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**A REPORT BY *Canada***  
**THE SECTOR TASK FORCE ON**

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**THE CANADIAN FERTILIZER INDUSTRY**

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Chairman Dr. K. F. Nielsen

OCTOBER 1978 (REVISED)

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THE FERTILIZER INDUSTRY CONSULTATIVE TASK FORCE

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REPORT OF  
 THE CONSULTATIVE TASK FORCE  
 ON  
 FERTILIZERS

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REPORT OF THE CONSULTATIVE TASK FORCE  
ON FERTILIZERS

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INTRODUCTION

Using investment capital and natural resources private enterprise has created a substantial fertilizer industry in Canada. The Canadian fertilizer industry is a vital part of Canada's agricultural and related food industries which contribute to more than one-third of this country's GNP.

Fertilizer use raises crop yields by 30 per cent to 35 per cent and such an increase contributes significantly both to Canada's domestic food supply and to the billions of dollars of agricultural exports. The export of fertilizer itself generates an additional contribution to Canada's earnings abroad.

The objectives of the fertilizer industry are:

- to be financially healthy and stable;
- to be internationally competitive and thereby generate foreign currency;
- to be good corporate citizens and contribute to the success of agriculture and associated industries.

For these reasons, the fertilizer industry welcomes the initiative taken at the First Ministers Conference in February of this year to "seek the active involvement of the private sector, business and labour, in federal/provincial discussions on specific development programs tailored to the particular requirements of each manufacturing sector".

The three major plant nutrients; nitrogen, phosphate and potash, are produced by the fertilizer industry in Canada. The industry is mainly Canadian controlled, has annual factory shipments of about \$1.3 billion, and employs more than 8,000 people in its operations.

The sales of fertilizer to the U.S. and offshore markets generate about \$0.8 billion in foreign currency annually. The industry is one of the few industrial sectors with a continuing positive balance of trade of significant proportions.

The fertilizer industry operates year round to produce the supplies needed for domestic and foreign sales. This involves storing large quantities, since about 50 per cent of the domestic shipments occur in the spring.

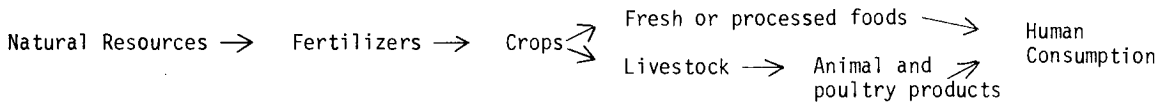
The geography of Canada divides the fertilizer industry into two groups, each with quite different problems. With the exception of potash to eastern Canada, no fertilizers are shipped between east and west because of the cost of transportation. The pattern of marketing from both regions is to the south, and to a lesser extent to offshore.

The raw materials for the fertilizer industry are:

<u>Fertilizer</u>	<u>Raw Materials</u>	<u>Source</u>
1. Nitrogen	Natural Gas	Western Canada
2. Phosphate	a) Rock phosphate b) Sulphuric acid	a) Imported b) Western sulphur or by-product acid
3. Potash	Potash	Saskatchewan

The fertilizer industry enables a substantial upgrading of Canadian natural resources as the benefits of fertilizer are multiplied through the food system. For example, Canadian natural gas, sulphur and potash are converted to finished fertilizers which, in turn, are upgraded to food for consumers through farm crops directly or further through livestock and poultry.

## Natural Resources to Food



Through these steps, the values of the raw materials are increased over 100 times. Also, about 10 per cent of the industry's output provides an essential input to other industrial applications, particularly mining, chemicals and wood products.

## OBJECTIVES

The objective of the Task Force has been to respond to requests from government for advice on how government policies and programs may be made or modified to help the Canadian fertilizer industry to be profitable and internationally competitive.

## ISSUES AND RECOMMENDATIONS

The following are major issues identified by the Task Force as affecting the fertilizer industry, together with recommendations to deal with each issue.

In the recommendations that follow it is not the intent of the Task Force to invite more government involvement in the fertilizer industry.

Also there are many things that the industry has to do by itself and recommendations for these items are not listed here.

### 1. Capital Costs, Taxation and Manpower

An important element of cost disadvantage the Canadian fertilizer industry faces in comparison with its major competition, the fertilizer industry in the United States, is that of capital costs. For example, it is estimated that capital costs of new ammonia plants are of the order of 20 per cent to 25 per cent higher in Canada. This, of course, adds to the continuing costs of the finished product.

The higher capital cost in Canada is partly due to climatic conditions. The colder weather requires equipment in Canada to be enclosed, buildings to have deeper foundations, and more insulation and heating equipment than those in the U.S. The balance is due to the relative skill in management of construction sites, salaries and wages, fringe benefits, work practices, productivity differentials, material cost differentials and higher interest costs.

