrient to a figure below that for other forms When fertilizing 640 acres at a high rate of application, liquid fertilizer – compared to anhydrous ammonia – required 18 5 fewer man hours to fill the applicator tanks, 60 fewer hours for application, and $115 less tractor fuel Compared to

bagged fertilizers, 20 fewer hours were required to fill the applicator tanks with liquid fertilizer Mixing herbicides and pesticides with liquids also reduces the total number of trips across a field Some pesticides cannot be mixed with liquids and time and depth of application also may not match

496
**Custom Rates for 1970**
Tony Minnichsoffer
*Farmer (Minn ) 88* (7), 37 (Apr 4, 1970)
Custom operation rates are listed for North and South Dakota and Minnesota Rates are based on surveys, not actual cost studies Operations covered are tillage, planting, harvesting, and miscellaneous The custom rate for applying dry fertilizer is about $0 50/acre in all three states, liquid fertilizer application costs $0 50 1 50/acre, anhydrous ammonia rates are $1 00 1 50/acre Fertilizer applicators dry, liquid, and ammonia rent for about $0 25/acre

497
**Bulk Handling an Asset for Dealers**
Joe Whittington
*Agr Chem. 25* (6), 25 6, 49 (June 1970)
A late fertilizer season with too much rain created problems for fertilizer dealers on the east coast Those dealers who had not converted from bag to bulk were affected more because they could not go straight to the farm with bulk material Local stocks were depleted and additional materials could not be obtained in time for mixing and distribution There was also a shortage of distribution equipment The price of fertilizer was not a factor since each dealer was selling every ton he could handle There are two fertilizer seasons, busy and dull This past spring was a busy one

498
**Role of Agricultural Machines in Proper Application of Fertilizers**
D N Kherdekar (State Farms Corp India Ltd , New Delhi, India)
*Proc Semin Coordinated Market Use Fert Other Inputs*, pp 207 11 (1970) New Delhi, India Fert Ass India
Increased consumption of chemical fertilizers in recent years has brought with it the development of agricultural machines for their application The farmer too has benefited in many ways when he handled the fertilizers and seeds through machines Details of some of the equipment currently under development and use in India are presented

499
**Spatial Distribution of Fertilizer and Seed Applied from Light Aircraft III Effect of Altitude, Cross Winds, and Fertilizer Material**
R S Scott (Ivermay Agr Res Center, Mosgiel, N Z )
*N Z J Agr Res 13* (4), 909 20 ( Nov 1970)
Distribution patterns from application of aerial and granulated superphosphate from altitudes of 75, 100, 200, and 400 ft were measured in the presence and absence of cross winds Distribution of cocksfoot and white clover seed mixed with the fertilizer was also studied Results show narrower distribution from granulated superphosphate than from aerial superphosphate Increases in altitude resulted in increased width of distribution of fertilizer and seed When distributions were overlapped at intervals of 30 ft very high levels of efficiency of fertilizer use in terms of pasture response were obtained The level of efficiency declined as swath spacings were increased from 30 to 66 ft There was no increase in efficiency of fertilizer use with altitude of application above 100 ft except where swaths were spaced at 66 ft intervals Application of granulated in place of aerial superphosphate did not alter the efficiency of fertilizer use Swath placement (a measure of pilot accuracy) was considerably better when fertilizer and seed were applied from altitudes of 100 ft or less Seed distribution was narrower than fertilizer distribution, and white clover seed distribution narrower than that of cocksfoot seed Because of seed's narrower distribution and its variable degree of segregation from fertilizer, it should be applied separately through special equipment (For Parts I and II, see *FA 3*, 1535, 1536)

500
**Development of Fertilizer Spreaders in Holland**
Netherlands Economic Information Service (The Hague, Netherlands)
*Fert News 15* (12), 43 6 (Dec 1970)
Because of increase in the use of chemical fertilizers and greater mechanization of agriculture, Holland uses a variety of mechanical spreaders for fertilizers, chief among them being centrifugal and pendulum types The bowl spreaders have become obsolete and are replaced by centrifugal and pendulum types The pendulum spreader with oscillating spout and centrifugal spreaders with metering plates or with rotating and vibrating hoppers are described Holland produced about 52,000 spreaders in 1969 and imported about 4,500 spreaders in the same yr It exported about 46,000 spreaders to 32 countries

501
**Tool Up to Ease Fertilizer Handling**
*Big Farmer 43* (6) n p (Sept 1971)
An expansion in acreage farmed makes timeliness of planting more difficult Fertilizer application is still one of the main problems Methods of reducing the problem include use of custom application by fertilizer dealers, especially when competition causes charges to be less than actual cost Fall application of some of the fertilizer in conjunction with some tilling operations reduces pressure in the spring Large machines that can perform several operations simultaneously reduce manpower requirements Some fertilizers may be lower in cost per unit of plant food but difficulty in handling or application may require so much added time that another fertilizer would be better

502
**Applicator for Granular Fertilizers**
G S Hartley (to Fisons Ltd )
*US* 3,616,973, Nov 2, 1971, Appl Eng Sept 17, 1968, 9 pp
An apparatus for uniformly applying granular fertilizers to the soil, independent of granule size and wind, consists of a cascade of riffles The granules from the first riffle pass into at least two subsidiary riffles of the cascade The apparatus is suitable for use on an agricultural vehicle traversing rough ground

503
**The Dealer and "The Liquid Revolution "**
Troy McNeil (North Plains Fertilizer & Chem Co , Inc , Dumas, Texas)
*Fert Solutions 16* (1), 46 7 (Jan Feb 1972)
The dealer has contributed to the labor saving element of the liquid revolution which began 6 8 yr ago He has provided the farmer equipment which is faster, more accurate, and more uniform The equipment is versatile and can be used in the application of herbicides and insecticides Dealers also have

trained their employees so that they have more knowledge of fertilizers and soils Application of fertilizer through sprinkler systems has opened a new area for the dealer Successful dealers are professional and are in contact with the consumer every day Better program planning is the best service the dealer can offer

504
**Liquids Move Ahead in Aerial Application**
*Fert Solutions 16* (2), 12 14 (Mar Apr 1972)
Liquid mixed fertilizers fit into the air farming program of the northern Great Plains because liquids are easy to handle and present equipment is readily adapted to them As much as 300 acres can be fertilized with 20 tons of liquid fertilizer in less than 3 hr using aerial application Principal crops fertilized are wheat, milo, and corn

505
**Dealer Credits Success to High Flotation Trucks**
Jim Holmes
*Fert Solutions 16* (4), 51 2, 54 (July Aug 1972)
Block & Deaver Fertilizer Co , Gothenburg, Nebraska, credits a 40% increase in business in 1971 to the use of high flotation truck applicators Corn and alfalfa are the principle crops in the company's area The custom application preplant season lasts about 60 days Two Big Wheels high flotation trucks are operated 12 14 hr/day for quick, efficient application of liquid fertilizer Each truck can cover 30 60 acres/day Two 1200 gal nurse trucks are used to keep each of the high flotation trucks operating in the field Minimum compaction to the soil is an advantage of the high flotation trucks for farmers and fewer mechanical problems than with rental equipment is a further advantage for the company

506
**Solving Dealer Problems Field Application**
John Babcock (Amer Oil Co , Roseville, Ill )
*Proc 1972 Natl Fert Solutions Ass Roundup*, pp 20 2 (1972)
The field application of liquid fertilizers, done properly and carefully, results in increasing annual sales For efficient application, the operator of the equipment must know the exact acreage, and he must use the proper nozzles with the correct pressure setting Uneven distribution is soon recognized by the farmer, poor advertising for the dealer is the result Trips over the field must be minimized if the farmer and dealer are to profit, the single application of a complete NPK solution having compatible chemicals is desirable Five points which the dealer should always remember are (1) use wide tires on application equipment to avoid packing the soil, (2) use a marker on the truck to avoid overlapping application, (3) make two trips around the field and waterways to ensure proper application in edge areas, (4) be prompt on the day of application so the farmer does not have to wait, and (5) spend some time looking over crops you have treated to evaluate yourself and the job you do

## CREDIT

507
**Credit Costs More Than You Think Part I**
Richard G Walsh (Univ Nebraska, Lincoln)
*Fertilizer Soln 12* (1), 100-1 (Jan Feb 1968)
Credit policies should be molded to fit the type of business, management, and trade area while taking into account the full cost of credit Credit costs include interest on money in accounts receivable, direct costs of bookkeeping, collection, and bad debts, and indirect "worry" costs, mostly as time that should be devoted to considering size of the trade area and potential for expansion, increased utilization of the present plant, new products, services, and other business problems Credit extended by fertilizer solutions dealers is increasing because of changes in farmer attitudes toward credit, tighter money from banks, strong cash position of manufacturers, and use of credit to finance a market The author recommends a discount for cash on delivery of the fertilizer and adding 1% interest/month on the outstanding balance after 30 days

508
**The Credit Dilemma**
Paul E Bernard (Doane Agr Serv , St Louis, Mo )
*Agr Chem 23* (4), 16 17 (Apr 1968)
Free credit for fertilizer costs the industry $160 million annually or about $1 25/ton of fertilizer sold In 1967 tonnage on which farmers paid an interest charge for terms beyond 30 days was almost 40% lower than in 1966 For credit terms beyond 90 days, five times more fertilizer was sold without interest than with interest in 1967 compared to only three times more in 1966 Other examples of relaxation in credit are used to illustrate the present course of the fertilizer industry

509
**Management of Credit — Effective Use or Costly Abuse of Credit**
P E Bernard (Doane Agr Service, Inc , St Louis, Mo )
*Agr Nitrogen Inst , Proc 18*, 34-40 (1968) Held Nov 18 20, 1968, Kansas City, Mo
Of all farmers using credit for the purchase of N material only 5% of the products sold on terms involved an interest charge There has been a greater increase in tonnages sold on terms beyond 90 days with no interest charge than there was in the same category with interest charge The estimated cost for interest free purchases by the farmer cost N producers and distributors $1,744,000 annually In spite of these liberal credit terms ammonia is selling at about $28/ton less than one year ago

510
**Credit as a Tool in Fertilizer Sales Promotion**
C J Mistri (L I D -Parry Ltd Hyderabad, India)
*Seminar on Fertiliser Marketing Proc* Fert Ass India (Held New Delhi, Dec 6 8 1968) pp 212 18 (Apr 1969)
Due to limited financial resources of farmers there is need for credit as a tool in sales promotion The organization extending credit must know where, to whom, how much, and when the credit should be given Extension work is necessary as a preliminary step to make farmers aware of higher economic returns from fertilizer usage Estimates are necessary of capacity of distributors to determine what increased sales are obtainable with credit Sales programs are necessary for distributors to have stocks available before and during the season All inputs should be issued on credit seeds, fertilizers, insecticides fungicides, and irrigation equipment Banks should make credit available for small cultivators Lending of money, charging interest and collection of dues is a bankers business and should not concern fertilizer companies Credit as a tool in sales promotion has immense possibilities, provided the organization extending credit has intimate knowledge of the distributor organization and the potential of the area

511

**Fertilizer and Banking Businesss Don't Mix**

*Farm Store Merchand 12* (2), 79 (Feb 1969)

Agriculture today is one of our major users of credit American farmers now owe $50 billion and their debt is expected to reach $100 billion by 1980 Credit sources available to a farmer in any community are numerous banks, production credit associations, Farmers Home Administration, insurance companies, federal land banks, machinery and livestock dealers, feed and fertilizer suppliers, and local merchants and individuals Many farmers want to know when it will pay them to use credit Briefly, it will pay to borrow when the investment made will result in an income increase greater than the cost of the loan Using credit to increase the efficiency of existing resources would include borrowing money for fertilizer to increase crop yields Factors the farmer should consider in planning a loan request include (1) purpose of the loan, (2) amount to borrow, (3) length of term, and (4) repayment plan Funds borrowed to pay for fertilizer should be repaid in a matter of months when the crop or livestock product is sold

512

**Trade Credit in the Fertilizer Industry**

R A. Benson

*Farm Store 13* (2), 72 9 (Feb 1970)

A notable feature of the changing farm environment has been the rise in purchased inputs and the decline in ratio of cash receipts to cash disbursements An important source of operating capital in the past has been trade credit This credit arises when a farmer purchases inputs from a merchant or dealer and delays cash payment Usual payment periods are 30, 60, or 90 days but terms of a year or longer are common In most cases, trade credit is simply handled by an accounting entry–listed under accounts receivable by the seller and accounts payable by the buyer The fertilizer industry makes a good case study Trade credit can be a particularly useful tool to increase quantity demanded when one or more of three conditions are present excess inventories, excess plant capacity, or seasonal demand for a product The potential of merchant dealer credit as a source of short term financing for agriculture is virtually unlimited But in the long run, large quantities of trade credit will be extended to farmers if, and only if, such terms meet the profitability criteria set by individual companies If financing arrangements beneficial to both farmers and dealers can be formulated, it is entirely possible that trade credit will become the primary source of operating capital for commercial farmers

513

**Impact of Credit on the Use of Agricultural Inputs**

S B Mahabal (Agr Credit Dep Reserve Bank India, Bombay)

*Proc Semin Coordinated Market Use Fert Other Inputs*, pp 152 8 (1970) New Delhi, India Fert Ass India

The need for credit for both farmers and fertilizer marketing and distribution agencies is discussed The demand for and availability of credit for agriculture is progressively increasing It is estimated that by 1973 74, the short, medium, and long term credit required would be of the order of Rs 20,000 million Rs 10,000 million, and Rs 15,000 million, respectively A large portion of the total short term credit required is likely to be for fertilizers The role played by cooperative institutions and commercial banks in extending agriculture credit is discussed It is pointed out that though credit is an important factor, in determining the use of fertilizers by farmers, a number of other factors also make a significant impact on its use

514

**Input Financing–Role of Commercial Banks**

B Rudramoorthy (Agr Finance Corp Ltd Bombay, India)

*Proc Semin Coordinated Market Use Fert Other Inputs*, pp 159 68 (1970) New Delhi, India Fert Ass India

If the present trend towards a modern agriculture in India with higher productivity should be firm, adequate institutional support should be given to agricultural programs High levels of chemical inputs used in modern agriculture have increased the operational credit requirements of the farmer Greater involvement of commercial banks in the matter of input financing to the farmer is seen in the future In providing credit to the farmer, the economic viability of the enterprise should be the main basis of determining eligibility for credit Besides production credit requirements of the farmer there will be demand for credit at manufacturers' and dealers' levels for stocking of fertilizers and selling them to various categories of consumers Fertilizer dealership will soon become sales cum service function requiring adequate knowledge about agriculture and a sense of dedication In order to facilitate stocking and trading in fertilizers, the Agricultural Finance Corporation, a consortium of commercial banks, has evolved certain schemes to be adopted by its member banks The schemes are to be operated at wholesale and retail dealers levels One of the major issues to be settled is the present level of margin money insisted upon by banks which dealers consider as being high The banks on the other hand are willing to reduce the margin money to 10 or even 5% if the Fertiliser Credit Guarantee Corporation is set up Developing a suitable credit card system through which farmers can obtain the supply of inputs from dealers who, in turn, can get the reimbursement from banks in their area merits attention The credit card system has several advantages, such as, ensuring timely availability of inputs to the farmer, avoidance of misuse of credit, avoidance of overfinancing through multiplicity of agencies, extension of rural banking facilities and training the farmer in simple farm accounting techniques

515

**A Comparison of the Effects of Credit and Subsidy Schemes on the Use of Fertilizers**

D N Truscott and K Bose (Humphreys and Glasgow Ltd , Bombay, India)

*Proc Semin Coordinated Market Use Fert Other Inputs* pp 178 86 (1970) New Delhi, India Fert Ass India

Credit and subsidy schemes both have their places in encouraging the use of fertilizers to improve crop yields Credit schemes have to be confined to the larger farmers because the administrative costs rise with the number of credit holders and the risks rise rapidly for smaller farms Other costs are, theoretically at least, limited to the interest on the money outstanding The costs of subsid schemes are more obvious but the administration of subsidy schemes can be confined to the sources of production and imports These costs are therefore low The need to increase crops is obvious and hence the need for schemes to encourage the use of fertilizers, the choice of the appropriate scheme can be helped by an analysis which brings out clearly the comparative benefits of the alternatives An analysis is given, starting with a general case then relating this to the practical situation

516

**Credit's Effect on Fertilizer in India**

*Fert News 15* (11), 14, 46 (Nov 1970)

One of the major causes for the slow rate of growth in fertilizer consumption is the lack of adequate credit to farmers and to the distribution system This vol of credit cannot be

mobilized except through concerted efforts and by providing necessary institutional safeguards and incentives for the commercial banks to enter the field of rural financing in a big way No doubt, with the nationalzation of major banking institutions in the country, a reorientation of their credit policies has been taking place, and the commercial banks are showing greater interest in financing the farmer and the agricultural inputs supplying industries Faced with the problems of mobilizing necessary resources for the task, orienting themselves to the new social obligations, and more importantly, evolving proper procedures which inevitably take time, the banks have been insisting on some sort of a guarantee system against possible failures of loan repayment that might choke further advances Side by side with a guarantee system for the lending instutitions, implementation of crop insurance scheme, a closely supervised system of credit to farmers and adoption of the principle of disbursement of credit in kind rather than in cash were recognized by the Comm ttee as essential in minimizing overdues at farmers' levels The Reserve Bank of India has recently imposed curbs on refinancing facilities to commercial banks in respect of their advances to the fertilizer trade This has had the undersirable effect of imposing a fertilizer credit squeeze on bank finance Marketing credit for fertilizers in the coming years is of crucial importance if India is to achieve targeted levels of food grain production

517
**The Impact of Selective Credit and Price Policies on the Use of New Inputs**
Norman Rask (Ohio State Univ , Columbus)
*Develop Dig 9* (2), 49 54 (Apr 1971)
The focus of this study is on the role of credit in fostering rapid productivity changes in southern Brazil in the 1960s Use of modern inputs, primarily fertilizer and farm machinery, was subsidized through agricultural credit at negative real interest rates and support of wheat prices The structure and performance of three distinct farm situations were examined (1) an established and traditional extensive livestock grazing system, (2) a new intensive mechanized crop system that evolved from the above, and (3) a more or less transitional small farm agriculture that had modern inputs available Labor utilization increased 50% in the change from livestock to crop production and net farm income was four times higher on the crop farms Capital investments were about the same for both farms but livestock farms used very little credit Mechanized crop farms used almost $17/ha for seed, fertilizer, and insecticides while small crop farms used about $5/ha and small livestock farms expended only $2 50/ha Possibly credit was not as available to the small farms as to the larger and hence the much lower use of modern inputs

518
**Inclusion of Fertilizer Under Farm Credit Act Requested**
*Agr Chem Newsletter*, No 57, 3 4 (Aug 1, 1971)
The Fertilizer Institute has asked Congress to include the fertilizer industry under the group of farm suppliers eligible to utilize the credit channels of the Farm Credit Administration The Fertilizer Institute president asked that changes be made in the Farm Credit Act of 1971 so that Production Credit Associations and other financial institutions would be permitted to accept open account assignments from fertilizer manufacturers and dealers, which could then be assigned to Federal Intermediate Credit Banks The net effect, if the request is granted, would be to assure full availability of credit for farmer's fertilizer purchases

519
**Bank to Farmer Credit Scheme for Agricultural Inputs—A Case Study**
Dharamsi Morarji Chemical Co , Ltd (Bombay, India)
*Fert News 16* (8), 23 5 (Aug 1971)
Under the policy of the Reserve Bank of India, the Dharamsi Morarji Chemical Company (DMCC) evolved a scheme for direct financing of farmers to meet their requirements of agricultural credit for intensive cultivation The Dena Bank of Raipur in Madhya Pradesh was the participating bank The program was limited to farmers who were nonmembers or nonborrowing members of coöperatives It provided a package deal consisting of short term credit, agricultural inputs (fertilizer and insecticides), and technical guidance Infrastructure created in advance of the program was adequate staff at branches of the bank to handle disbursement of loans, a network of DMCC distributors and dealers to stock the fertilizers and agricultural chemicals, technical representatives posted to the area to provide guidance to the farmers, and senior staff supervision of the entire program About 1300 farmers participated in the program in 1969 and over 13,500 in 1970 Small farmers (average holding about 4 acres) were the main beneficiaries but crop production and fertilizer use increased, cooperatives were achieved to function more effectively, farmer exploitation by dealers was eliminated, and farmers received technical guidance at no cost

520
**Credit Creativity or Calamity**
J B Teter (W R Grace & Co , Memphis, Tenn )
*Searching the Seventies* (Held Sept 15 17, 1971, Memphis, Tenn ) Tennessee Valley Authority, Muscle Shoals, Alabama, pp 31 5
The credit function will continue to be instrumental in the marketing of agricultural chemicals The credit manager of the future must continue to stay abreast of developments in the marketing of his company's products Additionally, as the size of individual farm units grows, his role of counseling customers will become more important The financial requirements of the individual farm units will become more complex, requiring the farmer of the future to devote more of his management time to financial planning Farm loans will become more attractive to financial institutions Nevertheless, the supply industry must continue to develop programs for providing a reasonable credit accommodation for the farms of tomorrow

521
**Fertilizer Companies are Revising Credit Policies**
*Agri–Finance 13* (6), 20-4 (Nov Dec 1971)
The fertilizer industry now realizes that extended no interest credit can absorb profits and return inadequate funds for reinvesting in fixed capital and inventories Philosophies on handling credit, as well as extending credit on fertilizers have changed Fertilizer companies are now limiting short term credit, charging interest on long term accounts, or turning accounts over to banks or other financial firms Many fertilizer dealers now conclude that fertilizer companies should sell fertilizer and banks should loan money

522
**Trade Credit—Friend or Foe**
M D Boehlje and C E Roush (Oklahoma State Univ , Stillwater)
*Fert Solutions 16* (4), 22 31 (July Aug 1972)

Extending credit is or service that fertilizer dealers offer to maintain their market share of sales However, these credit arrangements are not uniform for the industry In general, cooperatives have shorter account due dates than independent dealers Cooperatives also have higher finance charge rates, but more independents offer cash discounts Cooperatives have a higher proportion of their fertilizer sold on accounts compared to independents Approximately 70% of all fertilizer sold by the firms interviewed (about 100) was financed by the dealer or the supplier with an open account or note arrangement Although offering credit arrangements may maintain market share of sales, credit costs are also incurred The opportunity or interest cost of different credit policies varied from 0 5 cents to 3 9 cents/dollar of fertilizer sales In general, reducing the account due date and increasing the finance charge rate result in reductions in the credit cost Although offering less lenient credit terms may reduce market share of sales, calculations indicate that substantial sales reductions can occur without decreasing profits because of the higher profit margin on the sales vol that is maintained

523
**Why Dealers Should Get Out of the Fertilizer Credit Business**
Richard Cobbs
*Farm Supplier 46* (7), 38-40 (Aug 1972)
Interviews were held with farmers, fertilizer dealers, and bankers in different agricultural areas of the country to discuss agricultural credit for the farmer In recognizing the change in farming to a commercial operation it is also realized that a dependable and adequate source of credit must be available The fertilizer dealer is not financed to handle large amounts of credit for long periods of time The farmer must establish a line of credit with banks, production credit associations, or such companies that are financially oriented and capable of analyzing the farmers capabilities, as well as supplying the financing Industry feels that fertilizer dealers should sell fertilizer and credit should be handled by financial institutions

524
**Distribution Credit and Dealer Net Work Planning**
*FACT Mkt Bull 7* (8), 5 (Aug 1972)
The Ministry of Agriculture in India sponsored a seminar on distribution credit, dealer net work planning, and intensive factory based programs Participants made a number of recommendations on credit and net work planning For credit they recommended that manufacturers should use their funds for raw materials and fertilizer production and should not be involved in extending credit to wholesalers Wholesalers who stock fertilizers both in season and during off season should be financed directly by banks Manufacturers should recommend their wholesalers to banks so that credit is given to the right agencies Retailers keep fertilizer stocks for only a short time and should not need credit if they do, it should be obtained from banks Most banks require a high margin 10 25% should be adequate Cooperatives should be given preference in the distribution of fertilizers where a good net [illegible] exists and is functioning Recommendations for planning net work start with classifying each district in the country according to its potential for using fertilizer Districts with the highest potential should have at least one dealer in [illegible] miles of every 3 miles For districts with a medium potential the maximum distance between a farmer and a dealer should not exceed 5 miles For districts with lesser potential the distance could be 10 miles or more Each dealer should sell N, P, and K fertilizers If the sale potential in an area is high, there could be several dealers representing different manufacturers States should be responsible for mapping retail outlets in each district and notifying manufacturers and marketers where deficiencies are located

## EXPORTS

525
**Bulgaria is Active in Fertilizer Exports**
*Chem Age (London) 103* (2732), 20 (Nov 26, 1971)
One of last year's most active fertilizer exporters in Europe was Bulgaria Over 150,000 mt of N fertilizers were exported virtually world wide By the end of 1973 it is expected that national output of fertilizers will have reached the 1 million mark

526
**Largest Canadian Sulphur Shipment to Europe**
*World NPKS*, No 36, 3 (June 1969)
In March the largest S shipment yet made from Canada left Vancouver for north west Europe The bulk carrier *M S Gerne* sailed with 33,000 tons of S which has been sold to customers in Netherlands, France, Germany, and the United Kingdom The S was produced by Canadian Superior Oil Ltd , at its natural gas processing plants at East Crossfield and Harmattan, Alta The significance of the shipment is that the use of bulk carriers substantially reduces commodity freight costs, and accordingly the competitive position of Canadian S in overseas markets will be considerably strengthened if several such shipments are fixed Already as a consequence of this shipment Canadian exports of brimstone to Western Europe in the first quarter of 1969 exceed by 12% the level of shipments to this market in the whole of 1968

527
**Saskatchewan Anticipates Sale of 2 5 3 Million Tons Potash to Japan**
*Chem. Eng News 48* (24), 23 (June 8, 1970)
Negotiations over exact terms will start later this month in Regina, Saskatchewan The Province premier indicated the sale would be for delivery over a five yr period Last yr, Japan purchased more than 440,000 tons of potash from the province, about 40% of the country's needs The agreement will include a guaranteed maximum price, probably 33 75 Canadian cents/unit of $K_2O$, a little less than U S $19 a ton Saskatchewan's six month old price production prorationing plan would get a boost from the Japanese contract The Canadian potash producers are taking the brunt of the world potash glut by running their mines only about 42% capacity, U S producers are running about 90% and European about 75% of capacity

528
**Vancouver Makes Largest Bulk Potash Shipment**
*Fert Int* , No 28, 2 (Oct 1971)
Reported to be the world's largest shipment of bulk potash, destined for Rotterdam, was the 54,445 tons loaded aboard the 736 ft long *August Pacific* at Vancouver Loading began on the night of June 4 and was completed in a day and a half The shipper was International Minerals & Chemical Corp , whose potash mines are at Esterhazy, Saskatchewan Since 1964, over 6 million tons of potash have been loaded from this dock, one of the largest potash loading facilities in the world

529
**Canadian Company to Ship Phosphorus to Japan**
*Eur Chem News 20* (502), 13 (Oct 15, 1971)
Albright and Wilson has signed a contract for the supply of P to Nippon Chemical Industries The P is to be supplied from the Electrical Reduction Co , of Canada, the Newfoundland subsidiary of Albright and Wilson The ERCO plant, with a production capacity of 70,000 ton/yr, produces P primarily for the UK market, but at present, estimates suggest that 30% of the plant's current capacity is geared to meeting the contract with Japan The first shipment was to be delivered in early December and A and W staff have been supervising processing preparations at the Nippon Chemical Industries plant at Kinuura, near Nagoya, Japan A and W is still interested in expanding its P sales in Europe, but as yet no plans have been made to deliver P to any other countries outside the UK except Japan Just one of the two A and W phosphorus carriers, with a capacity of 5000 tons, will handle the P shipments

530
**Modification of Canadian Potash Prorationing Considered**
*Oil, Paint Drug Rep 200* (25), 5, 16 (Dec 20, 1971)
A switch to prorationing of Saskatchewan potash output based on the capacity of each plant, and the establishment of a provincial marketing board composed of company repre sentatives, are two major modifications of the Canadian prorationing plan being considered by the government Prora tioning increased company revenues by 68% in 1969, the first yr of its operation, and by 100% in 1970 The Mineral Resources Minister pointed out that the only flaw in the scheme is that the government's share of the profit is not escalating comparably For the calendar yr 1971, it is estimated that the 3 7 million tons of potash produced in Saskatchewan will be sold for a value of $130 million, in contrast to 3 4 million tons produced in 1970, which sold for $116 million, and 3 5 million tons in 1969, which sold for $69 million While the prorationing scheme sets the rate for standard grade potash at $20 25/ton, or $33 75 for $K_2O$, not all companies are adhering to it Some price manipulation is occurring and, because of this, a new formula is being studied In order to ensure compliance with the potash conservation regulations it may be necessary to allocate production of potash in Saskatchewan, though only for the purpose of fulfilling commitments made for sales, at not less than the established basic price In support of this, deliveries of Saskatchewan potash in $K_2O$ to work markets in 1970 represented about 19% of the estimated world consumption of 17,815,000 tons and 46% of Saskatchewan's 1970 capacity Saskatchewan's rated capacity in 1970 was 28 5% of the estimated world capacity of 25,537,000 tons The government will also use a revised prorationing scheme as a tool to assure stability of employment in the potash industry, and one method of doing this will be through control of inventory Proposals that the industry cooperate to prevent further deterioration and eventual collapse brought contentions from many potash companies that they were prohibited from collective action by virtue of the antitrust laws and other related legislation This meant that the Saskatchewan govern ment had to act to assist the companies, which it did by establishing the progran of prorationing to market require ments and price stabilization

531
**Saskatchewan's Government to Take Strong Role in Potash Industry**
*Chem Week 109* (25), 27 (Dec 22, 1971)
The Provincial Minister of Mineral Resources told producers recently that his government will work with them but expects them to go after world markets more vigorously He said they should all get behind Canpotex, the association formed last yr to promote export sales of Canadian potash Canpotex has been used mostly as a clearinghouse for government tenders The government may set up a marketing board with power to control exports and perhaps all marketing activities The aim is to bring potash regulation in line with regulation of oil and gas and to boost markets for potash if Canpotex is unable to do so A strong stand has been taken on prorationing and price control Prorationing will be continued but will reflect only capacity instead of allowing leeway for marketers that can sell beyond their quota The government will not permit price cutting and will reduce the quota of any producer that violates the price floor

532
**Canada Makes First Shipment of Sulfur to China**
*Mining Congr J 58* (8), 13 (Aug 1972)
Fourteen thousand tons of Alberta produced S have been sold to China by Brimstone Export Ltd This will be the first shipment of Canadian S to China The company did not reveal the selling price nor the vol of S shipments the company plans to make to China

533
**Canadian Potash Marketing**
*Chem Age (London) 105* (2785) 5 (Dec 1 1972)
Canada's potash producers have initiated a new export drive through a company called Canpotex Ltd to try to boost their share of overseas markets Canpotex will be the sole overseas marketing agency for the entire Canadian potash industry

534
**First Bulk Potash Shipment from Congo**
*Fertilizer Intern.*, No 5, 2 (Nov 1969)
In November some six months after the Congo potash mine was officially inaugurated, the first bulk cargo of potash is due to be loaded at Point Noire Destined for consumers in northeast Europe, the cargo will be unloaded at the Antwerp terminal of Northern Shipping Services Sales of Congo potash are being handled by Ste Commerciale des Potasses et de l'Azote

535
**Egypt Hopes to Expand Phosphate Rock Production**
*World Fert Rev No 11*, 36, 37 (May 1972)
With an output of 537,000 tons of phosphate rock (containing 63 65% tricalcium phosphate) in 1970 and an annual capacity of approximately 750 000 tons, Egypt is only a minor phosphate producer But it has hopes of advancing to second place on the North African list after Morocco and before Tunisia A development program provides for capital invest ment of $200 million 70% of which is to be for infrastructure, to achieve an annual production of 10 million tons Deposits are located in 3 main regions the Red Sea (400 500 kms south of Suez), the Nile Valley (100 150 kms north of Aswan), and in Abu Tartur Plateau (Western Desert) Reserves are estimated at 130 million ton and 300 million ton in the Red Sea and Nile Valley areas respectively Ore is processed at Kosseir, Safaga (both in the Red Sea area) and Sibaiya (Nile Valley) The 55% ore mined in Safaga is processed into a 65% concentrate (150,000 ton/yr) Four new deposits are being exploited and will come into production in the near future Abu Shegeila (near Kosseir, 500 kms south of Suez), Hamrawen (between Safaga and el Kosseir), and on both banks of the Nile near

Mahamid Output will be used to produce 40,000 ton/yr elemental P, 16,000 ton/yr phosphoric acid, and 20,000 ton/yr triple superphosphate It is planned to treble the P output

536
**Israeli Production and Exports Increase for Potash but Decrease for Phosphates**
*Mineral Trade Notes 69* (1), 32 (Jan 1972)
The production of potash by Israel's Dead Sea Works Ltd registered a 60% increase in 1970, to 869,000 mt Most of the output was exported Phosphate production by Israel in 1970 71 totaled 939,400 mt Of this total, 85%, valued at US$7 9 million, was exported These figures represent a decline in production and exports of 8 5% and 6%, respectively

537
**Israel Exports Potassium Nitrate**
*Eur Chem News 22* (543), 6 (July 28, 1972)
Israel Mining Industries new 110,000 ton/yr potassium nitrate plant is now in full production at Haifa, Israel Potassium chloride is reacted with nitric acid in aqueous isoamyl alcohol and the resulting insoluble potassium nitrate removed from the alcoholic solution of residual nitric and hydrochloric acids Substantial shipments of potassium nitrate are being made to the U S A

538
**Italy Remains Dependent on Export Market**
*Nitrogen*, No 65, 21, 31 (May June 1970)
Approximately one half the fertilizer N produced in Italy is exported Italy is the fifth largest exporter in the world The major works of both Montedison and ANIC are favorably located at ports with good shipping facilities Italian N producers benefit from a freight advantage in exporting to countries in the Mediterranean region, which constitutes Italy's main marketing area Work is underway on a canal from Cremona to Milan, connecting the latter city to the waterway of the River Po, the proposed port of Milan, Melagnano should be in operation by 1972, enabling barges of up to 1350 tonnes to travel from Milan to the Adriatic This the fertilizer complexes at Novara in the Milan area should soon have better access to the sea trading routes than at present Exports of urea and ternary formulations have been growing most rapidly, and there is likely to be a significant amount of the urea product available for export for some years, despite the fact that Italy is one of the few West European countries with any significant domestic demand for this product However, increasing difficulty may be experienced in disposing of this, as competition from new producers in Algeria and the Arabian Gulf becomes more severe in areas to which they are equally well placed to export

539
**Italy Exports Fertilizer to China**
*Eur Chem News 22* (560), 6 (Nov 24, 1972)
ANIC, Italy has completed a fertilizer supply trade with China Under the contract, ANIC will ship ammonium sulfate and urea valued at $7 7 million to China in the first half of 1973

540
**71 Percent of Japanese Urea Exported**
*Japan Chem Week 8* (394), 5 (Nov 16, 1967)
Japan exported 930,600 tons of N as fertilizer in 1967 Some 71% of the urea (518,000 tons of N) produced was exported Other nitrogenous materials of which over half was exported were ammonium sulfate (314,900 tons of N) and ammonium chloride (74,700 tons of N) Total exports amounted to 52 5% of production

541
**Fertilizer Export Pact with India**
*Japan Chem Week 8* (398), 2 (Dec 14, 1967)
An agreement for export of fertilizers was [illegible] Tokyo on November 19 between visiting Indian [illegible]als and Japan Ammonium Sulphate Industry Association Under this agreement Japan will export 267 000 tons urea, 30,000 tons $(NH_4)_2SO_4$, 50,000 tons $NH_4Cl$, and 16,000 tons high compound fertilizers to India Shipping of these fertilizers will start in January '68 and that of urea will be completed in 8 months, $(NH_4)_2SO_4$ in 3 months, $NH_4Cl$ in 5 months and high compound fertilizers in 4 months This export agreement is based on a Japanese yen loan worth $7 million which was decided to be extended for the food production promotion of that country

542
**FY 67 Fertilizer Export Totalled 3 4 Million Tons**
*Japan Chem Week 9* (432), 1 (Aug 8, 1968)
According to the Japanese MITI fertilizer export in fiscal yr 1967 totaled 3,389,185 tons, an increase of 21 2% over 1966 Ammonia based fertilizers accounted for 98% of the exports and were up 22 9% over 1966 Ammonium sulfate accounted for 1 6 million tons and urea 1 2 million tons of the total Urea exports were up 15% while ammonium nitrate was down to only 127 tons Export of phosphate decreased 12%

543
**Urea Expected to Dominate Among Nitrogen Fertilizers**
*Japan Chem. Week* 9 (444), 3 (Oct 31, 1968)
Urea has shown the most spectacular growth of any nitrogenous fertilizers and its production is now more than 10 times that of 10 years ago Production reached 1 43 million tons of N in 1964 65 Japan is now the world's largest exporter of urea Urea production in tons of N were 673,000, 756,000, and 959,000 for the years 1965 66, 1966 67, and 1967 68, respectively, in Japan Rate of urea export was over 70% of production Urea manufacturing technique is regarded as most important in the world fertilizer industry circles and has a history of brilliant technical innovation

544
**Urea Exports Exceed Those of Ammonium Sulphate in 1968**
*World NPKS*, No 36, 4 (June 1969)
During the calendar year 1968, Japanese exports of urea, at a little over 1 5 million tons product, were some 70,000 tons higher than ammonium sulfate shipments The main recipient of both products was the Chinese People's Republic, which took slightly over 50% of the sulfate and 45% of the urea Other major shipments of ammonium sulfate went to South Korea and Taiwan, while sales of urea to India also figured prominently

545
**Record Japanese Nitrogen Sale to China**
*Fertilizer Intern*, No 1, 1 (July 1969)
Deals worth $115 56 million have now been concluded between the Japanese N interests and China for the supply, between now and March 1970, of 780,000 tons of ammonium sulfate, 1,110,000 tons of urea, and 505,000 tons of ammonium chloride totalling a record 800,000 ton of N The quantity of N sold by Japan, this year, to China exceeds last year's sales by the equivalent of 217,000 tons of N and

approaches the total of 838,000 tons The Japanese contracts call for delivery of 410,000 tons of ammonium sulfate and 690,000 tons of urea between July and December and 370,000 tons of sulfate and 420,000 tons of urea in January to March 1970 The ammonium chloride deal calls for the shipment of 20,000 tons in June and 50,000 tons in July, August, September, and October on a "Memorandum" trade basis, the balance of 285,000 tons, through "Friendly Firms", being due for shipment from November 1969 to May 1970 This year the amount of fertilizer to be shipped under "Memorandum" trade is sharply reduced to 662,400 tons in terms of ammonium sulfate, while the "Friendly Firms" deal is now equivalent to 3,162,000 tons of ammonium sulfate The ammonium chloride deal is for 505,000 tons – equivalent to very nearly $34/ton The urea and ammonium sulfate deal was valued at $98 4 million and the agreed prices are believed to be in the range of $63 50–$64 50 c i f for the urea and $33 75–$34 50 for the ammonium sulfate

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**Urea Will Occupy Nearly 70% of Japan's N Fertilizers Next Year**

*Jap Chem Week 11* (508), 4 5 (Jan 22, 1970)

Ammonia and N fertilizer industries of Japan are promoting large scale up under the second stage program When it is completed sometime in 1971, the ratio of urea to other ammonical N fertilizers will be nearly 70% Japan's production capacity of urea as of April1, 1969, was approximately 7,800 tons/day The same scale will be added in a few years, though the existing plants with a total capacity of 2500 tons/day will be scrapped Consequently, upon the effectuation of the second phase program, urea capacity will become 12 500 tons/day which is expected to reach as much as 4,130,000 tons/year on the basis of 330 operation days/year Besides a large scale, a feature of Japan's urea industry is large exports Large scale urea plants are all constructed in the seaside industrial zones where 50 60,000 tons ships can berth Urea was chosen originally as N fertilizer most suitable for increasing its export, and the expansion of capacity and production was planned out A 1500 tons/day urea plant can produce some 500,000 tons/year The majority of output is shipped abroad at low ocean freight by means of mass transportation to increase the efficiency of quantity production Japan's urea export is the largest in volume in the world Manufacturers are proud of this fact They are endeavoring in rationalization by large capacity expansion, thereby not to be defeated by competing countries

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**Fertilizer Industry**

*Japan Chem Annual*, pp 82-4 (1970)

Large $NH_3$ plants, eight in number, of 1000 tons/day capacity are being completed and put in operation Including these plants Japan will have a capacity of 13,743 tons/day of $NH_3$ Export of ammoniacal fertilizers in 1969 with demand increase in China and Southeast Asian countries, is expected to have exceeded 60% of the total production Export of urea was the largest in quantity, followed by $(NH_4)_2SO_4$ and $NH_4Cl$ Export to China occupied a majority fertilizers contracted with China Chemical Import and Export Corporation in 1969 was reported to be some 7,160 000 ton The significant reason for Japan's marked increase in fertilizer export to China is a freight difference Phosphoric acid plants in Japan are small in scale with one stream averaging 94 ton/day and the price of ammonium phosphate is higher than imports Therefore, the tariff quota system has been enforced for ammonium phosphate since April, 1966 to carry out large scale up Nippon Rinsan Co has already completed a $H_3PO_4$ plant (200 ton/day) and is proceeding with the construction of a large scale $H_2SO_4$ plant using recovered S as material Delivery of potassic fertilizers in 1968 was 683,000 ton (as $K_2O$), an increase of 8% over the previous yr Conspicuous was increased shipment of KCl and $K_2SO_4$ for the production of compound fertilizers, especially high analysis complex and NK complex fertilizers However, delive y as straight fertilizers is decreasing Potash imports between April, 1969 and January, 1970, decreased by 9% from the corresponding period of the preceding yr

548

**Sino Japanese Trade in Ammonium Sulfate**

*Sulphur*, No 87, 46 (Mar Apr 1970)

The Japanese have secured an additional contract for the supply of $(NH_4)_2SO_4$ to China The contract covers export to China in March/April this yr of 200,000 tonnes of $(NH_4)_2SO_4$ together with a smaller quantity of urea Concluded by the Japan Ammonium Sulphate Industry Association, in conjunction with the Japan Ammonium Sulphate Export Co and the China National Chemical Import & Export Corp , this contract will bring the total of Japanese ammonium sulfate exports to China during 1969/70 to 980,000 tonnes and provide a much needed boost to the Japanese fertilizer industry which has been faced with a considerable surplus Thus with its increasing export marketing difficulties, Sino Japanese trade becomes even more significant to the Japanese producers

549

**Japan's Sales of Fertilizers in Asia Increase**

*Eur Chem News 18* (450), 4 (Sept 18, 1970)

The Japan Ammonium Sulfate Industry Association and the Japan Urea and Ammonium Export Company recently announced that negotiations for the export of ammonium sulfate and urea had been sucessfully concluded and a contract for the sale of 4 7 million tons of ammonium sulfate and urea signed with China The contract represents an increase of about 1 million tons (in terms of ammonium sulfate) over the previous year's total At the same time the Japanese are to export 650,000 tons of ammonium chloride to China by June 1971 This is 30% larger than the 505,000 tons contracted in 1969 The Indian government has also recently signed an agreement with the Japan Urea and Ammonium Export Company for the supply of 74,626 tons of urea Supplies will be spread from October to December this yr

550

**Japan's '69 Fertilizer Export**

*Jap Chem Week 11* (547), 3 (Oct 22, 1970)

According to a report released by the Chemical Fertilizer Division of the Ministry of International Trade and Industry, export of chemical fertilizers in 1969 fertilizer yr (July 1969 June 1970) was, reflecting an increase of ammoniacal fertilizers centering on steep increase of urea, 3,816,019 tons, an increase of 34 2% over the previous yr, in which export of ammoniacal fertilizers was 3,745,785 tons, up 34%, while phosphate fertilizer was 34,105 tons, a decrease of 3 6% Potassium fertilizer was 33,359 tons, 4 5 times as much as the previous yr

551

**Japan Attempts to Expand Exports to Stabilize Demand for Fertilizers**

*Jap Chem Week 12* (592), 6 8 (Sept 2, 1971)

Sulfuric acid exported from Japan has amounted to barely

1000 1700* tons/yr since 1968 mainly to Hong Kong, Indonesia and Korea The industry is keenly interested in expanding exports of $H_2SO_4$ to dispose of surplus production A recent inquiry from the Philippines for 8000 tons is a promising indication of potential expansion of $H_2SO_4$ exports Urea exported for industrial use during fertilizer yr 1971 was estimated at about 40 000 tons compared with 25,000 tons the preceding yr and a peak value of 41 000 tons in 1968 One of the problems in expanding urea exports is the build up of self sufficiency in Korea and Australia, Japan's traditional markets A contract for export of 101 100 tons of urea and 15 000 tons of ammonium sulfate to Indonesia was signed with shipment scheduled for August September From the new Alaskan urea plant now on stream a first shipment of less than 10 000 tons was imported by Japan, for use in fertilizers

552

**Japanese Fertilizer Makers Seek New Markets**

*Chem Age (London) 103* (2721), 17 (Sept 10, 1971)

The Japanese chemical fertilizer industry is seeking to attract new markets, other than the traditional one of China The Peking Government has bought Japan made fertilizers at prices lower than during 1970 and in noticeably smaller amounts this yr Thus to lessen this historical reliance on China as prime customer leading Japanese firms are turning their attention to India and Indonesia in Southeast Asia, and to concentrating on the more distant Middle Eastern and Near Eastern markets In line with the new government sponsored approach, some Japanese companies are dispatching technical guidance experts to India and Indonesia, where chemical fertilizers have long been welcome These firms will ask the government to relax its yen credit restrictions to facilitate funds for local purchasing of fertilizers The Japanese industry is in a good position to meet foreign interest, and has built up its exports In terms of ammonium sulfate, it has shipped some 5 8 million mt/yr in the last two fertilizer yrs Up to 80% had been going to China however Japan's chemical fertilizers exported to China in ammonium sulfate terms for the current 1971 72 yr have been set at about 4 6 million mt

553

**Ammonium Sulfate Export Becomes Brisk**

*Jap Chem Week 12* (599), 6 (Oct 21, 1971)

Under international circumstances of N fertilizers which have chronically been in excessive supply, only demand for ammonium sulfate in 1971 fertilizer yr becomes brisk At present, those concerned are amazed by this fact After Guanos Fertilizantes S A (Mexico) purchased ammonium sulfate in large quantities, the Indian Government which imports fertilizers on Yen loan from Japan, appropriates $4 million of total Yen loan from Japan this yr to the purchase of ammonium sulfate Therefore accumulated stocks of ammonium sulfate are expected to be cleared away Along with the change of demand and supply for ammonium sulfate, international price is also rising

554

**Japan's Fertilizer Exports Increase in 1970**

*Jap Chem Week 12* (599), 4 (Oct 21, 1971)

According to a report by the Ministry of International Trade and Industry, export of chemical fertilizers in 1970 fertilizer yr (July 1970 June 1971) was 4,144,409 tons, an increase of 6 8% over the previous fertilizer yr Particularly, ammoniacal fertilizers centering around urea and ammonium chloride showed a marked increase (9 5%) over the previous fertilizer yr, reaching the level of 6 million tons of ammonium sulfate However, exports of potassic fertilizers decreased to one fourth of that of the previous yr and phosphate fertilizers also decreased by nearly 20%

555

**Japan's Fertilizer Industry**

*Japan Chem Annual*, pp 72 74, 94 (1971)

Japan's chemical fertilizer industry is centered around the ammonia industry Domestic demand for ammoniacal fertilizers is inclined to decrease or to be stagnant because of adjustment in production of rice and export is also apt to decline Structural improvement of the ammonia industry by construction of large plants of 1000 tons/day level is being carried out to strengthen international competitiveness The major portion of ammoniacal fertilizers production of Japan is exported to China and other countries India, the largest market next to China, is becoming self sufficient in N fertilizers, but it is likely to be a long time before India can attain full self sufficiency Pakistan has completed its self supporting structure quicker than other Southeast Asian countries and is reputed to have reserve capacity for export As part of organization improvement of the phosphate fertilizer industry, phosphoric acid plants are being expanded However demand for fertilizer use which accounts for over 70% of all demand for phosphoric acid is showing a lower increase rate due to slow increase of demand for high analysis compound fertilizers, caused by production adjustment of rice, and also decreasing operation rate of phosphoric acid plants Imported phosphate rock is bullish because of increased freight rates and imported potash is bullish because of a price hike of Canadian potash

556

**Japanese Fertilizer Exports**

*Chem Marketing Rep 202* (9), 7, 36 (Aug 28, 1972)

For the first time in 5 yr, signs point to a vastly improved outlook for Japan's chemical fertilizer industry and, more importantly, to greater exports The Japan Ammonium Sulfate Industry Association reported that at the end of the 1971 72 fertilizer yr, on June 30, 1972, unsold stockpiles of the two most important chemical fertilizers, ammonium sulfate and urea, had decreased to approximately 300,000 and 550,000 tons, respectively Inventory normalization resulted from remarkable growth in demand from last autumn, conspicuously from India and other countries in Southeast Asia, and from Mexico and other nations in Latin America This demand has continued well into 1972 and is expected to continue indefinitely Imports of fertilizers on a customs clearance basis were listed as being valued at $50,421,000 in calendar yr 1969, at $53,604,000 in 1970, and at $61,374,000 in 1972 Exports of fertilizers, primarily nitrogeneous but also including phosphatic and potassium types, were reported as follows 1969–$152,462,000, 1970–$143,381,000, and 1971–$155,527,000 Of the export destinations, China has furnished the leading market, with $99,979,000 of the $155,527,000 total for 1971