The Task Force expressed concern over high taxation levels and unsettled jurisdictional responsibilities for potash which has discouraged investment by the private sector. The Task Force was also of the view that there is a need to adjust taxation to take account of the effect of inflation in replacement costs, provide equitable tax treatment for all producers and provide incentives to encourage personal investment.

The Task Force noted the high cost to governments of social benefits, such as those related to unemployment, which ultimately become a cost to the economy.

The Task Force therefore recommends:

#### A. Taxation

- (i) Government should ensure that higher costs which cannot be overcome by industry, such as those due to climate, will continue to be offset by tax arrangements now

in existence, e.g. accelerated depreciation, investment tax credits and lower corporate tax rates than now exist in the U.S.

- (ii) Governments, after consultation with the business community, should endeavour to adopt inflation accounting for the tax system in order to compensate for the difference between historical and replacement costs.
- (iii) Federal and provincial governments should provide stable tax policies and, particularly for the potash industry, should co-ordinate total taxation at a level which will enable the industry to retain sufficient profits to re-invest and expand.
- (iv) Money for expansion should be made available by not taxing corporate profits until they are passed on to shareholders.
- (v) Personal investment in industry should be encouraged by elimination of the capital gains tax.

#### B. Manpower

- (i) Governments should exercise restraint in establishing their wage and salary levels to ensure that they do not lead settlements in the private sector.

### 2. Raw Materials

There are two essential fertilizer raw materials for which the future costs and supply are of concern to the industry.

#### A. Phosphate Rock

There are no economic indigenous supplies in Canada. This country, therefore, has to import its requirements. Individual companies should continue to make their own arrangements for future supplies but there is increasing concern over moves by African producers of rock to form an international producers' cartel.

#### B. Natural Gas

Natural gas is the major component in the cost of producing ammonia, the building block of all nitrogen fertilizers. Less than three per cent of total Canadian natural gas production is used to make ammonia. However, it is critically important because it represents as much as 75 per cent of the total production cost for Canadian ammonia producers.

The value to Canada of further processing gas into fertilizers has been acknowledged but producers in eastern Canada have been faced with uncertain long-term supply, and prices for natural gas which are among the highest in North America. The U.S. gas pricing system has created a wide range of prices in that market. It is estimated that more than 75 per cent of ammonia manufactured in the United States uses gas at lower prices than those paid by manufacturers in eastern Canada.

Ammonia prices in North America are generally established in the Gulf Coast area where approximately one-third of all North American ammonia is produced. The area has low cost natural gas and is served by low cost transportation of ammonia by pipeline and barge.

It is contended that, to be more competitive, Canadian producers should not pay more for natural gas than the prevailing price in the Gulf Coast area. It is reliably reported that the difference in delivered cost of gas is more than 75 cents per thousand cubic feet or approximately \$27 per ton of ammonia higher in eastern Canada than on the Gulf Coast. For a 1,000 ton per day ammonia plant, this amounts to more than \$9 million per year.

The imposed increase in Canadian gas prices each year has resulted in an increased cost of about \$13 per ton of ammonia in each year since 1973 without similar increases to U.S. producers. These dramatic increases in cost have weakened the competitive strength of the industry and, coupled with aggressive world pricing, by other countries have made the industry's future uncertain.

If the current pricing policies are continued, no expansion will take place in Canada in the foreseeable future and eastern Canada will become a net importer vulnerable to the whims of the international market. Operating rates will be reduced to about 80 per cent and by the end of 1979, one or two smaller plants will have to be shut down because of the high cost of production.

To alleviate the problems related to raw materials, the Task Force recommends:

A. Phosphate Rock

- (i) That the federal government, through appropriate international discussions, oppose efforts to establish an international producers' cartel in phosphate rock.

8. Natural Gas

- (i) Governments should determine the prevailing price for gas paid by U.S. producers in the Gulf Coast area and ensure that Canadian ammonia producers can purchase natural gas at equivalent prices or less.
- (ii) Supply of gas when used as a raw material (rather than as a fuel) should be assured in all areas of Canada to the same extent that assurances have been given to ammonia producers in Alberta.
- (iii) In recognition of the critical importance of nitrogen in the production of food, governments should assign a high priority to the use of natural gas for the production of fertilizer.

3. Transportation

Each year the fertilizer industry encounters critical logistical problems, stemming from the seasonal nature of its sales. More than 50 per cent of its deliveries to the domestic market are concentrated in a period of 10 weeks, roughly coinciding with the farm planting season. Problems of moving several million tons of fertilizer in that time are exacerbated by the demands of the grain trade, which uses the same type of rail equipment. As a result, severe equipment supply shortages occur almost every season.

High transportation costs result from long hauls for large volume products, seasonal demand and specialized equipment for some fertilizers such as ammonia. In some cases, the cost component for freight in delivered fertilizers is more than the cost of the product at the producers' shipping point. These costs plus the cost of purchasing or leasing rolling stock to meet peak seasonal farm demand for fertilizers, place Canadian producers at a distinct disadvantage compared to their American competitors.

To enable the industry to deal more effectively with this issue, the Task Force recommends:

- (i) More effective legislative provisions for redress, or appeal by shippers, against unreasonable freight rates.
- (ii) Consultation between carriers, the industry and the government to establish a cost-related structure of rate making, which may be employed, along with market considerations, in negotiations between shippers and carriers, or appeals to the Canadian Transport Commission.

- (iii) Revision of regulations to permit government-owned railway cars to be used by the fertilizer industry during the peak fertilizer demand season as the needs of the grain trade allow.
- (iv) Provincial governments should adopt consistent and more liberal policies of granting operating authority to interprovincial truckers.

#### 4. Government Involvement

Proliferation of government regulations and agencies, jurisdictional uncertainties between Ottawa and the provinces, increasing involvement of governments in competition with industry; all have created a perceived instability in the operating and investment climate for the private sector of the fertilizer industry. The imposition of new regulations from time to time without consultation with industry and without a cost/benefit analysis adds to the cost of manufacturing and marketing fertilizer in Canada. In addition, the growing number of requests for information from all levels of government and the impact on the private sector of government hiring practices is of concern.

Demonstrated support for the private sector is essential for the long-term confidence of the industry.

Accordingly, the Task Force recommends:

- (i) Federal and provincial governments should develop principles which would guide their activities when competing directly with companies in the private sector of the fertilizer industry, and discuss these with them.
- (ii) Jurisdictional disputes between the federal and provincial governments should be resolved to avoid burdening the private sector of the fertilizer industry, e.g. environment, transportation and taxation.
- (iii) That the federal government program of providing social-economic impact studies on changes in safety, health and fairness regulations that have a major impact on the economy be adopted by all levels of government.
- (iv) In court cases arising from anti-combines charges, the government should assume at least the legal and court costs incurred by industry if industry is found not in contravention of the law.
- (v) Governments should seek means to consolidate and reduce the number of requests for information now made on industry.
- (vi) Government should exercise restraint in hiring for the public sector.

#### 5. Agricultural Policy

Use of fertilizer is greatly affected by the level of farm income and governments have a marked influence on the stability of farm income.

The Task Force therefore recommends:

- (i) Governments should continue to support and develop measures designed to promote farm income stability, higher productivity and growth.

#### 6. Marketing

The Task Force felt that marketing is the responsibility of the industry itself although it recognizes that there is government assistance available to expand exports.

Therefore, the Task Force recommends:

- (i) Free trade and unrestricted access to world markets should be maintained for all fertilizers.



- (ii) CIDA fertilizer aid should remain tied to fertilizers produced in Canada.
- (iii) CIDA should allow use of its funds to finance fertilizer educational programs.
- (iv) Procedures should be streamlined in order to provide greater protection in the event that "dumped" or subsidized fertilizer imports become a problem.

## 7. R&D

Optimum use of fertilizers for existing crops and development of new crop varieties that can be grown under Canadian climatic and soil conditions would increase the use of fertilizers. Also improving techniques for storing and processing fresh produce to enable growing more fruits and vegetables to replace imports would increase use.

To achieve this, the Task Force recommends:

- (i) The encouragement of research and development work by agriculture departments and others on fertilizer use by crops and work on new crop varieties that will be suitable for Canadian conditions.
- (ii) Continued work by agriculture departments to develop means of improving storage and processing of fresh produce in order to replace imports.

## IMPACT

In the opinion of the Task Force, implementation of the recommendations contained in this report would help to overcome some of the problems of the fertilizer industry and would have a salutary impact on several other important sectors of the Canadian economy. See Chart I.

### (i) The Consumer

- would continue to have assured supplies of nutritious food from Canadian farms;
- would continue to benefit from lower unit costs of farm production.

### (ii) The Farmer

- would have an assured domestic supply of fertilizer;
- would be better protected against the historical swings in world fertilizer prices;
- would be better able to compete in agricultural export markets.