557

**Japanese Chinese Long Term Fertilizer Contract**

*Jap Chem Week 13* (652) 3 (Oct 26 1972)

The Japan Urea & Ammonium Sulphate Industry Association decided to accept a Chinese proposal for signing a long term agreement on Japan's chemical fertilizer exports to China starting in 1973 fertilizer yr The Association will work out a draft of an agreement for presentation to the Chinese side The Association plans to fix the term of validity of the long term agreement at 3 yr and negotiate export prices every fertilizer yr The Association will request China to send a delegation to

Tokyo soon to negotiate on details of the projected long term agreement

558
**Jordan Seeks Greater Market Share for Its Phosphate**
*World NPKS*, No 32, 4 (Feb 1969)
Sales of Jordan phosphate exceeded the million ton mark in 1968 for the first time Jordan's position as a supplier of phosphate to markets east of Suez has improved greatly since the closure of the Canal Shipments to India have rocketed to half a million tons, displacing supplies from other less economic sources Pakistan is also taking increasing quantities of Jordan phosphate for its newly established superphosphate industry Recent efforts have been directed towards getting a share of Asia's largest phosphate rock market Japan Several trial shipments of 75% TPL material were made to Japan in 1968, but the response has not been encouraging

559
**New Export Emphasis for Korean Nitrogen Industry**
*Fertilizer Intern*, No 4 1 (Oct 1969)
Established international suppliers of fertilizer N to the world market, particularly those in Japan, are showing increasing anxiety over recent signs that South Korean producers of urea are exhibiting more aggressive export sales policies than in the past Until the beginning of 1969, the South Korean N industry contented itself with concentrating its sales largely on the domestic market The U S production of only enough urea to satisfy its own requirements, is no longer applicable since U S urea capacity has grown appreciably over the last two years, and as a result the Korean industry cannot count on this means of retaining outlets for its growing urea surplus Korean output of urea has been significantly increased during the last 18 months through the addition of two new and virtually identical N complexes, which were completed during 1967 Some observers believe that South Korean exports of urea during 1969/70 may exceed 100,000 metric tons and, indeed, a Korean trade delegation has recently visited Burma with a view to expanding sales of urea and other products to that market

560
**Fertilizer Exports Become Factor in Korean Economy**
*Chem Age (London) 103* (2732), 20 (Nov 26, 1971)
According to a report issued by South Korean representatives in Europe the fertilizer industry has become one of the major branches of the nation's economy with a total present capacity of 1 727,000 mt/yr Of this, urea fertilizers account for 968 000, complex fertilizers 368,000, phosphatic fertilizers 158,000, and calcium superphosphate 214,000 mt For the current yr production of nitrogenous fertilizers will be 157 000 mt above domestic consumption Export of these surpluses causes no difficulties

561
**Persian Gulf Nitrogen Capacity Bothers Europe Fertilizer Men**
*Oil, Paint, Drug Reptr 195* (9), 4 (Mar 3, 1969)
Bulk buying of N fertilizer, particularly by such state units as India and China, has been the main support of European fertilizer producers for a long time Now European companies are worrying about the impact huge N capacity in the Persian Gulf will have on this market Kuwait Chemical Fertilizer Company says it should get its existing plant up to about 90% of capacity this year Opened in 1966, the plant has a rated daily capacity of 400 tons of ammonia, 550 tons of urea, 400 tons of sulfuric acid and 500 tons of ammonium sulfate Since Kuwait is practically non existent as a user of fertilizer, the whole of this capacity is available for export A director of Petro-chemical Industries says that his country will soon become the third largest exporting country in the chemical fertilizer field " This export role would be achieved by the new $60 million plant being constructed at Shuaiba This plant is to start coming into operation in 1970 Its initial capacities have been put at two 800 tons/day ammonia plants, with provision for a third one later two new urea units of 700 tons/day each and a liquid ammonia unit which will supply, by ship, a fertilizer plant to be built at Mersin, Turkey Kuwait is far from being alone to take the ammonia urea plunge Iran, Saudi Arabia, and Qatar are all in the process of building or planning fertilizer plants The current thinking of the fertilizer advisers to these projects tends to put the emphasis on urea as it is believed there is an inadequate profit margin available now on ammonium sulfate

562
**New Trend in Ammonia Trade Starts**
*Nitrogen*, No 66, 46 (July Aug 1970)
The autumn of 1970 should see the implementation of plans to establish the first deliveries, which will be both large scale and long term, of $NH_3$ from a cheap producing area, Kuwait, to another area, Turkey, where it is processed into fertilizer products Scheduled to start up in the autumn are two related complexes which, since the closure of the Suez Canal, are now separated by a sea voyage of some 12,200 nautical miles instead of the 3660 miles possible when the plans were originally conceived The organizations involved in the contract are Kuwait Petrochemical Industries Co as the supplier, and Akdeniz Gubre Sanayii AS, a Turkish concern, as the consumer

563
**Kuwait Gets Five Year Sudan Contract for Nitrogenous Fertilizers**
*Fert Int*, No 22, 1 (Apr 1971)
The Kuwait Chemical Fertilizer Co (KCFC) and Petrochemical Industries Co (PIC) have recently signed a contract with the Sudanese Government to supply all the urea and ammonium sulfate needs of that country for the next five yr The total quantity for the 5 yr period is estimated at 800,000 tons, valued at more than Ku Di 18 million (U S $50 4 million) The Sudan Government will settle the cost of the fertilizers 5 yr after the date of shipment while KCFC and PIC have arranged to recover the cost of the deal from Kuwaiti financial organizations In the face of fierce competition, the Sudan was given extremely favorable prices and these will remain static throughout the course of the contract In the past reciprocal trade between the two countries has been limited because of the absence of regular shipping facilities Now that a regular and continuous service can be established between the Arabian Gulf and the Red Sea Kuwait can import commodities such as meat, sheep cereals, oil and hides from the Sudan The vol of trade could well increase to embrace trade between six or seven Arab countries, in addition to the Sudan and Kuwait The capacity of the KCFC/PIC plants in Kuwait is about 700,000 tons/yr of ammonia, 660,000 tons/yr of urea, and 150,000 tons/yr of ammonium sulfate

564
**Mexicans Push South**
*Chem. Week 105* (9), 32 (Aug 30, 1969)
Mexico's government owned fertilizer company, Guanos y Fertilizantes de Mexico, is building a 60,000 metric tons/year fertilizer plant in neighboring Guatemala to produce a range of NPK plant foods The company is also mounting a strong

export drive The new, $1 84 million plant is being built close to the Mexican border, will receive raw materials from Mexico, and part of the output will be exported to southern Mexico Exports will also go to El Salvador and possibly other Central American markets, but the main market will be Guatemala The plant will operate under the name Fertilizantes del Istmo Centroamericana Onstream target June '70 Guanos produces almost all of Mexico's fertilizer and distributes all fertilizer sold in that country It has built up capacity in recent years to the point where it can supply more than domestic needs, so it is now planning to increase its exports Domestically, Guanos is building a 250,000 metric tons/year urea unit in Minatitlan, on the Veracruz coast

565
**FFM Mexico Makes First Shipment of Phosphoric Acid to South America**
*Fert Int*, No 22, 1 3 (Apr 1971)
The first cargo of 8,800 tons of phosphoric acid from Fertilizantes Fosfatados Mexicanos SA (FFM), destined for South America, arrived at Santos on February 26 It was shipped from Coatzacoalcos to Santos for Cia Petroquimica Brasileira (COPEBRAS) of Cubatao, which has a phosphoric acid plant of 16,000 tons/yr $P_2O_5$ capacity The COPEBRAS phosphoric acid plant, supplied by Israeli Mining Industries, came on stream in December 1969 and, after various production troubles, was closed down in 1970 and has not since been restarted COPEBRAS' main fertilizer product range is triple superphosphate and the closure of its phosphoric acid plant is sufficient explanation for the shipment from FFM

566
**Mexico Increases Nitrogen Exports**
*Nitrogen, No 74*, 12 (Nov Dec 1971)
During 1970 there was a noticeable rise in N fertilizer exports over the previous yr In comparison with 1969 the total fertilizer export sales, mainly to Central America and the Caribbean area, increased by 7 6% to a total of 40,800 mt, almost 50% being accounted for by urea Recently Mexico has been very active in bidding for urea export tenders and, although not entirely successful at all of these, was awarded a contract earlier this yr to supply 55,000 mt urea to Peru This interest in the export market is the result of the present large urea over capacity which, even by 1975, may still show a surplus over domestic usage which currently accounts for 100,000 mt N To perhaps further the interest in the export market in the Caribbean area and in Central and South America, Guanomex has purchased from Esso Chemical International a majority equity holding in Fertilizantes de Centro America SA, which has fertilizer plants in El Salvador and Costa Rica

567
**Morocco's New Phosphate Output Record**
*Fert Int*, No 22, 5 (Apr 1971)
In 1970 Office Cherifien des Phosphates of Morocco the world's leading exporter of phosphate rock, had a new phosphate rock output record of 11 6 million mt as against 10 7 million mt in 1969 Most of the output was exported and there was a 10% increase in sales OCP has a major output expansion in hand and it anticipates an output of no less than 19 million mt in 1972

568
**European Fertilizer Marketing**
*European Chem News 16* (389), 24 (July 18, 1969)
The decision of the Esso group to make an entry into European fertilizer markets from a base in Rotterdam in 1967 was a shock in the Netherlands This plant is now largely through commissioning and the impact is beginning to be felt in the markets The Dutch fertilizer industry has not done badly in comparison with many others in the past few years One particularly good affair has been the fertilizer shipments of VKF to the UK This is largely based on a contract with Shellstar to build up a market Now Shellstar fertilizer units are on stream this trade will wither quickly By 1970 there will be 1 6 million ton/year of ammonia in Holland and a lot of it requires overseas markets Europe is the most intensive user of fertilizer for its area, and will always be a large absolute market, but the really attractive growth rates in fertilizer consumption are to be found in developing countries Europe has made a strong bid to supply these markets, but indigenous suppliers, the USA companies, and other producers have fought back and the resultant competition and displaced production have had repercussions back in Europe Technical difficulties have eased the European N fertilizer over supply problems, but these are now being ironed out This leaves the essential problem of fertilizer production as one of cheap energy supply—energy being the largest cost element in finished fertilizer apart possibly from transport costs VKF with its extensive cost reduction programs and its timely switch to natural gas feedstock would seem to be in a relatively good position

569
**Fertilizer Development Aid to Pakistan**
*Norsk Hydro Newsletter*, 1 2 (Mar 1970)
The Norwegian Agency for International Development is to purchase Norsk Hydro fertilizers for almost N Kr 40 m for delivery to Pakistan The fertilizers will be sold by the Pakistanian authorities to the farmers in that country, and the proceeds will be deposited in a special account for the advancement of agriculture in Pakistan Emphasis will be placed on experiments and training programs The Norwegian Agency for International Development has already sent an experienced and university trained agronomist to Pakistan to assist with experiments and advisory services A large consignment of urea has already been shipped to Pakistan, the remainder will consist mainly of NP fertilizers Pakistan is interested in producing its own NPK fertilizers, and have discussed with Norsk Hydro licensing the company's NPK Process

570
**Western World Imports of Polish Sulfur to Top 1 Million Tons in 1969**
*Fertilizer Intern*, No 1, 1 (July 1969)
Polish brimstone exports to the Western World appear to be heading for another massive increase during 1969, thereby maintaining the strong upward trend in shipments recorded during 1968 The forceful sales campaign in Western markets during recent years has lifted Polish deliveries from 148,000 tons in 1966, to 709,000 tons in 1968 and this year is expected to see the Western World intake climb to well over the 1 0 million ton level possibly as high as 1 1–1 2 million tons, the latter order of magnitude is clearly suggested by trends during the first quarter of 1969 when exports to the Western World amounted to some 300,000 tons

571
**Poland to Ship Liquid Sulfur to Hungarian $H_2SO_4$ Plant**
*Eur Chem News 18* (457), 8 (Dec 4, 1970)
Poland has signed an agreement to supply S for Hungary's

newest sulfuric acid plant, due to be commissioned April 1, 1972 In total, 100,000 ton/yr of S will be delivered, of which 68,000 ton/yr is destined for the new plant at the Tisza Chemical Works at Szolnok, the remainder will be distributed among Hungary's existing sulfuric acid plants Location of the new plant at the Tisza Works sustains Tisza as the center of Hungary's sulfuric acid production, it already produces 75% of the country's output The S will be transported in liquid form in special rail tank cars This will be the first time that S has been moved between East Bloc countries in this way The size of the new sulfuric acid plant has determined the quantity of S that Hungary is taking from Poland With a capacity of 200,000 tons/yr, the plant will add nearly 50% to the country's sulfuric acid production, which is currently at about 450,000 tons/yr Poland, like other eastern European countries, uses its sulfuric acid largely in the production of fertilizers In 1969 production of phosphatic fertilizers was 168,000 tons (as $P_2O_5$) On this basis, some 450,000 tons/yr of sulfuric acid is needed to satisfy this section of the industry

572

**South Africa Exports Phosphates**

*Feed Farm Supplies*, p 30 (Dec 1971)

The Phosphates Development Corporation (Foskor) plans to join the big league of South African exporters with two major export contracts One of the contracts, involving the export of 400,000 tons of phosphate concentrates to the Middle East, has reached an advanced stage Feelers in connection with a similar contract with a so far unnamed country have just been put out A trial shipment of phosphate concentrate is due to be sent to Iran shortly South Africa is in a strong geographical position, since Israel or Moroccan suppliers would have to take the long sea voyage around the Cape to supply Iran on the Persian Gulf The intention is to supply 36,000 tons initially, building up gradually to about 400,000 tons of phosphates/yr

573

**Shipments of Phosphate Rock from Spain**

*Chem Week 110* (18), 21 (May 3, 1972)

A shipment of phosphate rock from the Spanish Sahara has been loaded onto an ore ship bound for Japan (see *FA 5*, 736) It is the first export cargo from the 1400 million ton deposit of high grade (70 75% phosphate) ore Fosfatos De Be Craa (Fosbucraa), the Spanish agency in charge of developing the deposits, is expected to retain 100% ownership of the Sahara phosphates, but it has begun talks with two US companies regarding joint venture marketing of the ore Fosbucraa has set up a $200 million development program to begin staggered production 100,000 tons this yr, 3 million tons next yr, 6 million tons by 1975, and 10 million tons in 1980 Pricing is the major problem Spain does not want to undercut Morocco, which is modernizing its production to boost output from 10 million to 14 million ton/yr Spain does not want to revive annexation claims by Morocco on the Sahara deposits, or counterclaims by Algeria and Mauretania

574

**Syrian Phosphate Concern Formed**

*Chem. Age (London) 100* (2655), 16 (June 5, 1970)

The Syrian government has announced that a new phosphate and mining company has been set up at Homs with a capital of Syria $240 million. The company will produce and market phosphates, salts, S, and various ores The organization expects to form subsidiaries in other countries

575

**Taiwan Exports Ammonium Phosphate**

*Fert Int*, No 22, 2 (Apr 1971)

An unnamed trader in Tokyo has recently been approached by the Taiwan Fertilizer Co (TFC) concerning the export of ammonium phosphate (16 20-0) in 40 kg polyethylene bags at a price of about $62 00/mt f o b Kaohsiung It is estimated that TFC's stocks of ammonium phosphate are approximately 15,000 mt and it is reported that a similar offer has been sent to the Thai market This is believed to be the first time Taiwan has offered its domestically produced ammonium phosphate to any world markets and it could be that Japan will import the product from TFC for resale to a third country If Taiwan produced ammonium phosphate makes active inroads into Southeast Asian markets in the near future, Japan's exports of the product would have a strong competitor

576

**Tanzania Fertilizer Production**

*Fert Int* No 41, 8 (Nov 1972)

The fertilizer plant at Ras Kazone, Tanga, is in production It is operated by the Tanzania Fertilizer Co (TFC) and is designed for output of 105,000 ton/yr of monoammonium sulfate, diammonium phosphate, triple superphosphate, and NPK fertilizers Export prospects are encouraging as Kenya alone imports some 140,000 mt of fertilizers/yr and of this 20,000 25,000 mt of single superphosphate comes from Uganda TFC is apparently aiming at an export market to Kenya of 50,000 60,000 ton/yr which will assist in adjusting the present trade imbalance

577

**Togo—Phosphate Rock Capacity to Increase**

*Phosphorus Potassium No 59*, 14 15 (May June 1972)

A project is under way to increase the capacity of Togo's phosphate rock industry from the present 1 8 million tons/yr to an eventual 2 4 million tons/yr A new mine will be brought into production in the region of Kpogame, and a fourth stream will be added to the ore treatment plant at Kpeme Practically all sales are for export as Togo has no fertilizer plant to provide a domestic use Local sales in the past 2 yr have been limited to a total of 129 mt $P_2O_5$ for direct application Overseas demand has followed production so that stock accumulation has never been a problem

578

**Tunisian Phosphate Industry**

*Chem Age (London) 105* (2778), 16 Oct 13, 1972)

Societe des Phosphates Sfax Gafsa has the monopoly for production and sale of Tunisian phosphates but they are facing enormous difficulties Output last yr was 3 89 million mt, against a target of 4 8 million mt Areas currently worked have reserves totalling 100 million mt The position of the company was affected by extensive flooding in 1969 and low phosphate prices on international markets

579

**Yorkshire Potash Producer Plans United States Sales**

*Chem Age (London) 104* (2761), 17 (June 16, 1972)

Despite the vast reserves of potash in Canada, Cleveland Potash Ltd is considering the possibility of marketing some of its output from the new mine starting up in Yorkshire in North and South America Cleveland could supply to the eastern seaboard more cheaply than Canada, but at the moment the American buyers are a little reluctant to commit themselves until the potash is actually being produced Exports to Western Europe remain the chief objective although it is too early to say what extent the market in Europe will be

580

**AID Financed Fertilizer Procurements**

*World of NPKS*, No 21, 17 (Mar 1968)

During calendar 1967 AID financed approximately 3 million tons of U S fertilizer materials Value was about $165 million Commercial shipments and barter tonnages under AID are in addition A table shows the relative participation of various organizations and companies in supplying AID fertilizers

581

**Phosphates Morocco Gains While Florida Loses Ground**

*Oil, Paint, Drug Reptr 194* (7), 39 (Aug 12, 1968)

Morocco boosted phosphate exports in the first quarter of this yr by 10% while shipments from Florida dropped by ~2%, according to the British journal *Phosphorus Potassium* But the author indicates it is still too early to suggest that Morocco is beginning to make a permanent recovery of phosphate markets in Europe lost earlier to Florida exports Morocco showed large gains in shipments to Britain and Italy while Florida exports to Europe were off, particularly to Britain, Germany, and Spain Only Belgium showed an increase in Florida phosphate The author believes that little new phosphate rock mining capacity will come onstream this yr and he forecasts a marked improvement in the balance between phosphate demand and capacity for 1968

582

**AID Cut will Hurt U S Exports**

*Chem. Eng News* 46 (48), 36 (Nov 11, 1968)

The foreign aid bill for fiscal 1969 is down to $1 75 billion from the Administration's $2 9 billion original "barebones" request This record low aid budget sets an ominous tone not only for developing countries but for American private enterprise as well Because of the deep cuts inflicted on the budget by the 90th Congress, U S business will lose some $700 million in planned AID financed export sales over the next 18 months This will slow down the growth of long term commercial markets opened up by AID development financing Appropriated funds are not all spent in one year Thus, the cuts made will affect fiscal 1969, 1970, 1971, and perhaps 1972 According to AID, more than 4000 American companies in fiscal 1968 produced some $1 35 billion worth of products for export under AID financing Exports financed by AID this year will fall to under $1 billion Among those hardest hit are makers of fertilizer and other agricultural chemicals, fuels, metals, and pharmaceuticals

583

**Ammonia Shipments to Belgium**

*World NPKS* No 29, 7 (Nov 1968)

Last year large volumes of liquid ammonia moved from the U S Gulf area to Europe as a result of the U S ammonia surplus The product is being sold at prices more than competitive with European produced material even after the long ocean voyage However, the situation should not be expected to continue permanently since demand in the U S can be expected to strengthen in due course and more large single train plants are starting up or are planned in Europe The world's newest liquefied gas carrier recently sailed from Pascagoula, Miss, with her first cargo of 10,000 tons U S ammonia for Antwerp, Belgium This is reported to be the first batch in a 140 000 ton deal for Badische Anilin & Soda Fabrik AG of West Germany The supplier is Standard Oil Co, which has a 1500 ton/day ammonia plant at Pascagoula

584

**Urea Producers Compete in Developing Countries**

*European Chem. News Urea Supplement 15* (363), 4 (Jan 17, 1969)

During the past 15 years urea demand has grown from a relatively small market product with a total world production of only 300,000 tons/year to the major N product it is today In this comparatively short time, urea has reached the stage where it now accounts for about 15% of the total world production of N in all forms Another factor has been the strengthening of the U S position as an exporter of urea Most of the U S exports are to the developing countries supplied within the AID program giving the U S producers something of a captive export market Urea becomes the fertilizer of choice for all fertilizer producers interested in exports, since one of its most attractive features is the saving in transportation and distribution costs Urea has a further advantage over ammonium nitrate, it does not require the same special handling because it is an inert non explosive product Although about 10% of the total production of urea goes into other industrial uses and fertilizers account for the major use, it seems that the future growth of urea still lies in the fertilizer field

585

**Increase in Urea Exports**

*Oil, Paint, Drug Reptr 195* (7), 31 (Feb 17, 1969)

Over the past three years, exports of urea have jumped dramatically due mainly to the AID program Industry sources seem to feel that at present, urea is, of all the N fertilizers, in the best shape in terms of both pricing and general marketing conditions They also concur that 1969 will be the year that agricultural chemicals will be on their way back up to stable, realistic prices in all areas

586

**Ammonia in the Present Pattern of Nitrogen Trade**

*Nitrogen*, No 58, 1 (Apr 1969)

In 1968 the world N industry witnessed the first ever large scale movement of ammonia by sea, as a result of a round of contracts made by several West European companies with the U S Gulf producers to take up the surplus ammonia which had emerged in that center of production during the year Producers in the U S A and Trinidad developed significant markets for ammonia outside their respective borders U S exports of fertilizer and technical grades of ammonia have continually expanded over the last few years reaching some 460,000 tons during 1967/68, over four times greater than in the 1964/65 level During 1968, ammonia trading, particularly across the Atlantic, went through a period of substantial development as a result of three basic factors (1) U S N producers were left with more ammonia than they could readily dispose of, following disappointing domestic demand during the spring season, demand for U S ammonia within the U S A and its habitual marketing area was insufficient to provide employment for all the operational ammonia capacity in the U S A, (2) a significant shortage of ammonia for various purposes had developed in West Europe, largely in the U K, Norway and Belgium, and (3) the increased availability of the specialized chemical tankers designed for the transport of large quantities of ammonia over long ocean voyages

587

**Fertilizer Men Coping with Thin Export Market**

*Oil Paint Drug Rep 198* (16), 4, 21 (Oct 19, 1970)

US fertilizer exports are facing severe near term challenges, but solutions are already in the works, according to a Tennessee Valley Authority economist In remarks at the Eastern

Fertilizer Development Conference in Atlanta, Ga, the economist listed four major influences that are changing export concepts Fertilizer requirements by developing nations have fallen below original projections, there has been an over expansion of fertilizer production capacities in the developed nations, there has been a reduction in fertilizer supply awards by the Agency for International Development, and exports of fertilizer materials from other nations to the US have begun to show a significant increase In connection with these challenges, credit was given the Fertilizer Institute's production data service as helping to bring about needed corrections of supply imbalance and also the institute's new financial data service, "Fertilizer Financial Facts," with a major role in industry's effort to progress within a more stable atmosphere In another address, the director of transportation for Potash Company of America charged that the fertilizer industry is paying more and more for less and less service in rail transportation The industry has become vitally concerned about increased freight costs and deterioration of rail services We are confronted all too often with a shortage of proper transportation equipment and at the same time the rail carriers continue to petition the ICC for an increase in freight rates and charges A Washington, D C agricultural business writer told the meeting that fertilizer marketers will have to reform their too liberal credit policies One oil company executive stated there are significant strengthening signs in the current financial outlook for the industry, plus evidence of more realistic production and inventory management for the current fiscal 1970 1971 year

588

**U S Urea Regains Favor in Export Shipments**

*Chem Week 108* (14), 46 (Apr 7, 1971)

Domestic urea producers are taking a more aggressive approach in regaining Asian markets In recent yr U S producers have been unable to compete for business handled by the Agency for International Development (AID) in India and South Vietnam because of special financing and lower prices offered by Japan and Taiwan International Commodities Export Corp (ICEC) with an assist from First Mississippi Corp and Shell Chemical (which will supply the material), has recently won bids for 30,000 ton and 20,000 ton urea shipments to South Vietnam The bids are the first won from AID since Apr '69 for urea shipments to that area They were low enough to more than compensate for better terms offered elsewhere

589

**Fertilizers Approved for Trade with Red China**

*Oil, Paint Drug Rep 199* (24), 3, 47 (June 14, 1971)

Certain fertilizer materials are included among the items being freed from controls for export to Red China by the U S Among the broad categories of products placed under general license for export to China are manufactured fertilizers, except those closely related to explosives, crude fertilizers, and crude minerals, such as S

590

**United States Fertilizer Exports Show Increase**

*Chem Week 109* (11), 27 (Sept 15, 1971)

Fertilizer exports, which seemed headed for another drop this yr, are turning up Dollar volume of exported manufactured fertilizers ran heavy in June and July, and it now looks as though the full yr figures may top last yr total of $177 7 million Manufactured fertilizer exports are now mostly for commercial accounts, whereas AID shipments accounted for the major portion in 1968 Phosphate rock exports have always been primarily commercial and they have held up better than shipments of manufactured fertilizers The U S will continue to be a major factor in world fertilizer markets, exporters say, regardless of the source of financing for fertilizer purchases It is the world's major exporter of N and phosphates, and likely will continue to be during the next several yr

591

**United States Fertilizer Exports Become More Competitive**

*Chem Marketing Rep 201* (2), 5 19 (Jan 10, 1972)

U S fertilizer products are going to become much more competitive and attractive to foreign buyers, and U S export trade is going to increase for the foreseeable future largely because of the devaluation of the dollar and increased operating costs among overseas producers This is the forecast for fertilizer exports from the U S in 1972 by the president of International Commodities Export Company a division of ACLI International, Inc Specific benefits to fertilizer exports will differ by product and by market For example, the phosphates have already undergone a substantial increase in the past few months Among the nitrogens, ammonium sulfate showed a dramatic price change in 1971 Prices of other nitrogens have not changed a great deal, although there is a firming trend in most There has been some hesitancy in the price of potash, but this may have been halted by the recent action of the Canadian government In markets where currencies will be revalued in terms of the dollar, a much more competitive position for U S fertilizer exports is expected—even including materials which have already increased in price For the marginal markets—those which may be forced to devalue their currency partly—the attractiveness of U S fertilizers would be enhanced

592

**United States Soviet Trade Pact**

*Chem Mkt Rep 202* (17), 3, 18 (Oct 23, 1972)

The trade agreement negotiated between the U S and Russia will have a major impact on at least two areas of the chemical industry—plastics and fertilizers The agreement and implementing steps being taken to provide the extension of credit to Russia through the Export Import Bank can be expected to lead to substantial orders being placed in the U S

593

**Venezuela Plans Production of One Million Tons N Plus**

*Nitrogen* No 57, 26 (Jan Feb 1969)

If all five projected ammonia and N fertilizer complexes currently being considered become fully operational in Venezuela total effective N production capacity could reach over 1 2 million tons/year N by mid 1970 s, of which an estimated 1 million tons/year N would be available for export The tremendous expansion of production capacity in Venezuela will be accompanied by the installation of a number of large scale ammonia and N fertilizer plants in various parts of the world many of which will be directed almost wholly towards export markets Thus by 1974/75 the stability of the market could seriously be upset by the addition of about 3 million tons/year N in the form of exportable ammonia and N fertilizers Venezuelan suppliers plan to contribute one third of this and will therefore find themselves faced with heavy sales competition

594

**Yugoslavia Increases Exports**

*Eur Chem News 22* (536), 4 (June 9, 1972)

Yugoslavia became a major force in fertilizer markets in 1971,

boosting shipments in the first 10 months of the yr to 330,000 tons, compared with a figure of 39,000 tons for the same period in 1970

## IMPORTS

595
**Argentina Bans Nitrogen Imports Temporarily.**
*Nitrogen*, No 68, 11 (Nov Dec 1970)
As of September 1970, the Argentinian Government imposed a temporary ban on the purchase of N fertilizers from overseas The principal factor behind this temporary ban is believed to be the difficulty which Petrosur SAIC, which operates fertilizer plants at Campana and Rosario, has had in marketing its output The competition from cheaper, imported products and the undeveloped market itself have brought on the conditions The company produces ammonia, urea, ammonium sulfate, and mixed fertilizers, all but the latter at the Campana complex which came on stream in the early part of 1968

596
**First Burmese Nitrogen Complex in Operation**
*Nitrogen*, No 67, 23, 26 (Sept -Oct 1970)
Burma has just completed an ammonia urea complex and a dual unit is under construction and scheduled to be in production by the end of 1971 or early 1972 Urea now completely dominates the pattern of N consumption, having made its first appearance on the market in Burma during the 1963 64 season, when Japan exported a mere 94 mt N to this outlet The Burmese market, recently emerged from the realm of potential demand, now affords a welcome outlet for Dutch exporters who seem to have cornered the market, at least in the last two seasons, the Netherlands delivered 44,000 mt N of urea to Burma in 1967 68, the remaining 5000 mt N being obtained from the U S S R , while in 1968-69 the Netherlands constituted Burma's sole source of urea supply Complex fertilizers have been gaining in popularity in the last three years, the formulation 15 15-6 + 4 MgO winning considerable acclaim, applications of 16 20-0 material have been advocated by the Government for use on various crops other than paddy West Germany and Japan each exported 2000 mt of NPK fertilizers to Burma in 1968-69 Complex formulations are suitable for use on several of Burma's more extensively grown crops, notably rubber, cotton, and sesame, and some of these are expected to become increasingly important over the next few years, particularly if the world rice situation continues to offer little cause for optimism

597
**Cuba Negotiating for Fertilizers from Japan**
*Jap Chem Week 13* (653), 7 (Nov 2, 1972)
The Japanese fertilizer industry has received an inquiry from Cuba about the possibility of importing 25,000 tons of high density fertilizers from Japan The Japanese fertilizer industry is showing great interest in the Cuban inquiry and has started negotiations with the Cuban Government on terms of the deal Cuba wants to import the high density fertilizers between January and March 1973 If materialized, it will be the first high density fertilizers export to Cuba from Japan Japanese fertilizer manufacturers are in full operation to meet the growing demand for fertilizers, both at home and abroad Therefore, the Japanese fertilizer industry may not be able to export the high density fertilizer to Cuba despite its eagerness to meet the inquiry

598
**Importance of Fertilizers in the Rural Economy of Cyprus.**
*Fertilizer Intern*, No 2, 4 (Aug 1969)
The purchase of some 50,000 tons of fertilizers by Cyprus, reported in June 1969, attracted twenty seven suppliers and aroused the interest of many more With no fertilizer production of its own, Cyprus is dependent on imports for all domestic requirements Deliveries have increased steadily up to about five years ago, since then they have remained fairly static In recent years the rural sector has also been assisted by means of agricultural cooperatives which play a significant role in the rural economy, and act as agencies for crop collection and for the distribution of farm supplies and fertilizers Due partly to the favorable geographical location of the island to potential export markets, the question of the possible establishment of fertilizer manufacture in Cyprus has been raised more than once in recent years, particularly with regard to superphosphate and compound fertilizers basing production in part on sulfuric acid that could utilize indigenous pyrite

599
**Imports Competition for French Fertilizer Producers**
*Chem. Age (London) 105* (2776), 18 (Sept 29, 1972)
Despite an authorized 3 35% increase in the selling price of N fertilizers and 4% for K fertilizers, French producers are not showing full gains due to continued fierce competition from imports, according to an industry source The key appears to be the price that China is prepared to pay The danger to French producers from Eastern Europe supplies appears to be lessening, and imports are levelling off French consumption growth rate is put at 5% for compound and 2 to 3% for N types Phosphate fertilizers continue to do quite well, due to good demand and the reduction of capacity in the U S Urea sales are hampered by imports from the U S , Portugal, and Kuwait

600
**West Germany Hit by Fertilizer Imports**
*Chem Age (London) 102* (2709), 15 (June 18, 1971)
West German fertilizer manufacturers plagued for yrs by the effects of overcapacity have been hard hit particularly in the past 6 months by imports of fertilizer from Eastern Europe Most of the material comes from Romania and Yugoslavia, who in accordance with bilateral trading agreements have no limiting quotas for exports of fertilizer to Federal Germany Shipments are also being received from East Germany, Hungary, Poland, and Czechoslovakia Unofficial estimates of imported fertilizers this yr range from 120 000 mt to 150,000 mt, about three times the volume last yr The imports have disturbed ordered marketing by carefully timed offers in various regions, mainly at centers reached at relatively low transport costs, such as those along the Main river network The imports are giving rise to considerable concern in West German manufacturing circles since there seems to be little companies can do to counter the threat of East European competition The supplying countries are either delivering within their quota or like Romania subject to no quotas

601
**Germany's Fertilizer Imports Increase**
*Eur Chem Week 22* (536), 8 (June 9, 1972)
As the German fertilizer yr closed producers were looking back on a period in which still more ground was lost to imports in their domestic market From July 1971 to March

1972, deliveries increased by 7 5% to 1,013,600 tons of N fertilizers Imports of ammonium nitrate, ammonium sulfate, and urea accounted for most of the increase, which is expected to total only 4% over the whole fertilizer yr As a result of climbing imports and falling exports, German production is expected to decline by 10% in the current fertilizer yr

602
**India's Fertilizer Imports at 2 Million Tons This Year**
*Oil, Paint, Drug Reptr 195* (9), 31 (Mar 3, 1969)
India's imports of fertilizer during the current fertilizer year, ending June 30, are expected to reach around 2 million tons in Europe with N materials accounting for just over one half, P fertilizers, 420,800 tons and K fertilizers the balance Among contracts for the current year are 100,000 tons from Poland, 250,000 tons from Russia, 20,000 tons Bulgaria, 25,000 tons Rumania, 20,000 tons Hungary, 100,000 tons Japan, and 105,000 tons in barter deals with the U S and Japan

603
**India to Import 9 Million Tons of Fertilizer**
*Chem. Age (London) 100* (2652), 18 (May 15, 1970)
India's fertilizer imports during the five yr ending 1973-74 are expected to total about 9 million tonnes, valued at £579 million This estimate is based on the assumption that the fertilizer capacity target for the 4th plan will be achieved If the capacity target of 3 7 million tonnes is reached, production will be of the order of 3 2 million tonnes The projects, already in production, have a capacity of 1 3 million tonnes Those which are under way have a capacity of 1 2 million tonnes, making a total capacity of 2 5 million tonnes Then, there are a number of projects which have been approved in principle by the government which have a capacity of 2 1 million tonnes

604
**India's Fertilizer Import Plans**
*Fert Int, No 20*, 2 (Feb 1971)
The International Commodities Export Corp (ICEC) reports that fertilizer imports by India's Ministry of Supply will probably be 200,000 250,000 mt of NPK, 50,000-75,000 mt of DAP and 25,000 mt of urea, possibly in bulk Shipment will probably be required during the period January through June, and some part as late as September A good part of this business will be U S AID financed, but Canadian and other sources are being examined A further requirement of 100,000 mt of NPK is expected to be forthcoming under U S AID financing only

605
**Imports of Phosphoric Acid to India Forbiddan for New Plants**
*Fert Int*, No 21, 2 (Mar 1971)
An announcement was made by the Government of India to the effect that imports of phosphoric acid will not be permitted for new fertilizer plants which are to be built The Ministry of Petroleum and Chemicals decided that because of the low world price of phosphate rock in particular, new fertilizer plants should manufacture their requirements of phosphoric acid instead of importing the acid

606
**India Purchasing Diammonium Phosphate Against Untied U S AID**
*Fert Int*, No 22, 1 (Apr 1971)
What is believed to be the first tender held under terms of U S untied AID comes from the Indian Ministry of Supply for the procurement of 90,000 mt of diammonium phosphate (DAP) in bulk for shipment in June/July/August, each shipment totalling 30,000 mt The tender was to be held on March 30, with April 15 as the closing date for offers In the U S it was claimed that untied aid would be disastrous for that country's fertilizer industry, while other exporting countries objected to tied aid as being unfair It will be interesting to see which country secures the supply contract in this particular instance

607
**India Decreases Fertilizer Imports**
*Chem Age (London) 103* (2712), 15 (July 9, 1971)
Imports of fertilizers to India decreased in the 1970-71 fertilizer season Increases in domestic production coupled to a slow growth in consumption has brought about the reduction in imports Consumption of N fertilizers increased only marginally during the last fertilizer season to an estimated 1 42 million mt against 1 4 million mt in 1969 70 Increased production of N fertilizers accounted for much of the production gain rising from 716 000 mt in 1969 70 to 830,000 mt in 1970 71 Production of P fertilizers has been almost static over the past three yr, rising by only 20,000 mt since 1968 There is no domestic production of K fertilizers in India and imports are falling rapidly from 213,000 mt in 1968 69 to 12,000 mt in the last season

608
**Indian Fertilizer Imports Continue to Rise**
*Chem Age (London) 104* (2751) 15 (Apr 7, 1972)
Despite a substantial increase in the domestic supply of fertilizers which is anticipated for the coming yr, India's imports will continue to rise at a steady rate Domestic production of fertilizer is expected to be nearly 440,000 mt/yr higher than in the last yr The additional capacity will be supplied by new plants commissioning at Cochin Durgapur and Goa Trial runs have already begun at the Cochin and Durgapur plants and regular production is expected to start within the next 2 months The Goa fertilizer project should be on stream before the end of this year

609
**India Signs New Contracts for Fertilizer**
*Chem Age (London) 105* (2785), 13 (Dec 1, 1972)
The Minerals and Metals Trading Corp of India have recently concluded contracts for the supply of N fertilizers from Romania and Bulgaria through June 1973 Romania will supply 80,000 mt of N fertilizers such as calcium ammonium nitrate and urea by the end of 1972 and 75 000 mt between January and June 1973 The new contract will make Romania the largest single supplier of N fertilizers to India in 1972 The Bulgarian contract is for the supply of 30,000 mt of N fertilizers during 1972

610
**India Needs Ammonia**
*Chem Age (London) 105* (2788), 18 (Dec 1972)
China is reported to have made a bid to purchase Iran's liquid ammonia surplus which India is hoping to buy for the expansion of the Trombay and Cochin fertilizer plants If China succeeds in its offer, India will have to go to Western sources for supplies which will raise costs by millions of dollars because of higher freight rates and the higher prices prevailing there India has already negotiated for about 500,000 mt of ammonia from Kuwait and Qatar, but this still leaves a gap of 800,000 mt in India's requirements Negotiations for setting up a liquid ammonia plant in Iran with Indian participation the output of which would be entirely exported

to India, was agreed on in the initial stages of the commission's work The plant would have had a capacity of 600 mt per day

611
**Indonesia Set to Become Major World Market for Nitrogen**
*Nitrogen*, No 59, 1 (May June 1969)
The announcement that the Governments of Indonesia and the U S A are nearing finalization of an AID loan which will be partially used for the procurement of N fertilizers provides further confirmation that Indonesia is now on the point of emerging as one of the foremost world markets for fertilizer N In the last few months contracts have been concluded with major suppliers in Europe and Japan for the delivery of substantial quantities of N fertilizers over the next three years, which, coupled with the expected surge in AID financed fertilizer deliveries, are likely to raise Indonesia's standing as an outlet for the exportable surpluses of world supplies to a position second only to the world's two largest N importers – China and India From N trex AG, the consortium of several West European N producers, Indonesia has contracted to buy 1 1 million tons of N fertilizers for 1969 71 A three year agreement has also been negotiated with Japan covering the delivery of 900,000 tons urea over a similar period The inclusion of Indonesia as a recipient of U S fertilizer aid through the AID program which had been expected for some time within the industry, represents a further step in the opening up of this market

612
**Nauru's First Shipment to Japan**
*Phosphorus Potassium*, No 38, 7 (Nov Dec 1968)
An inaugural cargo of 13,000 tons of phosphate rock left Nauru on October 12, 1968, for delivery to Japan at the end of that month, the first shipment from Nauru for many years to a country outside those supplied by the British Phosphate Commissioners (BPC) Mitsubishi Shoji was granted the right of exclusive agent in Japan for the import of 40,000 tons before the end of 1968, a further 160,000 tons during the first six months of 1969 and 300,000 tons in 1969/70 The cargo has already been sold to fertilizer manufacturers in Japan who are eager to make long term contracts for the supply of Nauru phosphate as they consider that the material is preferable for both triple superphosphate and phosphoric acid production

613
**Japan's Imports of Potassium Fertilizers Increase**
*Jap Chem. Rev* p 48 (1970)
Imports of K fertilizer in 1968 were 1 3 million tons and were worth $45 million, corresponding to increases of 8 4% and 4 4% respectively The price of K fertilizers was depressed by increased production of KCl which accounted for over 90% of the imports from Canada and the U S S R. Due to inflationary pressure, producing countries reportedly are considering price hikes. Future developments are of concern to Japan because it depends upon imports for most of its K fertilizer

614
**Japan's Imports of Phosphate Rock Increase**
*Jap Chem Rev*, p 48 (1970)
Imports of phosphate rock in 1968 were 3 4 million tons valued at $72 million, corresponding to increases of 30% and 36% respectively A 15% expansion in phosphate fertilizer production and greater stockpiling accounted for the increased imports The trend toward higher analysis fertilizers and the greater demand for $H_3PO_4$ for use in compound fertilizers produced a need for phosphate rock of high $P_2O_5$ content This accounted for the greater percentage increases in the cost of the imports Nauru phosphate rock was imported for the first time in 1968 More imports are expected because of the high grade of the rock and the proximity of the source In Japan, production of compound fertilizers using $H_3PO_4$ derived from high grade phosphate rock is increasing, $H_3PO_4$ manufacturing facilities are smaller in scale than in other countries There is prospect of abolition of the tariff quota system for the import of ammonium phosphate A countermeasure would be the modernization of the phosphate industry by the construction of large-scale $H_3PO_4$ plants, large ocean transport vessels, and improved harbor facilities

615
**Japan's Potash Imports Decrease**
*Jap Chem Review (Jap Chem Week)*, p 68 (Dec 1971)
Import of K fertilizer in 1970 was 1 33 million tons worth $49 0 million, down 2 1% in amount and up 5 2% in value against the previous yr Decrease in import was due to restriction on rice crops in Japan Source wise, the largest import was from Canada which held 40 5%, and the figure showed an increase of 9 5% over the preceding yr in value Import from the U S A decreased by 20 5% from the previous yr, whereas France was up 91 2% due to a marked increase in potassium sulfate, and the U S S R , up 7 8% Japan depends on import for all K fertilizer needs and will have to make efforts to secure stable supply through the wide range of import sources, as the price is dominated by demand and supply in supplying nations

616
**Transportation Bottleneck for Japans-U S S R Potash**
*Fert Int* No 39, 2 (Sept 1972)
After an agreement with the U S S R concerning its potash imports through the port of Nakhodka, Japan now sees the steady flow of supplies jeopardized by an unforseen factor– the supply to North Vietnam of munitions of war affecting the rail transport of potash between the mines and the port of lading, Nakhodka Predictions are that imports of potash to Japan for this yr shipment will again have to be carried forward to next yr deliveries The restricted loading capacity of Nakhodka is well known and the adverse effects of the spring thaw upon the Trans Siberian Railway have hindered traffic considerably

617
**Japanese Imports of Phosphate Rock Decrease**
*Jap Chem Annual*, p 30 (1972)
Japan has no phosphate rock resources, so all domestic demand depends on imports Therefore, phosphate rocks of high quality are required for cost reduction of phosphate fertilizer manufacture Phosphate rocks imported from the U S A and Morocco are of high quality Therefore, the U S A and Morocco are stabilized phosphate rock supply markets, occupying 63 2% and 18 7% of the total phosphate rock imports, respectively Imports of phosphate rocks in 1971 were 3 05 million tons, $62 5 million in value, 4 6% decrease in quantity and 7 4% decline in value from the preceding yr Phosphate rocks from Jordan, which were almost nil in 1970 because of the unstable political situation of Jordan, $91 7 million in value, 5 5 times that in 1969

618
**Spain Worried by Rising Fertilizer Import**
*European Chem News 14* (342), 8 (Aug 23, 1968)
Fears of increased fertilizer imports have caused the Spanish Ministry of Industry to urge fertilizer producers in Spain to

increase the rate at which expansion of capacity is taking place Demand in Spain is now growing more rapidly than in recent years The current yr is expected to show a greater adverse trade balance in fertilizers than ever before A rise is expected for ammonium sulfate consumption Production will be around 790,000 tons Stocks are low and imports in the order of 100,000 tons are forecast Last yr Italy and West Germany were the major suppliers of the total 95,000 tons purchased Potassium nitrate imports in 1968 are probably going to be around 80,000 tons Calcium nitrate imports will be about 100,000 tons Last yr imports were in excess of 50,000 tons Norway was the major supplier Consumption of ammonium nitrate has risen sharply At an estimated 700,000 tons in 1968, there will be a shortfall of 100,000 tons Stocks are reportedly low Urea capacity should be in phase with the increased demand for the material which is forecast Compound fertilizer demand has been rising steadily in Spain Imports last yr were slightly in excess of 120,000 tons of compound fertilizer (expressed as fertilizer not as N) and this yr estimates indicate that another 50,000 tons will be needed Last yr's import/export balance of fertilizers was favorable to Spain Imports worth $17 million were exceeded by exports of $19 5 million A large part of this positive balance was due to potash sales Poland, Norway, the USA, and Italy were leading customers for Spanish potash

619

**Triple Superphosphate Imports.**

*Chem. Week 106* (8), 69 (Feb 28, 1970)

For the first time in years triple superphosphate is being imported in significant quantities Two 10,000-ton shipments from Fertilizantes Fosfatados Mexicanos (FFM) have landed in recent weeks at Gulf Coast ports and more–possibly much more–is on the way Last November, FFM contracted 65,000 tons to the U S market and expects to sell at least another 65,000 tons this year FFM's effort to develop U S markets, is aimed at cashing in on relatively high U S prices and retaliating for alleged competitive action by U S producers in global markets Claims are that U S export quotes on granular triple forced the Mexican export price down $8/ton, to $35/ton, in some cases to $29/ton The phosphate rock used to make FFM's triple super is mined in Florida U S fertilizer marketers aren't overly concerned about the initial imports But if FFM's drive to tap the U S market continues and succeeds, it could seriously aggravate an already oversupplied market Domestically made triple superphosphate is now selling at $41/ton–$53 50 at Florida Texas coastline locations. Although FFM declined to name its U S price, trade sources claim the company is selling triple super for $33 34/ton in Florida Some is also believed to be moving inland up the Mississippi FFM could be a tough competitor in domestic and foreign markets Its plant at Coatzacoalcos, Veracruz, based on the latest technology, started production last year Capacity–435,000 tons as $P_2O_5$–included facilities to make 240,000 tons/year of granular triple super and 600,000 tons/year of phosphatic fertilizer solution FFM also has an advantageous back haul transportation costs The same vessels that carry its phosphate rock from Florida take triple super to New Orleans

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**Impact of Foreign Production on U S Markets.**

J N Mahan (Agr Stabilization Conserv Serv , Washington, D C )

*Searching the Seventies* (Held Sept 15 17, 1971, Memphis, Tenn ) Tennessee Valley Authority, Muscle Shoals, Alabama, pp 35-8

U S imports of N have been climbing and may amount to over 1 million short tons of N in 1970 71 Canada, Trinidad, Norway, Belgium, and the Netherlands have been making inroads into the U S N market Imports of N increased from 529,000 tons in 1965-66 to 855,000 in 1969 70 Anhydrous ammonia imports increased from 258,000 to 477,000 tons of material during this period, ammonium nitrate from 178,000 to 306,000, urea from 202,000 to 424,000, N solutions from 80,000 to 98,000, and ammonium phosphates from 182,000 to 395,000 tons of material U S producers of $P_2O_5$ have been more competitive on the world market or have been in position to deliver materials where and when they were needed However, North Africa is aggressively striving to improve its competitive position in $P_2O_5$ and Mexico entered the U S market with phosphoric acid this past season Canadian potash is established in the domestic market and is expected to increase Plants in the U S are faced with refining lower and lower quality raw materials The declared values of N solutions, phosphoric acid, ammonium nitrate, urea, anhydrous ammonia, and ammonium phosphates were lower in 1970 71 than in 1969 70 The conspicuous new entries in the U S market were N solutions from the Netherlands and phosphoric acid from Mexico Potassium chloride was the only material for which the declared value in 1970 71 was more than in 1969 70, $16 98 to $23 68/ton The declared value on material from Canada increased from $16 90 to $23 52

621

**U S S R Fertilizers for United Kingdom**

*Eur Chem News 22* (555), 8 (Oct 20, 1972)

Rumors are circulating in the UK fertilizer market on the size and possible influence of a shipment of U S S R ammonium nitrate due to arrive in the UK in the near future If the material is of Russian origin, and there is considerable speculation as to the true source of the AN, it will be the first shipment of U S S R N fertilizers to enter the UK market U S S R. industry has been highly active in the N market in the recent past, sales being made to Turkey and Scandinavia in particular, at prices well below the current norm

## IMPORT–EXPORT

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**German Nitrogen Producers Seek New Distribution**

*Eur Chem News 20* (507), 8 (Nov 19, 1971)