### (iii) The Fertilizer Industry

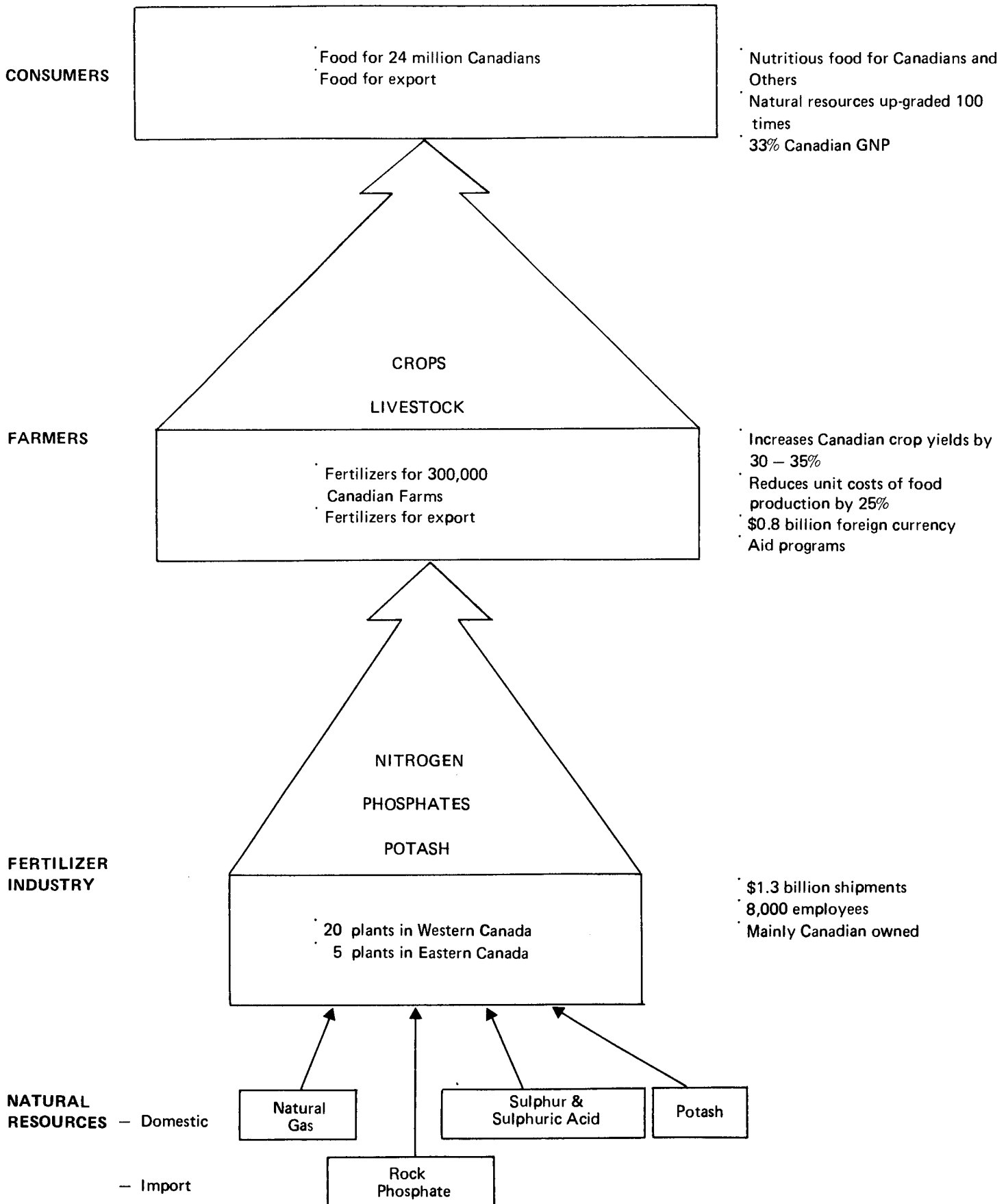
- would defer shutdown of ammonia plants, particularly in eastern Canada;
- in western Canada, would be able to maintain and/or increase the substantial export revenue it now produces;
- would enjoy an improved investment climate and would construct plants to meet domestic growth and expand the industry's traditional export markets;
- would continue to grow as a major employer of highly skilled technicians and professionals;
- would enable the continuing upgrading in value of Canadian natural gas, potash and sulphur through the food chain.

### (iv) Canadian Aid Programs

- could continue their use of Canadian fertilizer as one method of meeting international commitments of aid for developing countries.

# FERTILIZERS AND THE FOOD CHAIN

CHART I



**SECTOR PROFILE**

# **THE CANADIAN FERTILIZER INDUSTRY**

The following profile of the Canadian Fertilizer Industry was developed by the Sector Task Force on the Canadian Fertilizer Industry from a profile prepared by the federal Department of Industry, Trade and Commerce.