The continuing problems of the West German fertilizer industry were again the major subject for discussion at the *Fachverband Stickstoffindustrie* conference in Dusseldorf It is apparent that the West German fertilizer industry has exhausted most of the remedial measures open to it at the present time Freight tariffs and other distribution costs are expected to increase considerably next yr Fertilizer qualties of all producers are regulated by law to almost equal levels and under the *Franco* pricing system in Germany, all customers pay a standardized delivered price, regardless of varying distribution costs Production of N fertilizers in Germany fell from 1,597,000 ton in 1968/69 to 1,504,000 ton in 1970/71, while exports dropped from 708,000 ton in 1968/69 to 525,000 ton in 1970/71 Consumption increased by 5% in the 1970/71 fertilizer yr, but was offset by increased imports Imports totaled 143,100 ton in 1970/71, forced up by a five fold increase in East Bloc imports, mainly of calcium ammonium nitrate (CAN) and urea German exports of CAN

fell drastically to 10,500 ton in 1970/71, down from 64,800 ton in 1968/69 Domestic prices for CAN increased by 5% in 1970/71, while NPK 13 13 21 prices were raised by 11% One of the major factors which has opened up markets in Germany for East Bloc fertilizers is the high prices which German farmers have to pay for domestically produced fertilizers compared with other EEC countries Now that Belgium has decreased VAT on fertilizers from 18% to 6%, Germany has the highest tax rate on fertilizers in the EEC

623
**Rotterdam Handles More Fertilizer Tonnage**
*European Chem News 14* (340), 16 (Aug 9, 1968)
Fertilizer tonnage moving in and out of Europoort in 1967 was 4 7 million tons, an increase of 17% over 1966 according to the Port of Rotterdam Raw rock phosphate made up 2 3 million of the 2 7 million tons of total arrivals in the port but 1 9 million tons of phosphate were in transit Phosphate origins were U S 874,000 tons, U S S R 633,000 tons, and Morocco 506,000 tons About 75% of the 403,000 tons of potash arriving at the port originated in Canada

624
**Polish Export Imports of Fertilizer Materials Increase**
*Chem Age (London) 105* (2781), 16 (Nov 3, 1972)
Exports in Poland during 1971 were S 2 06 million mt, phosphate rock 2 47 million mt, and N fertilizer 84,900 mt The 1970 export of these materials was 1 77, 2 02, and 454,200, respectively Import of K was 2 19 million mt in 1971 compared to 2 08 million mt in 1970

625
**U K Overseas Trade**
*Fertilizer Feeding Stuffs J 65* (16), 513 14 (Aug 21, 1968)
Board of Trade statistics are used to compare exports and imports of various agricultural commodities for the first six months of 1967 and 1968 Phosphate imports in 1968 were up 126,000 tons to 924,170 tons, Morocco increased its share of this market and it decreased in Nauru and the U S Potash imports were almost identical for the two periods at about 383,000 tons There were no major changes in source country for potash although West Germany supplied only about half as much potash in 1968 as in 1967 Export of nitrogenous fertilizers was down 40,000 tons while imports were up 10,000 tons

626
**Political and Economic Planning Division is Pessimistic on British Fertilizer Exports**
*Chem Week 109* (17), 45 (Oct 27, 1971)
Political and Economic Planning Division feels that surplus capacity in the Common Market rules out much opportunity for British fertilizer exports Imports from the European Economic Community (EEC), on the other hand, are likely to spurt as the group's common agricultural policy stimulates grain production in the U K However, ICI looks for a boost in its fertilizer sales at home It estimates it has 50% of the British fertilizer market and expects the market to grow, especially if Britain adopts the EEC policy of strong support for farmers In the more specialized crop protection chemical field, ICI has been exporting almost 75% of its output, and a substantial portion of that goes to EEC

627
**Fertilizer Agreement with U S S R Proposed by United States Company**
*Eur Chem News 22* (552), 8 (Sept 29, 1972)
Occidental Petroleum's chairman has offered the U S S R a 20-yr $6,000 million deal on fertilizer trade The proposed agreement calls for the shipment of 1 million ton/yr of superphosphoric acid from Occidental to the U S S R for 20 yr In return, Occidental would receive ammonia and urea worth $150 million/yr from the U S S R every yr The U S company is already enlarging its Florida phosphate mines in anticipation of the agreement The sheer scale of the deal is currently giving rise to many doubts in the U S A particularly as Occidental's superphosphoric acid capacity is currently only about 750,000 ton/yr

628
**Urea Building Boom Intensifies Global Competition**
*Chem. Week 108* (6), 41 (Feb 10, 1971)
Until recently the U S has been a large exporter of urea, especially to developing countries like India and Pakistan Now these countries are building their own plants and the situation is changing Urea is being imported into the U S in quantities almost equal exports Stockpiles are building in countries like Japan as well as the U S However few plants are now being constructed in the U S and the immediate problem is controlling imports and retaining some export market Large urea plants are being built overseas and it is necessary that the production from these plants be directed properly

629
**United States Sulfur Exports Increase**
*Chem Week 109* (8), 37 (Aug 25, 1971)
Sulfur inventories fell 1% in June as production dropped 5% and shipments rose 6% from May levels The decrease of 23,990 long tons was entirely in stocks of Frasch S, since recovered S stocks rose 3527 long tons Total stocks at the end of May were 4 09 million long tons Sharply higher exports accounted for the increase in June movement, with most of the additional shipments going to Europe While exports exceeded imports in the first six months, value of the exported material was only about $13 million compared with $14 4 million for imported S Average value of exported S in June was $18 1/long ton compared with 1970 full yr average of $24/long ton Average value of imported S was $20 25/long compared with 1970 $22 20/long ton

## GENERAL

630
**International Marketing**
*Agr Chem. 24* (2), 52 (Feb 1969)
World trade in solid N fertilizers increased in 1967 1968 by over one half million tons India emerged as the world's largest market for N fertilizers, surpassing China for the first time India's imports are likely to continue at the present high levels for the next two years or so because of the continued delays in the development of its own industry Japan became the leading major N fertilizer supplier West Germany, which has been traditionally strong in exports of N fertilizers, slipped into third place in world exports, being overtaken by the U S for second place, after Japan

631
**The International Fertilizer Market**
J C Engibous (International Minerals & Chemical Corp )

*Agr Nitrogen News 18* (1), 18 23 (Jan Feb 1968)
There are 200 countries in the world but only 112 use chemical fertilizers and only 40 manufacture or process fertilizers Moving fertilizer from manufacturing plants to farmers is a major difficulty, especially in developing areas Other problems associated with the use of fertilizers in developing areas, such as ignorance and superstition, high cost, lack of credit, crop insurance, and warehousing are described briefly

632
**Anhydrous Ammonia May be Next for Commodity Exchange Trading**
*Chem. Week 103* (1), 29 30 (July 6, 1968)
Future trading in ammonia offers several potential advantages Speculative trading could be expected to stabilize prices and possibly result in an average overall increase Excess could be distributed in a national market instead of being dumped in a regional market Sound accounting practices, in order to assign costs to production, warehousing, and distribution, would uncover the realistic costs of distribution Future buyers would assume a share of the investment risk thus providing a new source of capital The New York Cotton Exchange has been studying trading possibilities but has yet to formulate any actual trading plans

633
**Phosphate Rock Exports Leap Ahead**
*European Chem News 14* (342), 8 (Aug 23, 1968)
Increased purchase of phosphate rock by East European countries has been a major factor in increasing exports of the major non Communist phosphate rock producing countries North African rock sales to East Europe reached a total of around 600,000 tons, an increase of 83% compared with the first quarter of the previous yr The bulk of sales in Eastern Europe went to Poland and Czechoslovakia Morocco showed an increase in the first quarter of 10% in exports and 12% in domestic consumption Total Moroccan exports in the first quarter were 2 6 million tons Morocco's increased exports were mainly to Western Europe and reflected rising fertilizer demand Sales by Morocco to non European countries–China and Japan–fell in the first quarter of the yr Although the closing of the Suez canal might appear to be the explanation for the decline, it is more likely that pricing considerations affected Far Eastern buying decisions since Tunisia increased its exports to these areas Florida, on the other hand, suffered a general decrease in markets during the first quarter Sales to Western Europe and Canada were down The only really significant increase in sales was to Belgium, Brazil, Australia, and some Asian markets, however, increased their purchases from Florida which offset the poor performance in Western Europe

634
**Opportunities for Fertilizer Trade Between the Americas**
Donald L McCune (Tennessee Valley Authority, Muscle Shoals, Ala )
*World of NPKS*, No 26 9 11 (Aug 1968)
Latin America is a food deficit region, its population growth rate is among the highest in the world, and it has the potential for producing much larger quantities of food In the period 1957 66 total plant nutrient consumption in Latin America increased at 10 5%/yr, reaching 1 7 million metric tons in 1966 Fertilizer production during the same period increased at 6 9%/yr, reaching 792,000 metric tons in 1966 At present more than half the fertilizer consumed is imported and, allowing for planned expansion in fertilizer production, Latin America will remain a net importer of fertilizer through 1972 In 1959 U S fertilizer imported by Latin America was valued at $20 6 million, compared with 1966 imports of $58 7 million This increase has come about primarily through free trade and has not had to depend on AID loans to the extent that it has in other regions of the world The U S fertilizer industry should encourage wider use of high analysis fertilizer intermediates in world trade, the savings in freight and handling costs for intermediates such as anhydrous ammonia, urea ammonia solutions, phosphoric or superphosphoric acid, or elemental P offer real opportunities for increasing overseas fertilizer trade

635
**Economic Evaluation of Export Shipments of Fertilizer**
D A Waltzman, N L Spencer, and M A Tschantre (Tennessee Valley Authority, Muscle Shoals, Ala)
*Tennessee Valley Authority (Report No S435)*, 23 pp (1968) (prepared for The Agency for International Development)
This report is based on cost of diammonium phosphate in India using Florida phosphate rock A 10% return on capital investment was assumed and current market price for materials was used in each of six case studies The case studies include (1) imported diammonium phosphate, (2) imported P, (3) imported 76% $P_2O_5$ electric furnace acid, (4) imported 70% $P_2O_5$ wet process acid, (5) imported 54% $P_2O_5$ wet process acid, and (6) imported phosphate rock and S Results of the study show that economies of supplying diammonium phosphate to India are in the order as listed above with the least cost being to export the material as a finished product and the highest cost to export phosphate rock and S The numerous cost and variables taken into account included (1) capital investment (2) cost of electricity (3) phosphate rock and S at given locations as well as other factors involved

636
**FAO Program Spurs Sales of Fertilizers**
*J Commerce 299* (21,856), 7 (Jan 20, 1969)
Sales of fertilizers have increased three times as fast in developing countries participating in the Freedom From Hunger campaign's educational fertilizer program, as compared with sales in comparable nonparticipating countries A working party on statistics has reported to the Fertilizer Industry Advisory Committee of the FAO that world production of commercial fertilizers during the 1967 68 crop year had increased by about 8 1% to an estimated 57 7 million tons and that consumption had also risen by an estimated 8 3% to 55 million tons for the same period The output of N was estimated at 25 million tons, an increase of 12 1% over 1966 67 The production of phosphoric acid, estimated at 17 5 million tons, was up 5 4%, while potash production rose by 4 8% to an estimated 15 2 million tons The largest estimated regional increase in production was shown by Europe, whose output rose by 1 7 million tons to 23 4 million tons North and Central America had an estimated output of 17 6 million tons, an increase of 1 2 million Sharp increases of about 0 7 million tons were estimated for Asia and the Soviet Union, for which total production was put at 4 65 million and 8 23 million tons, respectively

637
**Deceleration in the Export–Import Rate of Phosphate Rock**
*Chem. Week 104* (15), 74 (Apr 12, 1969)
A deceleration in the export import growth rate for phosphate rock and other bulk commodities is forecast Phosphate rock export expansion is expected to slacken from 12%/year to

8 5%/year in '75, and drop to 6 5%/year in '95 Nevertheless, tonnage shipped out will double by '76, reach 14 million long tons Increasing foreign production will account for the dip in growth rate of phosphate exports

638
**World Exports of Solid Nitrogen Top 6 Million Tonnes N.**
*Nitrogen* No 64, 2 3 (Mar Apr 1970)
With conditions on the world N market becoming increasingly favorable for potential purchasers during the year, the 14 9% increase in exports of solid N products during 1968/69, reaching almost 6 2 million tonnes N The dominance of the fertilizer market by urea increased during the year The ammonium sulfate exports appear to have revived marginally since 1967/68, due largely to the growing importance of cheaper co product materials in place of the synthetic product which had traditionally dominated the market While ammonium nitrate (comprising ammonium nitrate, calcium ammonium nitrate and ammonium sulfate nitrate) exports expanded by 22%, reaching just over 1 2 million tonnes N during the year, the contribution of this product category to world N exports has decreased from 20 2% in 1966/67 to 19 6% in 1968/69 In West Europe, the decreased profitability on the export market, combined with the equalization of domestic pricing within the EEC has led to a significant increase in the volume of intra European deliveries In East Europe, both Bulgaria and Romania managed to dispose of much of their growing export surpluses, Romanian sales increasing from a level of 21,000 tonnes N in 1967/68 to 85,000 tonnes N in the following season During the current season, Japan is expected to reestablish its strong lead over the remaining world exporters, contracting to ship 923,000 tonnes N (as ammonium sulfate, urea and ammonium chloride) in this period to China alone The 1969/70 season will probably see a slackening of U S overseas deliveries following a relatively tight last half 1969, and, in comparison with the previous season, little in the way of large scale AID business On the basis of historical growth of solid N exports, total overseas shipments of solids may be expected to reach some 7 2 million tonnes N during 1969/70

639
**European $NH_3$ Producers Must Export to Halt Price Slide**
*Eur Chem News 18* (451), 8 (Sept 25, 1970)
Outside the USA, pressure on prices is thought likely to continue during 1972 73, with European prices of around $43-45/ton and Japanese prices slightly higher at $44-46/ton being reached only in a long term equilibrium position after 1975 In the short term, 1971-72, the reduction of prices from about $65/ton in 1965 to about $45/ton is unlikely to be reversed before 1972 73 In the period 1972-73 western European N fertilizer producers could still have problems if exports are not at a sufficiently high level to keep the plants highly loaded An examination of the impact of new technology and feedstocks on production cost showed that technological advances in the 1960s had enabled cheaper feedstocks to be employed This had led to a reduction of the investment/capacity ratio through the use of larger capacities, for which the use of centrifugal compressors was more economic than the use of reciprocating compressors It was concluded that for a European ammonia plant for example, the investment/ton/yr of ammonia has been reduced by technological research to about $50 Thus for an industry traditionally considered capital intensive, the ammonia production cost includes less than 50% fixed costs For example, a French natural gas ammonia plant has fixed costs representing only 34% of production costs, at full capacity operation Long term equilibrium prices for ammonia after 1975 have been estimated by examining supply and demand curves for a developed market These curves are such that the resultant ammonia prices depend almost purely on the technology, and hence the production economies of steam reforming in the various regions The supply/demand curves indicated that equilibrium ammonia prices will not be affected by demand growth rates higher or lower than those anticipated, by delayed closure or uneconomic plants which will be forced to work on 1000 ton/day price structures, nor by ammonia imports at marginally lower cost

640
**Trade Association Raps Fertilizer Shipping Rule**
*J Commerce 307* (22 380), 3, 23 (Feb 12, 1971)
The American fertilizer industry is fighting to knock out a requirement in foreign assistance laws that at least half of the overseas aid shipments be carried in United States vessels The vice president of the Fertilizer Institute said that Japan and European countries produce and ship fertilizer cheaper than American companies This is a factor in holding back America's fertilizer industry—and it puts us at a disadvantage in world markets The Agency for International Development, in charge of the government's foreign aid program, said the requirement that at least half of the assistance shipments be transported in U S bottoms has been in effect more than 20 yr This agency has cut its purchases and shipments of American fertilizer about 50%, due largely to emerging and developing countries getting fertilizer at lower prices because of lower shipping costs The U S has the plant capacity to produce enough fertilizer to meet the needs for at least the next 5 yr, according to the Fertilizer Institute representative

641
**European Economic Commission Watching East Europe Fertilizer Imports**
*Chem Age (London) 103* (2720), 16 (Sept 3, 1971)
The European Economic Commission (EEC) in Brussels is keeping a strict watch on all imports of urea from Yugoslavia Imports of urea have increased considerably recently to the EEC countries, most of the material has been available at relatively low prices In the light of general market conditions, these imports have threatened to harm EEC interests Fertilizer imports from Eastern Europe, Romania, and Yugoslavia in particular, have been causing a great deal of trouble in Europe recently Both French and West German producers have been claiming losses in both production and sales in recent months due to very cheap fertilizer imports from Eastern Europe The U K has had its share of the problem Applications for anti dumping duty against Romanian fertilizer were made by producers in the last 12 months Yugoslavia is a latecomer in the field of urea production Until early 1969 no significant production facilities for urea existed, which is the main reason why urea has never been as popular in Yugoslavia as elsewhere in Eastern Europe Since 1969, a 100,000 mt/yr plant has been started up at Kutina by Tvornica Dusicnih Gnojiva and a 108,000 mt/yr plant for urea production is also in operation at Pancevo

642
**Fertilizer Industry Would Benefit by British Entry into EEC**
*Chem Ind (London), No 46*, 1308 (Nov 13, 1971)
For some time, surplus manufactured fertilizers have been accumulating in the EEC, EFTA, and the UK, while low cost imports from Eastern European countries have been dumped

in these markets, probably with the aim of obtaining hard currencies ICI and Fisons, the two major UK fertilizer manufacturers, have recently been forced to apply to the Department of Trade and Industry for anti dumping duties on compound fertilizers originating in Ireland, France, the Netherlands, and West Germany ICI has also filed an application for similar duties on imports of urea The extent to which the UK imports have increased is shown in the latest Custom and Excise figures, over the first nine months of this yr, imports of manufactured fertilizers were up 20% over the same period of 1970 The major constituent, potassic fertilizer, was up by 25 9%, the contribution from the EEC having nearly doubled, the main increase being from West Germany Nitrogenous fertilizers rose only by 12%, but phosphatic imports leaped by nearly 100% The basic factor which has determined this situation is the imbalance of fertilizer supply in relation to demand For most of the post war period, the annual rate of increase in fertilizer demand has tended to reach as high as 10%, and investment in the industry has been based on the assumed continuation of this trend However, in the UK, this growth has failed to materialize over the period 1968 71 The final result of the application will depend on the UK government's sense of priorities If the tariff proposals are rejected, it is inevitable that there will be further price increases in fertilizers to allow manufacturers to retrieve profits This could prompt a further increase in imports On the other hand, to enable the farmers to buy fertilizers at the old prices through increasing fertilizer subsidies would be against present agricultural finance policies Imposition of tariffs would be against the spirit of present pro European feeling, but the problem concerns all European fertilizer industries, and it would seem that to increase tariffs, in the hope that closer cooperation within an enlarged EEC will result, would be the best compromise

643

**European Economic Community May Take Action on Potash Trading.**

*Chem Age (London) 103* (2731), 6 (Nov 19, 1971)

The EEC Commission has stated that free trading in compound potash fertilizers from other EEC countries is now taking place, but the freeing of simple potash fertilizers had still not been achieved The EEC rules called for no discrimination in supplies and outlets However, even in the case of compound potash types, importing still continued solely through Societe Commerciale de Potasse et de l'Azote The Commission said it had told the appropriate French authorities that this situation was incompatible with the Rome Treaty The position is likely to be rectified very shortly, or the Commission will take action

644

**Aid Tying and Export of Nitrogenous Fertilizers from the Persian Gulf**

F Kahnert

*Organization for Economic Cooperation and Development*, Paris, France, 84 pp (1971)

This study examines the cost raising effect of aid tying in financing N fertilizer imports into India It does not consider the possible effect noncompetitive bidding in the donor country has on raising prices, but concentrates on the exclusion of a financially cheaper source of supply of N fertilizers, for example, the Persian Gulf In many ways the study refers to a situation which will arise in the near future since at present few supplies are available from the Persian Gulf The Persian Gulf is considered to be a most economic location for the production of liquid ammonia because of its plentiful supply of cheap natural gas Similarly it has a competitive advantage in terms of total cost in the production of some finished fertilizer products Total investments in the Persian Gulf up to 1975, either formally committed and financed or under consideration on the basis of preliminary decisions to go ahead, amount to roughly $500 million By 1975, the time horizon adopted in this study, effective production possibilities will be of the order of two million tons of N On the basis of the last 2 yr in India, it is estimated that 99% of the fertilizer imports are financed under tied aid from DAC countries (84 87%) and under barter agreements from East rn Europe (12 15%) The urea supplied by DAC countries costs between $55 60 and $72 60/ton f o b This compares to an estimated profitable urea f o b price for the Persian Gulf plants of $45/ton To this already sizeable price differential the cost differential in transport has to be added It would cost an estimated $3 40/ton to transport urea from Kuwait to India as against $14 to $16 for urea supplied from North America or Western Europe Even compared to urea from Japan which costs about $6 70 in shipping, supplies from the Persian Gulf have a sizeable cost advantage The U S is the main fertilizer supplier country under tied aid Taking into account the rule that half the supplies should be moved in U S flag vessels, then the c i f cost to India per ton of urea is more than twice as high from the U S than from the Persian Gulf By 1975 India would have to spend $80 85 million annually for urea if it were supplied under U S conditions as opposed to only $40 million if aid were untied for purchases in the Persian Gulf Taking account of the gradual build up of Persian Gulf supplies, the total savings to India over the period 1970 to 1976 (financial years) would amount to $215 million Between the completion of this report in draft form and its going to press, the U S Government announced the untying of aid loans for procurement in "eligible" developing countries as from 15th September 1970 At the same time, the proportion of the final value of the goods that may come from noneligible free world sources was raised from 10 to 50% The definition of eligibility used excluded Iraq and Kuwait from the benefits of this measure but admitted Iran Saudi Arabia, and Qatar

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**Outlook for U S Exports**

H S Ten Eyck (Everglades City, Fla )

*Searching the Seventies* (Held Sept 15 17, 1971, Memphis, Tenn ) Tennessee Valley Authority, Muscle Shoals, Alabama, pp 39-43

The U S currently is exporting rock phosphate at prices equal to or below the cost of production Other world rock producers are planning or actively expanding production Morocco, Spanish Sahara, Tunisia, Egypt, Algeria, Jordan Israel, North Vietnam, and Russia Nearly all these other producers are government controlled and these governments may sell rock to earn foreign exchange or for political reasons, regardless of profit The U S phosphate rock industry faces a period of extreme competition Export prospects for soluble $P_2O_5$ are no better because of the large number of manufacturing plants under construction in France, India, and other countries South America, however, should continue to be a good market for soluble $P_2O_5$ from the U S for several more years The future of the U S as a N exporter is questionable because of high costs for natural gas compared with gas costs in Venezuela, the Arabian Gulf, and parts of North Africa Spot and opportunistic sales and those due to political and geographic economics are about the only prospects in store Potash exports are completely out of the picture because of Canadian production New sources on the south shore of the Mediterranean probably will provide potash

at even lower costs About the only export market that has a growth possibility for the U S is that for mixed fertilizers in Central and South America

646
**Statistics on World Trade in Compound Fertilizers**
*Chem Marketing Rep 201* (7), 7, 47 (Feb 14, 1972)
Detailed statistics on world production and trade in compound fertilizers have been compiled by the London secretariat of the International Superphosphate & Compound Manufacturers' Association The ISMA study shows that in 1969, 29 exporting countries delivered 6 1 million tons of compound fertilizers containing 2 9 million tons of plant nutrient to more than 120 importing countries Although compounds supplied only 16% of nutrients in international fertilizer shipments in 1969, the relative importance of compounds for each of the major nutrients varies significantly They are most important for the phosphate fertilizer trade, accounting for 45% of total $P_2O_5$ entering the fertilizer trade This compares with 15% and 7% for N and $K_2O$ respectively Suppliers in West Europe and North America delivered 93% of world exports with four countries, Belgium, West Germany, the Netherlands, and the U S , accounting for two thirds of the total Ammonium phosphates account for more than 70% of North American exports of compounds and that area was responsible for over 50% of total world trade in NP compounds West Europe was the largest net exporter of compounds, nearly 1 5 million tons, compared with net exports from North America of just over 1 million tons Asia was the largest net importer, with just over 1 million tons, followed by Latin America, accounting for 800,000 tons Nearly 60% of world trade is in the form of NPK compounds, most of the balance is supplied by NP types, with about 40% of the NP tonnage in the form of ammonium phosphates, mostly used as intermediates for NPK compounds Shipments of NK and PK compounds amount account for 6% of world trade The communist countries are active in this business, according to ISMA, only as importers Initially, ISMA's statistics on the compound fertilizer business relate only to 1969, the purpose of the first study being to establish a methodology which will enable the association to prepare a consistent series with much less delay Figures for 1970 should be available to ISMA members shortly

647
**Fertilizer Contracts Signed Between East and West**
*Eur Chem News 22* (551), 8 (Sept 22, 1972)
A contract for the sale of 42,600 tons of potash has been signed between Saskatchewan and China The value of the sale is U S $2 5 million The delivery is scheduled for November 1972 January 1973 Saskatchewan officials feel that China could become one of the province's largest markets Romania has signed a contract to supply 40,000 tons of urea to Paraguay's state fertilizer company Senafer

648
**Eastern Europe Fertilizer Exports Making Inroads in Western Europe**
*Chem Week 111* (25), 27 (Dec 20, 1972)
West Germany reports that in the yr ended June 30, 1972, N fertilizer imports from the Communist nations of Eastern Europe tripled, to 99,000 tons Total imports increased 70%, to 228,000 tons Domestic sales dropped 10%, to 903,000 tons, and West German exports declined 20%, to 415,000 tons As a result, total sales of German ammonia fertilizer makers dropped more than 200,000 tons in 1971 72

## PRODUCTION–CONSUMPTION STATISTICS

649
**Austral Pacific Starts Production of Urea.**
*Fertilizer Intern.*, No 4, 1 (Oct 1969)
Urea production has now started at the Austral Pacific Fertilizer Ltd , plant at Gibson Island, Brisbane, the first large-scale fertilizer plant to come on stream in Australia The capacity of the new facility at Gibson Island is 212,000 tons/year–a capacity which is more than sufficient for immediate domestic needs, though these have been rising rapidly during the last few years It therefore seems probable that a proportion of the output will have to be sold in overseas markets in competition with suppliers such as Japan and Kuwait Although Indonesia is one likely outlet, financial difficulties may preclude the possibility of selling more than token quantities there, unless it can form part of the Australian aid to that country At present, however, there is a surplus of unsold urea in Indonesia, which has resulted in requests for the delay of further shipments from Europe until old stocks are cleared The U S $38 million Gibson Island plant is to be expanded further at a cost of U S $5 6 million to include an ammonium phosphate plant with a capacity of 250,000 metric tons/year of phosphatic fertilizers, based on purchased phosphoric acid

650
**Australian Sulfuric Acid Use and Production**
*Sulphur*, No 89, 21 5 (July Aug 1970)
All but a few tonnes of sulfuric acid produced in Australia are consumed within the country The major demand for sulfuric acid comes from the fertilizer industry, and in 1969, of the 1 9 million tonnes available, 1 5 million tonnes were used to manufacture fertilizers of which the bulk was consumed by single superphosphate operations–the remainder being supplied for production of ammonium sulfate and phosphoric acid The utilization during the past five yrs of an average of 1 5 million tonne/yr acid for phosphate fertilizer production is only exceeded in the U S and France Of the 34 sulfuric acid complexes presently operating in Australia, 23 of them have associated facilities for production of phosphoric acid and superphosphate, and five of the remaining 11 sell a large portion of their output to superphosphate manufacturers The high demand for superphosphate arises from the deficiency in Australian soils of P and to a lesser extent S, and growth in this sector of the fertilizer industry has been caused by an increase in the total fertilized area as well as greater use of fertilizers on cultivated areas The future development of the sulfuric acid industry will remain largely dependent upon the rate of growth of fertilizer oriented demand, notably for the manufacture of superphosphates, and particularly for single superphosphate production, since proportionally more acid is consumed in its manufacture than in higher analysis superphosphates and complex fertilizers While production of complex NPK's will almost certainly rise in the yrs to come it is expected that this will have no immediate effect on the incidence of single superphosphate production which will continue to be used in large and increasing amounts and which indicates accordingly that there will be a progressive expansion of the sulfuric acid off take in the major end use sector This is not typical of the evolving situation in the fertilizer industry in other parts of the world, where the introduction of high analysis straight and compound fertilizers has subsequently led to a reduction of the output of fertilizers with a lower nutrient content, such as single superphosphate

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**Fertilizer Consumption in Austria**

*Intern Fertilizer Corres* 9 (4), 1023 (Oct 1968)

Austrian farmers used 131 7 kg of plant nutrients (33 kg N, 46 kg $P_2O_5$, and 52 kg $K_2O$)/hectare of agricultural land in 1966/67 Austria ranked sixth among West European countries in fertilizer consumption Total fertilizer use was 90,885 tons of N, 127,229 tons of $P_2O_5$, and 143,722 tons of $K_2O$ for a nutrient ratio of 1 1 4 1 6 Compared to 1962/63, use of N increased 40%, $P_2O_5$ 20%, and $K_2O$ 39%

652

**Recent Developments in the Belgian Sulfuric Acid Industry**

*Sulphur*, No 88, 25, 38 (May June 1970)

Belgium has a $H_2SO_4$ industry of major importance, although it is almost solely dependent on imports of raw materials the acid industry is among the six largest in Europe and has increased by more than 25% annually since the mid 1960s Before the 1960s, $H_2SO_4$ was used principally for fertilizer, however last yr well over one half was used outside the fertilizer industry Sulfuric acid capacity in Belgium will have increased by almost 800,000 ton/yr by 1971 as a result of two companies expanding their existing acid facilities NV Bayer at Antwerp, which already operates a 200 000 ton/yr plant, is to commission a further 320 000 ton/yr capacity based on brimstone The second project to be completed in 1971 is that of SA des Fours a coke de Zelzaete The 450 000 ton/yr plant located at Rieme will utilize liquid S and one effect of this expansion program is expected to be the closure of several of Kuhlmann's relatively small pyrite plants in Northe n France Similarly, the Bayer and BASANT plants, located at Antwerp will supply an increasingly larger amount of acid to West Germany in the future The effects this new capacity will have on the Belgian acid industry in the future are highly significant It is clear that the country will become once again a major acid exporter in Western Europe

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**Sulphur In Brazil's Developing Economy**

*Sulphur, the J of World Sulphur*, No 72, 20-3 (Sept Oct 1967)

Brazil's present requirement for S is 200,000 tons annually with 172,000 tons coming from imports About 97% of this S is imported from the U S and the balance from Mexico and Bolivia Some S is recovered when Kuwait crude oil is refined and Fertilizantes Minas Gerais has a 99,000 ton capacity $H_2SO_4$ plant at Belo Horizonte that uses pyrites as feedstock As industrialization and agricultural development advance, S requirements will increase Indigenous S sources, in addition to pyrites, include oil bearing shales and coal with a high S content Development of these sources is a distant objective Sulfur recovery from increasing imports of crude oil and use of processes that do not require S–such as fused phosphate fertilizers, HCl solubilization of rock phosphate, and pro duction of urea and ammonium nitrate instead of ammonium sulfate–are planned in order to hold S imports to a minimum

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**Brazil Expands Fertilizer Market**

*Chem Week 110* (14), 31 (Apr 5, 1972)

The Brazilian fertilizer market is growing at a 30%/yr rate, according to the president of Nitroven, a Venezuelan semi government company Brazil will use 1 2 million mt of fertilizer nutrients this yr and much of it will have to be imported and the gap will widen since Brazilian fertilizer output is growing at only 22%/yr Nitroven, in which the Colombian government has a 10% minority interest recently agreed to supply Brazil's Fericul, S A with 50,000 mt of ammonia and urea

655

**Bulgarian Chemicals – Increase in Fertilizer Production**

*Chem Age (London) 99* (2591), 15, 18 (Mar 14, 1969)

The development of the chemical industry lies at the base of the rapid upsurge of the Bulgarian national economy Prior to World War II the chemical industry in Bulgaria was practically nonexistent After the end of the war, the existing industrial establishments were reorganized, equipped with new machines, and installations The existing natural resources and ever increasing demand favored the growth and production, on a large industrial scale of mineral fertilizers and products Production of fertilizers in Bulgaria during 1968 was 52% higher than in 1967, 544,000 tons N plus 131,000 tons P fertilizers By the end of 1970 total output of mineral fertilizers is forecast to reach one million tons

656

**Bulgaria Increases Nitrogen Production 44% in 1968**

*Nitrogen*, No 63 4 (Jan Feb 1970)

Production of fertilizer N in Bulgaria reached a total of 508,300 tonnes N in 1968, representing a significant increase of 44% over the previous year's level Until 1968 ammonium nitrate had been the major product manufactured, but in the last two years output of urea has expanded so rapidly that it now almost equals ammonium nitrate production, and together these products account for 98% of total N produced in Bulgaria Urea output advanced from 24,700 tonnes N in 1966 to 89,000 tonnes N in the following year, and, even more strikingly, to an estimated level of 243,400 tonnes N in 1968, the latter increase being the result of the first full year of operations of all the units at the Vratza ammonia urea plant, the first units came on stream in mid 1967

657

**Bulgarian Output of Nitrogen Fertilizer Increases**

*Nitrogen*, No 71, 9 (May June 1971)

During 1970, Bulgarian production of fertilizer N reached a total of 651,000 mt N, representing an 11% increase on the 586,200 mt N manufactured during the previous 12 months The expansion of output in 1970 was at a slower rate than has been evident during the last few yr, between 1968 and 1969 production has increased by almost 15%, but the most striking growth occurred between 1967 and 1968 when output expanded by just over 43% The main stimulus behind this growth in output has been the working up to capacity of the Vratza ammonia/urea complex, which has a rated capacity of 325,900 tons N/yr ammonia and 274,000 tons N/yr urea The first units of this complex began operation in mid 1967, but delays with the acceptance of the ammonia unit postponed the impact of this plant on the market

658

**Bulgarian Fertilizer Situation**

*Eur Chem News 21* (527), 18 (Apr 7, 1972)

In a recent study carried out in Bulgaria the problems of meeting the growth in domestic demand for phosphate fertilizers internally with the ultimate termination of imports were discussed At present the country produces annually around 150,000 tons phosphate fertilizers as $P_2O_5$ and to meet captive requirements it imports over 100,000 ton/yr By 1975, according to the Bulgarian report, demand will have increased by over 100% to 530 540 ton/yr $P_2O_5$ From an analysis of current production and projected increase in capacity by 1975 it appears that imports would still play an important part in the country's supply demand pattern At

Dimitrovgrad about 130,000 ton/yr $P_2O_5$ is produced as single superphosphate The Povelyanovo fertilizer complex is currently under construction but has been delayed and is not likely to be operating before 1973 However, when on stream it is expected to produce 150,000 ton/yr $P_2O_5$ as triple superphosphate and 150,000 ton/yr as complex NP fertilizers This indicates that by 1975 total $P_2O_5$ production will be only 430,000 tons hence the apparent need to import The study suggests that the Dimitrovgrad plant will be reconstructed to produce complex fertilizers at a rate of 130,000 ton/yr At Povelyanovo around 130-140,000 ton/yr $P_2O_5$ in the triple superphosphate could be mixed with soft finely ground phosphorites to produce additional $P_2O_5$ This could be achieved without much alteration to the complex possibly by the addition of a granulation unit Then the plant could produce in total 400-420,000 ton/yr $P_2O_5$ of which 150 170,000 ton/yr would be complex and 220 230,000 ton/yr new fertilizer Overall, the Dimitrovgrad and Povelyanpvo plants could produce around 300,000 ton/yr $P_2O_5$ in the form of complex fertilizers and the Povelyanovo plant 230,000 ton/yr in the form of new fertilizer Until the reconstruction of the Dimitrovgrad plant, which will not take place until after 1975, it will be adapted this yr to produce more fertilizer by the addition of phosphorites and this way demand can be met

659

**Uncertain Prospects Facing Canadian Nitrogen Industry**

*Nitrogen* No 49, 19 24 (Sept Oct 1967)

Domestic fertilizer production in Canada is favored by such major raw materials as natural gas, S, and K Phosphate rock is imported from the United States Internationalization of the wheat industry also has stimulated the fertilizer industry Annual wheat production recently has been near 650 million bushels with all but about 150 million bushels exported Wheat production is centered in the Prairie Provinces and so is a major share of the fertilizer production Wheat farmers are using ammonium phosphate, ammonium phosphate nitrate, and ammonium sulfate In eastern Canada the fertilizer industry concentrates on market gardening and supplies mixed and bulk blended NPK fertilizers Nitrogen consumption in Canada has increased nearly five fold during the last decade to 218,000 tons in 1965/66 Production capacity also has increased and 375,000 tons of N were produced in 1965/66 New plants and modernizations tend to be large scale so as to take advantage of production economies Producers are moving toward critical oversupply, however Exports to the United States, about 200,000 tons versus 125,000 tons of N imports, have balanced production and consumption in the past Exports to the United States are rather stable and new markets seem an obvious need Asia and Oceania are logical choices

660

**135% Increase Seen in Canadian Sulphur by '70**

*Com Fertilizer 115* (4), 33 (October 1967)

Free world consumption of sulfur will rise 7% per year to 33 2 million tons in 1970 according to Harold Manley, president of Jefferson Lake Petrochemicals of Canada, and Chairman of Canadian Sulphur Export Canada, the second largest producer of elemental sulfur in the free world, will increase its production by 135% to 4 million tons annually by 1970

661

**Sulphur and Potash Marketing in Canada.**

*European Chem. News 15* (384), 6 (June 13, 1969)

Problems involved in marketing the two main bulk chemical products of western Canada are discussed J B Hynes, of Calgary University, discusses both the economics and processing S He points out the successes of the Alberta S industry Since 1964 production has expanded six fold –to 3 3 metric tons/year in 1968, a 40% gain over the previous year A reversal of demand is attributed to a cutback in world utilization of chemical fertilizers, which in turn is associated, by some, with recent reductions in US foreign aid Crucial factors in the further development of Alberta S marketing are developing wells with high (40% plus $H_2S$) sour gas content, centralizing gas processing to achieve low volume, improved separation and oxidation efficiencies, reduced transportation costs, and price maintenance The Potash Committee set up by the Department of Industry & Commerce of Saskatchewan has reported its findings on the world supply/demand picture for that chemical, and its local effects Findings of Saskatchewan's Potash Committee were also concerned with the recent slump in world sales and markets for this fertilizer chemical Basically, the findings were (1) Production costs in Saskatchewan are competitive with other western world sources, (2) A world surplus is expected until 1977, (3) The North American excess capacity will not be absorbed until 1975, (4) In 1970 71, Canada must export 45% of its potash production in order to operate at capacity, (5) Canada and the USSR are the only countries with unlimited reserves and high grade potash–they will dominate the future world market, and (6) The market should be kept competitive, rather than resorting to "prorating" of producers production There are good prospects for further economies in the future

662

**Canadian Nitrogen Outlook**

*Can Chem Process 54* (11), 14 (Nov 1970

Outlook for Canadian producers of N fertilizers remains gloomy although there are several indications that the drop in sales may have come to a halt Sales of N solutions (aqua ammonia, 21% $NH_3$, urea and/or ammonium nitrate, 28% $NH_2$) in Ontario have dropped to 37,000 tons this yr compared to 43,000 tons in 1968 A similar trend exists in the other major market, Manitoba–sales of N solution (all urea or nitrate) were 10,000 tons in 1970, 15,500 tons in 1969 and 6,700 tons in 1968 In Saskatchewan 1000 tons were consumed this yr and in Alberta farmers used 8000 tons in 1970 and 3000 tons in each of 1968 and 1969 Anhydrous ammonia may stand to gain some ground as corn acreage has significantly increased–and ammonia is still the cheapest source of corn nutrient

663

**Saskatchewan's New Potash Production Quotas.**

*Chem. Week 107* (1), 27 (July 1, 1970)

The total output of potash for the yr beginning July 1 is to be 3 5 million ton $K_2O$, this is about 45% of estimated capacity in the Saskatchewan industry next yr The quotas can be reviewed quarterly by Saskatchewan's three man conservation board Tentative quarterly allowances have been set that authorize production of 19% of the full yr total quota during the quarter ending Sept 30, 23% in the quarter ending Dec 31, and 29% each in the quarters ending Mar 31 and June 30 It's reported that a shortage of rail cars prevented some producers from shipping their quotas during the past quarter Customers bought heavily before prorationing went into effect and stored the material in cars instead of returning them to the producers

664

**Canadian Potash Production Remains Curtailed.**

*Eur Chem. News 19* (462), 8 (Jan 8, 1971)
Initial hearings before the Potash Conservation Board in Canada last December indicate that potash production in 1971 will be limited to under 3 6 million tons of $K_2O$ Output in the first quarter of 1971 will be limited to 1 5 million tons $K_2O$, which is, on paper, slightly over 0 5 million tons more than was allowable in the first quarter of 1970 Theoretical production for 1971 will only be approximately 200,000 tons more than the actual total for 1970, and production in the first quarter of 1971 probably slightly less than the tonnage physically shipped in the same quarter of 1970 Despite some improvement in U S demand, exports from Canada appear to have leveled off just under 5 million ton/yr (KCl) No significant factors have emerged to brighten the continuing oversupply situation, and the U S Bureau of Mines has forecast that North American demand will lag behind productive capacity until at least 1974 Originally set up to operate for one yr, the Board, which really operates under a misnomer and is, in actuality a government export cartel, looks set to continue to guide the still chronically overweight Canadian potash industry to a hopefully brighter future

665
**Canadian Potash Production Reduced**
*Wall Street J (Eastern Edition) 180* (66), 8 (Oct 5, 1972)
Central Canada Potash Company said it had been ordered to cut potash production 50% by the Saskatchewan government The government has indicated that it will cancel the company's subsurface mineral leases if it fails to comply Based on the action of the Saskatchewan government, Central Canada will be allowed to produce only 730,000 tons of potash for the yr ending July 1, compared with 1 1 million tons last yr Central Canada said it had planned to produce over 1 3 million tons this yr Production at Central Canada has been averaging over 100,000 tons of potash/month for the first 3 months of fiscal 1973 On this basis, a spokesman said, output this month will be cut in half Prior to July 1972, the basis of prorationing potash was essentially to guarantee each mine in the province 40% operating rate and thereafter, to allow those with markets, to produce whatever they could sell beyond that level On this basis, Central Canada shipped some 1 1 million tons of potash last yr

666
**Ceylon Agricultural Policy Means Greater Fertilizer Use and Varied Crops**
*Fertilizer Intern.*, No 4, 5 (Oct 1969)
The campaign to raise rice production in Ceylon to a level at which the country would be self sufficient in this basic food has been so successful to date tha the Government is now showing signs of changing the emphasis to other crops Encouragement of crops by the Government is made in a number of ways, direct and indirect Indirectly, as part of overall policy, there are far reaching irrigation schemes such as the plan to dam the Mahaweli, Ceylon's longest river, while colonization and youth schemes for increasing the cultivated area are backed up by policies aimed at emphasizing the pleasures of rural life (in an attempt to reduce immigration to the towns) Ceylon has no fertilizer production facilities at present, but a plant is planned to come on stream in 1972 at Hapugaskanda with a capacity of 65,000 tons/year ammonia, 85,000 tons/year urea (and some ammonium sulfate) based on feedstock from the nearby oil refinery which began operation this year Until then all supplies will have to be imported and this could cause a delay in the growth of consumption Already, imports are having to be staggered to avoid congestion in the port of Colombo Nevertheless, the agricultural policy which has produced such good results in the past two years will have enough momentum to carry on those developments.

667
**Chilean Nitrates Decline**
*Mineral Trade Notes 69* (1), 31 (Jan 1972)
Total nitrate production by Chile in 1970 was 673,890 mt, considerably below the 781,669 tons produced in 1969 Most of the 1970 output, 515,615 tons, was in the form of sodium nitrate, the remainder was potassium nitrate The decrease is attributed to technical problems and to a 47 day strike at the three plants of the country's largest producer, Sociedad Quimica y Minera de Chile, S A (SOQUIM) Furthermore, the Victoria plant of SOQUIM was forced to suspend operations for 25 days at the beginning of the yr for repairs and improvements in the mill installations and power supply As a result, SOQUIM's output for 1970 was 637,805 tons, compared with 761,034 tons in 1969

668
**Fertilizer Production Consumption in China**
*Chem Age (London) 104* (2751), 16 (Apr 7, 1972)
Production of fertilizers in China increased by more than 20% last yr according to the W German newspaper *Frankfurt Allgemeine Zeitung* Annual consumption is put at nearly 4 million mt with utilization being about 30 kilos/ha of arable land compared with 158 kilos/ha in Western Europe

669
**Increase in Czechoslovakian Fertilizer Consumption**
*Eur Chem News 19* (477), 20 (Apr 23, 1971)
Consumption of potassic fertilizers in Czechoslovakia has been consistently higher than that of the other two main plant nutrients, despite the fact that there are no local supplies of K materials Of N fertilizers, calcium ammonium nitrate has been consumed in considerably larger quantities than any other material with ammonium sulfate following a long way behind However, the pattern of consumption is changing and it is hoped that in future urea and complex fertilizers will play a much larger part

670
**Czechoslovakia Fertilizer Supply**
*Eur Chem News 21* (532), 4 (May 12, 1972)
Production of fertilizers by the Czechoslovak chemical industry will satisfy only two thirds of the demand foreseen in the current 5 yr plan While output is to rise from 745,000 tons this yr to 1,015,000 tons (pure nutrients) in 1975, farm use of chemical fertilizers should increase from 1,325,000 tons to 1,560,000 tons over the period The U S S R and the German Democratic Republic are expected to supply most of the imports needed to meet the target posted for 1975, 220 kg/ha of cooperative farm cropland The production of NPK fertilizers in Czechoslovakia is to increase from the present 198,000 tons, 26% of the total, to 412,000 tons, 41% of the total in the last yr of the 5 yr plan New capacity due to be commissioned in the course of the plan will result in a spurt in fertilizer output in the second half of the decade

671
**Supply and Demand Prospects for Fertilisers in Developing Countries**
*Development Center of the Organization for Economic Co-Operation and Development*, 206 pp (May 1966) Available from OECD Publications Office, 2 rue Andre-Pascal, 75 Paris, France (16e) $6 00

This book contains a review of past and likely future trends in fertilizer production, trade and consumption in the developing countries during the period up to 1980 It is suggested that the most progress toward satisfying the demand for food will be obtained by increasing crop yields The proper use of fertilizer will thus be important, also, the desired fertilizer composition must be available at the right time and place World production and consumption of fertilizers have increased rapidly in the last decades and growth rates have accelerated in the early 60's As a result of a compound growth rate of 12 13%/yr the fairly steadily increasing share of developing countries in world consumption reached nearly 15% in 1965 66 This increase is likely to continue Estimates, calculated by various methods, suggest that the developing countries' share will be about one third in 1980 This would still leave average rates of fertilizer application well below those prevailing in developed areas today But this increase depends on a number of conditions being favorable With the possible exception of S, raw materials are plentiful and fertilizer production capacities are expanding rapidly By 1970 world capacity may be about 90 million tons of nutrient and the share of the developing countries in this total will rise from roughly one tenth now to one sixth in 1970 The increasing importance of the developing countries as fertilizer consumers is being recognized These are numerous issues that need further research and discussion These range from the role of technical assistance in agricultural research and extension to its possible role in improving fertilizer distribution systems (by giving management assistance to existing institutions like co-operatives or by encouraging fertilizer associations to move into this field) and in setting up food marketing organizations

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**Fertilizer Production in Six Selected Countries with Good Natural Gas Resources**

*United Nations Industrial Development Organization*, Vienna, Austria, ID/5, 68 pp (1969) (Sales No E 69 II B 5) price US$0 75

A large potential exists for the production of N fertilizer in Iran, Kuwait, Libya, Nigeria, Saudi Arabia, and Venezuela at costs substantially below production costs in the principal fertilizer producing countries at the present time This potential is based on the availability of large quantities of natural gas at prices ranging from $1 75 to $2 80/1000 $m^3$ delivered to the fertilizer plant Approximately 45,000 million $m^3$/yr of natural gas is now being flared in these six countries This is equivalent to approximately 40 million tons/yr of fixed N, compared with the present (1965/66) world production of about 24 million tons of N Similar potentials exist in other countries with good natural gas resources, such as Algeria, Argentina, Bolivia, Brunei, Burma, Indonesia, Iraq, Mexico, Pakistan, and Peru The potentials in these six countries are not being utilized at present, except on a small scale in Kuwait (100,000 tons N/yr) and in Venezuela (30,000 tons N/yr) Much larger plants are under construction in Iran (300,000 tons N/yr) and in Saudi Arabia (200,000 tons N/yr) A major expansion is being planned in Venezuela (165,000 tons N/yr) Capital requirements for developing this production potential would be approximately $200 300 million per million ton/yr N capacity, with urea as the end product Despite the potentially low cost of production, these countries will still have to compete for markets with the established N exporting countries, including Western Europe, the United States, Canada, and Japan The Soviet Union and Eastern Europe may also become large exporters of N The largest potential markets for N fertilizer during the next decade appear to be China (mainland), Cuba, India, Indonesia, and the United Arab Republic, although many other countries will provide smaller potential markets Most of these countries have limited foreign exchange resources and, therefore, credit for the sale of fertilizers will be a serious problem Nitrogen requirements of the developing countries are estimated at 8 million tons N in 1970 and 23 million tons in 1980 These estimates compare with N consumption by the developing countries of 4 million tons in 1965/1966 and 19 million tons global consumption There are possibilities for regional cooperation in the production and marketing of fertilizers, such as in West Africa, with Nigeria as the principal producing center, and in South America, with Venezuela as the principal producing center There is merit in the concept that the fertilizer deficit countries should import liquid ammonia for conversion into solid fertilizer, or for direct application The water transport of liquid ammonia at low rates is now becoming common

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**The Supply of Fertilizers in Developing Countries**

K H Tillman (Badische Anilin and Soda Fabrik AG)

*Phosphate Notes 14* (5-6), 54 (May June 1970)

Over the past 10 yr fertilizer consumption in developing countries has increased from 2 1 million to 7 7 million tons It is estimated to increase to 14 7 million ton in 1975 and 31 2 million ton in 1985 Ten yr ago 75% of these fertilizers were imported but now only 67% are imported The requirements through 1975 can be met from existing plants and known expansions, especially from the developed countries Future demand should be satisfied from plants located within economic distance of the consumption areas

674

**Future of Fertilizers in Developing Countries**

*Fert News 15* (11), 15 21 (Nov 1970)

The use of fertilizers in the developing countries has increased from 0 6 million tons in 1938 to 11 0 million tons in 1969, the last four years accounting for a 60% increase During the same 30 yr period, fertilizer production has reached 6 9 million tons The modernization of crop production is based on the use of fertilizer, improved seed, pesticides, and farm machinery in combination with improved soil, water, and crop management practices and production incentives The developing countries are expected to increase agricultural output in the 1970s faster than the advanced industrialized countries did during recent decades With an annual increase figure set at 3 5% for agricultural output, the developing countries will need 46 2 million tons of fertilizers by 1985 and probably 70 80 million tons by the end of the century The main hurdles in achieving these targets are (1) capital, including foreign exchange, (2) the nature of the industrial organization to produce and market the fertilizers, and (3) the development and use of fertilizer marketing service to reach small farmers

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**Effect of Foreign Aid Policies on Fertilizer Marketing**

R N Gleason (Agency for Intern Develop , Washington, D C )

*Fertilizer Marketing in a Changing Agriculture* (Held Oct 1-3, 1969, Memphis, Tenn ) Tennessee Valley Authority, Muscle Shoals, Alabama, pp 67 71

The panel on World Food Supply of the President's Science Advisory Committee has estimated that to sustain the needed rate of agricultural growth in the less developed countries between 1965 1985 would require $17 billion for mining, manufacturing, and distribution of fertilizers On the basis of present relatively firm investment plans, it is estimated that

the total fertilizer production capacity of the less developed countries will be 10 4 million tons (plant nutrient basis) by 1972 – an increase of 5 9 million tons over the 1967 capacity This would produce just over 50% of the proposed annual target of 19 million tons The remaining 8 6 million tons needed to reach the target would require imports costing about $1 5 billion/year In 1968 nineteen developing nations purchased fertilizer under the AID program, of which $(NH_4)_2SO_4$ comprised 35%, concentrated superphosphate, urea, and diammonium phosphate comprised 53%, and various NPK mixtures and potash comprised 12%

676

**Supply-Demand in Developing Countries**

*Chem Age (London) 103* (2727), 16 (Oct 22, 1971)

During the 10 yr ending 1970 consumption of fertilizers increased at the rate of 7 5%/yr in the developed countries and at the rate of 14% in the developing countries, the Second Inter Regional Fertilizer Symposium in New Delhi organized by the United Nations Industrial Development Organization was told by the Minister for Petroleum & Chemicals He added, in 1969 70 the developing countries produced 7 million mt of fertilizer (plant nutrients) and consume 12 3 million mt, indicating a deficit of 5 3 million mt It was, therefore, clear that the developing countries had to take urgent measures to increase production to catch up with their consumption of plant nutrients If this is to be achieved effective planning and large amounts of capital will oe required

677

**Finnish Industry is Small but Buoyant**

*European Chem News 16* (395), 8 (Aug 29, 1969)

Fertilizer sales during 1968 were brisk It was difficult for the industry to meet all the demand since there had been heavy demand during the autumn of 1967 which had depleted stocks The total demand in terms of N during 1968 was approximately 120,000 tons Construction works on Typpi Oy's ammonia plant and urea plant was carried out during 1968 The company also took steps in September 1968 to increase the output of nitric acid and calcium ammonium nitrate It was also decided that methanol should be produced Additional capacity for sulfuric acid was being built during 1968 The Siilinjarvi plant of Rikkihappo Oy was constructed during 1968 and went into operation in 1969 The capacity of this plant is 230,000 tons/year sulfuric acid, 75,000 tons/year phosphoric acid ($P_2O_5$), and 120,000 tons/year ammonium phosphate Expansion of the company's Kokkala chemical plant is due for completion soon The expansion will give a total capacity of sodium sulfate of 84,000 tons/year, calcium chloride capacity will rise to 72,000 tons/year At the same location, the company will have completed by 1970 a 100,000 tons/year compound fertilizer plant Expansions of sulfuric acid capacity are also under way which will give the company a total capacity of 1 million tons/year Total deliveries of fertilizers amounted to approximately 1 1 million tons and contained 7 1% more nutrient than in 1967

678

**French Output of Fertilizers**

*Chem Age (London) 100* (2644), 10 (Mar 20, 1970)

French fertilizer production during the past yr has shown very little change A 5 5% rise in sulfuric acid output to 3 5 million tonnes and a 3 3% rise in ammonia to 1 5 million tonnes was shown Calcium carbide dropped 2 5% to 486,000 tonnes Reason for the sluggishness appears to be a fall-off in demand by under developed countries In the case of ammonia, technical difficulties with new 1000 tonnes/day units commissioned in 1968 played their part The fertilizer situation was depressing Imports rose only 2% but exports plummeted 13% due to fierce competition even in the developing countries, who are strongly increasing their own output Foreign markets are now more distant The French market is attracting European competition to a major extent

679

**Nitrogen Fertilizer Situation in West Germany 1965/66-1966/67**

*Nitrogen* No 49, 8 (Sept Oct 1967)

Although economic growth in the West German N fertilizer industry continued during 1966/67, the rate of expansion for the industry as a whole declined from 17 4% between 1964/65 and 1965/66, to 13 7% between 1965/66 and 1966/67 During this period, production of N fertilizers increased by only 5 8% as against a 22 3% rise in the export of these products Straight N fertilizers accounted for 1 1 million tons N, or 74 5% of the 1966/67 production total, and 84 3% (560,500 tons N) of the 1966/67 export total, although during 1965/66, straight N products accounted for 85 9% of the export total, indicating a slightly increased demand for N in the form of compounds Domestic deliveries showed only a 1 9% increase between 1965/66 and 1966/67, due mainly to good weather which encouraged crop growth without increased fertilizer usage

680

**West German Nitrogen Industry Confronts Problems**

*Nitrogen*, No 76, 21 3 (Mar Apr 1972)

The level of N fertilizer production in West Germany in 1970 71 was substantially the same as that in 1966 67 During the 10 yr period since 1960 61 N fertilizer consumption in West Germany increased at an average annual rate of 6 2% from 618,400 tons of N to 1,133,000 mt N in 1970 71 Imports, which in 1969 70 represented 10% of deliveries to the home market (excluding calcium cyanamide), increased their share of the market to 12 8% in 1970 71 when 134,400 mt, or 33% more than in 1969 70, was imported West German N fertilizer exports reached a peak of 708,000 mt N in 1968 69 The export of 504,900 mt in N in 1970 71 put West Germany in third place in supplies of N fertilizers to world markets, behind Japan and the U S The outlook for domestic consumption remains unchanged and demand is expected to increase at an average annual rate of about 4%/yr for the next 5 7 yr

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**Hungarian Chemical Industry Posts 10% Gain in Output.**

*Chem. Eng News 47* (19), 20-1 (May 5, 1969)

Hungary's five year plan calls for fertilizer production to be substantially increased Last year's output of N fertilizers was about 250,000 metric tons as N, about 1% of world output But bigger supplies are demanded and production of these fertilizers will be increased by 150,000 metric tons as N during the next 18 months Output of N fertilizers will reach nearly 400,000 metric tons as N in 1970 Phosphate fertilizer production will be boosted 50,000 metric tons by the end of 1970 to about 200,000 metric tons, as $P_2O_5$ Hungary has no phosphate or potash deposits, and must import these materials

682

**Hungary's Fertilizer Output to Double by 1975**

*Oil, Paint Drug Rep 198* (24), 46 (Dec 14, 1970)

The latest five yr plan for Hungary calls for fertilizer production to nearly double The plan target for 1975 is 1 1 million tons, against an estimated 600,000 tons this yr The

total in 1969 was 300,000 tons of N materials and 168,000 tons of P fertilizers Consumption of fertilizers is also due to rise in Hungary The average level this yr is 110 lb/acre, with a target of 175 lb/acre in 1975

683
**India Aims to Remedy Fertilizer Shortage**
*Chem. Eng News* 46 (50), 28 (Nov 25, 1968)
India's targets for N fertilizer for the fourth five year plan, ending in 1971, are capacity of 2 4 million metric tons and output of 2 0 million metric tons If all firmly committed projects go according to schedule, capacity will reach only 2 2 million metric tons by 1971 The goals for the capacity and production of P fertilizer are 1 million metric tons each, as $P_2O_5$ Total capacity by 1970 71, however, will be 520,000 metric tons as $P_2O_5$ India's big need is N fertilizer Current N consumption in India is more than 1 million metric tons annually But production this year will probably amount to only about 600,000 metric tons the balance of its need will have to be met by imports Present N capacity, with the government's Namrup fertilizer project now coming on stream, is 894,000 metric tons In various stages of construction are six projects When completed, these projects will add 776,000 metric tons of capacity by 1970 Three government projects are committed, totaling 494,000 metric tons These will bring installed capacity to about 2 2 million metric tons by 1970 71 Indian officials estimate a production of 1 6 million metric tons as N from these projects for 1970 71, 2 0 million metric tons for 1972-73 In 1968 consumption of P fertilizer in India is expected to be about 650,000 metric tons as $P_2O_5$, while demand for potash is pegged at 450,000 metric tons Potash needs are met by imports Phosphates must also be imported, as installed $P_2O_5$ capacity is currently about only 419,000 metric tons Start up of new superphosphate plants will add about 100,000 metric tons This will mean a capacity by 1971 of about 520,000 metric tons Adding on nine more projects to be completed in subsequent years, capacity in 1975 76 would be 1 9 million metric tons of $P_2O_5$ India expects production to be 1 8 million metric tons by 1975 76 versus a demand of 2 million metric tons

684
**Developments in Fertiliser Production in India**
C Sahai (F A I, New Delhi, India)
*Fertiliser News 13* (11 Suppl), 1-24 (Nov 1968)
By March 1969 production capacity of Indian fertilizer manufacturers totaled 1,011,750 metric tons of N and 435,090 metric tons of $P_2O_5$ During the Fourth Plan (1969 70 to 1974 75) additional capacity is scheduled for 2 7 million tons of N and 1 5 million tons of $P_2O_5$ The main part of the report is a tabular listing of all fertilizer factories with the following information location, capacity in terms of N and $P_2O_5$, products, raw materials or feedstock, manufacturing process, engineer or collaborator for the plant, cost, and date on stream

685
**Fertilisers in Nineteen Seventies Consumption Pattern**
S M. H Burney (Ministry of Food, Agr, New Delhi, India)
*Fertiliser News 14* (7), 43 5 (July 1969)
The demand of fertilizers in India for the 1970's has been estimated by three sources independently adopting different methodology and the estimates do not differ significantly from one another The broad requirement is about 3 7 million tons of N, 1 7 million tons of $P_2O_5$ and 1 1 million tons of $K_2O$ by 1973 74 and 6 63 million tons of N, 3 31 million tons of $P_2O_5$ and 2 05 million tons of $K_2O$ by 1978 79 These estimates are capable of realization with an increased use of high analysis straight, complex and highly concentrated fertilizers produced at a minimum cost through improved technology and the product pattern In the late seventies production and use of urea phosphate, polyphosphate, liquid ammonia and liquid mixed fertilizers, already in practice in other countries, are also to be expected in India

686
**India's Growing Demand for Sulfur**
*Fertilizer Intern.*, No 5, 2 (Nov 1969)
India's S requirements will increase as the need for fertilizer raw materials grows S imports by India are expected to be 200,000 tons for the first half of the 1969/70, but for the whole year 600,000–800,000 tons Contracts were recently signed in Delhi for S by the State Trading Corporation and the three leading Canadian S suppliers, Shell Canada, Consulex Canada, and Brimstone Export Ltd Negotiations for supplies from Poland are being undertaken and S is also to be obtained from Iran and Japan Other sources are reported to be Mexico, Kuwait, Saudi Arabia, France, U S, and U S S R. Mexico and Canada have been supplying India with a combined total of 500,000 tons/year S Poland's contribution of 100,000 tons is expected to rise to 270,000 tons by 1973 This year will see 20–30,000 tons from Iran and about 20,000 tons from Japan.

687
**Deficiency of Nitrogen Fertilizer in India by 1973**
*Chem. Age (London) 99* (2628), 24 (Nov 28, 1969)
The Indian government's fertilizer program is progressing so slowly that a deficiency of 2 5 million tons of N is likely to arise in 1973 74, according to the latest study recently completed by the fertilizer experts of the Ministry of Petroleum and Chemicals The experts warn that at the present rate of progress total capacity of N fertilizers likely to be installed by the end of the Fourth Plan (1973 74) will be 2 6 million tons of N only against 5 1 million tons of capacity required to meet the country's rising demand The study has established the demand for N fertilizers at the end of the Fourth Plan at 3 73 million tons For this a minimum installed capacity of 5 15 million tons is necessary, as production at full rated capacity is not feasible from all plants.

688
**Fertilizer Commodities.**
*Mineral Trade Notes 67* (2), 7-9 (Feb 1970)
A number of plant by plant studies of fertilizer capacity and production in India during the Fourth 5-Year Plan (1969-74) have been made recently Requirement of chemical fertilizers at the end of the Fourth Plan will be 3 7 million tons of N, 1 8 million tons of $P_2O_5$, and 1 1 million tons of $K_2O$ This scale of consumption will call for large scale and effective fertilizer promotion efforts Production of 3 million tons of N fertilizer in 1973 74 would represent the remarkable development of nearly an entire industry in less than a decade Even if this goal is reached, however, the estimated requirements for N and P would leave gaps of about 750,000 and 650,000 tons, respectively In both fiscal years 1967-68 and 1968-69, imports of N fertilizers exceeded 800,000 tons, but imports of P fertilizers have never exceeded 350,000 tons annually There is reportedly considerable question concerning the measurement of requirements, and the Government's Fourth Plan estimate may be higher than the minimum amount of fertilizer needed to meet agricultural production targets.

689
**The Chemical Industry of India**

*Business and Defense Services Administration Quart Industry Rep, Chemicals 17* (1), 10-38 (Mar 1970)
Statistics are given for Indian capacity and production of fertilizers, pesticides, industrial chemicals, and pharmaceuticals in recent years In 1968, urea capacity (7 producers) was 283,500 ton and production was 174,621 ton compared with 76,700 ton in 1967 Ammonium sulfate capacity in 1968 was 200,200 ton (12 producers) and production was 110,955 ton compared with 81,820 ton in 1967 In 1968 normal superphosphate capacity (28 producers) was 213,110 ton and production was 117,746 ton compared with 137,882 ton in 1967 Triple superphosphate was first produced in India in 1968 in a recently completed 12,000 ton plant at Amarnath, a second plant is scheduled for 1972, the Khetri Project, with a capacity of 100,000 ton $P_2O_5$ The 1968 production was 1757 ton

690
**India Increases N Fertilizer Production**
*Eur Chem News 17* (432), 12 (June 12, 1970)
The production of N fertilizers in India in the 1969-70 fertilizer season increased to 716,000 ton of N This compares with the production of 543,000 ton in 1968-69 While only 42% of the country's requirement was being produced indigenously in 1968-69 the quantity increased to 57% in the last season As a result of this improvement imports of N fertilizers were reduced by 21 2% from 847,000 ton in 1968-69 to 667,000 ton in 1969 70

691
**Production and Consumption of Fertilizers, Annual Review, 1969 70**
*The Fertiliser Association of India*, New Delhi, India, 91 pp (June 1970)
The 11th annual review reports actual production and consumption of fertilizers in India for 1968-69 (July June), compares these data for the period 1964-65 to 1968-69, and indicates the trend for 1969 70 Production of N in 1968 69 was 562,981 mt or 55 6% of the installed capacity of 1,011,150 mt Production of N has increased about 30%/yr since 1965-66, but is expected to increase over 40% for the 1969 70 season Increases in production of P fertilizers have been erratic during the 5 yr under study For 1968-69 the increase was slightly more than 6000 mt of $P_2O_5$ or about 3% more than the preceding yr For 1969 70 the increase is estimated at more than 25,000 mt Imports of $K_2O$ increased consistently by 30 35%/yr and this trend is expected to hold for the next yr Consumption has been much more erratic than production Inadequate promotional practices appeared to be responsible for the failure of sales to match production Consumption of N was up only 5 8% in 1968-69 compared to the previous yr, whereas it had been increasing at rates of 40-50%/yr Use of N amounted to 1,222,398 mt in 1968-69 and was expected to increase only 1 8% in the next yr Consumption of both P and K in 1968-69 decreased in comparison to 1968-69 Use of P was 33 7% less and of K 20 2% less Use of P was expected to rise slightly (6 4%) in 1969 70 but a further decrease of 16.8% in use of K was predicted

692
**Indian Fertilizer Push**
*Chem Week 109* (3) 29 33 (July 21, 1971)
India is planning another boost in fertilizer capacity The country's minister for petroleum and chemicals says 1 6 million mt of fertilizer capacity is already in place and the government is considering applications for an additional 1 4 million tons Government owned Fertilizer Corp of India, which has capacity for 152,000 tons/yr of N and P materials on stream at Durgapur, will add 152,000 tons at Barauni in Oct 1971 and another 152,000 tons at Namrup in 1972 Coromandel Fertilizers, joint venture of Chevron Chemical and International Minerals & Chemical, is increasing production of complex fertilizers from 260,000 to 287,000 mt/yr and urea output from 16,500 to 43,400 mt/yr The company reports its plant in southern India operated at 76% capacity in 1970 State owned Madras Fertilizers has brought on stream at Manali its Chemico built complex Capacities are ammonia, 850, urea, 950, NPK 1250 mt/day Dharamsi Morarji Chemical will build a two stage complex When the project is completed in 1976, capacities will be sulfuric acid 2000, phosphoric acid, 750, diammonium phosphate 1500 mt/day India's first sodium nitrite plant will be built by Deepak Nitrite Ltd and will produce 2700 mt/yr of sodium nitrite and 9,000 mt/yr of sodium nitrate Completion target is fall 1972 After considerable delay, Fertilizer and Chemicals Travancore's plant at Cochin is expected on stream in September with 600 mt/day of ammonia and 1000 mt/day of urea Ammonia capacity of the Sindri fertilizer plant is being boosted from 900 to 1070 mt/day The unit's feedstock is being changed from coke to naphtha to produce 12 000 tons/day of urea The Indian government has approved construction of a complex at Tuticorn Capacities are ammonia 1400 and urea 1600 mt/day Completion target is fall 1973

693
**Fertilizer Statistics, 1970-71**
T M Alexander, K K Talwar, and K D Tripathi (editors) *Fertiliser Assoc India*,, New Delhi, 16th edition, 605 pp (Dec 1971)
The objective of this publication is to provide basic information on fertilizer production and consumption to the fertilizer industry and to those engaged in promoting the use of fertilizers The report is divided into three parts fertilizer, agricultural and allied statistics for India, and selected world fertilizer and agricultural statistics All information is presented in tabular form except for the listing of the members of the Fertiliser Association of India New tables added to this edition include production of rock phosphates, crude oil, natural gas, and petroleum products, prices of fertilizer raw materials, number of sales points in various states, seasonal rainfall during 1968 70, population by states, targets and achievements by 5 yr plans, and par value of foreign exchange currencies after devaluation

694
**Production Increase in India**
*Chem. Age (London) 104* (2757), 17 (May 19, 1972)
Fertilizer production in India during 1971 72 is expected to exceed 1 2 million mt according to the annual report of the Ministry of Petroleum and Chemical Last yr production was just over 1 million mt Two new fertilizer units came on stream during the current yr The ammonia section of the fourth phase of expansion of the Alwaye site by Fertilisers and Chemicals, Travancore Ltd went into production and Madras Fertilisers also started up a production unit Total installed N capacity has increased to 1 46 million mt and output of $P_2O_5$ reached 420,000 mt Units at Durgapur and Cochin are now starting trial runs and commercial production is expected to start soon

695
**Indian Fertilizer Supply Position Serious.**

*Chem. Age (London) 105* (2767), 14 (July 28, 1972)
The world supply of fertilizers has seriously affected the Indian supply position The country could, with some difficulty, obtain about 800,000 mt from sources such as West Asia, Korea, and western Europe Supplies totalling 700,000 mt urea were to have been provided by eastern European countries, but so far only about 70,000 mt are expected to be delivered by the end of September The same countries are reported to be holding back on deliveries in the hope of obtaining better prices for the product from China, who might import large quantities

696
**Phosphoric Acid Production from Indian Phosphate Rock**
*Phosphorus Potassium No 61*, 24 5 (Sept Oct 1972)
Commercial extraction of phosphate rock from the Jhamar Kotra deposits, near Udaipur, in the State of Rajasthan began in 1969 In 1971 72 output averaged 600 700 tons/day and it is expected that production will reach 2 million tons/yr by 1974 75 There is no beneficiation of the rock which is simply crushed to ½ in before despatch A product which contains over 36% $P_2O_5$ is obtained by restricting output to the pockets of high grade deposits Most of the output is used in India's 27 single superphosphate plants but with 70% of capacity for phosphate fertilizers expected to be in the form of high analysis products by the end of 1974, it was obviously desirable to test the rock s suitability for phosphoric acid manufacture

697
**Indian Fertilizer Gap Gets Wider**
*Chem Week 111* (16), 43 (Oct 18, 1972)
The Indian government's crash program to raise an additional 15 million metric tons of grain by next February is aggravating the nation's chronic fertilizer shortage Meeting the grain quota will add 480,000 mt to the nation's N fertilizer requirements, bringing total demand for the period to 1 74 million tons Domestic output is expected to supply 600,000 mt and planned imports 312,000 mt leaving a gap of 828,000 mt And a phosphate fertilizer shortage of 640,000 mt is expected Subject to price negotiations, Kuwait will supply the Indians with 350,000 500,000 mt of urea fertilizer before July '76 It will also sell India 250,000 mt of liquid ammonia for 5 yr, beginning in 1973 To take advantage of cheap Mideast feedstocks, the Indian government has offered to build a fertilizer plant in Iraq and market the output at home Mangalore Chemicals and Fertilizers has begun building an $80 million, naphtha based ammonia urea plant at Panambur, in Mysore state, in southern India Mangalore, a private company, has been licensed to produce 217,800 mt/yr of ammonia and 340,000 mt/yr of urea Production is scheduled to start in Sept 1973, but the plant will operate at only 60% of capacity in the first yr Meanwhile, Indian fertilizer production in Uttar Pradesh was set back as a result of an explosion last month at a government ammonia urea plant in Gorakhpur Production is expected to be reduced by 50% for at least several months

698
**Indonesian Fertilizer Production Increase**
*Chem Age (London) 102* (2709), 15 (June 18, 1971)
Indonesian fertilizer production totalled 95,200 mt in 1970, an 11,000 mt increase over the 1969 production figures

699
**Iran Bans Nitrogen and Phosphate Fertilizer Imports**
*Fert Int*, No 22, 2 (Apr 1971)
With the Shahpur petrochemical complex on stream and rapidly approaching full production, Iran has banned the import of N and P fertilizers The import ban came into effect the beginning of the yr, and only a limited amount of K fertilizers will be imported In 1969, Iran's total consumption of chemical fertilizers was 220,000 mt, an annual average increase of 10% to 15% The Shahpur complex will ensure Iran's full fertilizer needs and produce for export

700
**Increase in Fertilizer Use Continues in Irish Republic.**
*Fert Int, No 7*, 5 (Jan 1970)
The upward trend in the consumption of fertilizer in Ireland continues. During the season ended June 30, 1969, the increase in respect of each nutrient was 18 9%, 7 6%, and 7 1% for N, P, and K respectively Ireland has shown substantial improvements and over the past decade consumption of N, P, and K increased by 190%, 90%, and 127% respectively There is a positive trend towards the increasing use of granulated fertilizers and during the 1968/69 season the amount in powdered form was less than 4000 tons out of a total of over 490,000 tons of compound fertilizers used A marginal increase only (1 6%) in the total tonnage of fertilizers is indicated, but the increased consumption of N, P, and K highlights the increasing use of high analysis compounds.

701
**Sulphur Surplus to Top 573,000 Tons in FY '71**
*Japan Chem Week 8* (398), 1 (Dec 14, 1967)
The Japanese Ministry of International Trade and Industry has revised upward its estimate on the long range demand and supply position for S Excess S is estimated to amount to 156,000 tons in fiscal 1968, 573,000 tons in 1971, and over a million tons in 1985 The higher estimates are due to increased production of $H_2SO_4$ from waste gas, a marked increase in S recovery, and slow change in demand

702
**Fertilizer Industry Aims at Centralization and Expansion**
Hajime Yamashita (Staff Writer)
*Japan Chem. Quart 4* (1), 19 25 (Jan 1968)
Japan's domestic consumption of N fertilizers increased 3-4% annually after 1960 but jumped to 8% in 1966 because of favorable weather Exports in 1966 were up 12% also Total production of N was 1,789,300 tons with 52% exported Production of phosphates was up 1 7% with consumption increasing 8% and exports decreasing 62 5% Potassic fertilizer use increased about 2% These increases have led to expansions in production capacity Between 1965 and 1972, 17 new ammonia plants have been or will be constructed, 7 will have a capacity of 1000 tons/day Old plants will be scrapped so total capacity will be 9150 tons/day of ammonia Presently about 17% of ammonia production goes for industrial uses but this is expected to increase to 40% by 1970 Expansion of phosphate facilities has been slow but is expected to increase to compete with U S ammonium phosphates These can be imported at a cost 10% below Japanese production costs but import duties equivalent to 10% on imports in excess of quotas presently protect production Mergers to establish large scale ammonia and phosphoric acid plants integrated with petrochemical complexes are in the offing Of the N exported in 1966, 52% was as urea, 34% as ammonium sulfate, 6% as ammonium chloride, and 8% as ammonium nitrate and compound fertilizers Urea was exported to 26 countries with China taking 35% and Korea, India, Australia, and South Viet Nam taking another 46% Japan is the world's largest N exporter

703
**Six Million Tons Sulphur to be Recovered in 1973**
*Japan Chem. Week 10* (486), 2 (Aug 21, 1969)
Six million tons S may be recovered from fuel oil with S content 3% S demand this fiscal year will total 2,800,00 tons comprising some 350,000 tons for elemental S, carbon bisulphide and paper, and some 2,450,000 tons for pyrite as raw material for sulfuric acid Meanwhile, supply estimate will total 3,030,000 tons comprising pyrite based 2,420,000 tons (pyrite 1,470 000 tons and refinery sulfuric acid 950,000 tons) and S based, 610,000 tons (mined S 290,000 tons and recovered S 320,000 tons)

704
**Long Range Demand Forecast for Sulfuric Acid**
*Jap Chem. Week 11* (513), 3 (Feb 26, 1970)
Sulphuric Acid Association of Japan recently released long range demand forecast of sulfuric acid According to this, overall demand in 1974 is likely to reach 9,572,000 tons at an average increase rate of 6 2% 5 4% for 1970, 7 9% for 1972, and 6 6% for 1973 Yearly demand estimate is (in tons) 70--7,324,000, 71--7,717,000, 72--8,893,000 and, 74--9,572,000 Meanwhile, estimated result in 1969 is 6,919,000 tons Despite the growth of 5 5% for 10 years from 1958 to 1968, increase rate from 1968 to 1974 is estimated at 6 2% taking into consideration mining and industrial production index and economic growth As for use wise demand, fertilizer use which had held 70% up to 1958 has fallen to 35%, whereas industrial use has become 65% Production of sulfuric acid in December 1969 was 598,700 tons, up 18,500 tons over the preceding month

705
**Japan's Ammonium Sulfate Production to Decrease in 1973**
*Jap Chem Week 12* (571), 4 (Apr 8, 1971)
A problem of excessive ammonium sulfate caused by change of fertilizer demand structure, stagnation of domestic demand, and intensified export competition has caused the Ministry of International Trade and Industry to compile a production plan of 39 ammonium sulfate manufacturing companies Recently, the Ministry announced that production of ammonium sulfate in 1973 fertilizer yr is likely to be 2,027,100 tons, decreasing by 439,800 tons from 1970 fertilizer yr due to technical endeavors of the companies As a result, stock of ammonium sulfate which is considered to reach three and a half months of annual demand at the end of 1970 fertilizer yr is expected to decrease to one and a half months in 1973 fertilizer yr The Ministry expects ammonium sulfate manufacturers to realize the plan

706
**Urea Production Expansion for Japan**
*Jap Chem Week 12* (576), 1 (May 13, 1971)
Chemical production in Japan for 1971 (Apr 71 Mar 72) will increase by 12 6% over the preceding yr, which showed a 13 5% gain, thus forecast the Ministry of International Trade and Industry The largest expansion (31 5%) will be seen in urea as internal demand for industrial use and export are expected to increase by 100,000 tons and 800,000 tons, respectively, though that for fertilizer use will increase by only 4,000 tons

707
**Japan's Nitric Acid Capacity to Increase by '72**
*Japan Chem Week 12* (578), 7 (May 27, 1971)
Nitric acid requirements have been increasing steadily Production capacity in 1970 fertilizer yr compiled by manufacturers such as Sumitomo Chemical Co, Mitsubishi Chemical Industries Limited, and Asahi Chemical Industry Co was put at 563,158 tons in terms of 98% $HNO_3$ Under the announced expansion projects by Sumitomo Chemical Co, Asahi Chemical, and Nihon Suiso Kogyo Co, and with plants of Chisso Corporation and Sumitomo Chemical scrapped, production capacity will apparently be 770,996 tons during March, 1972 At a yearly increase of 10%, demand for the yr was estimated at about 620,000 tons, and operation rate at more than 80%

708
**Japan's Production Capacity of Ammonia, Urea, and Ammonium Chloride Up**
*Jap Chem Week 12* (584), 13 (July 8, 1971)
The Ministry of International Trade and Industry recently summed up production capacity of ammonia, urea, and ammonium chloride as of April 1, 1971, and presented these to Japan's Urea & Ammonium Sulphate Industry Association With the completion of three new facilities of Kashima Ammonia Co, Nippon Kasei Co, and Mitsubishi Chemical Industries Limited, and scale up of the Kawasaki factory (Kanagawa Pref) of Showa Denko K K, and the Niihama Works (Ehime Pref) of Sumitomo Chemical Co and the Kitakyushu factory (Fukuoka Pref) of Asahi Glass Co on the one hand, and with old facilities scrapped on the other, production capacity of ammonia totaled 3,808,300 tons, some 13% increase over the previous yr Production capacity of urea amounted to 3,597,400 tons, an increase of 20%, and ammonium chloride came to 943,200 tons, up 2% over the previous yr

709
**Japanese Sulfur to Face Over Supply After 1972**
*Jap Chem Week 12* (591) 7 (Aug 26, 1971)
Demand and supply of S in fiscal 1971 are expected to balance due to the continued closures of S mines An excessive turn is feared, as the result of big expansion of recovered S production in the petroleum industry, after fiscal 1972 Petroleum Association of Japan recently decided on the following policies to cope with the situation raise the present 51,900 tons of S storage capacity to 140,000 tons, promote exports to the Southeast Asian market despite the low international export price Some petroleum refining companies plan to tackle the establishment of a joint storage base for S export in cooperation with Japan Sulphur Export Co and traders This could ease the increasing investment burden of storage facilities and cope with the slackened market situation at home and expanding inventories

710
**Japan Builds Large Ammonia Plants**
*Jap Chem Week 12* (593), 3 (Sept 9, 1971)
Japan's ammonia production capacity as of April 1, 1971 was 3,808,300 tons/yr an increase of 426 000 tons over a yr before, according to the Ministry of International Trade and Industry The expansion was due to the completion and startup of a 950 tons/day plant in Kashima (Ibaraki Pref) for Kashima Ammonia Co, a 1000 tons/day plant in Onahama (Fukushima Pref) for Nippon Kasei K K, and a 1000 tons/day plant in Kurosaki (Fukuoka Pref) for Mitsubishi Chemical Industries Ltd under the second phase large ammonia scale up program The first mammoth ammonia plant of 1000 tons/day in Japan was completed in Osaka for Mitsui Toatsu Chemicals, Inc at the end of September 1969 As a result, ammonia plants of over 800 tons/day capacity in Japan constructed under the first and second stage programs

account for 61 6% at aggregate capacity The production structure is now of the international level Under the second phase project, three additional plants are under construction, for completion within 1972 With the commissioning of the three plants, some existing plants will be scrapped

711
**Japanese Consume More Urea in Industry Than in Agriculture**
*Jap Chem Week 13* (621), 7 (Mar 23, 1972)
Japanese demand for industrial urea in 1969 fertilizer yr was 362,000 tons, in 1970 fertilizer yr demand for industrial urea increased to 395,000, tons and in 1971 fertilizer yr it is expected to top 500,000 tons As domestic consumption of fertilizer urea is some 410,000 tons/yr, domestic consumption of industrial urea in 1971 fertilizer yr is likely to exceed that of fertilizer urea by a large margin

712
**Phosphate Demand for 1972 in Japan Forecast**
*Jap Chem Week 13* (626), 9 (Apr 27, 1972)
The Phosphoric Acid Division of Japan Inorganic Chemical Industry Association filed demand results of phosphoric acid for industrial use and phosphates in 1971 and estimates for 1972 The production of phosphoric acid and phosphates was 126,888 tons, and delivery, 127,438 tons, down 3% from the preceding yr Estimated demand for fiscal 1972 stood at 135,625 tons Business trend in 1971 was sluggish both in phosphoric acid and phosphates Demand estimates for fiscal 1972 were expected to show an increase of 5 8% due to the possible upturn of business activities

713
**Japan's 1972 Fertilizer Demand**
*Jap Chem Week 13* (641), 1 (Aug 10, 1972)
The fertilizer demand was estimated on the basis of crop-wise fertilizer demand, prefecture wise fertilizer demand, and increase rate judged by past results, taking movements of floating stock into consideration and including demand in Okinawa Prefecture As a result, N fertilizers and K fertilizers were expected to show a slight increase of 1 1% over the previous fertilizer yr and phosphate fertilizers an increase of 2%

714
**Japan's Sulfuric Consumption Decreases**
*Jap Chem Week 13* (642), 7 (Aug 17, 1972)
Japan consumed a total of 6,675,830 tons of sulfuric acid in fiscal 1971 which ended in March 1972 The total represented a drop of 2 5% from the preceding fiscal yr, or the second consecutive decline Sulfuric acid production in fiscal 1971 totaled 6,662,242 tons, or about 13,000 tons less than the consumption, ending the yr with a stock of 210,000 tons

715
**Japan's Ammonium Nitrogen Supply Demand**
*Jap Chem Week 13* (651), 1 (Oct 19, 1972)
Supply and demand for ammonium N fertilizers such as ammonium sulfate and urea in 1971 fertilizer yr have been reported for Japan Production, domestic demand, and exports in terms of N were 2,075,000, 841,000, and 1,274,000 tons, respectively The 1971 fertilizer yr-end inventory was 475,000 tons, a decrease of 35,000 tons from the previous fertilizer yr end inventory The inventory decrease in 1971 fertilizer yr is attributed also to fertilizer manufacturer's voluntary regulation of production and their efforts to expand exports from 1970 fertilizer yr

716
**Japan Forecast 1972 Sulfuric Acid Demand.**
*Jap Chem. Week 13* (659), 7 (Dec 14, 1972)
Domestic demand for sulfuric acid in the current fiscal yr ending March 1973, is expected to top the yr earlier level for the first time in 3 yr, according to Sulphuric Acid Association of Japan The Association's forecast estimated the total demand of the chemical during the yr at 6,909,000 tons, up 3 6% from fiscal 1971 Supply of sulfuric acid will total 6,840,000 tons in fiscal 1972

717
**Moxican Production of Nitrogen Decreases**
*Nitrogen, No 74* 12 (Nov Dec 1971)
The Mexican fertilizer industry recorded a reduction in growth in 1970, with output well below capacity levels Although the production of anhydrous ammonia increased as expected by 19 6% the production of all manufactured N fertilizers other than direct application ammonia decreased Ammonium sulfate production was down 8%, ammonium nitrate 6%, and urea 2% in comparison with the previous yr The direct application of anhydrous ammonia increased by 7% Guanos y Fertilizantes de Mexico SA (Guanomex), the State owned company, returned an increase in production and sales of 2 4% and 3 7% respectively over 1969

718
**Morocco Boosts Fertilizer Production**
*Eur Chem News 21* (527), 6 (Apr 7, 1972)
According to Morocco's Office Cherifien des Phosphates, the Safis fertilizer complex produced 383,930 tons of sulfuric acid and 112,607 tons of phosphoric acid in 1971, compared with respective figures of 247,010 tons and 76,528 tons in 1970 The complex produced 203,763 tons of triple superphosphate, 42,768 tons of diammonium phosphate and 50,195 tons of ammonium sulfate phosphate in 1971, against totals of 126,377 tons, 36,514 tons, and 32,878 tons respectively in the preceding yr Of these quantities, Morocco consumed 9,086 tons of triple superphosphate, 410 tons of diammonium phosphate, and 49,343 tons of ammonium sulfate phosphate

719
**Record Nitrogen Fertilizer Output in 1967/68**
*Nitrogen* No 57 4 (Jan Feb 1969)
Largely as a result of the considerable expansion of production capacity in the 1966/67 season, output of fertilizer N in the Netherlands reached an all time high to date of almost 850 000 tons N during 1967/68, just over 24% greater than in the previous season

720
**Production Consumption NPK Fertilizers in Netherlands**
*Chem Age (London) 104* (2756), 12 (May 12, 1972)
Production of N fertilizers in Holland during the 1970 71 fertilizer season rose by 4% to 929,900 mt of N, while phosphate fell by 3% to 275,200 mt Imports of N fertilizers fell from 20,250 mt in 1969 70 to 14,000 mt last yr while exports increased to 594,900 mt from 486,900 mt the previous fertilizer yr With an increase in total consumption in the Netherlands to 405,300 mt of N, fertilizer demand increased from 181 to 190 kg/ha of agricultural land Total consumption of P fertilizers increased from 107,500 mt in 1969 70 to 109,900 mt Exports fell to 209,700 mt and imports dropped to 50,200 mt Production of potash fertilizers remained steady at 9000 mt for the 1970 71 season while imports increased from 217,800 mt in 1969 70 to 239,600 mt last season

721
**Pakistan's Third Plan Focuses on Agricultural Development**
Theodore R Freeman (Asst Agr Attache', Rawalpindi)
*Foreign Agr 6* (26), 2 3 (June 24, 1968)
As a result of a food shortage crises in 1965, Pakistan has revised its 1965 70 Third Five Year Plan to emphasize agricul ture Agriculture accounts for nearly half of the gross national product and almost all of the foreign exchange earnings Particular attention in the new $1 8 billion agricultural development budget is given to available inputs such as fertilizer and improved seeds Fertilizer consumption is expected to increase from 144,000 tons in 1965 to 484,000 tons of plant nutrients in 1970 Production in this region will increase from 66 000 to 349,000 tons in the same period Fertilizer will be subsidized 43% of its imported cost to aid educational programs on use of fertilizers

722
**More Fertilizer Plants Needed by West Pakistan**
*Chem Age (I ondon) 104* (2751), 14 (Apr 7, 1972)
There are at present in West Pakistan two producers of nitrogenous fertilizers with a total production of 160,000 tons The current level of consumption is around 350,000 tons A new plant with production of 120,000 tons/yr, about to start production, will do much to close the gap Its proposed expansion to 150,000 tons and the start up of another 20,000 tons/yr plant, both intended for next yr, will have to meet a demand likely to reach 400,000-450,000 tons/yr by then Production of phosphatic fertilizers in West Pakistan only started about a yr ago and so far production totals only 10,000 tons of $P_2O_5$/yr The level of consumption is hard to ascertain but it is below 60,000 tons/yr It is estimated production will increase to 90,000 tons/yr by 1974 75

723
**Pakistan Fertilizer Shortage**
*Eur Chem News 22* (551), 4 (Sept 22, 1972)
The subsidy which Pakistan will apply to fertilizer sales this yr will amount to approximately $47 3 million Pakistan carried over from fiscal 1971 72 about 80,700 nutrient ton of fertilizer This yr production is estimated at 285,400 ton The country's estimate of its requirements is about 450,000 ton, the same as last fiscal yr There will be a large shortage which will be met by imports

724
**The Fertilizer Industry in the Philippines**
J T Shields and R C Gray (Tennessee Valley Authority)
*National Fertilizer Development Center, Muscle Shoals, Ala , Bull Y 30*, 72 pp (July 1971)
A Tennessee Valley Authority team studied the demand supply situation and related aspects of the fertilizer industry in the Philippines Agricultural exports account for 80% of the total value of all exports The demand for fertilizers is estimated at 225,000 mt of plant nutrients in 1971, 300,000 mt in 1975, and 425,000 mt in 1980 By 1975, N will account for 75%, K 23%, and P 20% of plant nutrient demand Domestic production shows a deficit in N and K but is self sufficient in P This trend will probably continue to widen through 1975 Industry is now importing all raw materials except S The costs of shipping, handling, and storage of fertilizers often represents more than half of the total cost of fertilizer to the farmer Recommendations for improving the agricultural program in the Philippines are given

725
**Fertilizer and Agricultural Trends in Poland**
*Fertilizer Intern* , No 3, 4 (Sept 1969)
Great strides have been made in the production of nitrogenous and phosphatic fertilizers in Poland during the 1967/68 fertilizer period The excellent progress in the country's fertilizer production is even more remarkable when it is considered that in 1955 N production amounted to only 154,000 tons N but by 1966 output had risen to 462,000 tons N About 100 miles north west of Warsaw lies the new nitrogenous fertilizer plant at Brziezle, which is due on stream by 1970 Daily production of ammonia is expected to be 1500 tons and ammonium nitrate output 825,000 tons/year Another new fertilizer N plant will be based at Police, near Szczecin Commercial operations will comprise units for the manufacture of sulfuric and phosphoric acid as well as complex fertilizers Trial runs are scheduled for the end of 1969 Production of phosphate fertilizers has made almost equal progress and is expected to reach 720,000 tons $P_2O_5$ by 1970 New and expanded phosphate fertilizer plants within the country are behind this growth one of the more recent additions to the country's industry being the Tarnobrzeg superphosphate phosphate facilities which came on stream in 1968 Potassic fertilizers will however, continue to be imported The main suppliers are the U S S R , West Germany and other EFC countries

726
**Poland Fertilizer Industry**
*Eur Chem. News 17* (417), 8 (Jan 30, 1970)
A giant new building program envisages the erection of no less than 91 new plants At least 36 of them were completed in 1969 The construction of a large N fertilizer unit at Pulawy was completed In addition, two sulfuric acid plants, each with a capacity of 100,000 ton/year, have been completed at Tranobrzeg and Zgierz, as well as a triple superphosphate installation at the Baltic port of Gdansk A new S mining operation at Grzybow has also been commissioned

727
**Poland's Nitrogen Output Exceeds One Million Tons**
*Nitrogen*, No 67, 13 (Sept -Oct 1970)
Among the announced targets of the Ministry of Chemical Industry was the production of 1 046 million mt N by the Polish industry during 1970 Some unofficial estimates expect production to be even higher and this may well prove to be correct, for the industry recorded increases in output of over 20% in both halves of 1969, the total for the yr reaching 938,000 mt N If an expansion of this magnitude had continued throughout the early part of 1970, production in 1969 70 would already exceed 1 million mt

728
**Polish Plan for Expanding Fertilizer Production**
*Eur Chem News 19* (483), 8 (June 4, 1971)
Although full details of the delayed Polish Five Year Plan for the Chemical Industry have not yet been released, some information is now available for the 1972 75 period The new plan, which is at present being drafted for the 4 yr period 1972 75, is mainly concerned with the modernization and reconstruction of existing plants Plants which will undergo substantial reconstruction include the Wloclawek N fertilizer plant which is still under construction The current investment program is giving some cause for concern Delays are being experienced at the Police phosphate fertilizer plant, and the Wloclawek N fertilizer plant Delays at this latter plant are due mainly to problems connected with equipment supply, particularly that of foreign origin A change of management at

this site may, however, enable two production lines for ammonia and nitric acid, for ammonium nitrate manufacture, to be brought on stream before the end of 1971 High targets are being set for 1980-1985 Production of elemental S, the major sector of the industry, is set to reach 7 million tons in the 1980's, compared with an actual output of 2 684 million tons in 1970 and 1 942 million tons in 1969 Sulfur bearing ore production was 4 031 million tons last yr compared with 2 955 million tons in 1969 This increase in S production will be necessary to meet demands for sulfuric acid targets which will be boosted to 6 million tons in the 1980's compared with 1 917 million tons in 1970 and 1 516 million tons in 1969 Demand for mineral fertilizers is expected to grow substantially, present estimates for 1985 put N fertilizers at between 1 7 million to 2 1 million tons N phosphate fertilizers at 1 4 to 1 7 million tons $P_2O_5$, and potash at 2 0 to 2 5 million tons $K_2O$ This compares with a 1970 production of 1 031 million tons N and 0 6 million tons $P_2O_5$ and 0 938 million tons N and 0 534 million tons $P_2O_5$ in 1969 In the past there has been no domestic production of potash, requirements have been met by imports from the DDR (1 13 million tons in 1969) and the U S S R (52,000 tons in 1969) From 1970 onwards, U S S R exports of potash to Poland will rise to an annual rate of 1 million tons due to output from the Soligorsk mine in Byelorussia, in which Poland has an investment share

729

**Portugal's Fertilizer Outlook**

*Nitrogen* No 68, 26 30 (Nov Dec 1970)

The last decade has witnessed mo e than a four fold expansion of Portuguese fertilizer N output from a level of 30,300 mt N during the 1958/59 season to almost 153 000 mt N ten years later In addition to the expansion of total output over the last decade, the range of products manufactured in Portugal has increased significantly Today, while ammonium sulfate remains the dominant product, calcium ammonium nitrate (20 5–26% N, with the more concentrated material becoming increasingly important) output now approaches the production level of the longer established material Complex fertilizers are fast accounting for an important share of the material manufactured and the only future expansion of fertilizer N capacity which seems at all firm at this time is a further addition to the Setubal complex fertilizer capacity of SAPEC The growth of fertilizer N usage over the last ten years has been substantially slower than the availability from domestic sources Usage has yet to double the 1958/69 level The main factor behind this problem is that the majority of farmers, such as the smallholders who are concentrated largely in the north, still regard chemical fertilizer as unnecessary purchases when they are already producing enough agricultural goods to feed their families and exchange for other requirements

730

**Change in Romania Industry**

*Nitrogen*, No 73, 13 14 (Sept Oct 1971)

The growth of the Romanian synthetic N industry during the 1960's was phenomenal, output increasing from 19,000 mt N in 1960 to 494,000 mt N in 1969 However, it is evident from recent developments within the chemical engineering and constructing industry that this high rate of growth witnessed in the 1960's is going to continue up to 1975 at least, despite the slackening in the growth of most other major N industries around the world Estimates of Romanian N capacity at the end of 1970, put total finished fertilizer capacity at 1 25 million tons N/yr, more than double the level of just over one half million tons N/yr at the end of 1967 Nevertheless, recent contracts finalized by the Romanian State Trading Organization, Romchim, suggest that by the end of 1975, the country's N capacity should reach a level of just under 2 1 million tons N/yr However, the most interesting aspect of this new development in Romania, in addition to the vast scale of the expansions expected over the next half decade, is the fact that the bulk of the additions planned between now and 1975 will take the form of complex fertilizer plants Of the 916,000 tons N/yr additional fertilizer N capacity due on stream by 1975, just over 58% will be for complex fertilizers, 30% for urea, and the remainder for ammonium nitrate (34 5% N) Until now, the industry has concentrated on straight N products, primarily urea and ammonium nitrate, although some 400,000 tons/yr complex fertilizer capacity has been operating at Turnu Magurele since 1968 and there is also small technical diammonium phosphate capacity in operation at another location However, these recent developments will bring urea capacity to a level of almost 700,000 ton N/yr, ammonium nitrate to just under 750,000 tons N/yr, and complex fertilizers to some 620,000 tons N/yr by 1975

731

**Romania Raises Nitrogen Fertilizer Capacity**

*Fur Chem News 18* (456), 12 (Oct 30, 1970)

Industrial import the Romanian Foreign Trade Organization is to build a new nitric acid plant at Tirgu Mures The plant, which will produce a 56% acid solution, will have a capacity equivalent to 725 ton/day of 100% acid Tirgu Mures has ammonia and ammonium nitrate facilities, but has not undergone expansion in recent years as have the complexes at Turnu Magurele Craiova, and Slobozia The complex at Turnu Magurele added facilities for the production of 100,000 ton/yr of ammonium nitrate and 190,000 ton/yr of NPK fertilizers during 1969 and plants with capacities of 300,000 ton/yr of urea and 300,000 ton/yr ammonium nitrate were brought on stream prior to this at Craiova The complex at Slobozia is currently under construction and when completed will operate urea (300,000 ton/yr) and ammonium nitrate (338,000 ton/yr) units, in addition to a unit for ammonia Ammonium nitrate is the predominant fertilizer produced in Romania and at one time it was expected that capacity would be in the region of 1 6 million ton/yr by the end of this yr A more likely figure seems to be 1 2 million ton/yr Besides Turnu Magurele, Craiova and Tirgu Mures, the other production centers are at Fagaras (about 150,000 ton/yr) and Piatra Neamt which probably has a similar capacity The ammonium nitrate plant at Tirgu Mures has a capacity of over 300,000 ton/yr and together with the plants brought on stream last year makes up a total capacity for Romania of about 1 2 million ton/yr