# **THE CANADIAN FERTILIZER INDUSTRY**

## **DEFINITION OF THE INDUSTRY**

The fertilizer industry includes production of the three essential plant nutrients — nitrogen, phosphorus and potassium — in the form of fertilizer materials such as ammonium nitrate, urea, ammonium phosphates and potash, as well as blends of these which are sold as mixed fertilizers.

## **STRUCTURE OF THE INDUSTRY**

Sixteen companies operate 25 manufacturing establishments in Canada with factory shipments of more than \$1 billion. Some companies manufacture fertilizers to consume the sulphuric acid produced as a byproduct from their major business of mining and smelting. (Sulphuric acid is required in the production of phosphate fertilizer.) Mining expertise provided the technical background for three of the companies producing potash. Three industrial chemical companies are active in the fertilizer business, and farmers' co-operatives also play a significant role.

A breakdown of basic producers showing plant location, products, company name and ownership, is shown in Appendix 1.

About 450 retail outlets are operated by fertilizer bulk blenders. They provide storage capacity close to the farmer, and the ability to create special blends as required. The blending industry is generally owned or controlled by basic fertilizer producers. However, the co-operatives are playing an increasingly important role and now account for about 30 per cent of domestic fertilizer distribution.

Employment in the sector is estimated at 8,200 of which 4,800 employees are located in the Prairie Provinces and 2,400 in Ontario.

## **KEY RAW MATERIALS**

Ammonia is the sole source of supply for nitrogen in fertilizers, and natural gas is the key raw material in the manufacture of ammonia. Approximately 100 billion cubic feet or four per cent of Canada's forecast natural gas production is required for ammonia production.

Phosphate rock is the source of phosphorus for the phosphate fertilizer industry. Canada has no phosphate mining operations and most of its phosphate rock is imported from Florida; the balance is supplied from the western United States. Phosphate rock is available from African sources, principally

Morocco. Historically, however, Moroccan phosphate has not been competitive in North America. Five of eight Canadian phosphate fertilizer producers have an equity position in U.S. phosphate reserves.

Sulphuric acid produced either from byproducts of the smelting of base metal ores or from natural gas byproducts is used in the conversion of phosphate rock to phosphate fertilizers. The availability of low-cost sulphuric acid has helped to offset the cost disadvantage that Canadian phosphate producers face in not having a domestic source of phosphate rock.

Potash occurs naturally in various forms in many parts of the world. The major producers of the world are the U.S.S.R., Canada, East Germany, West Germany and the U.S. (respectively, 6.5, 6.1, 2.9, 2.6 and 2.3 million\* tons annually). Saskatchewan is the source of all Canadian potash production. The quality and quantity of Saskatchewan deposits are excellent in comparison with deposits in most other countries. Potash deposits in New Brunswick are in the early stages of development.

## **CHARACTERISTICS OF THE INDUSTRY**

### **Profitability and Return on Investment**

Because the fertilizer industry is not a statistical entity, and as most of the producers are involved in other businesses, detailed information on the industry's profit levels is not available. However, the Canadian Fertilizer Institute estimates the combined nitrogen and phosphate segments of the industry were in a trading loss position (i.e. net loss before corporate tax and interest charges) for several years before 1972. Prices and demand firmed from 1973 to 1975 and a trading profit was achieved during this period. Figures are not available for 1976 and 1977, but overcapacity in phosphates existed in North America and there has been a substantial weakening in prices for both nitrogen and phosphate fertilizers.

### **International Competitive Position**

#### **Nitrogen**

The competitive position of the nitrogen fertilizer industry is based largely on the economics of ammonia production. The major factors influencing ammonia economics are the cost of natural gas, the capital cost of ammonia plants, and the distance to markets. The capital cost of new ammonia plants is higher in Canada than in the United States.

Ammonia production is basically a petrochemical process and the average difference in capital cost between Canadian and U.S. plants is approximately the same as for petrochemical plants, that is 20-25 per cent higher in Canada. Despite the higher capital costs in Canada, there has been a major impetus to expand ammonia capacity in western Canada because of expanding U.S. markets and the availability of natural gas in Alberta. In the U.S., Canada's major fertilizer export market, natural gas is in short supply and ammonia producers (particularly in the northern and mid-west states) are not expected to be able to obtain adequate supplies of natural gas to meet the anticipated long-term growth in the U.S. market. Thus, in spite of the fact that U.S. natural gas prices are controlled at a lower level than Canadian gas prices, it is anticipated that, in the near term, Canadian ammonia produced in existing plants and those just completed will remain competitive in the U.S. north and midwest but with cyclical periods of oversupply that will lead to under utilization of capacity and low profit levels.

A number of new ammonia plants are being built in regions of the world where natural gas is in surplus supply, which could mean low production costs. However, the cost of transportation will insulate the Canadian producers in the interior domestic and U.S. markets to a certain extent.

#### **Phosphorus**

Since Canadian phosphate fertilizer manufacturers are dependent on imports of phosphate rock, primarily from Florida, they are at a competitive disadvantage in U.S. markets with Florida producers.

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\* Expressed as tons of  $K_2O$  (1 ton of potash = 0.6 tons  $K_2O$ ).

Canadian producers have been able to offset this disadvantage somewhat because of the local availability of lower cost byproduct sulphuric acid used in the phosphate process. With the recent escalation in capital costs most existing producers should be able to remain competitive with new U.S. plants over the longer term, notwithstanding the fact that at present certain Canadian phosphate plants are shut down for varying lengths of time because of a depressed market and large imports. Capacity in Canada is now adequate to supply domestic markets through 1985 and expansion does not appear attractive to Canadian producers, except under special circumstances.

### Potassium

The high quality of Saskatchewan potash puts Canadian producers in a position to be competitive in the domestic U.S. markets as well as most offshore markets.

### Investment and Capacity Utilization

Since CIL brought its new ammonia and phosphate plant on stream near Sarnia, Ontario, in 1967 and Esso Chemical installed similar facilities in Redwater, Alberta, in 1969 there was no major expansion of that part of the industry until the recent round of investment in Alberta. Four new ammonia plants have been approved by the Alberta government of which three have been built and are in operation. Eastern companies evaluated new expansions in 1975 but were not able to receive assurances of natural gas supplies and no major investment has been made. The market in eastern Canada is approaching the point where additional capacity will be required but no specific plans have been announced.

The potash industry investment in mining capacity and concentrators in Saskatchewan began in 1960. Approximately \$1 billion has been invested. No significant investment has been made in new capacity since 1970 when the last mine was opened, although the Potash Corporation of Saskatchewan is increasing capacity of some of the mines it has acquired.

Major development of the phosphate industry occurred in the 1950s and 1960s.

TABLE I  
(in per cent)

	Capacity Utilization <sup>1</sup>		
	Ammonia	Phosphate	Potash <sup>2</sup>
1960	54	60	N.A.
1965	73	59	71
1970	80	-	-
1974	-	-	68
1975	95	65	75
1976	92 est.	57 est.	71 est.

<sup>1</sup>Compiled by Chemicals Branch, Industry, Trade and Commerce.

<sup>2</sup>Based on nameplate capacity.

Table I clearly illustrates the high level of overcapacity that existed in the industry during the 1960s.

### Increased Value of Processing

The value of ammonia is approximately three times the value of natural gas consumed in its production. The value of nitrogen fertilizer, such as ammonia nitrate, is approximately twice the value of the ammonia converted. In addition, the application of fertilizer results in a considerable increase in crop yields. The increase in yield varies from location to location and crop to crop but, as an example, the application of fertilizer valued at \$5.00 per acre should result in an increase in yield of approximately seven bushels per acre above that of unfertilized land. If wheat is valued at \$3 a bushel an additional \$21 worth of wheat would be produced.

## INTERNATIONAL TRADE

Fertilizer and fertilizer materials are imported free of duty into Canada and the United States. The U.S. is Canada's major export market for all fertilizers; relatively insignificant amounts of nitrogen and phosphate fertilizers are sold offshore. Two-thirds of Canadian potash exports are sold in the U.S., the remainder is shipped principally to Asia, Latin America, Australia and New Zealand.

Canada had a fertilizer trade surplus of approximately \$500 million in 1976. Further trade information is available in Table II.

TABLE II  
SALES AND TRADE IN FERTILIZER AND FERTILIZER CHEMICALS\*

	1965	1970	1975	1980	1985
	Million Current Dollars			Million 1975 Dollars	
<i>Nitrogen and Phosphate Fertilizer Chemicals and Mixed Fertilizers</i>					
Shipments	221	347	731	1076	1270
Exports	62	120	187	300	300
Imports	16	13	44	64	80
Consumption	175	240	588	840	1050
<i>Potash</i>					
Shipments	56	130	411	457	559
Exports	51	121	393	443	543
Imports	4	4	4	8	8
Consumption	9	13	22	22	24
<i>Total</i>					
Shipments	277	477	1144	1533	1829
Exports	113	241	580	743	843
Imports	20	17	48	72	88
Consumption	184	253	612	862	1074

\* These data include shipments of fertilizer chemicals to non-fertilizer markets. In 1975, the estimated value of these shipments was \$95 million. The forecast value of non-fertilizer shipments in 1980 is \$120 million and in 1985, \$160 million.

Source: Industry, Trade and Commerce, Chemicals Branch estimates. Potential New Brunswick fertilizer project not included.