732

**9% Increase in N Fertilizer Usage in Scotland**

*World NPKS*, No 35, 5 (May 1969)

During 1968, farmers in Scotland continued to increase their usage of N fertilizer, particularly straight N – evidence of the growing realization of the benefits it can bring in increased grassland production Recently published statistics show that total N usage was up by just over 9%, straight consumption increasing by over 20%, and N for use in compounds by nearly 6% Despite this increase, Scottish farmers still use less N than farmers in the south (0 44 cwt/acre compared with 0 52 cwt/acre) This gap is expected to close further this year as a result of more intensive fertilization of grassland, particularly

in the dairying areas

733
**The Future of Spanish Nitrogen**
*Nitrogen* No 49, 16 18 (Sept Oct 1967)
Spanish producers of N are oriented toward the domestic market rather than exports Application rates are sufficiently low (15 kg/hectare) that producers can expect a steady increase in internal sales for some time Exporting, then, is a means of handling temporary or small surpluses Consumption of N in 1966 was 398,000 tons while production was only 324,300 tons Projects already approved by the Government can add over 400,000 tons to present capacity within the next few years Some of the present capacity probably would be lost, however, due to operation economics Nine of the 15 present primary production plants have annual capacities of less than 50,000 tons of N Low analysis materials, such as ammonium sulfate, predominantly, but there are small shifts to higher analysis More positive attempts to push agronomic developments, irrigation, and use of high analysis fertilizers–which the Government has included in its 1967 71 four year plan–could provide a stimulus to agriculture Spanish economy expanded 8 2% in 1966, almost all in the industrial sector The new plan calls for expansion in the agricultural sector

734
**Production of N Fertilizers in Spain Since 1960**
*Chem Age 100* (2659), 7 (July 3, 1970)
The Spanish Ministry of Agriculture has announced that the use of fertilizers in Spain has increased sharply this yr, with phosphates up 29 7%, K compounds up 16 4% and N fertilizers up 19 7% The consumption of fertilizers during the last decade has more than doubled However, the production of N fertilizers from Spanish plants has increased even more spectacularly, in that it has increased five fold in the last decade from 93,600 tonnes of N in 1960 to 511,000 tonnes in 1969, indicating that Spain is becoming increasingly self-sufficient in this field During 1969 no $(NH_4)_2SO_4$ was imported, although previously large quantities had to be purchased Since 1963, when home production equaled imports, their lines have been further and further apart, so that whereas the home production could only supply 4% of the 1960 consumption, now it covers more than 90% The reason given for imports continuing is that some fertilizers, such as Chile nitrate, continue to be popular in Spain

735
**Spain Enjoys Healthy Fertilizer Market**
*Eur Chem News 17* (439), 26 8 (July 3 1970)
Spanish counterparts have a fast growing home market with increasing production capacity to match any declining imports One of the fastest growing sections of the country s industry is the production of N fertilizers The present capacity of production balances closely with domestic demand Future increases in demand will be met by new capacity coming on stream in the next two yr The largest producer of N fertilizers in Spain at the moment is REPESA The company's plant has a capacity of 90,000 ton/yr of N Amoniaco Espanol SA (AESA) is the second largest producer, their plant at Malaga has a capacity of 85 000 ton/N/yr Consumption has risen in leaps and bounds and in 1968 reached just over 1 million ton Unfortunately the tremendous growth of consumption has outstripped the growth in home production and considerable quantities of complexes have been imported especially the highly concentrated grades The imports amounted to 122,000 ton in 1968 and were probably double that figure in 1969–the statistics for 1969 have not yet been published However, this supply/demand situation is not likely to continue into the future Empresa National Siderurgica is due to bring a 220,000 ton/yr NPK plant on stream at Aviles this yr Cros/UEE is constructing a 300,000 ton/yr plant at Tarragona Interquimica will start up a 300,000 ton/yr plant at Huelva in early 1971 and EN Calvo Sotelo has a 165 000 ton/yr plant under construction By 1975 complex fertilizers will supply 35% of the N, 75% of $P_2O_5$ and 76% of $K_2O$ demand Spain is one of the world s largest exporters of potash Production is located in the North and North East of the country Superphosphates have been produced in Spain since the beginning of the century The current production capacity is about 600 000 ton/yr The most popular grade of superphosphate is 16 18% $P_2O_5$ Only small quantities of the grades 20 25% $P_2O_5$ and 46% $P_2O_5$ are produced

736
**Spanish Production and Use of Complex Fertilizers Increase**
*Chem Age (London) 103* (2731) 11 12 (Nov 19, 1971)
A marked increase in the production and consumption of complex fertilizers, a proportional decrease in ammonium sulfates, and finally the fall in imports as Spain becomes more self sufficient are the main targets for the future of the fertilizer industry This is revealed in a report published by the Fertilizantes Nitrogenados Nacionales SA authority, which gives the national statistics for the last five fertilizer yr Plants, which are now established in most regions of the country have increased rapidly over the last few yr mainly due to government encouragement and the aid of foreign capital and/or 'know how The average yearly increase during the period under review has been 14 8% The highlight throughout these years has been the rise in both production and consumption of complex fertilizers, which have had an annual average increase of 44% and 30 1% respectively This means that the fertilizer industry in Spain has shown a relatively high growth rate The greatest change in the fertilizer industry has occurred in the use of complex fertilizers These have grown from 8 2% to 20 0% of the total Correspondingly the use of ammonium nitrates has dropped from 42 5% to 25 1% while N solutions, which are still in their infancy in Spain moved from 0 9% to 1 3% of the total Several new plants for the production of complex fertilizers have come on stream during the same period which has resulted in an average annual increase of 44% It can therefore be said that Spain's complex fertilizer producers have developed sufficiently during the last 5 yr to be considered as exporters in the world markets, although at present in a small way

737
**Spain Enjoys Healthy Fertilizer Demand**
*Eur Chem News 21* (524), 8 (Mar 17, 1972)
The healthy Spanish fertilizers market remains envied by many a European producer Complex fertilizers demand, still supplied partly by imports, is now expected to total over 2 5 million ton by 1975 In that yr, complex fertilizers will supply 35% of N demand, 75% of $P_2O_5$ demand, and 76% of $K_2O$ demand

738
**Spain Self Sufficient in Fertilizer**
*World Fert Rev* No 15, 16 (Sept 1972)
The fertilizer industry in Spain has now become self sufficient, with imports falling and exporting manufactured fertilizers has begun There has been a marked increase in the production and consumption of the more concentrated fertilizers Produc-

tion has shown large increases during the past 5 yr, with an average annual increase of nearly 15% Many new plants have come onstream in recent years and large foreign investments have been injected into the Spanish chemical industry The fertilizer industry in Spain has benefited greatly from expertise of many large overseas firms

739
**Spain Reviews Fertilizer Sector**
*Eur Chem News 22* (559), 6 (Nov 17, 1972)
In the Spanish fertilizer sector of the chemical industry, comsumption of N fertilizers was 600,000 ton in 1971, and 800,000 ton in 1976 and 1 million ton by 1981 are predicted Production of ammonia is carried out in 12 plants, of which only two have competitive costs on an international basis and 6 operate uneconomically A restructuring of the fertilizer sector is suggested in which noncompetitive plants are closed down to reduce the production capacity to a maximum of 450,000 ton N, and two new plants of 1000 ton/day capacity are constructed before 1980 1982 These plants should be located in two or three under developed areas such as Cataluna, the north of Spain, and Seville Huelva It is felt that existing fertilizer plants, with the exception of ammonium sulfate, are competitive and capable of meeting demand until the second half of this decade

740
**Nitrogen Production Expands Rapidly in Turkey**
*Nitrogen*, No 73 31 5 (Sept Oct 1971)
Within the Turkish agricultural economy, the rate of growth of fertilizer N consumption since the mid 1960 s (averaging 47%/yr) is little short of phenomenal During the autumn of 1968 two new coal gasification units were completed at Kutahya bringing rated capacity for anhydrous ammonia at this location to a level of 125 200 tons N/yr Units added to the Kutahya plant include a 201 300 tons/yr nitric acid plant (as 100% $HNO_3$) and a 338 000 tons/yr calcium ammonium nitrate (26% N) This latter development is particularly significant since it marks the replacement of ammonium sulfate by calcium ammonium nitrate as the most important product manufactured in Turkey In addition to the expansion of the Kutahya facilities, Azot Sanayii has also brought on stream another fertilizer plant, located at Samsun on the Black Sea at the mouth of the River Murat This fertilizer complex is primarily oriented towards the manufacture of phosphate fertilizers–triple superphosphate–although facilities have been erected at this site to produce an alternative of 140,000 tons/yr diammonium phosphate (16 48 0) It is understood that during 1971 only triple superphosphate will be manufactured at the new Samsun facilities despite the growing importance of diammonium phosphate in the country's demand pattern

741
**Turkey Improves Nitrogen Self-Sufficiency**
*Chem Marketing Rep 201* (22), 7 (May 29, 1972)
Turkey hopes to become self sufficient in N fertilizers in the mid 1970's with the help of the World Bank The bank has just approved a $24 million loan to aid the financing of a Turkish fertilizer project that will produce 274,000 tons of urea and 90,000 tons of ammonia/yr for sale on the Turkish market The estimated $57 8 million project consists of the construction of a fertilizer plant at Izmit, about fifty miles from Istanbul on the Marmara Sea The loan is to Istanbul Gubre Sanayii Anonim Sirketi (IGSAS) Turkey is a large importer of N fertilizer The nutrient content of the IGSAS urea output is forecast to amount to 82,000 tons of N in 1976 and build up to 126,000 tons of N by 1978 This, combined with existing and planned capacity, would make Turkey self sufficient in N fertilizer in the mid 1970's, the bank said The project includes installation of a 750 ton/day single train ammonia plant and an 830 ton/day single train urea plant Production will be 248,000 tons/yr of ammonia, of which 158,000 tons will be converted to 274,000 tons of urea and 90,000 tons will be sold to manufacture caprolactam and diammonium phosphate fertilizer

742
**The Phosphate Fertilizer Industry in Turkey**
*Phosphorus Potassium* No 60, 13 16 (July Aug 1972)
With a capacity of 530,000 tons/yr $P_2O_5$, Turkey will be able to supply all its domestic requirements for phosphate fertilizers by 1975, and a surplus might be available for export The expansion of agricultural output has always been important in Turkey's economic development with agricultural produce comprising roughly 80% of all exports To supply the need for increased fertilizer application, new production facilities were planned and fertilizer imports were given priority in the allocation of foreign exchange After a period of busy growth, however, the expansion in fertilizer application has inevitably slowed down, and a concerted effort to increase consumption is now needed to make full use of the new capacity Unless some natural disaster intervenes, Turkey's phosphate fertilizer capacity will have increased tenfold in the decade up to 1975

743
**The UK Fertilizer Industry**
M Pearce (Fisons Ltd )
*European Chem. News 16* (408), 40-4 (Nov 28, 1969)
Enormous changes in the United Kingdom fertilizer industry have occurred in the last two decades Until the early 1950's superphosphate, $(NH_4)_2SO_4$, and KCl were the major plant foods. In 1951 the first granular triple superphosphate plant in the UK was brought on stream Also, the Broadfield den was modified to produce triple superphosphate powder for use in granular mixtures. The next significant step was the use of $NH_4NO_3$ in granular mixtures to replace $(NH_4)_2SO_4$ As a result of intense competition a number of smaller producers were forced out of business The field is now dominated by Fisons, Imperial Chemical Industries (ICI), and Shellstar Today some 1 7 million tons of plant food are applied annually of which 1 2 million tons are supplied as compound fertilizers The rate of market growth leveled off in the late 1950's and now averages about 4% per year There is, however, room for expansion For example over half the grassland currently receives no N fertilizer In many respects UK agriculture is the most technologically advanced in the world There is a high level of information on the nutrient requirements of the various crops, and both Fisons and ICI carry out extensive agronomic research These companies employ large field forces to maintain direct contact with farmers and these services are now largely taken for granted Over the years it has helped to create a demand for high quality fertilizers Even when unknown brands are put on the UK market at prices considerably lower than known brands they have proved difficult to sell – which is some measure of the trust created between UK manufacturers and the farmers There is a small but developing liquid fertilizer sector in the UK, the potential of which is difficult to assess. It seems unlikely that liquids can win more than a small share of the total market, though straight N liquids should do better than mixtures It seems likely that the advantage of easier handling of liquids will be eroded by development of more sophisticated methods of handling sc 's.

744
**Fertilizers in the UK 1970 71 A Crucial Year**
*Chem Age (London) 102* (2702), 18 19 (Apr 30, 1971)
The 1968-69 fertilizer tonnage in the United Kingdom came to 1 72 million tons, a rise of 4% However, this increase was due partially to an end to subsidies which caused farmers to buy heavy to increase stocks on hand In 1970 purchases of fertilizer dropped drastically necessitating government action Prices of fertilizer were lower, surpluses were accumulating, and imports were being dumped in the country Now for the first time in 3 yr prices of fertilizer are increasing and the estimated tonnage for the first 6 months of 1970 71 is up from 15% to 20% over a like period in 1969 70 Although manufacturing costs are rising, it is hoped that increase consumption and rise in prices will improve the overall fertilizer situation in the UK

745
**United Kingdom Fertilizer Producers Have Better Year**
*Chem Age (London) 104* (2743), 12 (Feb 11, 1972)
This current fertilizer yr, beginning June 1971, is reported to have been far better than the previous one largely due to a considerable increase in business being done by the major suppliers at the start of the season Demand has generally been maintained and has given rise to speculation that the consumption of fertilizers in the U K for the yr ending June 1972 will be about 6% higher than in the last fertilizer yr More important than the increase in consumption, however, is the possibility of better margins for the industry as a whole Of the increase in demand the largest share seems to be coming from the concentrated N business This yr it is expected that consumption will have risen from 264,000 tons to 298,000 tons, an increase of 13% while in the straight N market there could be an increase of 1 5% to a total of some 427,000 tons While present demand for compound fertilizer has shown signs of slowing down Fisons anticipate their share of this sector of the market to rise to about 30% this yr ICI on the other hand will probably see their share of the market declining and some observers of the market feel that ICI's straight N proportion will be down this yr from 44 4% to 42% Shellstar's share of the concentrated market is also improving rapidly and is estimated at 19%

746
**United Kingdom Sulfuric Acid Production Consumption**
*Chem Age (London) 105* (2771), 14 (Aug 25, 1972)
Production and consumption figures of sulfuric acid in the UK have been released by The National Sulphuric Association Ltd for the second quarter this yr (April 1 to June 30, 1972) Production of new acid totalled 882,016 mt of 100% sulfuric acid, down 0 8% from that of the same period last yr Capacity represented was 1,051,110 mt, Production was 83 9% of capacity Consumption totalled 988,900 mt of 100% acid, up 3 8% over last yr Fertilizers and agricultural uses consumed 327,680 mt up 5 3% over last yr

747
**Fertilizer Production in Russia Is Set for an 8 Percent Growth on Yearly Basis Through 1970**
*Oil, Paint, Drug Reptr 194* (8), 5, 41 (Aug 19, 1968)
The 1970 target for Russian fertilizer production is 62 million tons, against the 40 1 million tons produced in 1967, with an average of 8 million tons of capacity to be added each yr to 1970 The average annual increase in sulfuric acid will be 1 6 million tons, with 9 7 million tons produced in 1967 Fertilizers hold first place in Soviet chemical production but other industrial sectors, such as plant protection chemicals and plastics, also are growing rapidly New mineral deposits discovered in the last ten years help in the increased production These deposits are potash in Byelorussia, natural S in the Ukraine, and phosphate rock in Kazakhstan Nutrient content of fertilizers is increasing from the present 28 3% to 36% in the near future, it was 23% in 1964

748
**Soviet Nitrogen Industry Maintains Growth Rates**
*Nitrogen*, No 62, 22-6 (Nov Dec 1969)
The dramatic emergence in the 1960s of a sizeable fertilizer industry in the U S S R and two other developments have recently brought the Soviet industry further into line with its Western counterparts According to the current Five Year Plan (1966 1970), agriculture is to be supplied with growing amounts of non caking ammonium nitrate with 34% N content, and granulated urea, 45 46% N, in addition to larger quantities of increasingly higher analysis complex fertilizers from the large complex plants due on stream shortly The second development, at present less substantial, is the gradually strengthening position of N fertilizer exports from the U S S R. In proportionate terms, the greatest increases in production during the first years of the present plan have been made by ammonium and nitrophosphates and complex fertilizers, output of which, although still representing a small constituent of total N production, has expanded fourfold in the last three years Complex fertilizer output should further increase during the early 1970s, when several large new complex facilities will be on stream During the first four years of the current Plan, new complexes were established at Kokhtla Yarve, Tolyatti, Vaksh, Novgorod, Cherkassy, Rovno, and Cherepovets, while additions were made to existing facilities at Gorlovka Kuybyshev, Novomoskovsk, Tula, and Grodno Twelve new ammonia units were brought on stream, all but two using natural gas feedstock, which will add an estimated 1 5 million tons N/year to the capacity of around three million tons N/year existing at the end of the previous Plan 1959 1965 A further two million tons N/year ammonia capacity is scheduled for completion during the 1970-1973 period Facilities are being constructed at Chirchik, Fergana, Krasnoyarsk, Nizhniy Tagil, Sumgait, Tayshet, and Tomsk

749
**U S S R Phosphate Rock Production Increases**
*Phosphorus Potassium*, No 48, 51 (July Aug 1970)
Output of phosphate rock from the Kara Tau mines in Southern Kazakhstan U S S R reached 2 7 million mt in the calendar yr 1969 The deposits there are estimated to be 2000 million mt and are being exploited at an increasing rate as a primary source of the U S S R's domestic phosphate requirements in the 5 yr economic plan It is planned that output will further increase during 1970 to 3 7 million mt as efforts are being exerted to reconcile problems which have restricted output

750
**U S S R Fights to Meet Targets for 1970**
*Eur Chem News 18* (448) 6 (Sept 4 1970)
The U S S R envisages a 12 2% growth of total chemical production during 1970 compared with 11% in 1969 The current five yr plan ends in 1970 and strenuous efforts are being made to meet targets Two of these that have fallen short are sulfuric acid and fertilizers Sulfuric acid seems likely to meet its overall target for the yr After a poor yr in 1969, when production rose by only 5%, the $H_2SO_4$ industry needed to achieve a 10% growth in 1970 to raise production by one million ton to 11 7 million ton/yr The first half of 1970

showed an 11% growth rate equivalent to a production increase of 572,000 ton over the first half of 1969 This growth reflects an additional capacity of 1 28 million ton/yr brought on stream during 1969 The outlook for fertilizers is marginally more optimistic than it appeared earlier this yr Total production is expected to be 57 5 million ton in 1970 This falls short of the planned total of 62 million ton but is better than the 50 55 million ton production anticipated earlier Phosphate fertilizer production is expected to rise by over 20% over 1969 subject to availability of $H_2SO_4$ The most dramatic expansion has been in the production of potash Potassium fertilizer production in 1970 is expected to be over 45% above the 1969 level

751

**U S S R Fertilizer Production Below Target**

*Eur Chem News 19* (461), 4 (Jan 1, 1971

In the U S S R , a production increase of 8 7% in major sectors of the chemical and petrochemical industries has been forecast for 1971 Although a target production of 62 million ton/yr of fertilizers was originally set for 1970, it is now clear that this figure will not be attained until 1971, when production has been forecast to reach 61 3 million ton/yr, 10 2% above estimated production in 1970 Quality of mineral fertilizers will also be improved in 1971 to ensure higher nutrient content Consumption of mineral fertilizers totaled 46 5 million ton in 1970, and is expected to reach 50 5 million ton in 1971 Early in 1970, target fertilizer consumption in 1975 was reduced by 10 million ton to 72 million ton, and it now appears that increased production capacity will be urgently needed to attain even this reduced figure Although fertilizer usage has tripled per ha over the last 10 years, consumption is still only slightly more than half of that used in the U S A

752

**U S S R Develops Karatau Phosphate**

*Eur Chem News 19* (465), 6 (Jan 29, 1971)

A key factor behind the planned 72 million ton consumption figure for mineral fertilizers in the U.S S R in 1975 is the consistent expansion and development of phosphate deposits in the Karatau area Exploitation of the Karatau deposits has advanced rapidly since the Aksai mine was commissioned with a production capacity of 2 million ton/yr in 1969 During 1970, the first part of the Dzhanatas mine entered production with a 2 2 million ton/yr capacity, which will eventually be expanded to 9 million ton/yr In the same region, the Kok Dzhon mine will start operation soon with an operating capacity of 4 7 million ton/yr, while the neighboring Kok Su mine, currently in the planning stage, will have a capacity of 6 million ton/yr Total production of phosphate from the Karatau deposits is planned to reach 22 million ton/yr Five of the largest Karatau deposits have been estimated to contain reserves totalling some 100 million ton of $P_2O_5$, representing approximately 30% of total U S S R stocks The U S S R produced 50 million ton of phosphate in 1970

753

**U.S.S R Potash Find Heralds Chemical Growth in Turkmenia**

*Chem. Age (London) 102* (2706), 23 (May 28, 1971)

Large deposits of potash have been discovered in south Turkmenia, U S S R Construction of a pilot plant is planned in the current five yr period Chemical output in the area should show almost a 100% increase in the next five yr A sodium sulfate plant is under construction near Kara Bogaz Gol Bay Large fertilizer facilities for producing N and P fertilizers at Chardjou are also planned

754

**Soviets to Expand Fertilizer Production in New Five-Year Plan**

*Eur Chem News 20* (502), 22 (Oct 15, 1971)

The U S S R is to place particular emphasis on increasing production of phosphate and potash fertilizers in the period 1971 to 1975 Phosphate fertilizer production in 1975 will total 25 1 million ton, including 3 million ton of feed phosphates, compared with 13 4 ton in 1970 These plants fit within an overall plan to raise mineral fertilizer production to 90 million ton (22 2 million ton of nutrients) in 1975, by maintaining an 11 5% growth The structure of phosphate fertilizer production will change Triple superphosphate and complex fertilizers will make up 63 5% of production in 1975, compared with 33 1% in 1970 At the same time single superphosphate production will drop to 35 4% of the total compared with 65% in 1970 New triple superphosphate capacity will amount to 1 4 million ton/yr, new ammofos capacity to 6 15 million ton, new nitrofoska capacity to 900,000 ton/yr, new nitroammofoska capacity to 1 6 million ton, and new feed phosphates capacity to 3 million ton/yr Phosphoric acid production will be tripled during the next 5 yr to give a total production of 3 million ton/yr The wet process route will continue to provide the majority of the acid, but the introduction of larger electric furnaces will herald an increase in the production by the electrothermal route Electric furnaces with a capacity of 72,000 kWh are now in operation and new furnaces of up to 150,000 kWh will be introduced during the current 5 yr plans Kara Tau will provide 27 5% of the phosphate raw material in 1975 compared with 18 3% in 1970 It is anticipated that capital investments for building new capacities for phosphate fertilizers, sulfuric acid, and phosphoric salts, will be 1183 million roubles compared with 466 million roubles in the previous 5 yr At the same time investment in the existing industry will increase from 750 million to 1850 million roubles

755

**Production of Fertilizer in U S S R Increases**

*Chem Week 110* (6), 37 (Feb 9, 1972)

The production of fertilizer in the U S S R rose 11% to 61 4 million tons in 1971 Sulfuric acid production also increased 6% to a total of 12 7 million tons Increased production is planned for the 5 yr period (1971 75) by the installation of new equipment and the improved efficiency of labor

756

**Soviet Fertilizer Industry**

*Eur Chem News 21* (534), 10 (May 26, 1972)

One of the main achievements of the industry during the first yr of the current 5 yr plan was the improved quality of many of the products manufactured The physical properties of fertilizers were substantially improved and in terms of vol, output of highly concentrated and complex mineral fertilizers increased to 60% of total fertilizer production During 1971, capacities for the production of mineral fertilizers have been commissioned at the Chernorechensk, Novokemerovsk, and Grodno combines Ammonia plants were put on stream at the Ionava N fertilizer plant and at the Navoi chemical combine, and sulfuric acid plants at the Rovensk N plant and the Sumy chemical combine This yr, large mineral fertilizer plants will be commissioned at the Byelorussia, Novomoskovsk, Cherkassy and Maardu chemical combines, the Uvarovo and Ivanovo chemical plants, and at the Dzhambul double super phosphate plant and others Further expansion is also taking place in other sectors of the industry Examples where this has been achieved were at the Grodno N fertilizer plant A urea

unit at the Novgorod combine was commissioned in 10 months instead of 15, and a 30,000 ton/yr monocalcium phosphate plant at the Vinnitsa combine was brought on stream in 4 months in contrast to the anticipated 12 months In a similar vein a team from the Apatit combine commissioned capacities for the production of apatite-nepheline ore of 800,000 ton/yr total capacity and apatite concentrate of 300,000 ton/yr capacity, in each case in 3 months

757

**Soviet Fertilizer Production Less than Planned**

*Eur Chem News 22* (545), 6 (Aug 11, 1972)

The Deputy Minister of the Soviet chemical industry confirmed under utilization of fertilizer capacity Problems exist at the Uvarovo plant, the Sumgait superphosphate plant and the Rustavi and Novoi combines Faulty equipment supplied to the Nevinnomysk combine restricted production of complex fertilizers, replacement of this equipment will take place soon Planning errors restricted production of ammonium phosphate at the Almalyk chemical plant Additional tanks are being built there, and equipment such as blowers and pumps has been exchanged Projected production capacity is expected in the fourth quarter of this yr Reconstruction is also taking place at Kalush chemical metallurgical combine Completion is scheduled for 1973 with full capacity anticipated in 1974 Errors have also held up plans to produce granulated superphosphates at Konstantinovsk and Aktiubinsk Additional equipment for granulation is being installed that will allow capacity utilization in 1973

758

**Fertilizer Use in the United States by Crops and Areas 1964 Estimates**

D B Ibach and J R Adams

*US Dep Agri, Econ Res Serv and Statist Rep Serv*, Statist Bull No 408, 384 pp (Washington, D C, August 1967)

This report includes estimates of use of principal plant nutrients on individual crops for the 50 states, and for state parts of agricultural subregions for the 48 contiguous states, for whole subregions, and for the U S by major regions The statistics are useful in projecting potentials in crop production and in projecting demand for fertilizers

759

**The Farm Cost Situation—1968 Outlook**

*Econ Res Serv, US Dept Agr*, Bull FCS 39, Nov 1967

Supplies of N fertilizers—ammonium nitrate, ammonium sulfate, N solutions, urea, and others—that use anhydrous $NH_3$ as a basic raw material will be ample in 1968 U S plant capacity for $NH_3$ production may reach 17 million tons by the beginning of 1968, double the capacity available at the start of 1965 Despite moderately strong increases in N consumption, supply will more than equal demand and prices will level off or even decline Downward pressure on potash prices comes from continuing massive increases in Canadian productive capacity Competitive forces will determine whether or not the price reduction will be passed on to farmers Rising distribution costs may tend to offset potential price weaknesses Prices of phosphates are likely to rise in 1968 as they did in 1967 due to continuing scarcity of S Plans for expansion or erection of phosphate plants are being delayed, shelved, or discarded until the S situation eases Nitric phosphates that require no S for manufacture are under consideration Total fertilizer and plant nutrient use in 1967 68 are expected to exceed 1966 67

760

**The 1968 Micronutrient Market—Will it Boom or Bust?**

*Farm Chem. 130* (12), 22 23, 94, 96, 98 (Dec 1967)

Use of micronutrient fertilizers is estimated at 10,000 tons annually in the United States but the potential is much larger Market areas for 1968 are Zn, nearly every state, Mn, soybean belt from Ohio west to Minnesota, Fe, west of the Missouri River, B and Mo, east of the Missouri River, and Cu, northern states on soils with pH above 8 Micronutrients are available in many forms, both inorganic and organic, and from many companies Profits have been good but leadership in the sales field has changed frequently and quickly depending upon marketing programs Basic producers with well defined market development programs appear to have an advantage Market development programs contributing to sales growth have included research support and strong customer service programs

761

**Consumption of Commercial Fertilizers in the United States—Year Ended June 30, 1967 (Preliminary)**

*US Dept of Agriculture*, 11 pp (Nov 17, 1967)

Consumption of primary nutrients during 1966 67 totaled 14 million tons, an increase of 13% Consumption of N increased 14%, $P_2O_5$ 11%, and $K_2O$ 13% Mixed fertilizers supplied 56 7% of the total, compared with 56 9% a year earlier The primary nutrient content of mixed fertilizers averaged 37 7% compared with 36 5%, and the average grade was 8 4-16 6 12 7 compared with 8 1 15 8 12 6 a year earlier Illinois remained in top position in consumption of primary nutrients with 1 49 million tons, Iowa was second with 1 16 million tons, although Iowa showed a 36% increase over the previous year compared with a 14% increase for Illinois Of the materials consumed by direct application, KCl increased 26%, $NH_3$ increased 24%, $NH_4NO_3$ increased 19%, triple superphosphate increased 13%, and N solutions increased 10% over the preceding year Normal superphosphate showed a 10% decrease

762

**Sulfur Goes Critical, Stockpiles Gone**

*Chem. Eng News 45* (53), 32 (Dec 18 1967)

Producers' stocks of S are at their lowest point in 35 yr Mine production has been pushed to the limit and declines in production are forecast as the mines become older New reserves have not been located despite extensive exploration Increased supplies must come from higher cost sources and from recovered S Serge L Ievitsky, manager of marketing research for Texas Gulf Sulphur lists five alternatives for S users (1) abandon expansion plans, (2) curtail production, (3) close plants, (4) convert to more costly raw materials, and (5) experiment with new processes Prolonged shortage of S may endanger corporate investments of the S using industries, affect the economic growth of the country, imperil defense requirements, and jeopardize the entire world food production program

763

**The Fertilizer Outlook 57 Million Tons by '75**

*Farm Chem. 131* (1), 29 31 (Jan 1968)

Based on a survey of leading U S fertilizer companies, production, consumption, and marketing projections to 1970 and 1975 are given Comparing 1975 projected production with that of 1966, urea tonnage will increase 150%, $NH_3$ 100%, and N solution 85% Ammonium sulfate and ammonium nitrate show lesser increases Production of normal superphosphate will continue to decrease, most emphasis will be on ammonium phosphates Elemental P production in 1975 is expected to approach 890,000 tons of $P_4$ Wet process acid

will jump from 3 5 to 6 9 million tons of $P_2O_5$ Potash production may reach 11 million tons of $K_2O$ or 6 6 million tons more than will be consumed Marketwise, the trend is to more handling in bulk liquids, suspensions, and dry blends Over 5000 bulk blending plants, 1060 suspension plants, and 2960 liquid plants will be operating in 1975 according to the survey Still, over 18 of the 56 7 million total tons of fertilizer that will be consumed in 1975 will be marketed in bags At least 3000 company owned and staffed retail outlets and 1400 farm service centers will be in operation in 1975 compared to 820 and 575 in 1967

764
**Trends in the Manufacture of Ammonium Nitrate**
Clyde Reeder (Armour Agr Co , Decatur, Ga )
*A I Ch E Nitrogen Fertilizer Symp* , St Louis, Mo , Feb 1968, Preprint 12B
The title subject is reviewed and the following conclusions are reached Production of $NH_4NO_3$ will increase at a rate of 7 8%/yr with solutions increasing faster than solids The supply demand price structure will remain favorable Larger amounts of solution and raw material $NH_3$ will be shipped by barge Bulk shipments of solid $NH_4NO_3$ will continue to grow Use of polyethylene bags will continue to increase Processes will be improved to decrease the size distribution of prills and increase dimensional stability Production of complete fertilizers by mixing $NH_4NO_3$ with other fertilizer materials may become more important (60 references, 4 tables, 4 figures)

765
**Ammonium Polyphosphate Fertilizer in Ample Supply**
*Oil, Paint, Drug Reptr 193* (11), 43 (Mar 11, 1968)
Although still in its infancy, this member of the recent high-concentrate additions to the phosphate family of fertilizers seems to be in for a good though slow start Product has been in ample supply for the first time in three yr, according to sources in the trade However, they are quick to point out that the level of supply of this product is nowhere near that of some of the other concentrated phosphates, especially triple superphosphate and diammonium phosphate Material in 10 34 0 concentration is selling at between $68 74/ton, f o b , Monroe and Geismar, La The fertilizer is suitable for direct application or for blending with other solid fertilizers It can also be dissolved to make liquid 10 34-0

766
**The Fertilizer Supply 1967-68**
John N Mahan
*Agr Stabilization & Conserv Serv , USDA*, Washington, D C , 17 pp (Apr 1968)
The U S supply of fertilizer materials for the fertilizer yr that began July 1, 1967, will amount to 16 million tons of primary nutrients, an 8% increase over last yr Net supplies of N will increase by 16% and $P_2O_5$ will increase by 9%, whereas $K_2O$ will decrease by 5% from the preceding yr Over half of U S exports of plant nutrients (57%) went to countries in which the Agency for International Development (AID) has active agricultural programs They received 58% of the exported N, 77% of the exported $P_2O_5$ (excluding phosphate rock), and 31% of the exported $K_2O$ Exports of phosphate rock, $NH_3$, and AID materials are expected to gain over last yr Industry representatives were more pessimistic in mid winter than they had been in the last decade The tight supply of N had ended Phosphate production had not increased in the same proportion as capacity because of high inventories and limited storage capacity Potash shipments had slowed because of inventories in the field (11 tables)

767
**The Fertilizer Industry**
*Stanford Res Inst J* , No 19, 7 (Mar 1968)
The U S is the largest individual producer and consumer of fertilizers, accounting for about one fourth of total world production and consumption The U S is also the largest producer of basic raw fertilizer materials, and is unique because of its combined resources of low cost natural gas, phosphate rock, potash, and S It currently produces about 40% of the world's supply of phosphate rock (the U S S R is a close second), and in 1965 produced about 21% of the total potash supply Leadership in phosphate should continue, but potash output is declining as mines in Canada and the U S S R expand Natural gas continues to be abundant, and increasing supplies of S from recovery operations should compensate for dwindling Frasch resources In terms of export, the U S plays a minor role in world trade of N It does export about 23% of its potash output, but this share will decline as Canada increases its already large output The U S is a much more significant factor in phosphate exports In 1966, exports of phosphate rock, which were about 25% of domestic production, represented 26% of total world trade and were second only to Morocco by a slight margin The U S is also the world's largest exporter of phosphate fertilizers Consumption of fertilizers in the U S in 1966 reached a level of about 34 million tons, which contain over 12 million tons of plant nutrients Consumption on a gross basis has almost doubled since 1950, while nutrient use has tripled Since 1950, growth of total nutrient consumption has averaged over 7%/yr, with almost 9%/yr being realized since 1960 Of the three nutrients, N has shown by far the highest rate of growth since 1950, with an average annual rate of over 11%, compared with phosphate ($P_2O_5$) at about 4% and potash ($K_2O$) at about 7% Nitrogen growth is expected to continue for some years at a rate above the other nutrients, although at a somewhat lower rate than before A study by the U S Dept of Agriculture indicates that if 300 million acres of crop land are available for food production and if an increase of 50% over 1960 64 production will satisfy the U S production needs for 1980, approximately 27 million tons of plant nutrients will be required This amount is more than double the 1966 fertilizer use, which amounted to about 12 million tons

768
**U.S Production of Phosphate Rock—1967**
Richard W Lewis
*Mineral Industry Surveys—Phosphate Rock, Advance Summary* U S Dept of Interior, Bureau of Mines, Washington, D C , 4 pp (June 3, 1968)
Marketable production of phosphate rock in 1967 was 2% above that of 1966, and 95% of this production was sold or used by producers Much of the rock used captively went into the production of superphosphates which were in oversupply and stock inventories were increased Apparent domestic consumption increased a bare 2% over that of 1966, but exports of rock increased by 9% Producers' stocks of marketable rock at year's end were 10,221,000 short tons (3,127,000 tons $P_2O_5$) compared with 10,118,000 tons (3,118,000 tons $P_2O_5$) at the end of 1966 World production of marketable rock in 1967 reached an estimated 87 million short tons, an increase of about 10% over 1966 U S production accounted for about 46% of the total (44% in 1966), the U S S R accounted for 21%, Morocco 14%, and Tunisia 5%

769
**The Outlook for Fertilizers**
Russell Coleman (Sulphur Inst, Washington, D C)
*Chem Eng Progress 64* (7), 68 71 (July 1968)
A study was made by the Sulphur Institute in cooperation with State Agricultural Experiment Stations in which the amount of fertilizer required to meet experiment station recommendations was determined for various crops on a state by state basis Then an estimate was made of how soon US farmers could be expected to use the recommended amounts, with consideration of the principal factors which motivate farmers to buy or not to buy fertilizers Forecasts were made on the basis of these data Consumption should increase at an annual compounded rate of 12 8 8 for N, $P_2O_5$, and $K_2O$ through 1970 At that time, 60% more N, 40% more $P_2O_5$, and 40% more $K_2O$ should be consumed than in 1966 The annual growth for N, $P_2O_5$, and $K_2O$ is not expected to increase as rapidly in the 1970 decade as it did in the 1960's The midwestern and southwestern states (central region) will increase their use of fertilizer at a more rapid rate than either the eastern or far western states By 1970, the central region will be using about 70% of the U S total By 1970 the N and $P_2O_5$ supply-demand should be in reasonably good balance, but surplus $K_2O$ capacity will still exist

770
**The Outlook for Fertilizers**
H S Ten Eyck
*Agr Chem. 23* (18), 14-16 (Aug 1968)
A 15% reduction in present rate of fertilizer production in the U S would put supply back in balance with demand according to the author An across the board cut is not feasible since most plants must operate either at nearly full capacity or not at all Most likely, plants with the highest cost of production (older and smaller plants) will be forced out of production by low prices for fertilizer products In the future, plants will be located where raw materials are cheapest and will remain cheap For ammonia this means countries like Venezuela, Libya, Saudi Arabia, and Indonesia Ammonia would be transported in special ships to ports and then fed into pipelines for redistribution Elemental P will be produced at the mine site and shipped to the consuming area for conversion to phosphate fertilizer A breakthrough in atomic power is imminent and could really revamp the fertilizer industry

771
**Consumption of Commercial Fertilizers in the United States Year Ended June 30, 1968 Preliminary Report**
*U S Dept Agr*, Statistical Reporting Service, Crop Reporting Board Washington D C, 11 pp (Oct 23, 1968)
Total consumption of N, $P_2O_5$, and $K_2O$ was 14 8 million tons, a 6% increase over the preceding year Mixed fertilizers provided 8 million tons of N, $P_2O_5$, and $K_2O$ which was practically unchanged from the preceding year Materials provided 6 7 million tons of N, $P_2O_5$, and $K_2O$, a 13% increase over the preceding year Total N consumption was 6 6 million tons, an increase of 9% Total available $P_2O_5$ was 4 4 million tons, an increase of 1% Total $K_2O$ was 3 8 million tons, an increase of 5% The total fertilizer consumption was 38 3 million tons, an increase of 3% California, with a consumption of 3 5 million tons, was the leading state in terms of total tonnage consumed Florida was the leading state in consumption of mixed fertilizer with 1 5 million tons The average grade of mixed fertilizers was 8 6 16 7 12 9 compared with 8 3 16 6 13 0 a year earlier Mixtures accounted for 55 1% of the total tonnage of all fertilizers, compared with 57 0% a year earlier

772
**1968 Fertilizer Summary Data**
N L. Hargett (Tennessee Valley Authority, Muscle Shoals, Ala)
*National Fertilizer Development Center, TVA*, Muscle Shoals, Ala 124 pp (1968)
This biennial revision summarizes U S consumption of fertilizers and plant nutrients through fiscal year 1968 In addition to nine regions and the continental U S, fertilizer use patterns are detailed for individual states Information summarized includes tons of N, $P_2O_5$, and $K_2O$ consumed in mixtures and in total, tons of various materials used for direct application, consumption of dry compared with fluid fertilizers, seasonal consumption, 10 leading grades of mixed fertilizers for 1950, 1960, 1965, 1966, and 1967 average analysis of mixtures harvested acreage and average rate of fertilization, lime used compared with needs farm income from crops and from livestock and farm expenses for fertilizer, feed, and labor Tonnage of TVA produced fertilizers shipped to each state in FY 1965-68 also is listed

773
**Status of Domestic Phosphate Rock**
*Oil, Paint, Drug Reptr 195* (7), 31 (Feb 17, 1969)
Domestic production of marketable phosphate rock broke all records in 1968, according to the Bureau of Mines, U S Department of the Interior Approximately 41 6 million tons of phosphate rock valued at $269 2 million was produced Florida was the leading producer The remainder was from California, Idaho, Montana, North Carolina, Tennessee, Utah, and Wyoming The major use was for fertilizer Prices are considered by those in the industry to be in firm shape with no changes expected any time soon

774
**Micronutrient Fertilizer Survey Consumption of Commercial Fertilizers in the United States—Fiscal Year Ended June 30, 1968**
*U S Dept Agr, Statistical Reporting Serv*, Washington, D C, p 5 (May 12, 1969)
Data were collected for the first time on micronutrients sold for fertilizer use The statistics were reported by all primary producers supplying micronutrients for ultimate use in both mixed and direct application fertilizers The following data are in short tons, elemental basis, total United States, fiscal year 1967-68 Cu – 2400 4, Fe – 3259 5, Mn – 10,669 5, Zn – 14,495 0, Mn – 79 6 The report gives a breakdown of the data on a regional basis

775
**When Will Ammonia Turn the Corner**
*Farm Chem. 132* (6), 28 34 (June 1969)
When will ammonia turn the corner? At the earliest, 1971 and possibly not until 1975 That's the consensus of opinion *Farm Chemicals* received in interviews with industry leaders, TVA, Stanford Research Institute, and Arthur D Little, Inc Lured by lower production costs and predictions that use of N fertilizers would increase at 15 20% annually through the early 1970's, there was almost a stampede to get a "new technology" plant on stream In 1966 there were 88 ammonia plants in the U S, with a total capacity of 11 million tons, in 1967, 98 plants with a total of 13 4 million tons The 1967-68 fertilizer year punctured the balloon Use of N which had been climbing annually at about 12% slowed to 9% Producers have throttled back–some deliberately, some because of production problems, and some not at all In 1968, 12,093,000 short tons of synthetic ammonia were produced, barely above the

11,870,000 figure for 1967 A member of Economics Task Force of the Agricultural Nitrogen Institute, predicts t e gap will narrow about 1974 "We're projecting capacity at about 19 million tons if plants that have been shut down stay down, total consumption at 16 5 million We look for an annual growth of 5% in fertilizers, 8% in industrial uses" *Farm Chemicals* estimates current plus 2,762,000 tons of capacity currently shut down Tom Blue of Stanford Research Institute believes "very few, if any" of the closed plants will be put back into operation

776

**Potash Current Consumption and Supply**

*U S Dept Commerce Quart Rept 16* (3), 6 7 (Sept 1968)

U S Potash production reached a peak in 1966 while consumption of potash materials in the U S continued to grow at an annual rate of about 3% during 1967 and 1968 Preliminary data indicate that U S consumption during the first half of 1969 may be about 4% below the first half of 1968 The deteriorating position of U S production *vs* U S consumption is due largely to the unusually rapid expansion of production facilities in Canada In 1964, Canada produced approximately 1 44 million short tons of marketable potash materials In each year from 1965 through 1968 this figure grew annually by 66%, 43%, 19%, and 19% to a total of 4 82 million short tons in 1968 During this same period, U S imports have increased almost three fold, from 1 25 million short tons in 1964 to 3 7 million short tons in 1968 About 90% of U S imports are from Canada Production for 1968 placed Canada second (to USSR) in total potash production At year's end, reported Canadian capacity in operation was about 8 45 million short tons of potash annually By the end of 1971, this annual capacity is expected to reach 12 2 million short tons Elsewhere, it has been estimated that production world wide has increased about 28%, from 22 4 million short tons in 1964 to 28 6 million short tons in 1968 In addition, active investigation of substantial new potential potash deposits is being conducted in Australia, Brazil, the Congo, Ethiopia, Jordan, Morocco, and the United Kingdom This all points to a substantial world over supply, not only now, but perhaps well into the 1970's The over supply situation has not been without its effect on the domestic market The weighted average price at New Mexico mines during the fertilizer years ending June 30, 1965 and 1966 was 40 1/4 cents per unit ton (20 pounds of muriate of potash assaying 60% $K_2O$) At the end of the next three successive fertilizer years, the price was 38 1/3 cents, 28 cents, and 26 08 cents, respectively After almost two years of investigation, the U S Treasury has reportedly found that large quantities of muriate are being "dumped" in the United States by companies in Canada, France, and West Germany Canadian companies exporting potash to the United States are largely U S-owned At present, muriate of potash is imported into the United States free of duty If the Tariff Commission independently finds that the alleged "dumping" activity is injuring U S industry, a penalty duty will be imposed

777

**Fertilizer Growth TVA Sees a Drop Down to 5 Percent.**

*Oil, Paint, Drug Reptr 196* (17), 7, 29 (Oct 27, 1969)

Fertilizer growth trends are slowing down in the U S Though annual tonnage gains will still be impressive, the growth rate of plant nutrients over the next ten years is expected to average only 5% yearly This compares with an historical rate of 7 5% and increases of 12% and 13%, respectively, in the booming years 1966 and 1967 This is the outlook presented by Tennessee Valley Authority's National Fertilizer Development Center at Muscle Shoals, Ala , in the center's annual report titled "Fertilizer Trends" The report cites longer term estimates that over 25 million tons of plant nutrients will be consumed in the U S by 1980 While this represents a modest 5% annual growth rate, an average of almost 1 million additional tons of plant nutrients will be used/year if this increase is achieved Total world N capacity stood at over 41 million tons and is scheduled to exceed 60 million tons by 1972—an increase of 50% in four years World capacity in 1968 of phosphate fertilizer was about 27 million tons, and 9 million additional tons are scheduled to be in place over the next four years Scheduled capacity additions indicate that almost 27 million tons of potash will be installed by 1972, an increase of 6 7 million tons above present world levels

778

**Consumption of Commercial Fertilizers in the United States - Year Ended June 30, 1969**

*Preliminary Report U S Dept Agriculture Statistical Reporting Service, Washington, D C* (Oct 27, 1969), 11 pp

For the 1968–69 year, the total consumption of fertilizers in the U S was 38,701,000 tons of material compared with 38,743,000 tons for the previous year The total primary nutrients amounted to 15,294,000 tons compared with 15,033,000 tons for the previous year Mixed fertilizers accounted for about 53% of the total primary nutrients consumed compared with about 54% for the previous year The average grade of mixed fertilizer was 9 0–17 2–12 60 Consumption of secondary and micronutrients was 1,318,000 tons, a decrease of about 19% from the previous year, although the consumption of Zn (the only micronutrient showing a gain) increased by about 37% to a total of 20,000 tons, Zn basis

779

**Potash Production and Consumption**

*Pit Quarry 62* (7), 112 (Jan 1970)

While domestic production in the 1969 crop year of marketable salts (2 8 million tons $K_2O$ equivalent) was 1 7% below that of the 1968 crop year (and 15% below the record level of 1967), producers sales of 3 0 million tons ($K_2O$ equivalent) valued at $79 7 million was 5% better than the preceding year, and only 5% below the 1967 record A record level of exports was established, according to Bureau of Mines data, and imports, although 11% below the record level of the 1968 crop year, were still the second highest on record This contributed to the fact that apparent consumption of 4 2 million tons ($K_2O$ equivalent) was also at the second highest level, and 4 2% under the 1968 record Price softening in the 1969 crop year paralleled that in phosphate The total domestic sales value of $79 7 million was down 6% from the $85 1 million of the preceding year, but the average price/ton of $14 96 was down nearly 11% from the 1968 crop year figure

780

**General Fertilizer Situation**

John N Mahan (U S D A , Washington, D C )

*The Fert Supply 1969-70*, 24 pp (Mar 1970)

The domestic fertilizer supply for 1969 70 is estimated to be 11% above last yr Plant nutrients N, $P_2O_5$, and $K_2O$ supplies are up 13, 6, and 12%, respectively Inventories of materials reported were lower in December 1969 than for the previous yr Production of most N materials for the first six months were ahead of last yr, whereas only $H_3PO_4$ of the phosphates

showed an increase Imports of potash were up for the first six months but are expected to be reduced drastically during the latter part of the yr In world production of plant nutrients the U. S produced 25% of the N, ranked as number one in production of phosphate, and third as a producer of potash

781
**Fertilizer Supply Seen at its Highest Level**
*Oil, Paint Drug Rep 197* (14), 23 (Apr 6, 1970)
American farmers will have the largest reserve of plant nutrients to draw upon this yr of any time in history Net domestic supplies of fertilizer materials for the 1969 70 growing season are calculated by the government at 16 8 million tons of nutrients This is 11% more than last yr's supply Breaking down the total picture into its three principal components, the Department of Agriculture estimates supplies of N at 7,869,000 tons N, up 13% from last yr, P at 4,558,000 tons of $P_2O_5$, up 6%, and K at 4,423,000 tons, $K_2O$, up 12% In its annual report on the fertilizer situation, the department has these comments on the general situation (1) Inventories of anhydrous $NH_3$, N solutions, and all phosphatic materials were lower in December 1969 than a yr earlier Inventories of $NH_4NO_3$ and $(NH_4)_2SO_4$ were higher Comparable data on $K_2O$ are not available (2) Production rates for all N materials, except ammonium sulfate, were ahead of last yr during the first half of the fertilizer yr Rates during the second half are expected to be above those of last yr, but slackened from those of the first half (3) Ammonium phosphates and $H_3PO_4$ are the only $P_2O_5$ materials produced during the first half at a rate above last yr Phosphoric acid is the only one of these materials expected to show a decline at the end of the yr