## TRANSPORTATION

Fertilizer materials have a relatively low unit value. As a result, transportation and distribution costs generally average about 30 per cent of the cost of fertilizer to the farmer. Because of this, nitrogen and phosphate fertilizer shipments historically have moved from western Canada to the U.S., rather than to eastern Canada. The development of bulk loading and unloading systems and the adoption of unit trains — particularly for export shipments of potash but also for transportation of sulphur and sulphuric acid — has reduced transportation costs.

It should also be noted that the consumption of fertilizers is highly seasonal with most deliveries made during a three to four month period in late winter and early spring. This places a strain on transportation facilities and creates bottlenecks in the distribution of fertilizers to farmers.

## TECHNOLOGY

Substantial increases in the active ingredient content of fertilizers have been achieved over the past 20 years and the content now reaches 50 to 60 per cent compared with 20 to 30 per cent formerly. These levels have been realized by such means as substituting urea (45 per cent active ingredient) and ammonium phosphate (65 per cent active ingredient) for the previously used ammonium sulphate (21 per cent) and superphosphate fertilizers (21 per cent). More development work can be anticipated to



further increase the active ingredient content of fertilizers in order to reduce transportation and application costs.

Research and development into new fertilizer products and processes is not, to all intents and purposes, being carried out in Canada today. Most companies regard fertilizers as a commodity business with the results of product research impossible to protect, and with the manufacturing plant nearest the customer ultimately taking the business. Much the same situation exists in the U.S. The Tennessee Valley Authority has become the leader in fertilizer research and development and offers its results freely to industry, including the Canadian industry.

## **HISTORICAL AND FORECAST FUTURE PERFORMANCE**

Forecasts of future Canadian consumption of fertilizer have been made with the assistance of Agriculture Canada. In making these forecasts, it was assumed that farm economics would continue to favour fertilizer use, that there would be no significant change in cropping patterns over the next ten years, and that an additional 13 million acres (27 per cent) will be cropped by 1985. Half of this addition would be land formerly left in summer fallow. The most significant variables in forecasting future fertilizer use are crop acreage, time, fertilizer price and farm cash receipts. It should be stressed that there have been wide swings in annual fertilizer consumption over the past ten years, particularly in western Canada, with sharp reductions in fertilizer application following a decline in farm cash receipts. Therefore, variations of 15 per cent or more are possible in a given year.

Canadian demand for nitrogen fertilizers is expected to double from 1975's 560,000 tons to 1,100,000 tons in 1985. Three new world scale ammonia plants are now on stream in Alberta and will provide 1,200,000 tons ammonia capacity (920,000 tons nitrogen).

U.S. demand for nitrogen fertilizers and industrial ammonia is forecast to increase at rates of from 3.5 to 7 per cent per year from a 1975 level of 15 million tons a year. Existing and planned U.S. ammonia capacity, plus the three new Alberta plants, appear to be more than adequate to meet U.S. demand. However, natural gas shortages have curtailed U.S. ammonia production during the past two winters with the loss of up to one million tons of ammonia production each year, roughly equivalent to the annual capacity of two world scale ammonia plants.

Phosphate fertilizer consumption in Canada is forecast to increase by 5 per cent per year through 1985. Even with no Canadian expansion, capacity is adequate to supply Canadian requirements in this time period with a surplus available for export. The U.S. market is expected to grow at a rate of 5 per cent per year.

Domestic demand for potash will increase by approximately 2.5 per cent per year and will continue to represent a very small proportion (approximately 6 per cent) of the value of Canadian shipments.

World potash consumption has been forecast by various authorities to grow at rates of from 3 to 6.2 per cent per year. The latter figure is based on an FAO/UNIDO/World Bank forecast. The former is a Canadian Potash Producers Association forecast. According to the FAO/UNIDO/World Bank forecast, world potash consumption will increase from approximately 21 million metric tons in the 1975/76 fertilizer year to 27 million tons in 1979/80. Canadian producers supply about 25 per cent of world potash demand and if this share of the total world market is maintained an increase of 1.5 million tons could be expected over the four-year period to 1980.

## **CONSTRAINTS AND OPPORTUNITIES**

### **Nitrogen**

Western Canadian fertilizer producers have taken investment decisions to capitalize on the apparent opportunity presented by growth in the U.S. and Canadian nitrogen fertilizer markets and the developing shortage of natural gas in the U.S. As mentioned previously, three new ammonia plants and associated derivative plants are operating in Alberta.