782
**Urea Demand Builds Up**
*Oil, Paint Drug Rep 198* (3), 18 (June 20, 1970)
The market for urea, already past the three million ton mark, is in for a continued bright future Demand is expected to top 5 5 million lb annually within five yr, with a healthy average growth rate of 13%/yr, and this vol should absorb the anticipated buildup in capacity All major end uses are expected to contribute to this growth, with liquid urea and feed material leading the way Even the most conservative industry observers predict nothing less than a 10% annual increase, and the more optimistic believe markets will grow at a rate better than the 15%/yr averaged over the past ten yr Urea's biggest market, and probably its strongest, is as a liquid, primarily for use in N solutions Liquid urea output has topped a million ton/yr, compared with a little over 650,000 tons in 1966 The solutions' rate of growth has surprised some researchers with the major producers who had not expected such a surge Imports have been surprisingly active this yr During January April, 240,000 tons have arrived from overseas, compared to 114,000 ton in the same months last yr

783
**Urea's Long Term Prospects Bright**
*Oil, Paint Drug Rep 198* (8), 18 (Aug 24, 1970)
While long term prospects for urea appear bright, the recent market for solid fertilizer urea has been off Stocks are large, and industry sources report continued substantial discounts from producers' price schedules In the fertilizer season July 1969 through June 1970, domestic markets for solid urea scored the least growth of any of the major N fertilizer products, gaining only 1% from the previous season Inventories at the end of June were 77% higher than on June 30, 1969 The smaller export vol of recent months, along with the production–domestic use imbalance, has contributed to the buildup in stocks Marketers of domestic material are having to compete more with low priced imports this yr Nearly 300,000 short ton of foreign material arrived here between January and June, almost double the imports for the same period last yr Most of the increase is from the Netherlands, Belgium, and Italy It has been noted in the trade that some imports have been landed for not much more than $30/ton Nitrogen solutions of 32% N or less, of which urea is a major constitutent, gained 16% in domestic disappearance during the 1969/70 fertilizer yr Looking at the overall urea outlook for the next few yr, the general industry consensus seems to be that markets will grow a healthy 10 15%/yr through 1974

784
**Consumption of Commercial Fertilizers in the United States Year Ended June 30, 1970 Preliminary Report**
*U S Dep Agr Statistical Reporting Service, Crop Reporting Board, Washington, D C, 11 pp (Oct 27, 1970)*
Total fertilizer consumed in the United States and Puerto Rico during the yr ended June 30, 1970, is placed at 39 4 million tons by the Crop Reporting Board This was 1% more than the previous yr Changes in consumption from last yr varied by regions with the North Central, Mid Atlantic, and Southwest showing increases while the South and New England were down Illinois remained the leading state in terms of total tonnage used at 3 2 million, with California second with 3 0 million Fertilizer use was unchanged from last yr in New Hampshire and Mississippi, while in 27 of the remaining states there was an increase Mixed fertilizer for both farm and nonfarm use amounted to 20 8 million tons, down 2% from the 21 2 tons used a yr earlier Mixtures accounted for 52 8% of the total tonnage of all fertilizer for the 1969 70 yr, compared with 54 5% the previous yr The primary nutrient content of mixed fertilizer increased to 39 40% compared to 39 02 a yr earlier

785
**1970 Fertilizer Summary Data**
N L Hargett (Tennessee Valley Authority, Muscle Shoals, Alabama)
*National Fertilizer Development Center*, Muscle Shoals, Alabama, 126 pp (Jan 1971)
This biennial revision summarizes U S consumption of fertilizers and plant nutrients through fiscal year 1970 Fertilizer use patterns are detailed for individual states, nine regions, and Continental U S Summary includes tons of N, $P_2O_5$, and $K_2O$ total used and in mixtures with average analyses, tons of various material used for direct application, consumption of dry and fluid materials, seasonal consumption, 10 leading grades of mixed fertilizer for 1950, 1960, 1965, 1968, and 1969, harvested acreage and average rate of fertilization, lime needs and use, farm income and expense for fertilizer, lime, feed, labor, and operating expense, and tons of various materials shipped by TVA to each state for demonstration program in fiscal years 1967 1970

786
**Trends in Phosphate Rock Production and Consumption**
*Pit Quarry 63* (7), 100 (Jan 1971)
The decline in domestic production of marketable phosphate rock initiated during the 1969 crop yr, continued through the 1970 crop yr and registered a decrease of 7% from the preceding 12 months It was also an 11% drop from the industry's record output of the 1968 crop yr Marketable

production for the 12 months ended last June 30 was 37 3 million (11 6 million $P_2O_5$ content), valued at $203 million That value was 13% lower than for the preceding crop yr, and reflected the decline for the third consecutive yr in the average value per ton Prospects are not sharply defined with respect to the current crop yr, since producers are reported to have already started curtailing production in an effort to reduce stocks and to balance supply with demand However, loss of foreign markets has been an obstacle to reduction of stocks The long range picture, as drawn in a recent projection by the Bureau of Mines, should be brighter, at least with respect to domestic consumption However, in view of the fact that imports rose during the past two years while exports dropped, the position of domestic producers may not be comparably improved

787
**Marketable Value and Consumption of Potash**
*Pit Quarry 63* (7), 100 (Jan 1971)
The domestic production of marketable potash salts during the crop yr ending June 30, 1970, according to the Bureau of Mines final report on that period, was down 2% to 4 8 million tons (2 7 million $K_2O$ equivalent) which was valued at $83 3 million The drop last yr brought the level of marketable production down nearly 17% from the record peak set in crop yr 1967 However, the average sales value of $16 78/ton of K salts was the highest since the record year of 1967 The Bureau of Mines also reports that imports of potash in the 1970 crop yr broke all records, and amounted to 4 5 million tons (2 7 million $K_2O$) On the other hand, exports of domestically produced potash at 674,000 tons ($K_2O$) were the smallest of the past five crop years With the above factors in mind, the record breaking apparent consumption of potash materials, up 10% to 8 2 million tons (4 8 million $K_2O$ equivalent) loses a little of its luster as far as the condition of the domestic producer is concerned At least a balancing of exports and imports, as well as of supply and demand, will be prime factors in future growth of domestic production

788
**Fertilizer News**
*Fert Inst*, Washington, D C , p 1 (Feb 26, 1971)
U S fertilizer production and domestic disappearance are holding above 1 yr ago in figures released today by The Fertilizer Institute The industry association's Fertilizer Index shows that for the 7 month period, July 1970–Jan 1971, production for all key products was up 2%, domestic disappearance was up 3% over 1 yr earlier Nitrogen products showed heaviest production and movement with increases of 7% Phosphate products also showed increases But, production of potash was down 22% and domestic disappearance dropped 19% Fertilizer inventories were higher at the end of January 1971 compared to January a yr ago–except for phosphates Inventories of N products rose 15%, potash inventories were 27% higher, and multinutrient products showed a 5% inventory increase The phosphate product inventory was down 2% from January 1970 Active movement of ammonium sulfate in January stands out among the N products Domestic disappearance for the product was up sharply in January over January '70, and was 24% ahead of 1 yr ago for the July–January period

789
**Stocks of Surplus Sulfur Increase**
*Chem. Week 108* (9), 51 (March 3, 1971)
The Bureau of Mines reports that at the end of '70 total U S stocks hit 4 04 million long tons, up 17% from '69's 3 46 million long ton Yr-end '70 stocks were equal to about a 6 month supply The inventory buildup was entirely in Frasch stocks Yr-end totals Frasch inventories 3 95 million long ton, recovered stocks 84,819 long ton Sulfur producers got some encouragement from a mild upturn in December business Shipments hit 725,088 long ton–the highest monthly total last yr But real recovery depends on improvement in the general economy and in the phosphate industry, which is the largest S user The S producers' big problem last yr was that domestic and foreign markets failed to expand commensurately with production

790
**The Fertilizer Supply 1970-71**
J N Mahan
*Agr Stabilization & Conservation Service, U S Dep Agr*, 23 pp (Washington, D C , Apr. 1971)
Production rates for all N fertilizers, except $(NH_4)_2SO_4$, during the first 6 months of the fertilizer yr were ahead of last yr, with the largest increases being shown for N solutions and urea Production rates for N fertilizers are expected to continue at about the same levels during the next 6 months Production of wet process $H_3PO_4$ during the first half of the fertilizer yr was about 20% more than in the same period last yr Net domestic supplies of N, $P_2O_5$, and $K_2O$ in 1970-71 are expected to total 18 million tons, which is the largest quantity ever, and is 6% more than last yr Capacity to produce N and $P_2O_5$ exceeds the anticipated demand by farmers Production can be increased significantly if actual demand in excess of anticipated demand can be detected early enough However, the late spring and the resulting slow movement of fertilizers can cause producers to cut back production unless movement starts soon (13 tables)

791
**Fertilizer Turnaround, Overwhelming Demand Encourages Industry**
*Oil, Paint Drug Rep 199* (17), 5, 24 25 (Apr 26, 1971)
Several weeks of ideal weather in the Midwest corn belt states have spurred what one industry observer calls overwhelming demand for most fertilizer products Soaring sales, after a number of sluggish months, have many enthusiastic trade spokesmen talking in terms of a possible industry profit for the current fiscal year after a long period in the red There is now every indication that the business turnaround indicated in the latest set of Fertilizer Institute statistics is firmly established The sudden and early movement into the peak demand period is, in fact, straining the industry's ability to get material to market Shortages are cropping up on some products, and delayed shipping schedules are widespread Routine seasonal transportation shortages appear worse this yr Although several companies report only slightly more than normal difficulties in obtaining adequate rail car and truck transportation, one trade spokesman feels that the worst logistics problem since 1965 may be at hand Fertilizer Institute's just issued financial data for 1970 show a reported $29 3 million net income before interest and taxes on $2 16 billion in net sales of fertilizers and related products This follows a major loss in 1969 However, the current heavy demand will have to be sustained in the weeks ahead to compensate for a lackluster performance in earlier months Domestic disappearance of all major fertilizer products for the period of July 1970 February 1971 was up only 2%, compared with the July February period a yr earlier Export markets have not done well either With several exceptions, exports of most fertilizer products were down in 1970 from 1969 levels If transportation problems develop into a real logjam, it is very

possible that much potential business may be lost, with farmers making do with what fertilizer they can obtain and then rushing to get their crops in early Another problem that could seriously hamper significant industry improvement is that of price Particularly disappointing to the trade are prices on phosphates Potash, after very poor performance earlier (down 21% in domestic disappearance of U S and Canadian material during July February), is also in heavy demand now As for N, direct application products are selling well at the present Demand for anhydrous ammonia is described as tremendous Ammonium sulfate is another item experiencing heavy early demand This unprecedented early movement of ammonia has created a very tight situation for trucks to move material from producer terminals to retail outlets, and several companies are worried that if they can't get their shipments out fast enough to meet farmers' needs, they may end up with material in inventory

792
**Commercial Fertilizers Consumption in the United States Year Ended June 30, 1970**

*U S Dep Agr Statistical Reporting Service, Crop Reporting Board, Washington, D C*, 26 pp (May 1971)

Fertilizer consumption in the U S and Puerto Rico during the yr ended June 30, 1970 is 2% above the previous yr All regions showed increases over the previous yr except New England, South Atlantic, and East South Central Primary plant nutrients (N, $P_2O_5$, and $K_2O$) usage was 16 1 million tons, 4% higher than a yr earlier Nitrogen usage rose 7% to 7 5 million tons, $P_2O_5$ declined 2% to 4 6 million tons, and $K_2O$ was up 4% to 4 0 million tons Mixed fertilizer containing two or more primary nutrients accounted for 52 9% (1% below 1969) Primary plant nutrient materials applied directly increased, accounting for 43 8% of total Secondary and micronutrient material represented 3 3% of the total The average analysis of all mixed fertilizer increased N 9 25, $P_2O_5$ 17 69, and $K_2O$ 12 71% (8 95–17 53–12 53%, respectively for 1969) Consumption of each kind for regions and states is given

793
**Commercial Fertilizers Consumption in the United States by Class (Dry Bagged, Dry Bulk, Liquid) Year Ended June 30, 1970**

*US Dep Agr, Statistical Reporting Service, Washington, D C*, 7 pp (June 1971)

Dry bagged fertilizer consumption was 12 1 million tons in 1969-70 which corresponded to 32% of total fertilizer use, a decrease of 1 million tons compared with 1968 69 Dry bulk fertilizer consumed was 15 8 million tons, of which 9 million tons was mixed fertilizer Dry bulk materials and mixtures accounted for about 42% of total fertilizer use Liquid fertilizer used in 1969 70 was 10 million tons, corresponding to 26% of total fertilizer use and representing a 12% increase over 1968-69 The average nutrient content of liquid mixed fertilizers was 32 4% compared with 31 2% in 1968 69 The largest consumption of liquid fertilizers occurred in the West North Central states (3 25 million tons), the region which also showed the largest consumption of dry bulk fertilizers (3 72 million tons) The largest consumption of dry bagged fertilizers (3 million tons) occurred in the South Atlantic states

794
**Fertilizers Make Their Move**

*Chem. Week 108* (24), 20 (June 16, 1971)

Indications are that N consumption for the fertilizer yr 1970 71 exceeded the 1969 70 yr by at least 7%, possibly as much as 10% Consumption of P was up, but not as much as N Best estimates now project a 3 5% boost in P use Potash sales, however, ran counter to the trend for N and P Some observers believe that potash ran as much as 5% behind 1969 70 Despite the sharp increase in sales and higher prices, fertilizer marketers are looking forward to relatively modest increases in profits Higher costs, especially for transportation seem to be the big restraint on profits even though prices are generally higher And producers are clearly worried about the impact that natural gas costs will have on N fertilizers Mainland China may provide a new market for domestic producers under newly liberalized federal trade regulations All fertilizers except ammonium nitrate are expected to be allowed to be sold to China International Commodities Export Corp estimates that China could spend upwards of $50 million annually for U S fertilizers

795
**Consumption of Commercial Fertilizers in the United States for Fiscal Year Ended June 30, 1971 Preliminary Report**

*US Dep Agr, Washington D C* 11 pp (Oct 27, 1971)

Domestic consumption is estimated at 41 million tons,–a 4% increase over the preceding yr Consumption was unchanged or higher in all but seven states Illinois continued as the leader in terms of total tonnage (3 3 million) which was only slightly above that of California (3 2 million) The average percentage of N $P_2O_5$ $K_2O$ contained in all fertilizers (excluding secondary and micronutrients) was 19 92 12 03 10 50 compared with 19 48 11 94 10 54 a yr earlier Mixed fertilizers accounted for 52 9% of total tonnage,–the same proportion as last yr The total tonnage of mixed fertilizers (21 7 million) was up 3% from last yr The average primary nutrient content of mixtures was 40 37% compared with 39 65% last yr Direct application primary nutrient materials totaled 18 1 million tons,–an increase of 4% Nitrogen materials (excluding natural organics) used for direct application increased by 6%, whereas phosphate materials decreased by 2% and potash materials rose by less than 1% Consumption of the micronutrients Cu Fe, Mn, Zn, and Mo all declined The largest micronutrient tonnage was Zn (16,543 tons, Zn basis compared with 17,155 tons a yr ago) followed by Mn (12,438 tons, Mn basis, compared with 13,505 tons a yr ago)

796
**Ammonium Sulfate's Increased Demand Causes Shortage**

*Oil, Paint Drug Rep 200* (20) 7 21 2 (Nov 15, 1971)

When exports of ammonium sulfate (AS) to India of some 600,000 to 700 000 tons/yr stopped in 1970, producers of AS were not edified The resulting oversupply led to price cutting As a result of drastically reduced prices, many fertilizer blenders began using AS as their source of N rather than customarily used, but more expensive N solutions Demand and prices strengthened The coal strike has shortened supplies to the point where certain coke ovens that consumed 10,000 tons of coal/day are now getting 1500 ton/day As a result current byproduct ammonium sulfate output from coke oven operations–which totaled, according to Bureau of Census 595,000 ton last yr–is quite weak, and will continued to be so for the duration of the coal strike Through July of this yr, AS exports amounted to 255 552 short tons, valued at $4,387,284, as against 217,913 ton, valued at $4,053 242, through July of last yr Exports during the first six months are traditionally less than the second half, since it is during the first half that the U S has its season and exerts its strongest demand for AS Second half export statistics for this yr are expected to be significantly ahead of those for last yr Total

AS production through August of this yr was 1 18 million tons Imports–mainly from Canada–for the same period came to 156,592 ton, valued at $3 6 million Therefore, ignoring exports, total U S availability through August was 1 33 million tons As for demand, the Fertilizer Institute reports that AS, as reported by primary producers, was the front runner for the quarter ending September 30, 1971, in terms of percentage increase–153%–in domestic disappearance over last Fall Domestic disappearance of AS during August of this yr was 281% greater than during the same month in 1970, and in September of this yr domestic disappearance of AS was 86% greater than during September of last yr The use of AS as the source of N, since it is a dry material, gives the blenders a wider range of phosphatic materials to choose from Triple superphosphate is one which has the properties necessary to be used in combination with N solutions Supplies of triple superphosphate are said to not be abundant now and the necessity to use more is one factor which could prevent a switch back to N solutions from working as the answer to the shortage caused by insufficient AS supplies Another consequence of such a switch would be an increase of costs on the part of blenders, an increase they would not be able to pass along to customers due to the price freeze

797

**Fertilizer Situation Outlook for 1972**

J F Gale (Econ Res Service, U S Dep Agr , Washington, D C )

*U S Dep Agr FS 2*, 47 pp (Jan 1972)

The general outlook is for farm prices of most N and K fertilizers to level out in 1972 whereas P fertilizer prices may move close to ceilings approved by the Price Commission Production capacities for N and K fertilizers considerably exceed current demand Ammonia capacity will range up to 17 4 million tons in 1972, of which the U S will take less than 10 million tons Although K producers in the U S will operate at near capacity, Canadian output will be only about half capacity Phosphate fertilizers, especially concentrated superphosphate, may be in short supply, some manufacturers report that all production scheduled for the first half of 1972 was contracted for by the end of 1971 Domestic price ceilings on P fertilizers may be lower than world prices, in which case increased exports, which are not subject to price controls, could intensify the shortage **Changes in Patterns of Fertilizer Use** D N Harrington *Ibid* 29 31 In 1971, corn, cotton, wheat, and soybeans accounted for 85% of the N, P, and K consumed in the U S , compared with 55% in 1964 Fertilizer applied to corn, wheat, and soybeans increased in the last 8 yr, while that applied to cotton decreased More fertilizer is used on corn than on any other crop, the rapid increase is attributed to increased corn fertilizer price ratios and improved yield response to the new technology package which includes more fertilizer

798

**Tennessee Valley Authority Predicts Increase for Direct Application**

*Chem. Marketing Rep 201* (8), 19 (Feb 12, 1972)

Future growth of fertilizer demand, according to National Fertilizer Development Center, will be led by the increased use of direct application materials, which currently account for 44% of the total market and over 48% of total nutrient consumption Mixed fertilizers, after experiencing a decline in tonnage for 2 yr, showed a gain in 1971 of over 720,000 tons, and the nutrient content continued to increase reaching almost 41 units of plant food per ton of material last yr

799

**Shortage Predicted for Some Fertilizers**

*Chem Week 110* (13), 27 (Mar 29, 1972)

Urea buyers may have difficulty getting enough of the material in time for early spring application because urea plants operated at only about 75% of capacity last fall Now that unexpectedly strong demand has developed, producers are having trouble meeting it Ammonium sulfate and anhydrous ammonia plants, on the other hand, operated at more than 90% of capacity last fall, but shortages of those materials exist Also tight supplies of wet process phosphoric acid and diammonium phosphate are expected

800

**Shortage of Phosphate Fertilizer Likely Through 1972**

*Chem Marketing Rep 201* (12), 5, 38 (Mar 20, 1972)

Phosphate fertilizer supplies will continue tight at least until the end of 1972, according to the Fertilizer Institute There has been a decline in the number of phosphate plants and capacity An estimated 600,000 tons or more of basic product are unavailable as plants have shut down because of financial losses or lack of capital needed to remain competitive Spring 1971 proved an excellent market season for the leading phosphate products, pulling inventories to low levels by June 1971 Heavy export demand during the summer of 1971 prevented a rapid buildup in domestic inventories The institute's fertilizer index shows that heavy "downstream" disappearance of phosphate products for manufacturing and farm use has kept full pressure on producer capacities Compared to 1 yr earlier, overseas demand enhanced by the U S dollar devaluation, has been extremely strong to the point that some foreign tenders have not been covered With exception of ammonium sulfate, all other major products are in ample supply to meet U S farmers' demands for the balance of 1972

801

**The Demand Supply Outlook for Nitric Acid**

M C Manderson (Arthur D Little, Inc , Cambridge, Mass )

*Chem Eng Progress 68* (4), 57 61 (Apr 1972)

In 1970 the U.S demand for $HNO_3$ was about 6 5 million tons About 70% of $HNO_3$ demand is for fertilizer manufacture, and about 75% is used for the manufacture of one compound, $NH_4NO_3$, either as solid for fertilizer or blasting explosives or as solutions for fertilizer use Present $HNO_3$ capacity is slightly over 9 million tons, but it is likely that effective operating capacity is about 8 million tons There are about 125 $HNO_3$ plants in existence, exclusive of government owned ordnance units About 75% of these plants are at least 10 yr old and in general they have a capacity of not more than 300 ton/day Data are tabulated showing the idealized costs for manufacture, distribution, and marketing of $NH_3$, solid urea, solid $NH_4NO_3$, and liquid $NH_4NO_3$ urea fertilizers the total costs are 135, 172, 215, and 222 dollars/ton N respectively Past, present, and projected (to 1980) U S demand for $HNO_3$ by end use are also tabulated It is believed that total Free World $HNO_3$ capacity is about 26 million tons (6 fig)

802

**The Fertilizer Supply 1971 72**

J H Mahan (Agr Stabilization Conservation Service)

*U S Dep Agr* , Washington, D C , 24 pp (Apr 1972)

Domestic supplies of fertilizer material in 1971 72 are expected to total 19 4 million tons of N, $P_2O_5$, and $K_2O$ (a 5% increase from last yr) Estimated supply of N is 9,349,000

tons, up 7%, $P_2O_5$, 5,147,000 tons, down 1%, and $K_2O$, 4,864,000, up 8% Production rates for anhydrous ammonia, ammonium nitrate, and ammonium phosphate during the first 6 months of this yr (July Dec 1971) were ahead of last yr Ammonium sulfate was down about 5% and urea and N solutions were about the same level as last yr A large beginning inventory of N solution increased the supply Production rates for N material are expected to continue at about the same level during the second half of the yr Production of wet process acid, ammonium phosphate, and concentrated superphosphate during the first 6 months of this yr were 6%, 3%, and 6%, respectively, ahead of the same period last yr Diammonium phosphate and granular concentrated superphosphate are in short supply Exports of N and $K_2O$ materials will be down from last yr Exports of processed $P_2O_5$ material are expected to be up 29% from last yr U S exports of nutrients going to countries with AID programs continue to decline About 45% of all plant nutrients exported (excluding phosphate rock) went to these countries in 1970 71, compared with 53% a yr earlier

803

**Commercial Fertilizers Consumption in the United States—Fiscal Year Ended June 30, 1971**

*U S Dep Agr, Statistical Reporting Service*, Washington, D C , 26 pp (May 1972)

Fertilizer consumption totaled 41 2 million tons, a 4% increase over the preceding yr and 200 000 tons above the data in the preliminary report issued Oct 1971 All regions showed increases over the previous yr except the Middle Atlantic States Illinois continued to be the leading consumer followed closely by California Consumption of primary nutrients was 17 2 million tons, up 7% Nitrogen, $P_2O_5$, and $K_2O$ consumption was 8 2, 4 8, and 4 2 million tons respectively, up 9, 4, and 5% Mixed fertilizer accounted for 52 4% of total fertilizer consumption, continuing the downward trend in the proportion applied in this form The average grade of all mixed fertilizer was 9 59 18 38 12 96 compared with 9 25 17 69 12 71 last yr Consumption of anhydrous $NH_3$ was 3 97 million tons (up 14 5%), N solutions were 3 48 million tons (up 7 4%), urea was 601,335 tons (up 12 7%), and diammonium phosphate grade 18-46 0 was 1 72 million tons (up 13 3%) Consumption of 10 34-0 was 300,000 tons (up 28%), exceeding that of normal superphosphate (276,000 tons, down 11 5%)

804

**Phosphoric Acid Supply Demand Situation**

J R Douglas (Tennessee Valley Authority, Muscle Shoals, Ala )

*Fert Progress 3* (3), 8 11 (May June 1972)

It is forecast that the 1973 crop yr requirements for wet process acid will increase by about 400,000 tons $P_2O_5$ over that of 1972 About half that amount will result from increase in domestic consumption, 50,000 75,000 tons will result from changes in formulation, about 100,000 tons will be needed to replenish inventories, and 25,000-50,000 will go into feeds and industrial uses For 1974 the added requirements should not be so great, since inventories should already be replenished It is assumed that exports will show no appreciable decrease during the period The most significant unknown factor is exports A decrease of only 20% in exports—which could easily occur with the recent 30-40% increase in prices—could have major adverse effects on the demand for wet process acid (6 fig)

805

**United States Sulfuric Acid Supply and Demand**

O W Svenson (Allied Chem. Corp, Morristown, New Jersey)

*Sulphur* No 100, 61-4 (May June 1972)

In spite of surplus S production in Canada, Mexico, and elsewhere, and the construction of several new S recovery units due to come onstream in 1972 73, there are definite indications that a tight sulfuric acid supply situation is developing in the United States, especially on a regional basis Several reasons cited for the present situation and the expected tighter supply conditions are (1) fewer producing plants, (2) lower practical capacities in older existing plants, (3) improved business conditions—especially in the fertilizer industry, (4) delayed availability of byproduct acid, and (5) hesitancy to renew investment in certain regions and major rehabilitation projects Sulfuric acid demand is expected to continue to increase at a rate conservatively estimated at 3 5%/yr over the next 10 yr The existing acid plants will have to be put in compliance with pollution control laws and they must be properly maintained until such time as sufficient supplies of lower cost acid are available It is how to accomplish this, while maintaining a suitable level of profit, that is the task commanding most of the U S sulfuric acid industry's time and attention today

806

**Potassium Nitrate Production Resumed**

*Chem Marketing Rep 202* (4) 20 (July 24 1972)

Domestic production of $KNO_3$ is being resumed at the former Southwest Potash Corp plant at Vicksburg, Miss The newly formed Vicksburg Chemical Co has bought the plant, which should be in full operation by Sept 1 The capacity is about 95,000 tons/yr of KNO and 35 000 tons/yr of byproduct chlorine Vicksburg Chemical also bought the nitric acid plant, formerly owned by Gulf Oil, which supplied acid to the $KNO_3$ plant on an over the fence basis Agricultural use of $KNO_3$ is difficult to predict, since it varies with the availability of ammonium sulfate—now somewhat tight

807

**Fertilizer Situation Improves in Past Year**

*Chem Week 111* (6), 19 (Aug 9, 1972)

First returns for the just ended fertilizer yr are in, and the industry made a surprisingly good showing Nitrogen product disappearance was up 4% overall paced by a 17% gain in urea and 6% in ammonium nitrate Anhydrous ammonia disappearance was unchanged Ammonia production probably topped 14 million tons in the 1971 72 yr, a gain of 9%, according to Commerce Dep tabulations The resurgence of ammonia suggests that serious overcapacity which has existed in the industry since the mid 1960s, will not be a problem much longer Phosphatic fertilizers also showed solid gains in the 1971 72 yr Disappearance was up 11% from 1970 71, led by diammonium phosphate (up 23%) and concentrated superphosphate (up 18%) Strong export demand, aided by the recent U S currency devaluation, accounted for much of the gain Potash disappearance was off 1% Fertilizer inventories at the end of June were 10% higher than a yr ago Nitrogen product inventories were up 42%, while phosphate was down 5% and potash 13%

808

**Sulfur Consumption Increases**

*Chem Week 111* (8), 27 8 (Aug 23, 1972)

The U S Bureau of Mines says consumption during the first six months rose about 8%, to an annual rate of 8 74 million long tons Exports in the same period jumped 18%, to an

annual rate of 1 81 million long tons, while imports fell 5%, to a rate of 1 23 million long tons Export prices, moreover, are fi ming at about $18/long ton Import prices, on the other hand, are still falling, registering an average of $11/long ton in June Frasch S producers still face increasing competition from recovered S Shell Oil's recovered S plant in Rankin County, Mississippi, started up in late July It has a design capacity of 1250 long tons/day That will boost total U S sulfur output by about 5%

809
**Florida's Phosphate Production in 1971**
*Fla J Com 14* (8), 18 (Aug 1972)
Florida producers marketed 29 million tons of phosphate in 1971 to maintain their position as the world's largest suppliers of the valuable mineral, the Florida State Chamber of Commerce reported While this was an increase of 1 million tons over 1970 figures, it represented only the amount needed to meet the demands for the numerous products and processes using phosphorus chemicals and not total production The market for phosphate was considerably improved last yr as marketable production was less than demand, allowing pro ducers to deplete the stock inventories that had been built up in the last 2 yr U S Bureau of Mines indicated that the value of the 1971 marketed production was $152 million, a gain of $9 million over 1970

810
**United States Ammonia Supply**
*Oil Gas J 70* (37), 66 (Sept 11, 1972)
After half a decade of excess capacity, U S ammonia producers can expect the supply/demand situation to tilt back towards a balanced position However, world N supplies should easily stay ahead of forecast demand with little overall improvement indicated by 1975 Developing nations, which still have a supply deficit, primarily because of low capacity utilization, could come closer to self sufficiency in 1975 World N consumption has almost doubled in the last 6 yr as a result of an 11 6%/yr growth rate The continued strong domestic demand for N along with the closing of many small ammonia plants has brought the North American N situation close to a balance If a 90% operating rate occurs in 1973, a supply demand ratio of 1 05 is probable Supplies would be inadequate to sustain the current net trade level of over 500,000 tons

811
**Commercial Fertilizers Consumption in the United States Year Ended June 30, 1972 (Preliminary Report)**
*U S Dep Agr Statistical Reporting Service,* Crop Reporting Board, Washington, D C, 11 pp (Oct 27, 1972)
Consumption in the United States and Puerto Rico is estimated at 41 3 million tons compared with 41 1 million tons for the previous yr All regions west of the Mississippi River showed increases with the exception of West North Central East of the Mississippi River, the South Atlantic and East South Central regions showed increases California was the leading state in total tons used at 3 4 million tons The average percentage of $N$ $P_2O_5$ $K_2O$ contained in all fertilizers (excluding secondary and micronutrients) was 20 34-11 97 10 81, respectively compared with 20 38 12 04 10 60 a yr earlier Mixed fertilizers accounted for 51 9% of total tonnage of all fertilizers, a decline of 0 4% from the previous yr The total tonnage of mixed fertilizer (21 4 million) was down less than 1% from last yr The average primary nutrient content of mixtures advanced to 41 10% compared to 40 91 a yr earlier Direct application primary nutrient materials totaled 13 6 million tons, an increase of nearly 1% Secondary and micronutrients for direct application were 1 3 million tons Direct application material accounted for 48 1% of total tonnage used Nitrogen material (excluding natural organics) used for direct application at 13 0 million tons compared with 12 9 million tons the previous yr, phosphates were unchanged at 2 4 million tons and potash rose 6% to 2 6 million tons Estimates of micronutrients applied by regions are given

812
**Venezuelan Fertilizer Hugh Venture Okayed**
*Oil, Paint, Drug, Reptr 194* (14), 5, 47 (Sept 30, 1968)
Inter American Development Bank has approved $54 million for a fertilizer complex at Moron on the seacoast west of Caracas The complex will be built by Instituto Venezolano de Petroquimica It will consist of facilities for the annual production (in tons) of 198,000 of anhydrous ammonia, 660,000 of ground rock phosphate, 82,500 of phosphoric acid, 247,500 of urea, 99,000 of triple superphosphate, 150,000 of diammonium phosphate, and 115 000 of 13 13 20 NPK complex fertilizer The project is expected to make Venezuela self sufficient in almost all fertilizers until at least the 1980 85 period Domestic raw materials include natural gas to be piped from the Anaco gas fields in eastern Venezuela, phosphate rock from IVP's Riecito mine 62 miles west of Moron, and S from oil desulfurization

813
**Structural Changes in the Production and Consumption of Industrial Fertilizers**
J Keil
*Politicka Ekon , Praha 15* (11), 1005 11 (1967)
*World Agr Econ Rural Sociol Abstr 10* 1640
World production of synthetic fertilizers has steadily increased since the end of World War II From 1951/52 1960/61 production doubled, and from 1959/60 1964/65 it increased by another 50% The production of fertilizers is increasing at a high rate, and by 1970 production will probably rise by another 100% compared with the year 1960 The highest rate and volume of increase is being maintained in the production of nitrogenous fertilizers, which rose by 67% in 1959/60 1964/65 Production of phosphoric fertilizers increased by 41%, and potassic fertilizers by almost 40% The highest world standard of production and consumption of synthetic fertilizers has been attained in Europe, which is also the largest exporter of fertilizers (in 1965 66 net exports reached 1 2 million tons of pure nutrients) The second largest exporter was the U S S R with 411 thousand tons

814
**Potash Use in North America**
*Fertilizer Feeding Stuffs J 64* (21), 740 (Nov 1, 1967)
Deliveries of potash for agricultural purposes in the U S, Canada, and Puerto Rico by the North American potash producers (including Canadian), and importers totaled 7,139,148 tons of salts, containing 4,206,272 tons of $K_2O$ during the fertilizer year of July 1966 to June 1967, according to the American Potash Institute This was an increase of nearly 14% in salts and in $K_2O$ over the preceding year The U S took 3,982,019 tons of $K_2O$, Canada 204,384 tons, and Puerto Rico 19,869 tons These figures include imports from overseas of 300,944 tons of $K_2O$, an increase of 45% Exports to other countries were 1,223,265 tons of $K_2O$, an increase of 16% Muriate of potash comprised over 95% of the total agricultural potash delivered Of the muriate, the standard grade was 2,709,792 tons of $K_2O$, the coarse 1,585,105 tons, while granular muriate was 889,897 tons Sulphate of potash

and sulphate of potash magnesia accounted for nearly 5% of agricultural deliveries

815
**Easing of Sulfur Situation is Forecast**
*Barron's 48* (1), 7 (Jan 1, 1968)
The S boom may be drawing to an end While world consumption increased last year by over 1 1 million tons, production rose by almost 1 4 million tons The annual deficit, covered by drafts on inventory, has shrunk from around 700,000 tons in 1966 to 400,000 tons last year In 1968, Canada is expected to boost its output by at least 800,000 tons, the U S by around 400,000 tons, and Mexico and France by at least 300,000 tons Moreover, U S production of S from smelter gases is expected to revive with the end of the Western miners' strike Unless consumption rises in 1968 more than last year, the additional supplies appear adequate to meet demand In a recent interview with Platt's Oilgram, Tariq Shafiq, director of Iraq National Oil Co , contemplates an eventual decline in the S price to about $28 a ton, that would be $10 below the U S domestic price and about half the current world market price

816
**World Fertilizer Production and Consumption**
*Monthly Bull Agr Econ Statist , 17* (2) 26 8 (Feb 1968)
The 1966 67 production and consumption estimates of the third session of the Ad Hoc Working Party on Fertilizer Statistics are given in tabular form on a country by country basis Revised figures for 1965 66 also are given Combined world fertilizer output (including Mainland China, North Korea, and North Viet Nam) was estimated at 53 2 million tons, up to 8 4% from 1965 66 Nitrogen accounted for 22 2 million tons, $P_2O_5$ for 16 5 million tons, and $K_2O$ for 14 5 million tons

817
**1967/68 World Potash Fertilizer Use Up Over 8%**
*Phosphorus Potassium*, No 38, 30 (Nov Dec 1968)
World potash fertilizer consumption in 1967/68 attained a level 8½% above that of the preceding year, to reach nearly 14 1 million tons $K_2O$ At the same time supplies of potash from the world's mines also rose by 5½%, reaching a record 15 7 million tons $K_2O$ It is becoming evident that the attempts made during the year by many potash producers to limit, or solely maintain, output levels, in order to enable consumption to catch up with supply, were at least partially successful

818
**State of the Fertilizer Business**
A E Cascino (International Minerals & Chemical Corp )
*Mining Congress J 55* (2), 110 14 (Feb 1969)
An industrialist's appraisal is given of the present status of the fertilizer business Tonnage volumes of phosphate rock and concentrates, potash, and S totaled 30 million tons in 1962, increasing to 55 million tons in 1968, with an estimated total of 113 million tons world nutrients consumption by 1980 Since 1962, phosphate rock capacity is up 120%, consumption up 96%, and price down 3%, phosphate concentrates capacity is up 144%, consumption up 104%, and price down 34%, potash capacity up 97%, consumption up 88%, and price down 37%, and S capacity up 45%, consumption up 45%, and price up 68% but beginning to turn Price drops cannot be attributed to excessive capacity alone but rather to a whole series of factors including weather effect on consumption, spending policies of U S and foreign governments, and the confusion in our agricultural economy and our government farm policy However, temporary, non recurring adverse circumstances have magnified the excess capacity problem The first good turn of events should restore the industry's confidence in its capacity to change the supply-demand curve for the better

819
**Potash Deliveries Rise Sharply in Past Year**
*Oil Paint Drug Reptr 195* (11), 7, 45 (Mar 17 1969)
Deliveries of potash for agricultural purposes in the United States, Canada and Puerto Rico by the principal North American producers including Canadian, and also importers went up to 7,132,252 tons of sales containing an equivalent of 4,177,416 tons $K_2O$ during 1968 Muriate of potash continued to be far the most popular material, comprising over 95% of agricultural potash Of the muriate, standard grade was 2,666,581 tons $K_2O$, while coarse was 1,751 311 tons and granular was 871,400 tons

820
**Sizeable Sulphur Stocks are Forecast.**
*European Chem News 16* (391), 6 (Aug 1, 1969)
A substantial excess of brimstone supply over demand is to be expected in the early 1970's, especially in 1970 and 1971, according to J M Lancaster, managing director of the British Sulphur Corp Production of S in all forms in the Western world in 1968 totalled 27 9 million ton, 2 million ton or 7 6% more than in 1967 Imports of S in the form of pyrites from the USSR and notably of brimstone from Poland, rose by over 400,000 ton to 1 1 million ton, while the relatively small S exports to communist countries further decreased Thus where producers stocks had decreased in 1967 by nearly 700,000 ton, they increased in 1968 by 1 6 million ton The indications for 1969 are that brimstone production will increase by a similar amount to 1968 to bring Western world production to about 18 million ton Imports are expected to total about 1 25 million ton Expectations that brimstone consumption might surge forward again after three years of stagnation have, however, been squashed As a corollary, brimstone producers' stocks can be expected to increase by about 2 million ton to make the year end total over 7 million ton, equal to approximately 20 21 weeks' consumption at the current rate Thus should be compared with stocks equal to 17 weeks consumption at the end of 1968 or 12 weeks consumption at the dangerously low point in 1967 Excesses of brimstone are, therefore, to be expected and by 1973 producers' stocks should be between 11 12 million ton It should be realized, however, that stocks of this order of magnitude will then represent only 25 weeks' consumption In 1959 producers stocks represented 31 weeks' consumption and 1962, 39 weeks' consumption

821
**The State of Food and Agriculture, 1969 Fertilizers**
*Food Agriculture Organization, United Nations, Rome,* pp 26 8 (1969)
In 1967/68, world consumption of fertilizers (in terms of nutrient content) increased by nearly 10%, about the same as the year before, to a total of 53 million tons Of this, 87% was used in developed countries The increase was more rapid in the developing countries (26%, as against 7% in the developed ones) Increases ranged from 17% in the Near East and Africa to 24% in Latin America and 31% in the Far East The largest increases took place in countries which produce fertilizers locally World production of fertilizer rose in 1967/68 by about 8% and was higher than consumption Output in the

developing countries generally failed to keep up with the sharply increasing demand, and more than 75% of the additional fertilizer used by all of them combined had to be imported in 1967/68 Data for 1968 on the prices of fertilizers and crops are insufficient for a systematic review of their influence on fertilizer use For some countries, reports indicate that the economic advantage of fertilizer use, as measured by the price relationship between fertilizer and crops, has increased The use of fertilizers has been stimulated because of the large increases in yields which can be obtained through the use of high yielding cereal varieties and other improved planting material, supported by the intensification of efforts to promote fertilizer application through demonstrations, extension and improved distribution, and through special programs to intensify crop production Total consumption is expected to increase by 50% between 1967/68 and 1972, to over 80 million tons, a figure which can be met adequately by the then installed production capacity In developing countries present consumption is expected to double and production to increase nearly threefold Nevertheless, production of these countries will in 1972 still amount to only half of estimated requirements, indicating continued need for fertilizer imports Of the developing regions the largest gap between potential production and estimated consumption would occur in the Far East

822

**Sulfur Consumption**

*Chem. Week 106* (2), 53 (Jan 14, 1970)

Sulfur consumption in countries outside the Sino-Soviet bloc last year held up relatively well Although detailed estimates won't be available for a few weeks, indications are that world use expanded 4% in '69, reached 28 million long tons. (The gain in the U S market was about 1%, boosting total consumption to an estimated 9 5 million tons) Supplies (including Polish exports) increased about 1 million tons, to an estimated 29 million tons Don't be surprised if final estimates show non Communist world inventories are near the 20 week supply mark At the end of '68, world inventories totaled 17 9 weeks' supply The imbalance in world market has eroded S prices as much as $15/ton, according to the Bureau of Mines Nominal list prices, however, are still $39 40/ton Meanwhile, more capacity is coming onstream The Kharg Island venture in Iran has gone operational 200,000 tons/year Allied's Iranian venture (500,000 tons/year) is also producing S Duval added 1 5 million tons/year in Texas Freeport, however, closed its big (600,000 900,000 tons/year) Caminada mine, Phelan shuttered a small Texas operation, Mecom cut back output, and Gulf Resources closed its 350,000-tons/year mine in Mexico in a dispute with Mexican parties over sale of the venture

823

**World Nitrogen Fertilizer Output up 13 8 Percent**

*Chem. Age (London) 100* (2635), 16 (Jan 16, 1970)

According to a report issued by the German N marketing syndicate Ruhr Stickstoff AG, of Bochum, world output of nitrogenous fertilizers rose over the year ended June 30 by some 13 8% to 28 2 million tonnes N,consumption increasing 12 6% over the same period to 27 5 million tonnes N As of the end of the year, world ammonia capacity was about 41 1 million tonnes In the current fertilizer year, West European ammonia capacities will probably once again reach the North American level, as was already the case in 1966 67

824

**Eastern Europe Becoming Bigger Factor in World Sulfur.**

*Chem. Week 106* (3), 46 (Jan. 21, 1970)

Eastern Europe is becoming a bigger factor in world S markets, according to Texas Gulf's latest tabulation of world S statistics. Last year non communist countries consumed 1 1 million long tons of S produced in communist countries, principally Poland That was 383,000 tons more than in '68,a gain of 53 4% Western countries' total S consumption, says TGS, was 27,755,000 long tons, up 4 1% from '68 Consumption in countries other than the U S was up 6 2% (to 18,485,000 long tons), but use in the U S expanded only 0 2%, reached 9,270,000 long tons U S use of elemental S dropped 1 4%, to 8 million long tons, while consumption of nonelemental S expanded 11 4%, to 1,275,000 long tons. World inventories continued to mount as production from Western Canada and new sources more than offset close-downs in the U S At year's end Western countries' inventories represented 24 weeks' supply, a year ago inventories totaled only 17 9 weeks' supply Production in these nations in '69 expanded 5 3% over '68, totaled 28 9 million long tons. Canadian production spurted 20% last year, to 3 64 million long tons, while Mexican and French outputs each remained at about 1 6 1 7 million long tons Production of S in all forms in the U S dropped 3 2%, to 8 53 million long tons

825

**Sulfur, Phosphate, and Potash**

S L. Levitsky (Texas Gulf Sulphur Co )

*Mining Congr J 56* (2), 115 21 (Feb 1970)

Another low growth rate was registered in 1969 for the manufacture and use of fertilizers The fertilizer industry consumes 80% of all phosphate rock, 95% of all potash, and about one half of all S produced The large expansion in plant capacities which began in 1966 1967 in the phosphate industry and continues to be installed or planned by K and S industries had an adverse effect on the price structure of these industries in 1969 Sulfur consumption in the Free World in 1969 increased by 4 1% over 1968 Production increased in 1969 at a rate of 5 3% above the previous year The most significant increase in S output was achieved from sour natural gas in Western Canada and sour natural gas and refinery gases in the U S showed an increase In contrast, U S Frasch S, which carried the main burden of supplying the market during the years of shortage, registered a 4 5% decrease in production in 1969 from 1968 The search for new sources of S and plans for expansion continues These efforts are based on the anticipated improvement in demand by the phosphate industry Inventory level of elemental S was at 24 weeks at the end of 1969 in the Free World compared to a 12 week level in 1967 Inventories of unsold $P_2O_5$ fertilizer materials were still piling up in 1969, but at a rapidly diminishing rate due to cuts in production. Plant capacities continued to grow, but at a lower rate than growth in consumption The new forecast is that supply and demand in $P_2O_5$ fertilizers might again be in balance within a few years, sooner than in S or in K, and sooner in North America than in the rest of the world The world consumption of $P_2O_5$ fertilizers in the next five years should grow at a lower annual rate than during 1964/65 1969/70 In North America, the growth rate could decrease from 7 to 4 5% The potash industry is being challenged by a capacity explosion In Canada, production of potash went from 150,000 tons of $K_2O$ in 1962 to 3 4 million tons in 1969, while production capacity rose 7 7 million tons of $K_2O$ and additional facilities are in the process of installation. The bulk of Canadian production must be sold in export Consumption of $K_2O$ in Canada amounted to 6 8% of its production in 1969 In the Soviet Union a crash program is underway to boost Soviet capacity New production facilities

in the United Kingdom could potentially transform it into a net exporter by mid 1970 Additions to existing capacities are being installed or planned in other countries World wide use of potash continues to grow and on an international scale the low level of prices in 1969 appeared to be due to the psychological effect of the world wide build up in production capacities In North America the causes of price drop were real and the penalties by the U S on low price imports and the institution of a floor price by Canada raised hopes among producers for an improvement in the depressed price levels

826

**Fertilizer Production, Consumption, and Trade 1968-69**

*Phosphate Notes 14* (2), 16 (Feb 1970)

The Ad Hoc Working Party on Fertilizer Statistics completed a review of world production, consumption, and trade in fertilizer statistics It is estimated that combined world output (including Mainland China, North Korea, and North Viet Nam) of fertilizer nitrogen (N), processed phosphoric acid ($P_2O_5$), and potash ($K_2O$) in the 1968/69 was 61 4 million tons, which is nearly 6% greater than the output for 1967/68 Nitrogen output in 1968/69, at 27 4 million tons, and that of potash at 15 9 million tons, increased by 9 2 and 4 6% respectively, but output of processed phosphoric acid, at 18 million tons, went up by only slightly more than 2% During the fertilizer year under review, the largest estimated increase in combined output is shown by Europe (some 1 7 million tons), followed by Asia (620,000 tons) and the USSR (610,000 tons) In 1968/69, world consumption of all fertilizers (including Mainland China, North Korea, and North Viet Nam), totalled 59 3 million tons, an increase of 6 8% or 3 8 million tons, compared with 1967/68 This figure excludes ground rock phosphate used for direct application The heaviest rate of application is still to be found in Europe with a consumption of some 149 kg of all fertilizer nutrients per hectare of arable land This compares with 64 kg in North and Central America, 36 kg in Oceania, 33 kg in the USSR, 21 kg in Asia, 13 kg in South America and only 7 1 kg in Africa The volume of world trade in all fertilizers in 1968/69 is estimated at more than 17 million tons and represents 29% of total world consumption compared to 31% in 1967/68

827

**Nitrogen World Market Looks Gloomy This Year**

*Oil, Paint Drug Rep 199* (10), 7 (March 8, 1970)

The gloom in the world N market is not likely to lift in the current 1970 71 fertilizer yr, according to the latest survey by *Nitrogen*, publication of the British Sulphur Corporation The journal puts production last season at 29 million metric tons of N on a world basis, an increase of 9%, demand is estimated to have risen by 8 2% with a net addition to world inventories of 550,000 tons of N For the current season, *Nitrogen* puts production rising by 8 8%, on a conservative basis, assuming that new facilities are operating at low rates of capacity This would give world production above 31 6 million tons of N, against an estimated consumption just under 31 2 million tons, or an addition to inventories of over 450,000 tons The journal estimates West European production in the current year at 8 9 million tons, (versus 8 4 million tons in the previous season), and consumption at 6 4 million tons (6 2 million tons) The figures for East Europe are production, 8.3 million tons (7 5 million), and for North America, production 7 7 million tons (7 5 million) and consumption 7 2 million tons (7 million)

828

**N Fertilizer Demand Reached 29 Million Metric Tons**

*Chem Age (London) 101* (2681), 21 (Dec 4, 1970)

According to a report issued by the Austrian State chemical concern Osterreichische Stickstoffwerke AG, world consumption of N fertilizers has risen over the past decade from 9 8 million mt N to 29 million mt N for the 1969/70 fertilizer yr ended June 30 Of total consumption for the latter period, some 32 5% was accounted for by Europe excluding the U S S R 27 2% by Northern and Central America, 22 8% by Asia, 12 9% by the U S S R, 2 6% by Africa, 1 4% by South America, and 0 7% by Australasia This means that the industrialized countries of Europe and North America, with only 18% of the agricultural acreage, used 60% of all N fertilizers and the other countries only 40% nevertheless, the share of the latter countries was no more than 25% 15 years ago and 30% ten years ago

829

**Fertilizers — Annual Review of World Production, Consumption, Trade, and Prices — 1969**

*Food and Agriculture Organization of the United Nations* (Rome, Italy 1970)