Although the threat of a Canadian natural gas shortage has abated somewhat since 1974, there may be a need to phase out natural gas exports in the future. Natural gas exports are controlled by the National Energy Board and no major new exports have been authorized since 1971. Under these

circumstances, concern had been expressed that if there was not orderly growth in ammonia capacity, a major increase in the export of natural gas could occur in the form of the natural gas derivative ammonia. Through consultation with provincial governments and the industry, the department is pursuing the objective of orderly growth of ammonia capacity within the limits of Canada's energy policy.

### **Potash**

Assuming a 5 per cent market growth after 1979/80, the Canadian market share at 25 per cent would grow to more than nine million metric tons by 1985/86, an increase of about four million tons, worth more than \$300 million per year over 1975/76 levels. This would require the expansion of most existing mines in Saskatchewan. Thus far expansion plans have been announced by the Potash Corporation of Saskatchewan.

According to the industry, there is a need for the federal and provincial governments to ensure that the combined level of government taxation enables the industry to retain sufficient profits to re-invest and expand.

One company has announced plans to produce potash in the Sussex area of New Brunswick and another company is evaluating promising deposits nearby. Production is expected to begin in 1982. If the plans are realized, this will improve the competitive position of Canadian potash in eastern U.S. and South American markets.

### **Phosphates**

The major constraint facing the phosphate fertilizer industry is the lack of domestic phosphate rock. Notwithstanding the fact that three phosphate plants are shut down at present due to market softness and competition from imported materials, existing Canadian plants are largely written-off and it appears that the Canadian industry will be able to supply Canadian requirements from existing capacity through 1985. However, except under special circumstances, it is doubtful that Canadian phosphate capacity will be expanded during this period.

With commercial potash mining developing near Sussex, New Brunswick, the export of potash along the eastern seaboard might provide an opportunity for a back-haul of phosphate rock from Florida. It is possible that an integrated New Brunswick fertilizer complex with freight savings available on phosphate rock and with the availability by byproduct sulphuric acid might be internationally competitive.

## PRIMARY FERTILIZER PRODUCERS

<i>Producers</i>	<i>Plant Location</i>	<i>Products</i>	<i>Ownership Control</i>
APM Operators Ltd.	Saskatchewan	K	Canada (60% Potash Corporation of Saskatchewan) (40% Texasgulf Inc.)
✓ Belledune Fertilizer Division of Canada Wire and Cable	New Brunswick	N*P	Canada (Noranda Mines Limited)
✓ Canadian Fertilizers Limited	Alberta	N	Canada 51% (western Co-operative Fertilizers Limited, United Co-operatives of Ontario; Coopérative Fédérée de Quebec U.S. 49% (C.F. Industries) Britain (I.C.I.)
✓ Canadian Industries Limited	Ontario	N,P	
	Alberta	N*	
Central Canada Potash Co. Limited	Saskatchewan	K	Canada 51% (Noranda Mines Ltd.) U.S. 49% (C.F. Industries)
✓ Cominco Ltd.	B.C. (Trail)	N,P	Canada (Canadian Pacific Investments Limited)
	B.C. (Kimberly)	P	
	Alberta (Calgary)	N	
	Alberta (Carseland)	N	
	Saskatchewan	K	
✓ Cyanamid of Canada Limited	Ontario	N	U.S. (American Cyanamid Company)
✓ Esso Chemical Canada Division of Imperial Oil Limited	Alberta	N,P	U.S. (Exxon Corporation)
✓ Genstar Chemical Limited	Ontario	N	Canada (Genstar Limited)
✓ International Minerals and Chemical Corporation (Canada) Limited	Saskatchewan	K, K	U.S. (International Minerals and Chemical Corporation)
	Ontario	P	
✓ Kalium Chemicals A Division of PPG Industries Canada Ltd.	Saskatchewan	K	U.S. (PPG Industries Inc.)
Potash Company of America Division of Ideal Basic Industries Inc.	Saskatchewan	K	U.S. (Ideal Basic Industries Inc.)
Potash Corporation of Saskatchewan	Saskatchewan (Cory)	K	Canada (Potash Corporation of Saskatchewan)
	" (Rocanville)	K	
	" (Lanigan)	K	
✓ Sherritt-Gordon Mines Limited	Alberta	N,P	U.S. (Newmont Mining Corporation)
✓ Simplot Chemical Company Limited	Manitoba	N,P	U.S. (J. R. Simplot Co.)
✓ Western Co-operative Fertilizers Limited	Alberta (Calgary)	N,P	Canada (Alberta Wheat Pool, Federated Co-operatives Ltd., Manitoba Pool Elevators, Saskatchewan Wheat Pool)
	" (Medicine Hat)	N,P	

N — Ammonia and derivatives of ammonia

N\* — Derivatives of ammonia only, i.e., ammonia not manufactured

P — Phosphate products

K — Potash

Source: Chemicals Branch, Industry, Trade and Commerce

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