World production of N, P, and K fertilizers in 1968 1969 was about 60 million tons of nutrients corresponding to an increase of about 6% over 1967 68 During the period 1963 64 to 1968 69 world production increased by 57% but the annual rate of increase dropped from 12 to 6% during this period World consumption of N, P and K in 1968 69 was 56 5 million tons of nutrients an increase of about 6% over 1967 68 The rate of increase had remained steady at about 10%/yr for the preceding 4 years Increase in consumption of N in North and Central America over the preceding yr was 3% compared with 11% each for Europe Asia and South America Consumption of P (excluding phosphate rock for direct application) showed the largest increase in South America (22%), followed by Africa (11%), while Europe and North and Central America both showed 4% gains The rate of increase in consumption of $K_2O$ declined to 4% in Europe and North and Central America which accounted for 44% and 27% respectively of world consumption of $K_2O$ Total consumption of N, $P_2O_5$ $K_2O$/1000 ha/arable land in 1967 68 was The Netherlands 626 18 Belgium 528 54, West Germany 349 10, France 187 81, United States 77 18 and India 10 96 mt The prices paid by farmers for plant nutrients increased in Finland, Ireland Spain Argentina, Colombia and New Zealand, were steady in much of Western Europe, and decreased in Belgium, The Netherlands Australia, and the United States

830

**Annual Fertilizer Review—1970**

Edited by Nafiz Erus

*Food and Agriculture Organization* United Nations, 176 pp (Rome, Italy, 1971) (Eng , Fr , and Span )

This differs from previous editions in that the statistics were processed by computer, it is trilingual instead of being issued as three separate volumes and statistics are included for mainland China, the Democratic People's Republic of Korea, and the Democratic Republic of Viet Nam World production of chemical fertilizers containing primary nutrients in 1969 70 was about 61 million mt an increase of 5% over 1968 69 World consumption also showed a 5% increase, amounting to about 59 million mt Nitrogen accounted for about 44%, phosphate 30%, and potash 26% of the total N $P_2O_5$ $K_2O$ consumption World trade was about 18 million mt, or 31% of world consumption, N exports decreased slightly and P exports dropped by 8% whereas K exports (about 49% of total fertilizer exports) maintained a steady 7% increase for the past 2 yr (36 tables)

831
**Fertilizer Shipments for April—A New Record**
*Oil, Paint Drug Rep* 199 (23), 4, 25 (June 7, 1971)
April was a record breaking month for the North American fertilizer industry, as nearly 12 million tons of major products moved through the marketing chain, according to the Fertilizer Institute For the ten month period ending in April, domestic disappearance of the six major N products was up 8% over 1970 Output was up 4%, and inventories were down 8% Disappearance of the four major phosphate nutrients was up 4% for the ten month period Phosphate rock output through April was 3% ahead of the previous yr Phosphate rock production through April was 3% ahead of a yr ago, 1971 ending inventory was 10% below 1970 Each of the five potash products lags behind last yr in domestic disappearance for the ten month comparison Brisk movement during April significantly cut inventories of the muriate grades However, April ending inventories for coarse and granular still were nearly twice their April '70 levels Potassium sulfates inventories also are running high—76% over April 1970 Base solutions (11 37 0 and 10 34-0) continued their strong performance with production for the ten months, up 13%, domestic disappearance up 31%, and April ending inventories down 22% Diammonium phosphate failed to meet its 1969 70 record through April by 2% in domestic disappearance Production thus far for the product was ahead 10% with April ending inventories up 15% over 1970 Domestic disappearance for all fertilizer products rose 18%, compared with April 1970, for the heaviest U S -Canadian monthly movement on record

832
**Comecon Fertilizer Usage Continues Big Upswing**
*Eur Chem News 19* (484), 11 (June 11, 1971)
The fertilizer industry of the Comecon area has been significantly developed in the last 10 yr In 1960, production reached some 6 4 million tons in terms of nutrient content and increased to over 24 million tons in 1970 Poland's consumption of mineral fertilizers rose from 55 5 kg/ha NPK in 1965 to 131 kg/ha in 1970, an increase of 137% This consumption is expected to reach about 200 kg/ha in 1975 The increased consumption in Poland will result from expansion of the capacity of existing fertilizer plants and the start up of the Police (P fertilizers) and the Wloclawek (N fertilizers) complexes together with modernization of production facilities in general A similar expansion in production and consumption of fertilizers will also occur in the remaining Comecon countries Compared with 1965, Czechoslovakia increased its production in 1970 by 44%, the GDR by 30%, the U S S R by over 100%, Hungary by over 150%, and Bulgaria and Romania by factors of 3 and 4 5 respectively During the current 5 yr plan, further increases are envisaged In Romania, production of fertilizers will play the most important role in the chemical industry In 1975, Romania will produce 2 million tons of fertilizers in terms of nutrient and increase its consumption to 180 200 kg/ha Although the GDR is at the top of the league of consumption in the Comecon bloc, it is planned to double its 1975 consumption, compared with that of 1965 Consumption in Czechoslovakia is expected to grow by 35% during the current 5 yr plan Although production of fertilizers in the Comecon countries rose by a factor of 3 7 in the 1960 70 period, production of concentrated and complex types was increased by a factor of 6 7 This large increase in concentrated and complex types includes a large increase in the production of N fertilizers based on natural gas, which is plentiful in the Comecon bloc Concerning P fertilizers, the situation here is quite different, since the raw materials on which these types are based have to be imported Only the U S S R has substantial apatite deposits, with Bulgaria and the GDR possessing less important supplies, and the balance of demand for the Comecon bloc is imported from Morocco and Tunisia Another likely area of cooperation is the construction of a phosphate fertilizer plant in the Mediterranean basin This would use local phosphorites and Polish S, and would be a more profitable venture than the present arrangement where phosphorites are shipped to the home based plants Also sales of accumulating S would be ensured Poland only specializes in the field of sulfuric acid plants, but it is capable of supplying these to the other members of Comecon In addition, Poland may also consider setting up ventures, with developing and even developed countries, where the sale of sulfuric acid plants is tied to the supply of Polish S as raw material For potash, the U S S R and the GDR are the only producers and these two countries are able to satisfy the demand of the others in the bloc for this nutrient Both Poland and Czechoslovakia have participated with the U S S R in the construction costs of the Soligorsk potash mine in Byelorussia, and Poland now receives 60% of its potash requirements from the U S S R Cooperation between Comecon countries is also evident in the construction of other plants required for mineral fertilizer production Poland is a large supplier of sulfuric acid plants and these are essential for phosphate fertilizer plants

833
**Fertilizer Use Throughout the World**
Raymond Ewell (New York State Univ , Buffalo)
*Chem Technol 2* (9), 570 5 (Sept 1972)
The fertilizer industry is one of the major industries of the world, with a total world output in 1969/70 of 200 million tons of products containing 66 million tons of plant nutrients The total ex factory sale value was approximately U S $7 billion Fertilizer is one of the largest commodities in international trade with approximately 50 million tons of fertilizers moving across international borders in 1969/70 In addition to finished fertilizer, large tonnages of fertilizer raw materials (such as phosphate rock and S) and fertilizer intermediates (such as ammonia and phosphoric acid) move in international trade The rate of growth of fertilizer consumption during the decade of the 1960's averaged 8 5%/yr Of this, developed countries exhibited growth of 7 5% while the developing countries had a growth rate of 14 0%/yr In production of fertilizer the developed countries had a growth rate of 8 0%/yr during the 1960's, while the developing countries had a growth rate of 14 8%, giving a world average of 8 6% In 1969/70 the developing countries produced 7 0 million tons of fertilizer (nutrient basis) and consumed 12 3 million tons, indicating an apparent deficit of 5 3 million tons The largest apparent deficits among the developing countries in 1969/70 were People's Republic of China, 1 6 million tons, India, 0 8 million tons, Brazil, 0 5 million tons, Cuba, 0 5 million tons, Turkey, 0 4 million tons, Pakistan, Indonesia, United Arab Republic, and Republic of Vietnam, 0 2 million tons each These nine countries comprised 85% of the total apparent deficits of the developing countries in 1969/70 Projections of fertilizer production and consumption have been made for all countries in the world for 1975/76 and 1980/81 based on data from 1955/56 to 1969/70 The projection method used is a visual, graphical adaptation of the Gompertz growth curve "Developing countries" include all countries of Asia, Africa, and Latin America, except Japan "Developed countries" include all the rest of the world Effective planning and large amounts of capital will be required to increase fertilizer production in the developing countries

from 7 0 million tons in 1969/70 to 24.2 million tons in 1980/81

834

**World Consumption Production Increase Last Year**

*Chem Marketing Rep 201* (9), 40 (Feb 28, 1972)

World consumption of synthetic fertilizers increased by 8 5% to 68 2 million mt (excluding direct use of ground fertilizer phosphate rock) in the yr ended June 30, 1971 In the same fertilizer yr, world production rose 8% to around 70 3 million tons Production of nitrogenous fertilizers increased by 8 7%, that of phosphatic products by 8 5%, and potassium fertilizers by 6 3% Europe produced 27 million tons, followed by Northern and Central America with 21 million tons, the U S.S R , 12 million tons, Asia, 6 3 million tons, Communist China, 1 8 million, Africa, 1 3 million, Australia, 1 2 million, and South America, 516,000 Europe also leads in consump tion, accounting for 25 million tons, followed by North and Central America which took 17 5 million tons The Soviet Union consumed 9 6 million, Asia, 7 7 million, Communist China, 3 6 million, South America, 1 7 million, Africa, 1 7 million, and Australia, 1 4 million Consumption of nitroge nous fertilizers amounted to 31 5 million tons, followed by 19 8 million tons of phosphatic fertilizers and 16 8 million tons of potassium based products

835

**Wet Process Acid Production Growth**

*Chem. Marketing Rep 201* (25), 5, 30 (June 19, 1972)

Worldwide production of $P_2O_5$ for technical uses in 1971 totaled 2 69 million mt 41% more than in 1965 Over the same period production of furnace acid rose by 27% to 1 9 million tons, but wet process acid had a 91% boost to 795,000 tons Wet acid now represents 29% of total $P_2O_5$ used for technical purposes compared with 22% in 1965 This big increase can be seen from figures presented at the annual conference of the International Superphosphate & Compound Manufacturers' Association (ISMA) held in Deauville, France

836

**Potash Consumption—North America**

*AgChem 27* (1 8), 21 (July Aug 1972)

Disappearance of potash products was 46% higher in June 1972 than it was during June 1971, according to the Potash Institute of North America The huge June jump enabled North American producers to close out the fertilizer yr (July 1 June 30) with an overall annual increase of 11% Exports for the yr were up 27% and domestic disappearance (U S and Canada) gained 7% during the yr

837

**Computerized Tonnage Reporting on the Horizon**

*Farm Chem. 132* (10), 118 (Oct 1969)

Computerized reporting of monthly state fertilizer consumption reports is coming Results of a recent meeting of fertilizer industry, state control officials, and USDA representatives show that major companies can use computer reporting methods, and that most states are equipped to handle such computerized information More than 30 representatives of 18 major fertilizer companies at the meeting helped adopt a computer code system, seen as a significant step toward improved uniform reporting Fifteen of the companies present stated they could adopt such a code using either computer print-outs, data cards, or tapes by July, 1970 A recent survey among control officials showed that of 42 states responding, 33 could accept computer print-outs, 11 could accept tapes, and 23 could accept punched data cards for monthly tonnage reports Eleven states now have adopted UFT and published monthly statistics—Arkansas, Florida, Kentucky, Maryland, Missouri, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, and Virginia The Uniform Fertilizer Tonnage Reporting Committee of AAFCO plans to prepare a complete description of the uniform reporting procedure as it is now recommended and distribute to the industry The industry's proposal for computerized reporting was presented to AAFCO last month

## FORECASTS AND TRENDS

838

**Polish Sulphur**

*Sulphur, The J of World Sulphur,* No 72, 12 14, 31 (Sept Oct 1967)

Polish S production started in 1422 but modern production dates back only to 1960 With an annual production of nearly 500,000 tons, Poland now ranks 6th in world S production—behind the U S , Mexico, Canada, France, and the U S S R In the subCarpathian region near Tarnobrzeg deposits extend over 30 sq kilometers and contain over 100 million tons of S The S beds are 5 10 meters thick with a 35 70 meter overburden Open-cast mining is used Two plants, each with a capacity of 300 tons/day, convert S to $H_2SO_4$ by the contact process Much of the acid is used in a nearby superphosphate plant with a capacity of 400,000 tons/yr A new open-cast mine at Machow, in the same area, will replace the present Piaseczno mine in 1970 73 Production at the new mine should reach 1 5 million tons/yr Another new mine, at Grzybow, is in trial operation using a hot $H_2O$ extraction process At full operation this mine should produce 150 200,000 tons S annually During 1966 Poland exported 272,000 tons of S (of 477,000 tons produ ed) mainly to Czechoslovakia

839

**The Crucial Input—Fertilisers**

K S Mann (Desert Development Board, Jodhpur, Rajasthan, India)

*Fertiliser News 13* (2), 15 18 (Feb 1968)

Normal cropping patterns of Punjab at different levels of fertilizer supply highlighted the key role of fertilizers The 1966 67 level of availability of fertilizers (47 kg of calcium ammonium nitrate and 3 5 kg of superphosphate) permitted a low intensity of land use, adoption of improved technology on only 10 9% of cropped land with a nominal acreage under high yielding varieties, and a net return of only 1026 rupees/hectare With fertilizer supplies improving to the expected level of 1970-71 (200 kg of calcium ammonium nitrate and 200 kg/hectare of superphosphate), intensity of cropping improved from 115% to 139%, coverage under the improved technology rose to 48 25% of the total cropped area, high yielding varieties were used over 809,000 hectares, production of foodgrains was more than doubled, and net returns rose to 1841 rupees/hectare This level appeared to be below the requirements It was only in a situation of free market supply of fertilizers that a full exploitation of land and other fixed farm resources was possible At this level cropping intensity could be raised to 155% and switch over to improve technology and high yielding varieties could be undertaken Production of foodgrains could be increased to 20 million tons and farmers could expect a net return of 3012 rupees/hectare

This would demand some major adjustments in cropping pattern in favor of food crops The fertilizer needs totaled 663 kg/hectare of calcium ammonium nitrate and 282 kg/hectare of superphosphate or equivalent fertilizers The requirements of the Punjab State alone were estimated at 528,900 tons of N and 176,000 tons of $P_2O_5$ This would be available from 2 58 million tons of calcium ammonium nitrate and from 1 1 million tons of superphosphate, or from 1 million tons of urea and 383,000 tons of diammonium phosphate

840

**All That Fertilizer and No Place to Grow**

Thomas O'Hanlon

*Fortune 77* (6), 90 5, 129 (June 1, 1968)

A discussion of the fertilizer industry is given Basic producers of N, P, and K materials were selling their products to regional companies which combined these materials and distributed the mixtures to independent dealers, which in turn sold them to farmers The fragmented industry lacked money for expansion, practically all research was conducted by the TVA, and the results were made available to manufacturers and farmers U S fertilizer consumption was growing at an annual rate of 6% Then several oil companies, who were already producers of ammonia, began to branch out into other parts of the fertilizer business Also, old line fertilizer producers were expanding at an unusual rate Much of this new capacity was built to supply export markets As production increased, prices collapsed Technological changes have been compounding the problems of over production and sliding prices As inventories mount, the producers are forced to consider building their own wholesale and retail chains of consumer outlets The Central Farmers' Cooperative is said to have sold $550 million worth of fertilizer last yr, this was 28% of the national retail market The present capacity of the fertilizer industry is such that even if no further expansion takes place, supply and demand in the U S will not be in balance before 1972 The international picture is even more gloomy In a report prepared for AID, economists for the TVA estimate that world fertilizer capacity will exceed requirements by 18 million tons in 1970 Finally, the industry is dismayed and kept off balance by U S AID policies Last yr the industry expected AID to buy $450 million worth of fertilizer to give or sell to underdeveloped nations Actually, AID bought $140 million worth There is no certainty that AID will continue its purchases even at present levels Studies undertaken by the TVA on behalf of AID and the State Department indicate that in some cases underdeveloped nations would be better served if AID would underwrite the construction of local fertilizer plants rather than helping its client nations import fertilizer The article concludes that probably only companies with large cash resources will survive the barren years ahead The smaller and financially weaker producers will either collapse or be absorbed in mergers and acquisitions Gradually the number of basic producers will decrease, possibly to as few as 12 The survivors will be totally integrated companies, each having a substantial share of the market

841

**For Faster Growing Forests**

*Chem Week 102* (25), 60 (June 22, 1968)

Chemical and paper companies are launching large scale tests of forest fertilization Hercules, Tennessee Corporation, and International Minerals and Chemicals are supporting Cooperative Research in Forest Fertilization in Georgia and Florida Other companies also are supporting or conducting research If the experiments and demonstrations are successful, more than 500 million acres of forest land would be added to the U S potential for fertilization

842

**Estimated World Fertilizer Production Capacity as Related to Future Needs 1967 to 1972-80**

F M Kennedy, E A Harre, T P Hignett, and D L McCune (Tennessee Valley Authority, Muscle Shoals, Ala )

*Tennessee Valley Authority*, National Fertilizer Development Center, Muscle Shoals, Ala , 23 pp , (June 1968)

World fertilizer consumption is now at 50 million metric tons of plant nutrients/yr, and it is estimated to double by 1975 and to triple by 1980, the current trend of increase is at 10-22%/yr The developed countries with 30% of world population account for more than 80% of the fertilizer use, giving them 11 times the fertilizer consumption per capita of the developing countries These estimates show that, while the developing countries have a higher percentage rate of tonnage increase (16 2% *vs* 9 7%/yr), the developed regions will continue to lead in actual tonnage of annual increase during the 1970's Diets of the developing and developed countries differ in both amount and type Average diets in most developing countries amount to 2000-2500 kilocalories/day and are mainly of direct plant origin Food intake in the developed regions includes only slightly more kilocalories/day of direct plant origin but there is a 30 50% caloric supplement of animal origin with its proteins, certain vitamins and other values Improvement into this costly animal cycle is noticeable but inherently slow among developing countries Progress can be reported for the developing regions Fertilizer consumption per capita has doubled during the past five years, and many sections have achieved moderate increases in amount of caloric intake and in improvement in its quality If effective use is made of the increased fertilizer consumption, Latin America could achieve a 10% dietary improvement (expressed as plant origin) during the '970s, Asia (apart from Japan and communist Asia) is estimated to break even, dietwise, while Africa could lose ground The world does have existing and projected production capacity to meet these estimates of rapidly advancing fertilizer consumption The margin of production capacity over consumption is increasing through 1970 and is adequate through 1972 Each of the developed regions has present and planned capacity to meet its own needs or to provide for substantial exporting to the developing regions, none of which is self sufficient productionwise North America has the greatest production reserve, having rapidly exploited the new production technology for ammonia and the massive Canadian potash deposits as well as continuing phosphate expansions Europe's projected production capacity allows for exports at a fairly fixed proportion of consumption If the developing countries are to continue their 15%/yr gain in fertilizer consumption per capita, they will need rapid progress in almost all phases of agriculture and agribusiness Effective use of the rapidly growing fertilizer tonnages will place increasing importance on crop varieties, pest control, the use of water, farming practices and the whole commercial climate of distribution and marketing, investment and credit, the food processing industry and others The large scale, often less tangible and less directly rewarding aspects of fertilizer use may well be more difficult problems than the actual production of the amount and type of fertilizers needed

843

**Forestry Advances Provide Fertilizer Outlet**

*Chem Eng News 46* (41), 21-2 (Sept 23, 1968)

W H Garman of the National Plant Food Institute and Laurence C Walker of Stephen F Austin State College predict that forests are a coming market for fertilizers Less than half

of the 509 million acres of commercial forests in the U S are well managed Poorly managed timber probably will respond to fertilization Weyerhaeuser Co fertilized 1400 acres of Douglas fir last yr, will fertilize 14,000 acres this yr and plans to be fertilizing 137,000 acres annually by 1980 Rate of fertilization is 330 lb/acre of urea Plans are to fertilize all 2 2 million acres of Douglas fir in the Northwest Stands will be fertilized every five years after they reach 15 years of age Harvest should then come at age 45 60 instead of 80-100 years In the southern U S N and K, and P in some areas, are increasing tree yields

844

**Spanish Fertilizer Market Goes Over to Complex**

*European Chem. News* 14 (353), 4 (Nov 8, 1968)

Changes in the demand in Spain for fertilizers are going to affect the availability of ammonia there and alter the pattern of investment The demand is changing from superphosphates to complex fertilizers If announced intentions for more superphosphate, ammonium sulfate, and complex fertilizers are realized during the next five years, there will be a demand in the country for about 750,000 tons/year of N There will be a deficit of about 100,000 tons/year of N if this comes about It would appear that the plan for meeting this shortfall is to import the necessary ammonia from the 330,000 tons/year plant which will be built in Arzew, near Oran, in Algeria It has been expected, for some time, that both Cros and UEE would merge some or all of their activities At Tarragona a joint venture is envisaged It will produce 230,000 tons/year of ammonia, 100,000 tons/year of ammonium nitrate, 160,000 tons/year of nitric acid, 100,000 tons/year of urea, and 300,000 tons/year compound fertilizers A new complex fertilizer plant for Abonos Complejos del Sureste (ASURJ calls for the production of 200,000 tons/year of complex fertilizers and 75,000 tons/year of ammonium nitro sulfate A new complex fertilizer plant has been brought on stream by Sociedad Iberica del Nitrogeno at La Felguera

845

**Fluid Mixed Fertilizers (Clear Liquids, Suspensions, and Slurries) Usage and Materials – Past, Present, and Future**

F P Achorn (Tennessee Valley Authority, Muscle Shoals, Ala)

*Agr Nitrogen Inst, Proc 18*, 119 29 (1968) Held Nov 18 20, 1968, Kansas City, Mo

The fluid fertilizer industry is expanding at an extraordinary rate Increased supplies of superphosphoric acid, N solution, urea, ammonia, and liquid grade potash have encouraged growth during the last two years Consumption of liquid fertilizers in the United States increased from 5 1 to 8 2 million tons in 1965 and 1967, respectively Diagrams and descriptions are given for the hot mix, semihot mix, and cold mix liquid fertilizer plants Additional research is being made to improve winter storage characteristics, addition of micronutrients, production techniques, suspension agents, and other areas expected to encourage growth of liquid fertilizer consumption in the future

846

**Fertiliser Production Pattern in India--Now and in the Future**

M Ramakrishnayya (Ministry of Petroleum and Chemicals New Delhi, India)

*Seminar on Fertiliser Marketing Proc.* Fertiliser Assoc. India (Held New Delhi, India, Dec 6 8, 1968), pp 20-3 (Apr 1969)

At present single nutrient fertilizers dominate the production pattern in N as well as P In the next few years the double nutrient forms will improve their position and the triple nutrient forms will make their debut This trend will be most pronounced in phosphates By the end of the Fourth Plan a little over three-quarters of the P produced is likely to be in the form of complex fertilizer In regard to N, the straight forms will continue to be favored by producers. Several factors contribute to the growth of binary and ternary fertilizers The more important of them are the growing coverage and sophistication of soil testing practices, the increasing intensity of the cropping pattern, the comparative transport economics in relation to the designated markets, and the availability of raw materials at the selected locations It is likely that with the growth of competition the producers will have to seek new ways of reaching and retaining their customers Bulk blending near market centers and application of liquid ammonia may be tried by the more enterprising of them in an effort to provide special combinations and reduce the cost of nutrient per acre

847

**Growth of Urea Consumption in India**

A G Soomar (Japan Urea Center, New Delhi, India)

*Fertiliser News 13* (12), 70-4 (Dec 1968)

The principal considerations in the planned production, marketing, and consumption of urea are outlined The N deficiency of Indian soils has to be corrected by making greater use of nitrogenous fertilizers in proper and adequate quantities to step up agricultural production and the yield/unit area In recent years, urea with 46% N content has become an efficient and economic source of crop nutrient The indigenous production of N as urea, which has increased from 2% in 1959-60 to 31% in 1967-68, is still far below the consumption level and by 1970 71, 65% of the installed capacity of N will be accounted for by urea alone Ammonium sulfate, which had been the principal source of N before 1960-61, has given place to urea and urea accounts for 65% of the total consumption of N in India in 1967-68 Though there has been a steady, often spectacular, increase in the consumption of urea throughout the country, the quantity of 1 4 million tons of urea targeted for 1970 71 should make the marketing organization reorientate its approach in providing facilities such as adequate distribution channels, technical know how, and advisory services

848

**The Changing Fertiliser Industry**

E N Fitzpatrick

*J Agr Western Australia* 9 (12), 554 5 (Dec 1968)

For many years superphosphate was the basic fertilizer used by most farmers in Western Australia With the development of manufacturing complexes in both the Eastern and Western sections, a much wider range of materials became available These now include ammonium sulfate, urea, ammonium nitrate, anhydrous ammonia, sodium nitrate, calcium ammonium nitrate, "double" superphosphate, normal superphosphate, 24 24 0, and 28 14 0 Production capacity far exceeds demand Considering the world wide excess production capacity, Australian producers will have much competition on the world market They will compete strongly with each other for the local market Farmers in Western Australia should benefit but should be wary of sales pressure

849

**Farm Store Operators Cautious About 1969**

*Farm Store Merchand* 11 (12), 14 (Dec 1968)

Nearly double the number of dealers reported declining sales during the past year as compared with the year before, according to the annual How's Business Survey of Farm Store

Merchandising This year, 32 2% of dealers responding to the survey reported sales declined, while 60 8% reported sales increased This compares with 16 6% reporting declines and 81 7% reporting increases the year before As dealers look ahead to the new year, 59 8% said they feel sales volume will increase, while 36 6% say it will remain the same and 2 4% see a decline Last year, 69% looked for increases, 28% thought sales would be the same and 3% felt declines would be upcoming In 1969, 47 6% of the responding dealers are planning special programs to increase sales, while 43 9% plan nothing new

850

**Liquid Fertilizers in United Kingdom**

*World NPKS*, No 31, 14 (Jan 1969)

It is not easy to forecast how important liquid fertilizers will become in the U K., at present they possibly supply about 2% of U K. total fertilizer Some liquid fertilizers supply N, P, and K and in British experiments these have been as effective as equivalent solids They are less concentrated than solid fertilizers and tend to be more expensive, so their use is not likely to increase rapidly

851

**Fertiliser Production Pattern in India — Now and in Future**

M Ramakrishnayya (Ministry of Petroleum & Chemicals, New Delhi, India)

*Fertiliser News 14* (1), 27-8, 63 (Jan 1969)

At present single nutrient materials dominate the production pattern in N as well as P fertilizers In the next few years the double nutrient forms will improve their position and the triple nutrient forms will make their debut This trend will be most pronounced in phosphates By the end of the Fourth Plan a little over three-quarters of the phosphate produced is likely to be in the form of complex fertilizer In regard to N, however, the straight forms will continue to be favored by the producers for various reasons

852

**The Place of Europe in the World Sulfur/Sulfuric Acid Scene**

M N J Horseman and D L. Mermikides (British Sulphur Corp , Ltd )

*European Chem. Marketing Res. Assoc , 2nd Intern. Conf* , London, (Mar 1969)

The effects of recent developments in the supply and demand of S on western Europe, and the position of western Europe in the S industry as a whole are described The survey is centered on the trends in the supply of S produced by the Frasch process, of S recovered as a by product from natural gas plants, oil refineries, and coking plants, and of S from pyrites The Frasch process S currently accounts for >60% of Western World production Pyrites is used mainly in the countries which produce it The S shortage which occurred from 1963 1967 took place when an unforeseen increase in demand happened to coincide with a reduction in the growth of S production by the Frasch process in Mexico, Canada, and France Production then began to increase again and demand declined somewhat In 1968 larger increases in output and only modest increases in demand occurred, and supply restrictions came to an end There was very little effect on the S and $H_2SO_4$ industries in western Europe during these developments Demand for S did not increase rapidly, and pyrites was used more than in the rest of the world Fertilizer and $H_2SO_4$ demands are the most important considerations

853

**European Chemical Marketing Research Association Conference in London Ammonia Production and Consumption Could Double Again by 1975**

J P Johnson

*Chem. Age (London) 99* (2593), 17 (Mar 28, 1969)

World production and consumption of ammonia have doubled in the last six years and are likely to double again by 1975 Fertilizer N consumption, expanding at an annual compound growth rate of over 11%, has almost trebled in the last 10 years to 25 million tons in 1967/68, 85% of total N consumption World trade in fertilizer N had also grown very rapidly, at over 10%/year over the last 10 years, about a quarter of the world's consumption is now accounted for by imports, and about half the developing countries consumption is made up of imports from the developed world Because of favorable feedstock and transport costs, the gradual downward trend in Western Europe's share of world N trade is likely to continue By 1971/72, based on new capacity announced, about one third of world ammonia capacity will be in plants of 1000 tons/day and over The world fleet of refrigerated tankers is growing fast The development of larger tankers will result in lower freight rates and provide a further incentive to world trade in ammonia Long distance pipelining of ammonia is also being developed now for the first time Recovery in world N prices is therefore unlikely over the next two years or so

854

**Key Long Term Factor for Phosphoric Acid is Availability and Price of Sulphur**

*Chem. Age (London) 99* (2593), 22 (Mar 28, 1969)

Estimated world capacity for wet process phosphoric acid was 7 4 million tons of $P_2O_5$ in 1965 and this is expected to reach 15 million tons within the next two years, when capacity of thermal phosphoric acid will be approximately 2 5 million tons of $P_2O_5$ annually Approximately 93% of world wet acid production is used in the manufacture of fertilizers, whereas only 16% of the thermal acid produced in the U S during 1967 was used for fertilizers Forward projections have been produced by various authors which suggest that in 1971 the phosphate fertilizer industry will have a capacity of 25 6 million tons of $P_2O_5$, of which nitrophosphate will account for 6%

855

**Mideast Ammonia Production**

*Chem. Week 104* (14), 28 (Apr 5, 1969)

Mideast ammonia production will become a major factor in world fertilizer trade by the early '70's, says Imperial Chemical Industries' agricultural chemicals marketing manager In Kuwait alone, ammonia capacity will reach 800,000 tons/year (N equivalent), and other projects for the Arabian Persian Gulf areas and along the North African coast are contemplated Development of larger refrigerated tankers will decrease freight rates, further stimulating world ammonia trade By '75 '76, world N trade may reach 11 million tons- twice the level of '66 '67

856

**Fertilizers in 2000 A D**

G W Cooke (Rothamsted Exp Sta , Harpenden U K )

*Phosphorus Agr* , No 53, 1-13 (June 1969)

The estimated use in 2000 A D is (million tons) 110 N, 55 $P_2O_5$, and 55 $K_2O$ In 1946 estimates were made for 1960 The estimated and actual use, respectively, were N 9 3 and 9 7, $P_2O_5$ 10 2 and 9 8, and $K_2O$ 6 4 and 8 4 million tons In 1966-67 Europe and North America used about two-thirds of

the world's total of N and P and three-fourths of the K An increasing proportion of the world total is expected to be used in Asia

857

**Fertilizer for Forest Fertilization**

*Agr Chem. 24* (8), 34 (Aug 1969)

Perhaps it is symptomatic of the situation to note the forward looking decision of the Chemical Construction Corp of New York It has inaugurated a study, by its own Consulting Division, of the "Commercial Potential of Forest Fertilization," which is to be completed by this coming September The object is to determine the return on investment from fertilization by timberland owners and the potential market this would create for fertilizer producers As noted previously, considerable doubt exists among some timber companies whether fertilization of forest trees is a profitable practice Swedish timberland owners on the other hand have satisfied themselves it pays, they had already fertilized by 1968 more than 150,000 acres Here in the U S the Weyerhaeuser Corp plans to fertilize 58,000 acres by 1970 and by 1980 it expects to make at least one application of a N fertilizer on 20% of its 730,000 acres of forest land Three other firms–Hercules, International Minerals and Chemical Corporation, and Tennessee Company–together with 10 pulp and paper firms have funded to the extent of $45,000/year a five year project named "Cooperative Research in Forest Fertilization" (CRIFF), in which the Univ of Florida is participating CRIFF will fertilize experimentally up to 10,000 acres a year of Florida and Georgia woodlands In the Pacific Northwest, Crown Zellerbach fertilized 9000 acres of forest trees this year at the rate of 440 lb urea/acre at an estimated total cost of $25 30/acre

858

**Agricultural Problems in the 1970's**

G L Johnson (Michigan State Univ , East Lansing)

*Fertilizer Marketing in a Changing Agriculture* (Held Oct 1 3, 1969, Memphis, Tenn ) Tennessee Valley Authority, Muscle Shoals, Alabama, pp 4 9

Population expansion in the U S in the next decade will require a 10 15% expansion in agricultural production But, supplies of agricultural products will continue to outrun effective demand More and more attention will be devoted to devising and implementing new kinds and combinations of private and public controls of the investment in and over the use of resources for agricultural production Because of advances in food and feed grain production in the less developed countries, there will be an increased need to coordinate domestic and international control programs In the U S inequalities in nutritional needs will be handled through a redistribution of incomes and wealth, in the less developed countries egalitarian distribution of growth in income would be a more important source of effective demand Population control cannot be expected to have much world wide impact on per capita income before 1980 Regional distribution of development and population will receive increased attention in the 1970's both in the U S and especially in the less developed countries

859

**Fertilizer Materials will Boom, with the Biggest Increases Seen in Other Than Fertilizer Areas**

*Oil, Paint, Drug, Reptr 196* (16), 5 (Oct 20, 1969)

Market outlook for the three major fertilizer materials–phosphate rock, potash, and nitrogen–promises to remain bullish at least for the next decade Consumption increases can be looked for through 1980 in all three of the materials, but with the biggest percentage wise increases probably showing up in demand for other than fertilizer uses This projection of the market is contained in a new technical publication of the Interior Department's Bureau of Mines, made public last week It is the first in a series of applied economic research studies that the Division of Mineral Economics is undertaking in the field of mineral demand Phosphate rock for agricultural use is expected to continue to rise through 1980 with a projected consumption of 7 9 million tons ($P_2O_5$) for that year compared with 5 1 million tons in 1965 Potash for agricultural use is expected to continue rising through 1980, with an estimated consumption of 7 1 million tons ($K_2O$) in that year, compared with 3 1 million tons in 1965 N for agricultural use is expected to continue to rise through 1980, with an estimated consumption of 15 8 million short tons (N) in that year compared with 5 6 million tons in 1965

860

**Major Development Trends in the Production of Phosphatic and Complex Fertilizers**

V M Borisov and Ye V Yuzhnaya

*Khim. Prom. 45* (10), 740-4 (1969) From Soviet Chemical Industry, No 10, 26 31 (Oct 1969)

In the Soviet Union the consumption of single nutrient P fertilizers now accounts for 48% of the total fertilizer consumption and this is expected to decrease to about 28% by 1980 The production of P containing compound fertilizers is scheduled for marked increase, most of which will be based on ammonium phosphates rather than nitrophosphates. The well known increase in nitrophosphates (which are not all-purpose fertilizers owing to the relatively low water solubility of the $P_2O_5$ ) has been a useful expedient, but the basis for Soviet compound fertilizers during the next 10 to 15 years will be wet process $H_3PO_4$ It is estimated that by 1980 only 15% of all Soviet fertilizers will be produced from thermal process $H_3PO_4$ Soviet production of triple superphosphate is by either the den process or the fluidized bed process, the latter representing a unique development that offers considerable promise

861

**World Potash Resources**

G Ruping (Verkausgemeinschaft Deutscher Kaliwerke, GmbH, Hannover, West Germany)

*Chem. Ind. (London)*, No 44, 1575 7 (Nov 1969)

At the world production level of today (approximately 15 million ton/year) world reserves would last another thousand years The production level of 1970-1 (expected to be 19 million tons) could be maintained for at least 657 years The probable consumption by 1975 will increase to 26 million tons of $K_2O$ The potash industry should gradually return from its unhealthy capacity surge to a policy of judging demand rather than the beauties of a new deposit In the long range planning a shortage may occur in some countries' home production which will affect the international pattern of trade in $K_2O$ On the whole, however, the ratio between probable output and consumption does not seem to indicate any strain on the supply of $K_2O$ Estimates of reserves in currently worked deposits of countries as major producers are given

862

**A Statistical Analysis of U. S. Demand for Phosphate Rock,**

**Potash, and Nitrogen**
Olman Hee (U S Dep Interior, Washington, D. C)
*U S. Bur Mines, Inform. Cir. 8418,* 55 pp (1969)
This study investigates the identity and relative importance of factors affecting the future demand for phosphate rock, potash, and nitrogen The main objective is to analyze demand relationships for these chemical raw materials for some specified past period, and to utilize this information to make projections of consumption into some designated future period The end use approach is used, which divides total consumption of each chemical raw material into agricultural, industrial, and export use Multiple regression analysis is employed to statistically measure the relative effects of the different factors on consumption in each end use The general method centers on the construction of a consumer demand model, the fitting of the respective equations in the model, and the interpretation of the statistical results Direct and cross price elasticities of demand are computed for each end use of the chemical raw materials. These give an insight into expected changes in consumption with respect to given changes in price The results of this study indicate that price, consumer income, and level of technology are factors which measurably affect consumption of chemical raw materials For phosphate rock and potash, the agricultural and industrial end uses showed an inelastic demand, whereas for N, all end uses (including export use) exhibited an elastic demand Among the chemical raw materials, average annual growth of consumption of N for agricultural and export uses to 1980 is expected to be notably higher than that for phosphate rock and potash

863
**Potential Plant Nutrient Consumption in North America**
J D Beaton and S L Tisdale (The Sulphur Inst, Washington D C)
*Sulphur Inst Tech Bull. No 16,* 64 pp (1969)
The Calculated Potential Annual Consumption (CPAC) of plant nutrient use in various regions of the United States and Canada was made These estimates were made on the basis that acreages planted in 1967 be fertilized at or near the rates of N, $P_2O_5$, $K_2O$, and S based largely on recommendations of State Extension Services and provincial Departments of Agriculture The CPAC totals for all crops and forests in North America are 14 55 million tons of N, 11 33 $P_2O_5$, 8 85 $K_2O$, and 2 84 S The actual consumption figures were 6 92 million tons of N, 4 79 $P_2O_5$, and 3 79 $K_2O$ Methods and sources of data are summarized Also, potential and actual use of plant nutrients are tabulated by areas and by states

864
**The Fertilizer Outlook**
*Farm Chem. 133* (1), 16 (Jan 1970)
The experiences of the last two fertilizer seasons have dampened but not wiped out the enthusiasm of U S fertilizer producers Still aware of the 1968-69 fertilizer season, the first since 1955 that usage failed to increase, they are cautiously optimistic about the future, predicting a 9 million ton increase in consumption by 1975 Two years ago when this survey was first conducted, they forecast a 44 million ton market in 1970, climbing to 57 million tons in 1975 Primary plant nutrients will account for 42 6% of the total market in 1975, estimated at 47 7 million tons N is expected to dominate, accounting for 10 million tons, compared to 5 9 million tons of $P_2O_5$ and 5 4 million tons of $K_2O$ Liquids will make significant inroads, but dry bulk fertilizers will still be the most popular form, with consumption estimated at 20 7 million tons, compared with 14 million tons of liquid and 13 million tons of bagged The boom in bulk blending facilities is expected to fade, with only 250 new units predicted over the next six years. There will be some 4600 bulk blending plants in 1975, and about 3100 liquid mixing units, fertilizer manufacturers predict Some slight gains are predicted in production of fertilizer materials It is estimated that 18 4 million tons of $NH_3$ will be produced in 1975, 5 5 million tons of ammonium nitrate, and 2 5 million tons of ammonium sulfate Urea will make significant gains, with production estimated at 3 7 million tons, compared to 2 4 million tons in '68 Production of phosphatic materials will show little change, with the exception of phosphate rock output, expected to climb by some 9 million tons, and wet process acid production, which is predicted to increase about 1 1 million tons of $P_2O_5$

865
**More Fertilizer is Needed Abroad**
*Farm Supplier 44* (1), 51 (Jan 1970)
An official of the U S foreign aid program, AID, has asked the U S fertilizer industry to increase its investments in developing nations which seek to boost their food production. The assistant administrator recently said that he believes investment in fertilizer plants in developing countries should largely be financed by private industry He said that projected plants abroad by 1975 at best can supply only about half the fertilizer needed The rest, around 8 to 9 million tons annually, will have to be covered by imports at an estimated cost of $800 million or more This is a threefold increase over the present AID fertilizer procurement program which now approximates $200 million a year the largest single use of AID funds in the foeign assistance program

866
**World Capacity to Produce Synthetic Ammonia is Scheduled for Large Increase**
*Chem. Week 106* (4), 48 (Jan 28, 1970)
By '73, according to a new compilation by the Tennessee Valley Authority, global capacity for ammonia will top 71 1 million metric tons a 35% gain from '69 The biggest increase will be in Asia Excluding Japan, that area's capacity will soar 169%, to 8 09 million metric tons India will account for most of the increase, adding nearly 3 million metric tons Collectively, Iran, Iraq, Israel, Kuwait, Qatar, Saudi Arabia, and Syria will add nearly 1 5 million metric tons Japan will boost capacity 60%, to 4 8 million metric tons Western Europe will increase capacity 30%, to 18 2 million metric tons, with most of the gain coming from France, Italy, and the Netherlands Eastern European and Soviet capacities will grow at about the same pace, reaching about 15 5 million metric tons Latin American capacity will expand more than 80% by '73, to 3 million metric tons Venezuela will account for half the boost African potential will grow 26%, to 1 37 million metric tons North American capacity, now far in excess of demand, will expand relatively slowly (11 1%), reaching 17 9 million metric tons The slow expansion stems from gross over supply of the North American market despite the closing of many older and smaller plants

867
**The U S Nitrogen Industry**
G C Sweeney (Arthur D Little, Inc , Cambridge, Mass )
*Agr Chem. 25* (2), 13 15 (Feb 1970)
When the profitability of an industry as basic as the U S fertilizer industry deteriorates to the point where it is today, it is superficial to simply accuse management of poor judgment in overbuilding and underpricing Some elusive and complex factors have clearly been at work to permit such a situation to develop Since investment in $NH_3$ plants is probably greater

than that for any other fertilizer, this segment of the industry is examined in detail Overcapacity in $NH_3$ was not an over night phenomenon Instead, it developed steadily over a period of several years What was happening was apparent to many in the industry, yet new construction continued Technological breakthrough based on the use of centrifugal compressors is perhaps the most easily identifiable factor in causing overcapacity Pressures to adopt this new type of plant were felt both by those with old plants and those considering new plants Unfortunately the new technology was only applicable to large plants with capacities of 600 tons/day or more The economics of the new plants were so attractive that marketing considerations became secondary Lack of concern over marketing was partly the result of a second factor—overoptimism Many companies, especially those in the oil, gas, and chemical fields, had "discovered" fertilizers and were convinced that fertilizers would provide a major answer to the well publicized population explosion These companies were not alone in this feeling It was echoed by organizations such as the United Nations and major financial institutions Presumably there would be no problem in disposing of almost unlimited quantities of fertilizer to developing countries Unfortunately, few examined the basic arithmetic of this premise Adding to the confusion were major shifts that occurred in the type of fertilizer products and the nature of fertilizer distribution Regarding the future, within two or three years the demand will have increased to the point where the construction of additional plants will be necessary Additional capital will have to be found for these plants and prices will have to provide acceptable returns on this new capital Therefore through the classic workings of our economy, prices will be forced to higher levels In any case it is difficult to see a continuation of present fertilizer prices indefinitely It is also unlikely that an overcapacity of the present magnitude will develop again While it will not be an easy industry in which to operate profitably, it does have a basically attractive growth rate compared with many

868

**Phosphate May Bring New Feelings in Spain and Morocco**

*Oil, Paint, Drug Rep 197* (8), 4 (Feb 23, 1970)

The U S phosphate industry may be encouraging an accommodation between Spain and Morocco Both countries are now sidling toward a cooperative attitude in the exploitation of the huge North African phosphate reserves Production is to start during the second half of 1971 from the Bukraa deposit in the Spanish Sahara Output will reach 3 million tons in 1972 and ultimately 10 million tons/year The projected Bukraa total is roughly equal to the current rate of production from Morocco's existing mines and it is in the process of opening up two more major deposits for production According to French reports, American producers are now delivering phosphate rock at Rotterdam harbor for Common Market consumers at a price less than the official quote of the Office Cherifien des Phosphates (OCP), the Moroccan state company, at Casablanca Morocco last year commissioned the French Krebs engineering group to build a phosphate and ammonia phosphate fertilizers plant at Annaba as a way of upgrading its natural product But the economic future of OCP for a long time must rest on the export of crude phosphates. With a new producer coming on the scene for the 1970's, equal to the total Moroccan production or U S exports, it is natural that OCP and the Moroccan government have reexamined their position with Spain A total of about $200 million is to be invested in opening the deposit, treating the ore, and transporting it to the port The Moroccan reserves at Ben Guerir, the next deposit to be opened, are put at 900 million tons of ore, available at competitive prices In 1967 the Moroccan ambassador in Madrid was quoted as asking why the phosphate riches should not be exploited jointly With American competition already putting a dent in the growth of Morocco's OCP, that view is gaining more adherents. Morocco isn't dropping its claim to the Spanish Sahara, but it is being muted to avoid a major disruption in the world phosphate market

869

**Fertilizer Growth Seen Needing $11 Billion in Capital Investment for World's Developing Areas.**

*Oil, Paint, Drug Rep 197* (8),7 (Feb 23, 1970)

To meet anticipated growth in fertilizer demand in developing countries, it will take an $11 billion capital investment in new plant capacity over the next fifteen years, says the assistant director general of the Food & Agriculture Organization The projection, made last week to the American Institute of Chemical Engineers meeting in Atlanta, Ga , is based on FAO's recently released Indicative World Plan for Agricultural Development This plan estimates that in the next five years fertilizer use in developing countries will double the 1968-69 figure of 7 7 million tons and that it will reach 33 9 million tons by 1985 By 1980, he estimates, developing countries will be spending $4 2 billion annually in foreign exchange on imports of fertilizers and raw materials for domestic fertilizer production, or about 8% of total export earnings. Investment costs estimated at $500/ton annual capacity, and employment created would be small in relation to the capital requirements. The foreign exchange saved would not be as much as the savings from reduced fertilizer imports because in most countries a large proportion of the raw materials would still need to be imported and the initial investment would also require foreign exchange

870

**Status of Fluid Fertilizers 1970**

F P Achorn (Tennessee Valley Authority, Muscle Shoals, Ala )

*Fert Solutions 14* (2), 26 31 (Mar Apr 1970)

The growth of fluid fertilizers in the past five years has been spectacular In 1968 fluids accounted for 24% of all forms of fertilizer Sixty two % of the straight N was applied in the fluid form In 1968 fluid mixtures constituted about 12% of the total mixed fertilizers sold The growth rate over the past five years has been about 35%/yr The reasons for this rapid growth rate are (1) Fluid fertilizers are easy to handle (2) They provide a means for the uniform application of plant nutrients, including micronutrients (3) Pesticides can be uniformly applied in fluid fertilizers The fluid cold mix and hot mix processes are described Descriptions of suspensions and clear liquid fertilizers are given Satellite fluid fertilizer plants which use potash base suspension 5 15 30, ammonium polyphosphate base suspension 12-40 0, and urea ammonium nitrate solution are described Information is given concerning new products for the fluid fertilizer market, such as TVA 15 62 0, 12-44 0, 14 59 0-4Zn, and high N suspension 37-0-0

871

**Estimated World Fertilizer Production Capacity as Related to Future Needs 1970 to 1975**

E A Harre, F M Kennedy, T P Hignett, and D L. McCune (Tennessee Valley Authority, Muscle Shoals, Ala )

*National Fertilizer Development Center, Tennessee Valley Authority, Muscle Shoals, Ala Bull Y-7*, 32 pp (June

1970)
A supply-demand comparison of fertilizers on the world basis is shown A review of production, consumption, and plant capacities with estimates of future consumption and plant capacities by regions is given Consumption will show smaller percentage gains in the 1970's than was shown in the 1960's For 1970 75, consumption is estimated to increase almost 7%/yr and the latter 1970's are estimated to increase at a rate of 5½%/yr The developing region of the world (Asia, Africa, and Latin America) showed an annual increase in use of 16% for the period 1962-69 and will probably maintain their current rate of increase through the 1970's World consumption in 1968-69 was 59 5 million metric ton, estimates show increases to 89 and 115 million metric ton in 1975 and 1980 respectively Phosphate, N, and K supply-demand balances are expected in 1973, 1974, and 1975, respectively

872
**Fertilizers for Increasing Production and Productivity in Agriculture in the 1970's**
C R Ranganathan (Fert Assoc India, New Delhi)
*Fert News 15* (7), 17 22 (July 1970)
Requirements for food grains in India is expected to go up to 167 million tonnes by 1981 as against a production of 100 million tonnes (± 2%) during 1969 70 The quantity of plant nutrients required for the production of the additional 67 million tonnes of food grains is computed at 6 7 million tonnes on the generally accepted basis that one unit of plant food produces 10 units of additional grain Taking into account the present (1969 70) consumption of plant food and requirement of crops other than food grains, a total requirement of 10 5 million tonnes made up of 6 million tonnes of N, 3 million tonnes of phosphate and 1 5 million tonnes of potash is seen for 1980 81 The success of plans to achieve a six fold increase in the use of fertilizers during the next 10 yr calls for considerable improvements in the existing arrangements for distribution of fertilizers, provision of credit, and other steps In this context, the move for the formation of a Fertiliser Promotion Council is welcomed The importance of a favorable benefit/cost ratio in the development of fertilizer use is also discussed

873
**Soviet Union Fertilizer Output Schedule**
*Chem Week 107* (5), 27 (July 29, 1970)
The Soviet Union plans to double its fertilizer output in the next five yr The plan is part of a renewed Soviet effort to boost agricultural production The Russians say they will increase total capital investment in fertilizer plants 70%, to more than $84 billion Fertilizer production is scheduled to double, to 90 million ton/yr by '75, reach 150 million ton/yr by '80 Improved quality and better packaging will be stressed in the upcoming five yr plan In the past, the Soviets have failed to attain many of their stated goals in chemical production, but the industry is being modernized

874
**Demand for Compounds Expands in Yugoslavia**
*Phosphorus Potassium*, No 48, 21 2 (July Aug 1970)
The advantages of concentrated fertilizers and the importance of a correct balance between the three major nutrients s universally recognized and accepted and, in most East European Countries, rapid progress is being made in the replacement of single superphosphate by high analysis compound fertilizers, this is particularly the case in Yugoslavia The completion of a revolution in the supply of phosphate fertilizers in Yugoslavia is destined for 1970 The anticipated fall in the production of single superphosphate, which began in 1969, is likely to continue further in 1970, while compound fertilizer production facilities, planned several yrs ago, have either come on stream or are shortly due on stream According to preliminary figures for 1969, phosphate fertilizer supply declined from 293,000 tonnes $P_2O_5$ in 1968 to 287,000 tonnes $P_2O_5$ in 1969 and the principal feature of the supply pattern in 1969 was the sharp swing from single superphosphate to compound fertilizers During 1969 and 1970 80% of the country's present compound fertilizer manufacturing facilities became operational About half of the compound fertilizer $P_2O_5$ is produced by nitrophosphate processes, the phosphate solubility and content of which is improved by the addition of quantities of phosphoric acid or triple superphosphate The average phosphate content of the compounds produced is 14 5% $P_2O_5$ with formulations ranging from 12% to 23% $P_2O_5$ Total phosphate fertilizer capacity in Yugoslavia is now 371,000 tonnes $P_2O_5$ with the further possibility of a 30,000

875
**U S Fertilizer Nitrogen Capacity**
*Nitrogen*, No 56, 16 (July Aug 1970)
Current $NH_3$ capacity is estimated to be 15 2 million tonnes distributed among 90 plants, four fewer than the previous yr, as a number of small plants and some of the older multi train plants have been shut down Around 1 2 million tonnes capacity is under construction but the net addition to current capacity will only total 805,580 ton/yr, once replacements have been discounted Annual urea capacity is estimated at 3 8 million tonnes, although some of the newer plants are not up to full production, while capacity for fertilizer grade $NH_4NO_3$ is as much as 6 9 million ton/yr Ammonium sulfate capacity, now approximately 3 0 million ton/yr is today divided between synthetic, coproduct, and coke oven by product material in the ratio 46 30 24

876
**World Ammonia Plant Need by Year 2000**
*Chem Age (London) 101* (2669), 8 (Sept 11, 1970)
The world will need about 260 more new large $NH_3$ plants by the end of the century, an average of nine/yr, if world demand for N fixation capacity is to be met according to the planning director of the ICI Agricultural Division Estimates of annual fixed N requirement/head of world population in the yr 2000 AD varies between a low figure of 17 5 kg and 35 kg, amounting to 110 million and 220 million tonnes in total for the world, assuming a population of between 6 5 billion and 7 0 billion Extrapolation of past growth in fertilizer N usage from 0 36 million tonnes in 1905 to 29 million tonnes in 1969 indicates that the higher of the two figures is the more likely to be correct—that is at least 170 million tonnes Present world capacity is 42 million tonnes and, if the forecast is to be met, there will have to be an additional annual capacity amounting to some 130 to 140 million tonnes provided progressively by the end of the century

877
**Ammonium Nitrate Fertilizer, World Demand Expected to Reach 13 Million Ton During 1977 78**
*Oil, Paint Drug Rep 198* (13), 5, 16 (Sept 28, 1970)
World demand for $NH_4NO_3$ fertilizer should reach 13 million metric tons of N/yr by the 1977 78 season, an average increase of not quite 4% annually from the 1967-68 total of 8 9 million ton Despite this growth, the relative importance of $NH_4NO_3$ among fertilizer N materials will decline, accounting for only

22% of total agricultural N usage, compared with 37% 10 yrs earlier Nitrate's decreasing share of the total market for agricultural N, which should grow more than 9%/yr to almost 58 million ton by 1977 78, is seen stemming mainly from the sharper growth rate of urea, which will account for the bulk of N growth If world capacity does approximate this figure by 1977 78, supply and demand should be in relatively good balance, allowing for average operating rates of more than 80% For the short term however, planned expansions are not expected to permit that degree of plant utilization In 1972 73 world capacity is expected to reach 14 7 million ton, compared with a demand of 11 2 million ton Average plant utilization of 80% during that season would create a 600,000-ton surplus On a regional basis, however, planned expansions will place most over capacity in Western Europe, which, with 80% plant utilization, would have an 800,000 ton surplus in 1972 73 and a 400,000 ton surplus in 1977 78

878

**Italian Phosphoric Acid Production to Double by 1975**

*Chem Age (London) 101* (2675), 24 (Oct 23 1970)

The Committee of Economic Studies in Italy has compiled long range forecasts for the production of major chemicals in 1975 and 1980 One of the most interesting forecasts made by the committee concerns the future production of fertilizers and their related raw materials Main growth areas for the industry are in complex fertilizers and urea, superphosphates, straight nitrogen, calcium cyanamide, and nitrogen calcium fertilizers will all show a substantial reduction in production Raw materials capacity will grow accordingly Phosphoric acid will be the only material to show a large increase with production nearly doubling to 630,000 mt/yr by 1975 Ammonia and nitric acid while showing an increase will alter dramatically in the next 5 years

879

**Fertilizer Contradiction Abroad Expansion Amid Over Supply**

*Oil, Paint Drug Rep 198* (19), 3, 55 (Nov 9, 1970)

A big ammonia plant on the Mediterranean is up for sale, according to one of the latest reports circulating in the European fertilizer industry This is indicative of the continued sensitivity of this market, and it also represents something of a turnaround from 1969 The ammonia plant reported to be up for sale is a petrochemical operation not tied to an existing market base in fertilizer and, therefore, completely open to the variations of the present competitive situation The main European fertilizer groups are still expanding However, they are pursuing a program which yields a net addition to capacity after closure of old uneconomic plants Societe Chimique des Charbonnages is switching rapidly from coal to oil as a raw material and has just started up a 1000 ton/day ammonia facility at Grandpuits, which by the end of 1970 should be around 650,000 tons, up from about 500,000 tons Everyone recognizes the irony that world need for N continues to be great and will grow even larger with an exploding population Future expansion by companies in the developed part of the world will pay more attention to business marketing and financial men than to economists and engineers projecting needs and costs

880

**Trends in Fertilizer Materials, 1970 1980**

T P Hignett (Tennessee Valley Authority, Muscle Shoals, Ala )

*Proc Fertilizer Ind Round Table, 20th Annual Meeting, Nov 1970*, pp 6 12 (Pub Apr 1971)

In the history of the fertilizer industry, various materials have risen into prominence, flourished for a time, and then declined in importance Based on past experience, it can be expected that "new" materials (probably now on hand) will rise in importance during the next decade and that some of those now popular will become less so The currently popular materials did not become popular as soon as they were recognized as potential fertilizers For example, diammonium phosphate fertilizer (DAP) was produced commercially as early as 1930 but did not become popular until the 1960's DAP did not fit very well into the marketing and distribution system before bulk blending appeared in the 1960's It can be said that bulk blending made DAP successful, or that DAP made bulk blending successful Thus a new material to be successful must fit into existing marketing and distribution systems, or else new systems must be devised to fit the new material It is unlikely that any really new fertilizer materials will appear on the market during the 1970's although some materials now produced experimentally may achieve commercial prominence Continued increase in popularity of DAP is expected Use of merchant $H_3PO_4$ and superphosphoric acid will increase Nongranular $NH_4H_2PO_4$ (MAP) is a promising intermediate for use in mixed fertilizer granulation plants to replace or supplement superphosphate Continued growth in popularity of liquid fertilizers is expected and increasing amounts of urea and ammonium polyphosphate will be used in their manufacture If potassium polyphosphate can be produced economically it will be widely used Continued increase in the use of urea is probable and would be accelerated by improved conditioning and production of larger granules suitable for bulk blending and forest fertilization By 1975 nearly 40% of fertilizer nitrogen capacity will be in urea in the developing countries 60% of the nitrogen capacity will be in urea

881

**Ammonia Shipments Will Increase**

*Eur Chem News 19* (462), 10 (Jan 8, 1971)

Water borne international trade of ammonia will reach between 4 5 and 6 0 million ton/yr by 1977, most of this destined for north west Europe This was one of the projections made by the Director of Economics of the Agricultural Chemicals Group, W R Grace and Co , in a paper on the worldwide production and marketing of ammonia In 1970 some 2 million ton of ammonia was moved by seagoing vessels, mostly in long distance shipments In 1972 the vol will fall to around 1 5 million ton, but for the period 1974 77 export orientated ammonia plants will be proportionately more important than they were in the early 1960's The most attractive freight opportunities, even to north west Europe, will develop with the expansion of North African production As international trade expands generally, it will be logical for cross subsidization of long distance shipments from the short haul business–from North Africa to the North Sea averaged against trans Mediterranean movements

882

**U S S R Fertilizer Production Plans**

*Fert Int* , No 21, 5 (Mar 1971)

Plans for the overall chemical industry in the U S S R were presented recently at a meeting of the D I Mendeleev All Union meeting Under these plans the main emphasis is to be on N fertilizers in the period 1971 1975 While the most usual size for a single train ammonia plant is 100,000 tons/yr, in the coming five yr period it is planned to bring into operation 1360 1500 tons/day, of ammonia in single stream units Various units will be reconstructed since it has been

shown to be possible to raise the capacity of some plants In particular this will apply to urea plants and it is indicated that for a very low capital investment capacity will be increased by up to 50% It is suggested that urea will then be at a unit cost per ton of N which is 8 10% lower than for any other N fertilizer Ammonium sulfate requirements will be mainly based on byproduct materials from coke ovens and from the increasing number of organic chemical operations such as nylon and acrylonitrile The fertilizer sector of the U S S R chemical and petrochemical industry is expected to be up by 8 7% in 1971 A fast growth rate is being maintained in expansions to existing plants and in new production capacities Now on stream are some new operations, in particular, at the Maardu Chemical Combine, some 400,000 tons/yr of granulated superphosphate is to be produced based on the nearby phosphorite deposits near Talin At the Kedaynay Works granulated superphosphate has been added to the production At Vinnitza compound fertilizers are produced utilizing phosphoric acid and ammonia Early completion of the Almalyk Works in Uzbekistan will mean a production of 300,000 tons/yr monoammonium phosphate this yr

883

**Is Stability Returning to the Fertilizer Industry? Part II**

J R Douglas (Tennessee Valley Authority, Muscle Shoals, Ala )

*Farm Chem. 134* (4), 28, 30 32 (Apr 1971)

Overcapacity in N production in the U S will continue until 1973 or 1974 Supply/demand for P is improving faster and should be in balance no later than 1973 Demand for Canadian potash already matches the production quota of 50% of capacity imposed on the mines, a gradual increase in quotas is expected Fertilization trends for maize, wheat, cotton, and soybeans still are generally upward in terms both of acreage fertilized and rate of application However, these trends are flattening and fertilizer use cannot be expected to increase as rapidly as for the past 10 yr Exports of fertilizer, and also of food grains unless there is another major war, drouth, or other catastrophe, have already peaked Developing countries are producing more grain and also are now capable of producing 70% of their fertilizer needs Prices are forecast to move upward but at a very slow rate Pollution control expenses will close some old plants and increase fertilizer production costs generally (See *FA 4* 653 for Part I)

884

**World Fertilizer Use Seen Growing at Slower Pace in 1970's**

*Oil, Paint Drug Rep 199* (25), 3, 27 (June 21 1971)

World fertilizer consumption continues to move forward, but the pace of the seventies is likely to be considerably slower than that of the sixties For the U S fertilizer producers, it is going to be a scramble to get their share of this growing market, and even to hold their own in this country against the competition of foreign suppliers Nitrogen will be getting the biggest boost in consumption, with K and P trailing at a more moderate rate Under existing policies and directives, the U S fertilizer industry can well expect continued increasing competition from overseas suppliers for the U S domestic market J M Boudewijn, Director General of Nitrex AG, Zurich, Switzerland, is looking for a 40% increase in world N fertilizer consumption This is the picture that was painted for the industry last week by government and industry spokesmen at the Fertilizer Institute's first annual marketing conference at White Sulphur Springs, West Virginia L B Nelson Manager of the Office of Agricultural & Chemical Development of the Tennessee Valley Authority, reports that a recent preliminary analysis indicates about 20% more total capacity in P fertilizers will be available in 1975 than a 1970 survey showed The latest TVA AID projection for increases in fertilizer use indicates that between 1970 and 1975 total world use may be expected to increase at approximately 7%/yr Between 1975 and 1980, the increase is expected to approximate 5% annually By 1980, world use of fertilizer is expected to approximate 115 million tons of plant nutrient, compared with about 63 million tons in 1970 and about 90 million tons in 1975 Asia and other developing areas will experience the greatest percentage increase in N use by 1975 76, with a growth of nearly 50% for Asia and a gain of 40% for the other developing nations as a whole

885

**Urea Oversupply to Continue World Wide Through 1970's**

*Oil, Paint Drug Rep 199* (26), 5, 13 (June 28, 1971)

Oversupply of urea worldwide, due to excessive production capacity, is likely to continue throughout the 1970's And the situation will probably get worse before it improves World urea capacity should top 19 million mt of N nnually by the 1975 76 fertilizer yr, compared with 11 9 million tons estimated for 1970 71 This assumes that no e than 3 million tons of expected capacity will not come on stream by then, due to abandonment of existing plans by some producers and closure of old facilities by others By the end of the decade–that is the 1979 80 season–world capacity for urea may be more than 23 million tons N The statistical forecast shows some improvement in the second half of the 1970's, with capacity growth averaging 4 8% annually and growth in demand averaging 13 4%/yr However, even by 1979 80, capacity utilization worldwide will be only about 75%, comparing estimates for demand and capacity Since much of the anticipated capacity build up in the yrs ahead will be located in the main demand areas, primarily Asia, it is expected that producers who are export oriented will be hardest hit, with more exporters competing for fewer markets The impact of new capacity in developing regions of the world–with primarily agricultural based economies, which have in the past been large net importers–will be strongly felt by West European producers

886

**World Capacity of Potash by 1975 Estimated at 29 6 Million Tons**

*Oil Paint Drug Rep 199* (26), 4, 43 (June 28, 1971)

There will be no lack of capacity to meet the demands for potash in any of the major consuming areas of the world for the next 5 yr, according to R Zimmermann von Seifart of Kali & Salz GmbH, Hannover, Germany By 1975 the productive capacity of the industry throughout the world will reach 29 6 million mt, with the capacity expansions taking place in Eastern Europe U S potash capacity is not likely to increase as, according to the Bureau of Mines, Canadian sources may sooner or later cover 60 to 90% of the U.S potash demand In Western Europe the capacities of the two largest producers, West Germany and France, are sufficient to supply all the quantities which those two countries plan to sell Eastern Europe plans a considerable capacity expansion (but not likely to fully materialize) in the U S S R In East Germany, one additional mine and factory is being built which will bring East European total planned capacity up to 10 8 million tons in 1975 By 1975 a West European capacity of approximately 7 2 million tons of $K_2O$ is estimated With respect to the consumption of potash in the yr ahead, there is nothing to indicate a change in the structure of the markets Rates of growth will be modest in Western Europe They will probably be less impressive than expected in North America and they

will certainly be rather elevated in Eastern Europe

887
**Findings of Fertilizer Dealer Survey**
John Foss
*Agr Chem 26* (8), 14, 15 (Aug 1971)
The author traveled through the Midwest and interviewed fertilizer industry people, particularly in Ohio and Indiana In the area visited, the use of liquid has increased to about 20% based on dollar value Indications are this will increase to 30% this yr but there is little possibility it will replace dry fertilizer in the foreseeable future A large number of the fertilizer dealers are now handling pesticides Much of the application of the pesticides is accomplished by the dealer along with the fertilizer There is a trend toward satellite blending plants covering an area of not more than a 10 mile radius Trends indicate more contracts for the application of fertilizer and pesticides applied to the land and a continuation of good relation between the farmer, dealer, and extension workers The problems of seasonal rush and keeping properly trained personnel continue to plague the large and small fertilizer dealer

888
**Trends in the Supply Demand Situation**
E A Harre (Tennessee Valley Authority, Muscle Shoals, Ala)
*Searching the Seventies* (Held Sept 15 17, 1971, Memphis, Tenn) Tennessee Valley Authority, Muscle Shoals, Alabama, pp 9 14
By 1975 the U S probably will be using 20 22 million tons of plant nutrients and producing 25 29 million (including $K_2O$ in Canada) Nitrogen consumption is estimated at 9 5 10 5 million tons as fertilizer plus another 3 5-4 0 million tons for industrial use Between 7 and 8 million tons of fertilizer N will go on the soil direct from the producer–through the distribution system but without further processing Production of N at 90% of capacity–based on installations expected to be in operation in 1972–will match consumption requirements by 1973 74 Demand for $P_2O_5$ should reach 5 5 6 1 million tons by 1975 Exports should range between 0 4 and 0 7 million tons of finished phosphates No new additions to productive capacity have been announced so that plants must operate at 92 108% of capacity to supply the demand Wet process phosphoric acid will account for 85 87% of the total available supply of phosphate materials Potash estimates are based on a combined U S -Canadian market Demand is projected to reach 4 9 5 5 million tons for domestic (U S plus Canada) use plus 1 8 2 0 million tons for export Even at the most optimistic rate of consumption (7 5 million tons), production rate would be only 75% of capacity Plants for producing bulk blended and liquid mixed fertilizers have consistently increased in numbers in each of the last five yr, but average annual fertilizer throughput per plant has decreased

889
**Priming Little Markets into Bigger Markets Potentials with Marginal Farmers and Specialty Crops**
A B Ezzell (Ohio State Univ , Columbus)
*Searching the Seventies* (Held Sept 15 17, 1971, Memphis, Tenn) Tennessee Valley Authority, Muscle Shoals, Alabama, pp 60-4
The unit Te ' Demonstration farms, Rapid Adjustment farms, and Fruit Demonstration farms have demonstrated in southern and southeastern areas of Ohio that marginal and specialty crop farmers should increase fertilizer use by 200% This region consists of 28 counties principally in the Appalachian area The average cash farm income is $7,535,000 per county compared to $15 500,000 as an average of Ohio's 88 counties and $19,104,000 average for counties outside the Appalachian area This area needs 1 860 000 tons of lime 89,725 tons $P_2O_5$, and 19,450 tons $K_2O$ to establish optimum levels of fertility Annual maintenance needs then will be 45,000 tons N, 25,000 tons $P_2O_5$, and 52,975 tons $K_2O$ This represents approximately 200% of N, 100% of $P_2O_5$ and 235% of $K_2O$ sold in 1970 **The Potential with Soybeans** W L Nelson (American Potash Institute West Lafayette, Ind) pp 64 8 Soybean production technology is about the same as that of corn in the 1950 s Key factors for increasing yields are varieties row spacing thickness in the row time of planting, pest control and fertilization Use of the complete program is important in order to get response to fertilizer Present technology can boost average soybean yields 30-50% Fertilizer dealers can demonstrate increased yield by selecting growers who are willing to cooperate on pH 6 0 6 5 recommended variety plus inoculation and perhaps Mo application narrower rows (30 in or less) earlier planting (May 1 20), thin planting weed control use of herbicide and shallow cultivation, and a recommended fertilizer program **Potentials in Pastures and Ranges** N D Morgan (American Potash Institute Shreveport La) pp 69 72 With proper rainfall and fertilization pasture land has a potential of one animal/acre "Fertilize and utilize" are keys to profits in the cow business Many people who fertilize leave their profits in the pasture as unutilized forage A pasture should be judged not by the quantity of forage, but by the stocking rate and condition of cattle Hay and pasture land in the U S have a potential fertilizer use of 4,584,828 tons N, 4,191,793 tons $P_2O_5$, and 3,309,574 tons $K_2O$, and 1,248,688 tons S **Trends in Forest Fertilization** G W Bengtson (Tennessee Valley Authority, Muscle Shoals, Ala), pp 72 7 The use of fertilizers on forests has become commercially feasible in several regions of the world under the present generally favorable economic conditions Extensive acreages of timberlands in these same regions remain unfertilized and vast areas in developing nations are known or suspected to have equal response potentials It is expected that fertilization of forested lands in the developed nations will proceed at least at the current rate for many yr in the future probably at a considerably accelerated rate if the demand price situation for forest products improves and/or if greater value is placed on nontimber values enhanced by fertilization The future of intensive silviculture in developing countries is uncertain, but with foreign investment in silviculture and development of forest products industries, those in tropical and temperate regions of abundant rainfall could become very substantial users of fertilizers within the coming decade In the United States continued growth in the use and profitability of forest fertilization will depend primarily upon continued refinement of specialized fertilizers and fertilizer technology, research to identify fertilizer responsive areas and to characterize the effects of fertilizer use on forest ecosystems and extra forest environments, and development of means of encouraging fertilizer use on small privately-owned woodlands

890
**Fertilizer Outlook Brighter**
*Oil, Paint Drug Rep 200* (10), 7, 17 (Sept 6, 1971)
Department of Commerce economists who took a mid yr look at the trend of business in the fertilizer industry for the rest of the yr and found it encouraging, believe now there are gounds for even more optimism in the industry's outlook Side effects of the price wage freeze could well lead to even higher levels of consumption than were anticipated before One reason for this

is that the devaluation taking place in the U S dollar could well make for curbing imports of foreign fertilizers while at the same time lowering the price of the American product to make it more competitive on the world market The freeze on wages and prices, coupled with the tax depreciation incentive being recommended by the President, could lead to new capital commitments in the industry not previously planned–for modernization and plant improvements to improve the cost profit ratio for the producers The department's mid yr survey, completed just prior to the wage price freeze order but not off the presses until after the freeze announcement, indicates fertilizer shipments would continue at a slightly higher rate than estimated at the beginning of the yr to reach a total dollar value of $1 9 billion, a gain of 5% over 1970 Profits in the first half of 1971 were the best since 1967 Contributing to increased production and sales were growth in agricultural acreage and expanded crop planting intentions of the farmers It is expected that the fertilizer industry will continue to show steady improvement in 1972, with an estimated growth of 5% in the value of shipments to nearly $2 billion

891

**Market Potential for Fertilizer Sulfur**

J D Beaton (The Sulphur Inst , Washington D C )
*Proc Symp Marketing Fertilizer Sulfur, Memphis, Tenn , Sept 15, 1971*, pp 16 29 (1971) Tennessee Valley Authority, Muscle Shoals, Ala and Sulphur Institute, Washington, D C

Soils of North America presently requiring S fertilization, and those with a potential requirement for S, are described by regions Data are given on soil properties, area used for specific crops, and present and potential requirements for S (102 ref)

892

**Liquid to Grow More Rapidly Than Dry Fertilizers**

*Oil Paint Drug Rep 200* (16), 5, 15 (Oct 18, 1971)

The liquid fertilizer industry is expected to grow rapidly through 1980 In particular, application of liquid fertilizers in combination with irrigation, so called "fertigation," is expected to become increasingly popular By contrast, the rapid increase in bulk blend fertilizers which has taken place during the past 10 yr is expected to level off in the next decade Newer high analysis fertilizers such as urea ammonium phosphate and ammonium polyphosphate will also become more important Increasing evidence of S deficiency in more than half of the states in the U S will make use of S containing fertilizers necessary in many fertilizer programs Sulfur coated urea appears to be one of the slow release products with the most favorable economics One ton of plant nutrient in fertilizers is considered to be the equivalent in crop production to 9 4 acres of land Fertilizers play a vital part in reclaiming land damaged by forest fire, mining activities, or heavy recreational use Fertilizers account for between a third and a half of crop production in the U S The relatively low cost of food is due largely to extensive fertilizer use While the cost of most other farm input has gone up, the cost/lb of plant nutrient in fertilizer has decreased from 10¢ in 1955 to 6 9¢ in 1970

893

**World Shortage of Phosphate Rock Could Occur by Year 2100 It Is Claimed**

*Oil, Paint Drug Rep 200* (17), 5 (Oct 25, 1971)

A study sponsored by the Institute of Ecology and supported by the National Science Foundation and others, notes that world reserves of phosphate rock amount to 3-6 billion tons, while about 8 million tons/yr are mined Although the current reserves consumption ratio appears ample, expected increases in population and improvement in standards of living could exhaust world reserves in about 130 yr The report recommends the curtailment of nonfertilizer uses of phosphates and regulation of the use of phosphate fertilizers It also recommends studies to develop more economical methods for reclaiming and reusing phosphates and the establishment of an international agency to advise on their production, distribution, and use The report was scheduled for presentation at the United Nations Conference on the Human Environment, Stockholm, November 1971

894

**Chemical Composition of Fertilizer to Change in 1970s**

*Ag Chem (Newsletter)*, No 60, 2 (Nov 1, 1971)

New high analysis fertilizers such as urea ammonium phosphate and ammonium polyphosphate will become increasingly important during the coming decade, according to the agricultural research director for the Sulphur Institute Increasing evidence of S deficiencies in more than half the states in the U.S will make the use of S-containing fertilizers increasingly necessary Controlled release fertilizers will be more widely used because of their high plant nutrient efficiency and their reduced rate of release of plant nutrients into the environment One of the slow release products which exhibits the most favorable economics, and which is most liable to achieve prominence, is S-coated urea

895

**Excess Phosphate Rock Capacity is Major Problem**

*Chem Age (London) 103* (2733), 23 (Dec 3, 1971)

Demand for phosphate rock and phosphate fertilizers is expected to continue to expand at about 6%/yr over the next 5 yr according to Tennessee Valley Authority, the UN Industrial Development Organization, and the Food and Agricultural Organization Projections suggest that this growth could be higher than 6%/yr if developing countries increase the use of fertilizers The major problem in the foreseeable future is the excess phosphate capacity in the world Consumption of phosphate rock has risen at the rate of about 6 8% over the last 15 yr and in 1969 totalled 77 million tons Production on the other hand is growing at a faster rate with an annual increase of some 7 3% Indicative of their rapid encroachment on the traditional North African producers is the faster growth rates of the value of phosphate rock exports by the U S and the U S S R which have increased respectively by 11% and 15% This compares with a growth rate in exports from Morocco of less than 4 7%/yr Production of phosphate rock in Morocco was 11 4 million tons in 1970 and this is due to increase to 18 million tons by the end of next yr In Tunisia the 1968 output figure of 3 5 million could rise to 8 million by 1976

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**Fertilizer Trends–1971**

E A Harre (Tennessee Valley Authority, Muscle Shoals, Ala )
*National Fertilizer Development Center, Tennessee Valley Authority, Muscle Shoals, Ala Bull Y-40*, 45 pp (Dec 1971)

This is a biennial publication which provides basic marketing data A review of production, consumption and foreign trade of the United States is given in tables for the period 1950 1970 A list of companies in the United States producing ammonia, ammonium nitrate, urea, wet process phosphoric acid, concentrated superphosphate, ammonium phosphate, or

potash in August 1971 is given with their production capacity Fertilizer demand is continuing to expand in the United States, with estimated 1975 tonnage 25 35% greater than in 1970 The use of N is increasing at a faster rate than that for either P or K, and by 1975 it is expected to account for almost half of all plant nutrients used by farmers Phosphates will account for another 28% reaching a projected level of 5 5 6 1 million tons of $P_2O_5$ while the use of potash should be within a range of 4 7 5 2 million tons $K_2O$ In terms of plant nutrient use, the United States represents over 23% of the world fertilizer market World plant nutrient consumption reached 62 8 million mt in 1970 Nitrogen accounted for 45%, phosphate 29%, and potash 26% Projections made in early 1970 indicated total world plant nutrient use in 1975 at 89 million mt

897

**U S S R Plans Fertilizer Expansion**

*Eur Chem News 20* (510), 20 (Dec 10, 1971)

Expansion of the U S S R 's fertilizer raw material industry for the 1971 75 5 yr plan is planned for an increase of 60% over that of the 1965 70 period Fifty eight per cent of the total sum allocated for minerals production will be directed to the phosphate industry the remaining 42% going to potash production The Uralkali enterprise, situated in western Russia is to increase its production of potassium chloride (in terms of 41 6% $K_2O$) from 3 8 million ton/yr in 1970 to 10 8 million ton by 1975 a proposed increase of some 280% This expansion will represent an investment of around 450 million roubles The Byeloruskali enterprise is to increase production of potassium chloride from 4 8 million ton in 1970 to 8 million ton/yr (41 6% $K_2O$) by 1975 an increase of 67% Production expansion at this plant will cost some 102 million roubles In the phosphate sector the Apatit enterprise is now scheduled to produce some 14 5 million ton/yr of apatite concentrate by 1975 commissioning new production capacities for apatite concentrate (1 6 million ton/yr), and apatite nepheline re (10 8 million ton/yr) One of the largest expansions in the current 5 yr plan is scheduled for the Karatau enterprise The following capacities are to be commissioned at this works ore recovery 6 900 000 ore production 5,600 000 and finely ground phosphates 650 000 ton/yr A new phosphate rock mine is to be opened within the Phosphorit enterprise to utilize the southern deposits and will be followed by the construction of a plant for the production of 360,000 ton/yr of monoammonium phosphate The first stage of this plant will include facilities for sulfuric acid production and will be brought on stream in mid 1972 The present 5 yr plan also allows for the construction of a plant south of Moscow for defluorinated phosphates the capacity of which will be 100 000 ton/yr by 1975

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**Trends in Future Fertilizer Product Pattern**

S M H Burney (Ministry of Agriculture, New Delhi, India)

*Fert News 16* (12), 67 70 (Dec 1971)

With increased use of fertilizers there has been a change in the use of fertilizer products In the case of N fertilizers, ammonium sulfate and calcium ammonium nitrate, which were very popular in the past, are being replaced by urea In the case of P fertilizers, superphosphate is being replaced by diammonium phosphate, nitrophosphate, and urea ammonium phosphate In the future, anhydrous ammonia is likely to be introduced as a source of N and ammonium polyphosphate (15 60-0) may be a potential source of P In the case of K fertilizers, there will be more demand for coarse and granular sizes of potash Because of intensive cropping and use of high analysis fertilizers, deficiencies of secondary and micro nutrients may occur more frequently Calcium and Mg may have to be supplied through liming programs but S additions may have to be made to S deficient soils For ensuring balanced use of fertilizers bulk blending may be adopted on a widespread basis in near future Use of fluid fertilizers also holds some promise Significant development may be expected in the production of augmented fertilizers which may contain pesticides, herbicides, micronutrients, and primary nutrients For increasing efficiency of N fertilizers, production of slow release fertilizers may be achieved on a commercial scale In view of the high cost of fertilizers in India, the new technology will have to make efforts to reduce the cost of fertilizer so that the farmer gets a reasonable profit by using fertilizers Also there is need to evolve a multinutrient fertilizer which will contain primary plant nutrients, secondary plant nutrients, and micronutrients as one package

899

**Growth of Fertilizer Use in Indian Agriculture, Past Trends and Future Demand**

G M Desai

*Cornell Int Agr Develop Bull 18*, Ithaca, N Y , 148 pp (1971)

The objective of this study was to analyze the past fertilizer use pattern in India in order to identify different sources of growth in effective demand for fertilizer, examine their strength, and then to use this knowledge to study the problem of continuous rapid growth in fertilizer use from the viewpoint of cultivators' demand The main conclusions of the study are A consistent pattern was observed for 39 groups of cultivators from different parts of the country with regard to the relative spread of fertilizer use on different crops Within each group some non foodgrain commercial crops such as sugarcane, tobacco banana vegetables and the two major foodgrains, rice and wheat, were more extensively fertilized than some commercial crops such as cotton and oilseeds and other foodgrains The average rates of fertilizer applied by these cultivators were significantly below the recommended rates The rates recommended were approximately equal to the optimum rates as determined from trials on cultivators fields and relative prices of fertilizers and crops Findings on fertilizer practices of cultivators at different points of time, indicate that the main source of growth in fertilizer use until the mid 1960's was an increase in proportions of fertilized areas under a few crops such as sugarcane, tobacco, rice, and wheat, rather than rise in the rates of application It appears that this was also an outcome of the nature of returns from fertilizer use to the cultivators A high proportion of total sales in each state was concentrated in a few districts in which levels of irrigation were high and where crops such as rice, wheat, sugarcane, potato, and tobacco dominated the crop pattern Districts with low levels of irrigation, and hence where these crops were less important shared a low proportion of total fertilizers sold in the states Nitrogen growth patterns varied between extremes of little growth in Rajasthan and Madhya Pradesh to dramatic growth in Punjab and Madras These features of interstate variation were mainly due to underlying differences among states in levels of irrigation, and relative prices of N and crops The interpretation of growth in fertilizer use until 1964 65 has important implications for further rapid growth in cultivators' demand Findings on the past use pattern reveal the importance of the absolute size of returns in generating effect demand for fertilizer, and the crucial role irrigation and crop pattern play in determining the returns under the old technological conditions On the basis of the kinds of crops and cultivated land expected to be fertilized

as the level of N use in the country approaches about 1 7 2 million ton/yr, it appears that further continuous rapid growth in effect demand for N fertilizers would depend on (a) continuous improvement in the varieties of foodgrain crops, (b) development of new fertilizer responsive varieties of major foodgrains suited to unirrigated conditions and of important non foodgrain commercial crops, and (c) increase in the level of irrigation

900
**The World Fertilizer Market**
E A Harre (Tennessee Valley Authority, Muscle Shoals, Ala ), W H Garman, and W C White
*In Fert Technol Use, 2nd Ed , Madison, Wis.* Soil Sci Soc Amer , pp 27 55 (1971)
The world fertilizer market has recently completed a second decade of almost uninterrupted expansion Use of fertilizer nutrients is now over four times the 1950 consumption level and the market outlook continues to be one of promise This chapter reviews the long term effective demand for fertilizer, shows the past and present trends in both production and consumption, and indicates future market patterns Some problems facing the industry in the next decade also are discussed (30 ref)

901
**Fertilizer Demand and Supply Projections to 1980 for South America, Mexico, and Central America**
*Fertilizer Industry Series Monograph 6*, United Nations Industrial Development Organization, Vienna, Austria, 80 pp (1971)
Data used in describing the population, land area, average annual growth rate, and other characteristics of each country are for 1968 or earlier Eleven countries are considered individually, plus Central America as a unit The countries are Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Paraguay, Peru, Uruguay, Venezuela, and Mexico For each country except Bolivia and Paraguay, a very short description is given of farming patterns, economic policies, fertilizer use, fertilizer supply, identified fertilizer raw materials, and the balance of supply and demand Consumption of N, $P_2O_5$, and $K_2O$ is given for 1957 59, 1960 61, 1964, 1966, and 1967 68 From trends established by these data, a high and a low use projection is given for each of the major nutrients for 1970, 1975, and 1980 High projections are based generally on a 15 20% annual rate of increase and the low projection on a 10 15% annual rate of increase

902
**Structural Changes in the Ammonia Manufacturing Industry**
R G Walsh (Colorado State Univ , Fort Collins) and R K Rudel (South Dakota State Univ , Brookings)
*US Dep Agr FS 2*, pp 35 6 (Jan 1972)
In 1960, 46 firms operated 58 plants with a total capacity of 5 3 million tons of $NH_3$ In 1970, 61 firms operated 100 plants with a total capacity of more than three times as much The average plant capacity has more than doubled while the capacity per new plant has tripled since 1960 Statistical techniques were used to predict the situation of the $NH_3$ manufacturing industry in the U S in 1975 The projections indicate that there should be 47 plants having capacities up to 200,000 tons/yr in 1975 compared with 59 in 1970, 52 plants having capacities of 201,000 to 400,000 tons/yr in 1975 compared with 37 in 1970, and 7 plants having capacities above 400,000 tons/yr in 1975 compared with 4 in 1970 Elimination of firms which own smaller size plants, together with more rapid increases in plant sizes than in total industry capacity, will lead to increased concentration of firms

903
**"The Liquid Revolution"--Where Are We Headed?**
G C Matthiesen (Allied Chemical Corp , Morristown, N J ).
*Fert Solutions 16* (1), 66, 68 70 (Jan Feb 1972)
The liquid industry has responded to the farmer's need by developing products and equipment which function efficiently Farmers buy fertilizers in terms of a very basic appeal--more yield per acre at higher profits The industry must prove and sell this better yield response with liquids if sales are to grow Demonstrations conducted in 1971 show significant agronomic advantages for liquid fertilizers over dry fertilizers The dealer has provided more to the farmer than just product, he has provided management help The dealer has provided credit management when bankers were in a better position to handle this Credit terms must be handled so that they will not become an impossible burden to industry, dealers, bankers, or farmers

904
**Future of United States Fertilizers Look Bright**
*Fert Int* , No 32, 1, 3 (Feb 1972)
U S fertilizer export trade looks very bright The devaluation of the dollar is seen as having varying effects, depending on geographical areas, on the export of different fertilizers and fertilizer raw materials But the greater certainty of foreign exchange parities would influence all fertilizer sales and would be of benefit to them Without fixed exchange rates, planning and execution of international transactions had been difficult, and doubly difficult for fertilizers because of the huge quantities in which they are shipped Phosphates have undergone a substantial price increase, while among the nitrogens, ammonium nitrate has shown a dramatic price change in 1971 Prices of other nitrogenous products have displayed little change--though a firming trend has been evident There is some hesitancy in the price of potash

905
**Phosphate Supply Demand in Balance**
*Ag Chem Newsletter*, No 64, 4 (Feb 25, 1972)
Supply of and demand for phosphate fertilizers in North America was back in balance in 1971, and is likely to remain so for 1972, according to the president of the Sulphur Institute, speaking to the Chemical Marketing Association in Atlanta, Feb 17th The oversupply situation of recent years is now a thing of the past By 1975, he predicted, consumption will reach 5 7 million mt of $P_2O_5$, 1 million tons more than for 1971 On the world market, there is still an oversupply of phospnate fertilizers, however, the overcapacity is for normal super and other materials for which demand has declined in recent years High analysis products made from phosphoric acid are actually in tight supply

906
**Phosphate Supply Not Inexhaustible**
*Farm Chem 135* (2), 46 (Feb 1972)
In the report on global ecological problems just released by the Institute of Ecology and intended for presentation to the 1972 United Nations conference on the environment of the key elements essential to life, P is the most nearly limited and the least efficiently recycled element in nature If current trends continue, according to the report, in 60 yr the world's population will have grown to 11 billion and known reserves of P will have been used up New reserves will be discovered, but there is a limit--a geological upper boundary--of about 30 billion tons of usable P Without P fertilizers world food

production could support only about 2 billion people The Institute recommends more judicious use of fertilizer, development of economic methods to recover P wasted in sewage effluents, and development of even more intensively managed systems of agriculture–including aquaculture–where the cycling of nutrients can be completely controlled

907
**Fertilizer Trends in Seventies to Higher Analysis**
*Chem Marketing Rep 201* (9), 4, 47 (Feb 28, 1972)
Anhydrous ammonia, by far the leading N fertilizer now, will remain the leader in 1980, but urea will take over second place from ammonium nitrate (total N basis) and more economical N fertilizers will continue to displace synthetic ammonium sulfate Ammonium phosphates will still out distance the superphosphates in the seventies and more concentrated forms of phosphates will be developed before the decade is over Potassium chloride will be the predominant potash source in 1980, as it is now, and account for some 93% of the nation's potash fertilizers in 1980 The economic vise holding the farmer, the energy crisis, the surge toward a cleaner environment, and the shortage of natural gas will all influence fertilizers and fertilizer technology in the coming years, but ammonia, wet process phosphoric acid, and potassium chloride will still be the basic fertilizer building blocks Canadian recoverable reserves of potassium chloride are estimated at up to 8 billion tons of $K_2O$ and use of other potash fertilizers will be limited to situations requiring properties which can justify a higher cost For the future, phosphoric acid, key intermediate for phosphate fertilizer use, will be manufactured by the wet process Sulfur will remain long for the next 5 yr–probably the next 10–due to the fast growing supply of byproduct S Byproduct S, which accounted for 30% of world production in 1968, is expected to increase to between 50 to 60% in 1975 The U S will produce 4 million tons of byproduct S in 1975 and 5 million in 1980 and the latter figure will be conservative, since 27 million tons of S–in the form of $SO_2$–will be generated in that yr, most of it from power plants Legislation and improved technology could mean staggering amounts of additional S from this source With S prices remaining low and the price of power going up, virtually all phosphoric acid for fertilizer use will be manufactured by the wet process, barring the unlikely occurrence of a technological breakthrough

908
**Potash Supply Demand in Balance by 1978**
*Eng Mining J 173* (3), 185 7 (Mar 1972)
The potash industry of North America is alive, improving in health and now living in reasonable harmony with the problems of its economic world This performance in 1971, which might best be described as a yr of stability in product and price, is all the more remarkable when considering the fact that the industry's most pressing problem just 2 yr ago was its sheer survival through avoidance of a potential market debacle caused by the onrush of new Canadian output capacities Based on the present upward trend in domestic usage, government specialists are forecasting a balanced supply and demand picture by 1978 Indeed, some knowledgeable marketing men see the balance possibly coming into existence as early as 1976 Whether this situation comes about on schedule or not depends largely on one factor now being eyed by many individuals as a possible stumbling block to a balanced market–that is, the possible large scale shipments of potash products from the U S S R once its own demands have been met

909
**Current Sulfur Situation and Prospects for Future Uses**
*Eng Mining J 173* (3), 160 3 (Mar 1972)
Sulfur consumption increased by 3 2% in 1971 to a total of 17 8 million tons Production of S in 1971 amounted to 29 9 million tons or an increase of 2 4% over 1970 At an international forum on long range S consumption held in May in Amsterdam, an annual increase of 6 4% was forecast in Free World use of S in phosphate fertilizer over the next 5 yr Including industrial uses, an overall growth rate of 4 4-4 9% was forecast, the higher level of the range reflecting development of new uses The S producers, through the Sulphur Institute, continue to investigate new uses Among such uses with potentially large volume markets are "plant nutrient S," S asphalt, foamed S, and S impregnated tiles An important additional source of research funds is likely to develop in Canada, where the National Research Council has recommended financial support by the governments of both Canada and Alberta for technical and commercial development of new S consuming products

910
**The Use of Liquids Outside the United States Part II**
H J Stangel (Marketing Consultant)
*Fert Solutions 16* (2), 80, 82, 84, 86 (Mar Apr 1972)
Liquid fertilizers are used on less than 1% of the fertilized acreage in Japan and constitute less than 1% of the fertilizer consumed Use is expanding, especially on fruits, vegetables, and horticultural crops despite the 45% higher price for liquids than for equivalent solids Principle manufacturers are Sumitomo Chemical, Mitsui Toatsu Chemical, and Ishihara Sangyo Kaisha Ltd In Mexico anhydrous $NH_3$ is the most important N source for direct application The extent of use of other liquid fertilizers is not known because of a lack of statistical data Canada's liquid fertilizer use was confined almost entirely to Ontario province until recently when use in Alberta and Manitoba began to expand Liquid mixed fertilizer, N solutions, and aqua and anhydrous ammonia all are used but aqua appears to be losing ground to anhydrous Use of N solutions also is increasing fast-22% annually for 5 yr compared to 9 6% for all N fertilizers (See *FA 5*, 657 for Part I)

911
**Fertilizer Trends in the 1970's**
*World Fert Rev No 11*, 24 (May 1972)
The manager of marketing research and development for Collier Carbon and Chemical Corporation makes some predictions with regard to plant nutrients over the next 10 yr Anhydrous ammonia, by far the leading N fertilizer now, will remain the leader in 1980, but urea will take over second place from ammonium nitrate (total N basis) and more economical N fertilizers will continue to displace synthetic ammonium sulfate Ammonium phosphates will still out distance the superphosphates in the seventies and more concentrated forms of phosphates will be developed before the decade is over Potassium chloride will be the predominant K source in 1980, as it is now, and account for some 93% of the nation's K fertilizers in 1980

912
**Phosphate Industry Forecast.**
*Phosphorus Potassium No 59*, 5 (May June 1972)
Phosphate rock sales will be close to 90 million mt in 1972, if current forecasts of growth in major market areas are confirmed As there are unlikely to be any major additions to capacity before the end of the yr, producers should be able to improve utilization levels of existing capacity, and circum-

stances should generally favor the continuation of the recent firmer trend in international prices The present forecast of sales in 1972 is based on t' c growth of demand in the two largest phosphate rock consuming countries, and on the projected expansion of export trade Export results for the first quarter reveal only a marginal increase in international phosphate rock trade as compared with the corresponding months of 1971 In Morocco and Tunisia domestic deliveries of rock to export oriented phosphate fertilizer plants have increased by 20 and 24% respectively, reflecting the intensification of international demand for triple superphosphate and other concentrated phosphatic fertilizers Interest in new fertilizer capacity is not confined to North African rock producers

913
**Sulfur Demand in the Fertilizer Industry**
J H Sprague (Enjay Chem Co , Houston, Texas)
*Sulphur* No 100, 18 21 (May June 1972)
In 1953, Western World S consumption for fertilizers was approximately 5 million tons, or less than 45% of total Western World S consumption In 1972, Western World S consumption for fertilizers is expected to exceed 15 million tons and to account for over 50% of total Western World consumption The soundly based growth of S consumption for fertilizers during the period 1953 to 1972 is expected to continue through the 1970s In the U S , phosphate fertilizers consumption growth should continue to be dominated by solid and liquid ammonium phosphates with their high ratio of S to phosphate In Europe, with basic slag production peaking out, ammonium phosphates should play a greater role in the future, the more so as indigenous S supplies become more abundant Asia will be developing as a major new growth area adding further impetus to future growth in S demand by the fertilizer industry

914
**Estimated World Fertilizer Production Capacity as Related to Future Demand**
E A Harre, T P Hignett, and D L McCune
*Muscle Shoals, Ala* Tennessee Valley Authority, National Fertilizer Development Center, 24 pp (Aug 1972) Bull Y-48
This report is one in a series designed to provide industry and government market planners with basic information for use in evaluating the adequacy of production facilities to meet future demand The report is divided into consumption trends, projected production levels and their relationship to demand, and major products of the fertilizer market Consumption forecasts were made by evaluating past trends Production forecasts are based on announced future capacity additions in the time period considered World consumption is forecast to climb from 68 million mt in 1971 to 105 million mt in 1980 Growth rates will average 5% per yr from 1972 to 1980 Rates will increase faster in developing countries than in developed regions, but will not equal the rapid gains made in the developing countries in recent years (16 tables, 16 ref)

915
**United States Nitrogen Production Forecast**
*Ag Chem Newsletter* 70, 6 (Sept 1, 1972)
It seems doubtful that any more big N plants will be built in the U S The gas situation is very tight, and the price of gas so high as to make ammonia manufacture in the U S uneconomic for the future With potash production having shifted largely to Canada, and N production now threatening to move to areas where gas is lower in price, the U S may shortly find itself basic in only one of the three major fertilizer raw materials

916
**Japanese Sulfuric Acid Demand**
*Jap Chem Week 13* (647), 5 (Sept 21, 1972)
The Mining Council, Japanese Ministry of International Trade and Industry, has recently compiled medium/long term demand forecast for sulfuric acid including its use for fertilizers According to the forecast, average demand growth rate during 5 yr (1971 1975) is expected to be 2 9%, a fall of 0 4% from the average growth rate in the past 5 yr This suggests a future possible downward trend in demand for sulfuric acid

917
**U S S R Details Fertilizer Output in 1975**
*Eur Chem News 22* (556), 18 (Oct 27, 1972)
During the current Five Year Plan, the U S S R plans to increase phosphate fertilizer production by almost 9 million ton/yr from 13 4 million ton in 1970 to 22 1 million ton in 1975 More high analysis and multi nutrient products will be manufactured Production of concentrated superphosphate is expected to increase from 2 8 million tons/yr in 1970 to 5 6 million tons/yr in 1975, ammonium phosphate production will increase from 0 5 to 4 2 million tons/yr, and NPK fertilizer production will increase from 0 8 to 3 9 million tons/yr

918
**Asian Fertilizer Consumption Forecast**
*Chem Age (London) 105* (2782), 22 (Nov 10, 1972)
Fertilizer consumption in the Asian and Far Eastern regions is likely to increase by over 200% by 1985 according to a study presented at the Regional Conference of the FAO in New Delhi Fertilizers alone are likely to take up about 45% of the total investment of all agricultural inputs in the region The study which has been carried out by the FAO regional office in Bangkok suggests that to meet the increasing demand for fertilizers the production capacity for plant nutrients should be planned according to realistically estimated needs

919
**Urea Forecast for Complex Fertilizers**
*Eur Chem News 22* (561), 22 (Dec 1, 1972)
The increasing importance of urea for the provision of the N component in granular compound fertilizers was indicated in four papers presented at the ISMA Technical Conference held November 20 24, 1972 World output of urea for fertilizer purposes at present accounts for 22% of total fertilizer N output World urea capacity increased by an average of 67%/yr from 1 6 million ton N in 1962 to over 10 5 million ton N in 1970 It is expected that by 1979 80 the world fertilizer urea demand will be around 15 million ton N, representing 30% of total fertilizer N demand Although the bulk of urea N is now being applied as a straight fertilizer in the developing regions of the world, it is felt that as agricultural practice develops, then urea will be increasingly used as the main N component in balanced NP and NPK granular fertilizers Wet process phosphoric acid is purified by crystallizing the $P_2O_5$ as urea phosphate and the crystals used to make polyphosphate based liquid fertilizers In addition the urea phosphate can be used as an intermediate for the manufacture of other more highly concentrated polyphosphate based fertilizers

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